



DETECTION OF FINANCIAL STATEMENTS MANIPULATION USING THE BENEISH M-SCORE: THE CASE OF COMPANIES RECENTLY CHARGED BY SEC.

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Abstract:

The Beneish M-score model is a useful tool for identifying the potentially fraudulent behaviour of a company that could lead to misstated financial data. This paper uses the detective model to determine if and when warning signs of manipulation were identifiable before the companies were officially charged with fraud by U.S. SEC. Data used in the analysis are the 10-K reports from the U.S. SEC Edgar database. The study analyses two companies involved in financial scandals in 2021 and shows that the model can be used to catch manipulative actions in advance under the condition that other factors should be considered. To further deepen the analysis of the model's mechanisms, the paper recommends concentrating on fewer fraudulent cases and entering into details for each business.

Keywords: *Earnings manipulation, Beneish M-score model, Financial ratios, Fraudulent reporting*

JEL: *G30, G32*

1. Introduction

One of the central issues of the accounting research is the extent to which companies' managers manipulate the earnings in their favor. (Beneish, 2001). In the last decades, the world economy has seen a lot of fraud cases, financial statement manipulations, and other violations of the corporate ethics. We can mention world-famous fraud scandals like Enron, Xerox, WorldCom, Tyco International, HealthSouth, Freddie Mac, AIG Lehman Brothers, Bernard L. Madoff Investment Securities and others appearing all the time which increases concerns in investors about fraudulent financial reporting.

The purpose of this paper is to examine the ability of the Beneish M-score to reveal the manipulation of the financial statements data of companies who were recently officially charged by SEC. The objective of the elaborated assessment is to observe whether the model based on a few financial ratios is able to indicate and signal possible manipulations of financial data. By analysing the officially reported financial measures, the paper attempts to indicate the companies' fraudulent actions at different points of time, before and after the officially revealed manipulations. The research allows us to observe whether some warning financial distress signs appeared before the manipulations were reported and the companies charged by SEC.

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The first question that this research aims to answer is whether and under what conditions the Beneish M-score successfully reveals manipulation by using data for which fraud is already proven. The second question answered is whether after restatement of fraudulent data and after how many periods Beneish M-score is showing absence of manipulations.

In order to achieve the purpose of this paper, we use the Beneish M-score model with 8 variables for different periods for each of the analysed companies – Kraft Heinz Co. and Pareteum Corporation.

The paper is structured as follows: first we perform a literature review, followed by the methodology of this research and the empirical analysis using the detection model of Beneish. To further deepen and ameliorate the analysis some limitations are examined and recommendations are given. The paper ends with conclusion and references.

2. Literature review

The agency theory provided by Jensen and Meckling in 1976 explains the motivations behind the management of earnings (Jensen & Meckling, 1976). Sometimes in order to achieve higher return on equity the management utilizes the flexibility of the accounting rules or directly violates them. (Curtis & Thalassinou, 2005). In 1999 Messod D. Beneish created the M-score model which represents a quick and easy approach to reveal and measure the probability of earnings manipulation (Salas Najera, 2021). His research is thought-about as one of the fundamental fraud detection models. Beneish's M-Score results showed an accuracy of 76% in identifying manipulators, while only 17.5% of the non-manipulators were incorrectly identified (Beneish, 1999).

In one of his further papers “The Predictable Cost of Earnings Manipulation” in 2007 M.D. Beneish used the M-Score as a stock selection technique for the period from 1993 to 2003. A hedged return of nearly 14% per annum was generated using this strategy (Beneish and Nichols, 2007). Another of his papers named Identifying Overvalued Equity revealed that an overvaluation score (O-Score) can successfully identify companies with abnormal price declines of average 27% by combining proxies for manipulated operating activities, overstated earnings, merger activity and stock issuance (Beneish and Nichols, 2009). M.D. Beneish described the manipulation of earnings as the violation of the Generally Accepted Accounting Principles by the management in order to present better financial performance (Beneish, 1999).

In general, the treatment flexibility in the accounting standards is created to give the accountants the necessary instruments to adapt to the constantly changing circumstances. However, this flexibility in accounting is more often exploited to manipulate financial data for personal economic interest. Arthur Levitt, former Chairman of the U.S. Securities and Exchange Commission outlined the importance of this accounting flexibility in his speech in 1998. Clearly, the accountants need the flexibility to keep up with the innovations in business as it is impossible to predict all new transactions or business structures and include them in the principles (Levitt, 1998).

The earnings manipulation practices should be revealed as otherwise they may lead to rising bad reputation for the whole industry. The frauds in the financial reporting can ruin the image and brand of many companies and even cause business collapse (Mollah and Sakib, 2020)



M.D. Beneish identified the warning signs that indicate the manipulation of earnings and his evidence showed that the probability of fraud rises with the following: growth of sales, drop in gross margins, increase of receivables, decrease of asset quality and increase of accruals (Beneish, 1999).

2.1. Beneish Predictive Financial Ratios

The financial ratios used in the M-score model were five when Professor M.D. Beneish first tested them in 1997 and after the restructuring and enhancement of the model in 1999 their number was increased to a total of eight.

All eight predictive ratios in the model are constructed from the data available in the companies' financial statements and help together to describe the extent to which the accounting financial data might have been altered. The M-score used alone can reveal the financial data manipulation done by any corporation in favour of profit enhancement. Despite the fact that the Beneish M-score resembles in multiple ways the Altman Z-score, it keeps the focus on the prediction and detection of possible manipulation or creative accounting practices, whereas the Z-score's focus is on the bankruptcy prediction (Mahama, 2015).

The eight ratios included in the model capture either financial statement distortions resulting from earnings manipulation - Days Sales in Receivables Index, Asset Quality Index, Depreciation Index and Total Accrual to Total Assets Index, or indicate a predisposition to engage in earnings manipulation - Gross Margin Index, Sales Growth Index, Sales General and Administrative Expenses Index, Leverage Index (Beneish and Nichols, 2007).

Days Sales in Receivables Index (DSRI). This ratio presented in Equation (1) below measures the number of days required between the date of the credit sales and the date when the cash is collected from the customers in the first year when the earnings manipulation is revealed (year t) to the corresponding measure in the previous year $t-1$. This variable indicates whether receivables and revenues are balanced or not in two consecutive years. According to the model, a large increase in sales may be the result of a change in the credit policy to incite sales but when combined with unusual increases in receivables, it increases the likelihood that the reported earnings and revenue have been overvalued (Beneish, 1999).

$$\text{Days' Sales in Receivables Index (DSRI)} = \frac{\frac{\text{Accounts Receivables, net}_t}{\text{Sales}_t}}{\frac{\text{Accounts Receivables, net}_{t-1}}{\text{Sales}_{t-1}}} \quad (1)$$

Gross Margin Index (GMI). This ratio in Equation (2) compares the gross profit (sales minus cost of goods sold) to sales revenue in year $t-1$ and the gross profit to sales revenue in year t . When the result is greater than 1, it means that the gross margins have declined. Consequently, such an evolution has a negative effect on the going concern which may tempt the management to engage in manipulation in order to meet the investor's expectations in terms of investment return (Spătăcean, 2019). Beneish suggests that increased gross margins may be result of inventories' manipulation and other production costs. The inventor of the M-score also states that either increased or decreased gross margins can boost the risk of manipulation, but in his model he only included a variable reflecting the relation between gross margin changes and inventory changes but it did not enhance this specification (Beneish, 1999).



$$\text{Gross Margin Index (GMI)} = \frac{\frac{\text{Sales}_t - \text{Cost of Goods Sold (COGS)}_{t-1}}{\text{Sales}_{t-1}}}{\frac{\text{Sales}_{t-1} - \text{Cost of Goods Sold (COGS)}_t}{\text{Sales}_t}} \quad (2)$$

Asset Quality Index (AQI). Asset Quality Index in Equation (3) is the ratio of non-current assets other than property, plant and equipment (PPE) divided by total assets of year t versus the previous year (t-1). The index measures for what portion of the total assets the future benefits are not that certain. If Asset Quality Index is greater than 1, it indicates that the company is using cost deferral to show better performance and low cost. Thus, M.D. Beneish expects that an increase in the risk of asset realization indicates an increased inclination to cost capitalization. However, there is a possibility that the increase is partially due to acquisitions which involve goodwill (Beneish, 1999).

$$\text{Asset Quality Index (AQI)} = \frac{\frac{\text{Other Long Term Assets}_t}{\text{Total Assets}_t}}{\frac{\text{Other Long Term Assets}_{t-1}}{\text{Total Assets}_{t-1}}} \quad (3)$$

Sales Growth Index (SGI). This is the ratio of sales in year t compared to sales in year t-1, presented in Equation (4). The increase of this variable does not necessarily imply the existence of a manipulation, but the companies that report significant increases are examined with more caution as the managers are pressed to achieve earnings targets. If companies experience significant stock price drop at the first signs of a slowdown, they may be more motivated to use manipulation and eliminate the impression of growth decelerating, which costs a lot to them (Beneish, 1999).

$$\text{Sales Growth Index (SGI)} = \frac{\text{Sales}_t}{\text{Sales}_{t-1}} \quad (4)$$

Depreciation Index (DEPI). Equation (5) presents the ratio of the rate of depreciation in year t-1 compared to the corresponding rate in year t. The depreciation rate in a given year is equal to the depreciation divided by the sum of depreciation and property, plant and equipment (PPE). A result greater than 1 indicates that the depreciation rate of assets has slowed down which may signal that the reporting entity explores new methods of improving income and financial performance by increasing the estimates of assets' useful lives. To analyse the possibility of companies using lower depreciation rates to manipulate financial results, M.D. Beneish tested the model using the depreciation rate instead of changes in the depreciation rate, which did not lead to enhancement of the model's specification or alterations (Beneish, 1999).

$$\text{Depreciation Index (DEPI)} = \frac{\frac{\text{Depreciation}_{t-1}}{(\text{Property, Plant \& Equipment}_{t-1} + \text{Depreciation}_{t-1})}}{\frac{\text{Depreciation}_t}{(\text{Property, Plant \& Equipment}_t + \text{Depreciation}_t)}} \quad (5)$$

Sales General and Administrative Expenses Index (SGAI). This index in Equation (6) is calculated as the ratio of sales, general and administrative (SGA) expenses to sales in year t relative to the corresponding ratio in year t-1. An irregular increase of these expenses compared to the change in sales is a warning signal for the future financial perspectives of the reporting entity (Beneish, 1999). This disproportion may also reveal the transfers of resources under the form of external benefits (Spătăcean, 2019).



$$\text{Sales, General and Administrative expenses Index (SGAI)} = \frac{\frac{SGA \text{ Expenses}_t}{Sales_t}}{\frac{SGA \text{ Expenses}_{t-1}}{Sales_{t-1}}} \quad (6)$$

Leverage Index (LVGI). Equation (7) is the ratio of total debt (current liabilities plus total long-term debt) to total assets in year t relative to the corresponding measure in year t-1. A Leverage Index result greater than 1 signals an increase in leverage which is also a negative signal for the firm's ability to continue operations under normal business conditions. M.D. Beneish included this variable to the model with the intention to capture the earnings manipulation incentives driven by the debt covenants (Beneish, 1999).

$$\text{Leverage Index (LVGI)} = \frac{\frac{Current \ Liabilities_t + Total \ Long \ Term \ Debt_t}{Total \ Assets_t}}{\frac{Current \ Liabilities_{t-1} + Total \ Long \ Term \ Debt_{t-1}}{Total \ Assets_{t-1}}} \quad (7)$$

Total Accruals to Total Assets (TATA). The indicator in Equation (8) is calculated as the difference between income from continuing operating and cash flow from operations, divided by total assets. This ratio reveals the extent to which managers manipulate earnings by using discretionary accounting options (Spătăcean, 2019).

An important remark to Equation (8) is that if the company does not specify a net income category for the income from continuing operations or prepare a multistep income statement report, net income can be used instead. Therefore, the total sum of accrual differences is determined as the difference between net profit and cash flows from operating activities - based on the findings of the cash flow statement (Hořda, 2020).

TATA is taken as a proxy for the extent to which cash represents reported earnings and higher positive accruals (less cash) are expected to be associated with a higher probability of earnings manipulation (Beneish, 1999).

$$\begin{aligned} & \text{Total Accruals to Total Assets (TATA)} \\ & = \frac{Income \ from \ Continuing \ Operations_t - Cash \ Flow \ from \ Operations_t}{Total \ Assets_t} \end{aligned} \quad (8)$$

2.2. Beneish M-score model

All variables in this formula are the indicators described previously and the Beneish M-score model is presented mathematically as follows:

$$\begin{aligned} M \ score = & -4.84 + 0.92 \times DSRI + 0.528 \times GMI + 0.404 \times AQI + 0.892 \times SGI + 0.115 \\ & \times DEPI - 0.172 \times SGAI + 4.679 \times TATA - 0.327 \times LVGI \end{aligned} \quad (9)$$

When the model was first created by M.D. Beneish in 1999 the limit was set at -2.22. This means that when applying the model, a result greater than -2.22 (i.e., less of a negative) is an indication that the financial statements may have been altered with fraudulent intentions (Beneish, 1999). In 2004 the model was tested again by using a sample of 120 "manipulator" companies and 67 366 "non-manipulator" companies for the period from 1986 to 2001 and as a result of the new calculations, the level was moved to -1.99. (Hořda, 2020). Finally, in 2012,



M.D. Beneish established the value of -1.78 as the M-score threshold for manipulation of financial statements (Beneish, Lee and Nichols, 2012)

Although, Beneish M-Score method can be used to detect companies with certain probability to commit fraud on their financial statements, not all of the companies which exceed the given threshold, are charged for being manipulators. (Pustylnick, Temchenko and Gubarkov, 2017) Empirically, companies that have higher M-score also have higher tendency to commit fraud. Beneish M-score is a probabilistic model, so that one of the limitations is that the ability to detect fraud is not with 100% accuracy.

3. Methodology

3.1. Approach

In the literature there exist a lot of probabilistic and statistical analyses of the predictive efficiency of Beneish M-Score model with multiple companies. In this research we mainly analyse and comment on two companies which were charged with fraud by SEC in 2021 in order to observe at what point and if the manipulation of financial data was predictable and if after the restatement Beneish M-scores shows that the manipulation was removed.

Selected financial indicators are be taken from the companies' financial statements and used to calculate the eight financial ratios necessary for the M-score model. This action is performed consecutively for each of the analysed periods followed by the calculation of the M-score using the eight-variable version of the formula. These calculations aim to observe how the M-score results change through years and after restatement of financial statements.

3.2. Data and collection method

All the required data is collected from secondary source. The data used for the calculations in this paper is collected from the official 10-K annual reports of the companies from the U.S. SEC database. The analysed period for each company is between five and seven fiscal years, depending on the data availability and the companies' fraud reporting period.

4. Empirical analysis

4.1. Pareteum Corporation

Pareteum is New York-based telecommunications company which is a global provider of Communications Platform-as-a-Service solutions. This includes a platform that connects devices around the world. The company operates in North America, Latin America, Europe, Middle East and Africa, and Asia-Pacific regions (Pareteum.com, 2022)

On September 2nd, 2021 the company was charged by Securities and Exchange Commission with fraud and other violations coming from multiple filings that contained inaccurate financial statements and disclosures (Sec.gov, 2021). SEC's official order states that from January 2018 through June 2019, Pareteum manipulated its revenue. It was overstated by performing revenue recognition based on non-binding purchase orders before the actual shipment of product. In addition, another finding in the order is that once questioned about the large increase in its



accounts receivable, Pareteum manipulated the third-party confirmation process and hence provided false information to its auditor (Sec.gov, 2021).

The Pareteum Corporation neither admitted nor denied SEC's findings. The company consented to the SEC order finding that Pareteum violated multiple rules and provisions. As per the order's requirements, Pareteum had to pay a \$500,000 penalty. Fortunately, company's cooperation in the process of the investigation and its corrective actions was acknowledged by SEC's order.

On December 14, 2020, Pareteum restated its financial statements for the financial year 2018 and the first half of 2019. Some of the amendments are the reduction of the 2018 revenue from \$32.4 million to \$20.3 million and the increase of the net loss from \$12.9 million to \$18.0 million (Sec.gov, 2021).

The analysis of Pareteum Corporation by the M-score method invented by Beneish M.D starts from 2016 before the revealed fraudulent actions. In order to calculate the M-score for 2016, the data used in this research is for the financial years ending on December 31st, 2015 and December 31st, 2016.

Table 1. Selected data from financial statements of Pareteum Corporation

In thousands, USD	2015	2016	2017	2018	2018 (restated)	2019
Sales revenue	31 015	12 856	13 548	32 436	20 258	62 049
COGS	5 926	3 659	3 684	10 330	10 054	47 134
Accounts receivables, net	1 112	615	2 058	15 362	3 338	8 307
Current assets	4 016	3 195	16 696	23 928	11 905	18 662
Property, plant and equipment, net	15 023	8 708	4 713	4 554	5 444	6 262
Depreciation	15 496	14 534	15 756	19 491	22 792	24 205
Total assets	25 392	13 045	25 326	161 041	159 509	54 028
SGA expenses	14 284	13 049	11 672	20 970	20 527	44 928
Net income (loss)	-5 006	-31 445	-12 463	-12 975	-18 024	-226 770
Cash flow from operations	8 980	-3 658	-2 616	-7 662	-7 820	-17 761
Current liabilities	14 822	13 293	7 538	20 006	19 094	49 934
Other long-term assets	6 353	1 142	19 673	132 559	142 160	29 104
Total long-term debt	2 517	9 117	2 367	8 971	8 940	5 656

Source: Pareteum financial statements published on www.sec.gov

In Table 1. I have selected a few financial indicators for the period 2015-2019 which are necessary for the calculation of the financial ratios used in the M-score model. As stated before, the financial statements for 2018 were restated in 2020, so M-score is calculated twice for 2018 – once by using the initially published data and once by using the restated data. This approach allows us to observe if before the restatement M-score model catches the fraud and if after the restatement the indicators for manipulations disappear due to the corrections.

Table 2. Computation of derived variables for Pareteum

Derived variables		2016	2017	2018	2018 (restated)	2019
DSRI	Days Sales in Receivables Index	1.334	3.175	3.118	1.085	0.812
GMI	Gross Margin Index	1.131	0.983	1.251	1.445	2.095
AQI	Asset Quality Index	0.350	8.873	5.322	5.762	0.604
SGI	Sales Growth Index	0.415	1.054	2.394	1.495	3.063
DEPI	Depreciation index	0.812	0.812	0.950	0.954	1.016
SGAI	SGA Expenses Index	2.204	0.849	0.750	1.176	0.715



TATA	Total Accruals to Total Assets	-2.130	-0.389	-0.033	-0.064	-3.869
LVGI	Leverage Index	2.516	0.228	0.460	0.449	5.854

Source: Author's calculations

In Table 2. are shown all the derived variables results for Pareteum Corporation. At first glance, we note that the Days Sales in Receivables Index increased drastically in 2017 and 2018 reaching values above 3 but was significantly reduced to 1.085 in the 2018 restatement. According to the model a result above 1.465 is an alarming sign for possible accelerated revenue recognition to inflate profits, which later turns out to be the case as per SEC's report. The Gross Margin Index result in 2018 before restatement also exceeds the threshold of 1.193 which means that the gross margin is deteriorating, and management may be more prone to use manipulation. However, as the Gross Margin Index keeps growing even after restatement, I suppose that it might be due to company's worsening performance.

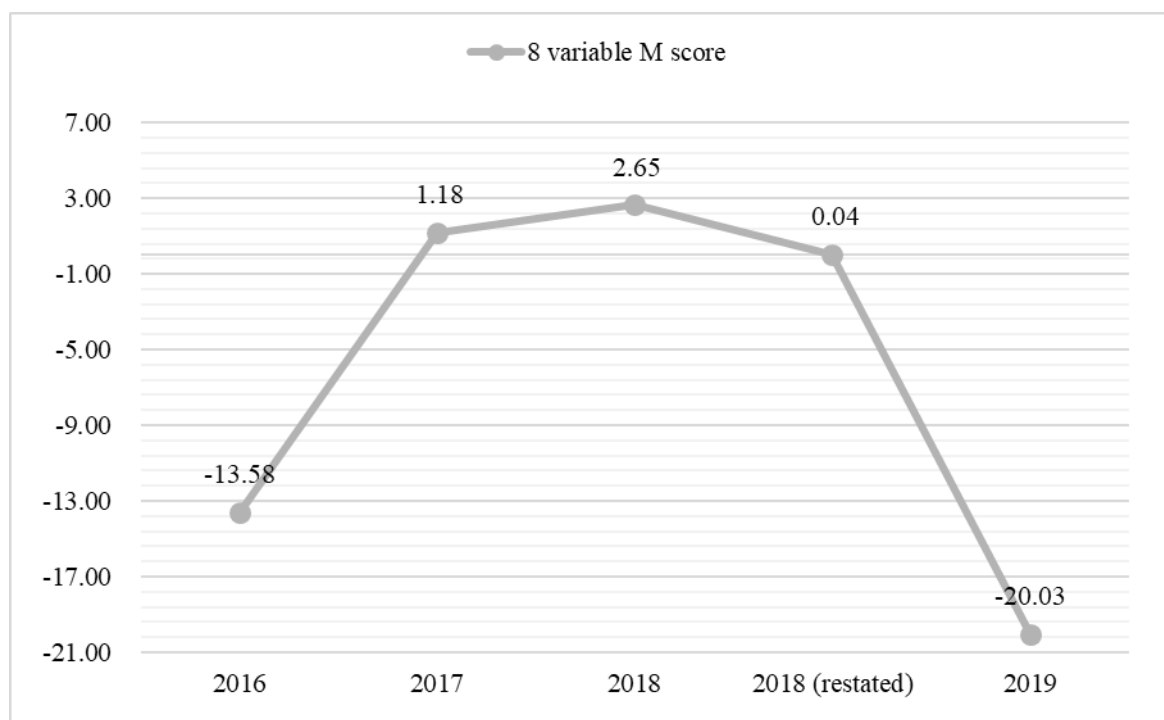
A significant fluctuation is observed in the Asset Quality Index as it reaches values above 8 in 2017. These results are far above the manipulator benchmark of 1.254 and suggest the existence of tendencies toward capitalizing and deferring costs instead of expensing them. The index drops to "non-manipulator" values below 1.039 in 2019 when fraudulent practices were probably ceased. The Sales Growth Index results also adhere to Beneish's model specifications as we observe manipulation results of 2.394 in 2018 when manipulations were proven. Here a value greater than 1.607 is considered as possible earnings alternation. The restated value of 1.495 complies with Beneish's assumptions. In 2019 the SGI even surpasses the result from 2018, reaching 3.063 but we cannot affirm with certainty that new manipulations exist, although the company may be regarded with more caution.

On the other hand, the Depreciation Index results remain quite stable during the examined period, slightly increasing in 2019 which may suggest that Pareteum Corporation slowed its rate of depreciation. With regard to the SGA Expenses Index, Pareteum Corporation does not seem to use creative accounting practices to distort financial results as the index values do not fall below -1 which is considered as the benchmark. Similarly, TATA Index does not exceed 0.031 meaning that most probably the accruals were not involved in manipulation. During the examined year of manipulation – 2018, Pareteum Corporation does not show a Leverage Index result above the benchmark of 1 which means that no signs of manipulation are present here. The Leverage Index was quite high in 2016 and more than doubled in 2019 which means that predictive ratios cannot be used straightforward and additional specifics of the companies need to be analysed.

In Figure 1 below are shown the M-score results per year calculated via the model's formula with eight variables.



Figure 1. Pareteum Corporation M score



Source: Author's calculations

From the results above we observe a defined curve of the M-score values through the years. Back in 2016, the M-score was way below the threshold for manipulation (even if we consider the original one of -2.22 from 1999), indicating no presence of manipulation. However, in 2017 and 2018 there is a significant increase and M-score reaches record values of 2.65. We observe that this event occurs exactly around the period when manipulation was suspected by SEC. Afterwards, the restatement of financial data for 2018 decreases the M-score result to 0.04, approaching the manipulation “safe zone” below -1.78. Consequently, in 2019, the year following the restatement, a very sharp drop of the M-score can be observed due to the aforementioned ameliorations in few of the manipulation indicators.

4.2. Kraft Heinz Co.

Kraft Heinz Co. is one of the largest multinational food and beverage companies in the world which was formed by the merger of Kraft Foods and Heinz in 2015. The company is co-headquartered in Chicago and Pittsburgh (Kraftheinzcompany.com, 2022).

In September 2021 Kraft Heinz Co. was officially charged by Securities and Exchange Commission with engaging in a long-running expense management scheme (Sec.gov, 2021). According to SEC's analysis, Kraft Heinz Co. performed different accounting misconducts like the recognition of unearned supplier discounts, maintenance of false and misleading contracts with suppliers for the period starting from the last quarter of 2015 to the end of 2018. These actions incorrectly reduced the company's cost of goods sold and led to unreal “cost savings”. All these accounting inaccuracies resulted in inflated adjusted EBITDA reported by Kraft Heinz Co. which is a key performance indicator for investors. Consequently, as investors heavily rely



on the fact that public companies by definition should be accurate in their public statements, companies misleading them will be held accountable by SEC (Sec.gov, 2021). Kraft's former Chief Operating Officer Eduardo Pelleissone and its former Chief Procurement Officer Klaus Hofmann were also charged by SEC for their participation in the scheme including actions like approving improper contracts, ignoring the warning signs, pressuring the procurement division to hit unrealistic savings targets and approving the company's financial statements (Cnbc.com, 2022). As per the order's requirements, Kraft Heinz Co. had to pay a penalty of \$62 million.

After the investigation of SEC began in June 2019, Kraft Heinz Co. restated its audited consolidated financial statements at December 30, 2017 and for the years ended December 30, 2017 and December 31, 2016. The restatement resulted in correcting a total of \$208 million in improperly recognized cost savings arising out of nearly 300 transactions. (Sec.gov, 2021).

Kraft Heinz Co. did not post the restated Consolidated Balance Sheets as of December 31, 2016, only as of December 30, 2017, therefore it was not possible to calculate the M-score for both the restated years – 2016 and 2017.

In Table 3 below are shown selected values from Kraft Heinz financial statements.

Table 3. Selected data from financial statements of Kraft Heinz Co. 2015-2018

In thousands, USD	2015	2016	2016 (restated)	2017	2017 (restated)	2018
Sales revenues	18 338	26 487	26 300	26 232	26 076	26 268
COGS	12 577	16 901	17 154	16 529	17 043	17 347
Accounts receivables, net	1 454	898	N/A	1 812	1 812	2 281
Current assets	9 780	8 753	N/A	7 266	7 201	9 075
Property, plant and equipment, net	6 524	6 688	N/A	7 120	7 061	7 078
Depreciation	906	1 830	N/A	2 094	2 089	2 584
Total assets	122 973	120 480	N/A	120 232	120 092	103 461
SGA expenses	3 122	3 444	3 545	2 930	2 976	19 141
Net income (loss)	647	3 642	3 606	10 990	10 932	-10 254
Cash flow from operations	2 467	5 238	2 648	527	501	2 574
Current liabilities	6 932	9 501	N/A	10 132	10 154	7 503
Other long-term assets	106 669	105 039	N/A	105 846	105 830	87 308
Total long-term debt	49 805	53 405	N/A	43 853	43 862	44 180

Source: Kraft Heinz Co. financial statements published on www.sec.gov

As I mentioned above, Kraft Heinz Co. did not post the complete restated financial data for 2016, so the approach I adopted regarding this company is the following: M-score is calculated for 2016, 2017 using the initially reported data. Afterwards, the M-score is again calculated for 2017 but this time using the restated data for 2017 and the original one for 2016. The idea is to observe at least how the M-score will change when only one year's restated data is available. For 2018 the M-score is also calculated twice – once by using the original data for both 2017 and 2018 and again by using the restated financial statements as of December 30, 2017.

Table 4 shows the predictive ratios results calculated using the financial statements data in Table 3.

Table 4. Computation of derived variables for Kraft Heinz Co. 2016-2018

Derived variables		2016	2017	2017 (restated)	2018	2018 (restated)
DSRI	Days Sales in Receivables Index	0.428	2.037	2.050	1.257	1.250
GMI	Gross Margin Index	0.868	0.978	1.045	1.089	1.020



AQI	Asset Quality Index	1.005	1.010	1.011	0.959	0.958
SGI	Sales Growth Index	1.444	0.990	0.984	1.001	1.007
DEPI	Depreciation index	0.568	0.945	0.941	0.850	0.854
SGAI	SGA Expenses Index	0.764	0.859	0.878	6.524	6.385
TATA	Total Accruals to Total Assets	-0.013	0.087	0.087	-0.124	-0.124
LVGI	Leverage Index	1.132	0.860	0.861	1.113	1.111

Source: Author's calculations

The Days Sales in Receivables Index results in 2017 show one of the manipulation techniques as the value of 2.037 is above the threshold of 1.465. Then in 2018 the index returns to normal levels below the benchmark of 1.465 and suggests that manipulative actions are no longer present. However most of the other ratios including Gross Margin Index, Asset Quality Index, Sales Growth Index, Depreciation Index and SGA Expenses Index, if analysed separately, do not enter the “manipulators” zone beyond the thresholds for each predictive ratio as defined in the model. According to the M-score model Total Accruals to Total Assets Index should not exceed 0.031, otherwise some warning signs for accrual engagement in creative accounting are present. From Table 4 we see that TATA result of 0.087 for 2017 surpassed the threshold, meaning that manipulation indications exist.

Table 5. M score of Kraft Heinz Co. 2016-2018

	2016	2017	2017 (restated)	2018	2018 (restated)
8 variable M score	-2.79	-1.07	-1.03	-3.80	-3.81

Source: Author's calculations

The calculations in Table 5 revealed that even after the restatement of the financial data for 2017, the M-score for 2017(restated) (1.03) remains in the manipulator zone above the threshold of -1.78. This is due to the fact that the calculation of the eight predictive ratios was done based on the original fraudulent data for 2016. Afterwards, we observe that the use of the initial fraudulent data for 2017 as t-1 and the use of the restated data for 2017 as t-1 does not change the M-score result for 2018 (the value is still - 3.8). It remains in the “non-manipulator” zone since the financial statements data as of December 31, 2018 was not manipulated as per SEC’s report. Generally, we observe that the model’s principles work if the necessary data is available.

For the purpose of this research, I have decided to calculate M-score for the consecutive 3 years (2019-2022) after the “fraudulent” years 2016 and 2017 in order to observe if the M-score model produces consistent results. No fraudulent actions are yet officially discovered by regulators for the period from 2019 to 2021, therefore by definition the M-score model should not show manipulation signs. In Table 6 is presented the selected data from Kraft Heinz Co. financial statements.

Table 6. Selected data from financial statements of Kraft Heinz Co. 2018-2022

In thousands, USD	2018	2019	2020	2021
Sales revenues	26 268	24 977	26 185	26 042
COGS	17 347	16 830	17 008	17 360
Accounts receivables, net	2 281	2 146	2 063	1 957
Current assets	9 075	8 097	10 822	8 994
Property, plant and equipment, net	7 078	7 055	6 876	6 806
Depreciation	2 584	3 187	3 563	3 868
Total assets	103 461	101 450	99 830	93 394
SGA expenses	19 141	5 077	7 049	5 222



Net income (loss)	-10 254	1 933	361	1 024
Cash flow from operations	2 574	3 552	4 929	5 364
Current liabilities	7 503	7 875	8 061	9 064
Other long-term assets	87 308	86 298	82 132	77 594
Total long-term debt	44 180	41 826	41 526	34 878

Source: Kraft Heinz Co. financial statements published on www.sec.gov

Table 7 includes the calculated predictive ratios for 2019, 2020 and 2021.

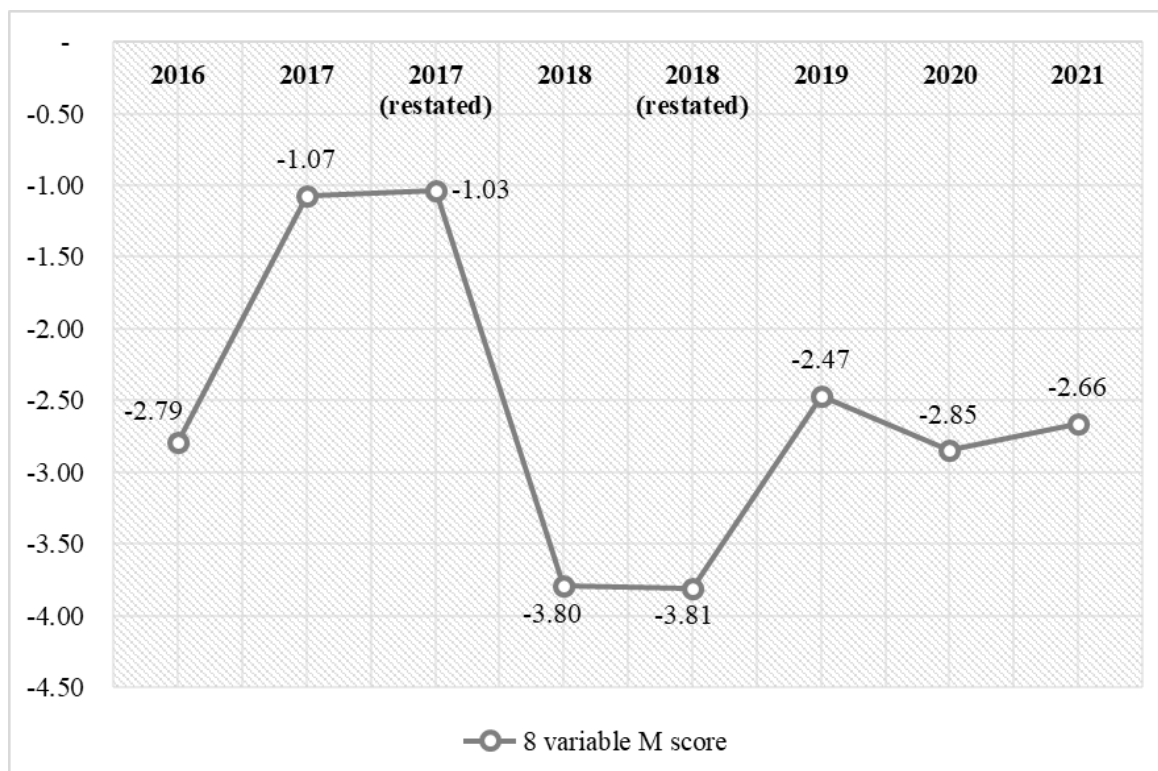
Table 7. Computation of derived variables for Kraft Heinz Co.

Derived variables		2019	2020	2021
DSRI	Days Sales in Receivables Index	0.989	0.917	0.954
GMI	Gross Margin Index	1.041	0.931	1.051
AQI	Asset Quality Index	1.008	0.967	1.010
SGI	Sales Growth Index	0.951	1.048	0.995
DEPI	Depreciation index	0.859	0.912	0.942
SGAI	SGA Expenses Index	0.279	1.324	0.745
TATA	Total Accruals to Total Assets	-0.016	-0.046	-0.046
LVGI	Leverage Index	0.981	1.014	0.947

Source: Author's calculations

Figure 2 reveals the M-score fluctuations for the period 2016-2021. The results confirm that the financial statements data for the period 2019-2021 was most probably not manipulated as the M-score results are below the manipulation threshold of -1.78 varying between -2.47 and -2.85. Even if we consider the first threshold introduced by M.D. Beneish in 1999 -2.22, Kraft Heinz Co. still appears as a “non-manipulator” for this period.

Figure 2. Kraft Heinz Co. M-score



Source: Author's calculations



The analysis of the second company in this paper – Kraft Heinz Co. also shows that the model can be indeed used to catch manipulative actions under the condition that many factors should be considered and model is not just used straightforward.

5. Limitations

First of all, Beneish M-score is a probabilistic model, so that one of the explicit limitations is that the model is not able to detect fraud and earnings manipulations with 100% accuracy. Even though the model helps analysts in detecting the financial frauds in the company, the M-score model only gives the researcher the probability of manipulation. Another limitation is that if the management of the company is quite familiar with the mechanisms and calculation of the Beneish M-score model, then they may manipulate the balance sheet entries, used for the calculation of M-Score.

Another significant limitation of the model is that it is estimated using financial information for publicly traded companies. Therefore, privately-held firms cannot be reliably studied using the M-score model. Moreover, the model was created using sample which involves cases of earnings overstatement rather than understatement and hence, the model cannot be applied to firms that operate in circumstances favorable for earnings decrease (Beneish, 1999). In other words, the model only works when the companies manipulate their statements ‘upwards’ attempting to create better earnings results. The opposing case can be observed when companies attempt to limit their tax exposure by manipulating earnings and the approach used in M-Score model will not produce any meaningful signs of earnings manipulation. (Pustynick, Temchenko and Gubarkov, 2017)

While the model’s variables exploit distortions in financial statement data that could result from manipulation, these distortions can have an alternative origin like material acquisition during the period examined, material shift in the firm’s value maximizing strategy, or a significant change in the company’s economic environment. (Beneish, 1999)

The data availability is also a limitation of this research as not all companies’ data is easy-accessible, well structured or consistent. Even if we analyse only public companies as in this paper, data is not always available for each fiscal year or for a prolonged period. Moreover, depending on the standards and the business specifics, companies structure their financial statements in different way and the calculation of uniform indicators for completely different companies can be quite challenging.

6. Recommendations and suggestions

To further expand the analysis a few approaches can be adopted. I would suggest that other companies officially charged with manipulation can be included in the research. Since most of the research papers I have found on this topic focus mainly on testing the capabilities of the M-score model using mathematical and statistical analyses of multiple companies or focusing on notorious cases like Enron scandal, future research might deepen the analysis of the model’s mechanisms concentrating on fewer fraudulent cases of companies like Enron and entering into details for each business. The methodology of the research can also be ameliorated by including other theories and models in the analysis. Another recommendation is that the specifics of



different industries can be studied in order to refine the ability to reveal manipulations by analysing the key indicators and needs for a business sector.

7. Conclusion

After the performed research, I can conclude that Beneish M-score model definitely outlines some of the most significant manipulation signs and in some cases may indeed assist professionals in the process of revealing fraudulent actions. However, fraud detection remains a difficult task and often requires to think out of box and derive information from various sources. The model has its limitations and cannot be used straightforward as a lot of factors should be taken into account and all included variables need to be carefully analyzed in respect of all companies' specifics and economic environment. The accounting ratios included in the model are fundamental for the analysis and even if these ratios are widely used in financial analysis, they derive from purely accounting data which as history has demonstrated is subject to different interpretations and in some cases even manipulation. In the literature review there were different suggestions and interpretations for some of the metrics used in the model computation which may produce varying results in revealing financial statement manipulations. This research also shows that the computation of metrics which happens year on year, reveals another imperfection of the model when applying it to cases where financial statement manipulation and then restatement is done over several years. However, the strength of the model arises from the fact that manipulation indicators can be found both in the individual metrics constructing the model and in the collective result.

References

- Beneish, M. D. (1999). The Detection of Earnings Manipulation. - *Financial Analysts Journal*, 55(5), 24-36.
- Beneish, M.D. (2001). Earnings Management: A Perspective. - *SSRN Electronic Journal*. [online] Available at: <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=269625>
- Beneish, M. and Nichols, D., (2007). The Predictable Cost of Earnings Manipulation. - *SSRN Electronic Journal*. [online] Available at: <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1006840>
- Beneish, M. and Nichols, D., (2009). Identifying Overvalued Equity. - *Johnson School Research Paper Series*, 9(9) Available at: <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1134818>
- Beneish, M., Lee, C. and Nichols, D., (2012). Fraud Detection and Expected Returns. - *SSRN Electronic Journal*. [online] Available at: <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1998387>
- Cnbc.com. 2019. Kraft Heinz to restate earnings for 2016 and 2017, citing employee misconduct. [online] Available at: <<https://www.cnbc.com/2019/05/06/kraft-heinz-to-estate-earnings-for-2016-and-2017>>
- Curtis, P., & Thalassinou, J. (2005). Equity fund raising and 'creative' accounting practices': indications from Athens Stock Exchange for the 1999-2000 period. - *European Research Studies*, 8, 2-10.
- Hołda, A. (2020). Using the Beneish M-score model: Evidence from nonfinancial companies listed on the Warsaw Stock Exchange. - *Investment Management and Financial Innovations*, 17(4), 389-401.
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. - *Journal of Financial Economics*, 3(4), 305-360.
- Kraftheinzcompany.com. (2022). The Kraft Heinz Company. [online] Available at: <<https://www.kraftheinzcompany.com/>>
- Levitt, A. (1998). The Numbers Game. *Securities and Exchange Commission, U.S.*



- Mahama, M., (2015). Detecting Corporate Fraud and Financial Distress Using The Altman and Beneish Models, The Case of Enron Corp. - *International Journal of Economics, Commerce and Management*, 3(1), ISSN 2348 0386.
- Mollah, MD, T. and Sakib, I.A., (2020). Detection of Financial Statement Frauds Using Beneish Model: Empirical Evidence From Listed Pharmaceutical Companies in Bangladesh. - *International Journal of Management, Accounting and Economics*, 7(9), 506-521, Available at: <<https://ssrn.com/abstract=3712000>>
- Pareteum. (2022). MVNO/E/A, IoT, SMS/Messaging, Wi-Fi & Value-Added Services. [online] Available at: <<https://www.pareteum.com/about/>>
- Pustynick, I., Temchenko, O., and Gubarkov, S. (2017). Detection of Earnings Management. Practical Approach. *Actual Problems of Economics*, 193(07-2017), 85-98. Available at: <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2893726>
- Salas Najera, C., (2021). The Evolution of Fundamental Scoring Models and Machine Learning Implications. - *CFA Institute Research Foundation Forthcoming*, Available at: <<https://ssrn.com/abstract=3945477>>
- Sec.gov. (2021). SEC Charges Telecommunications Company Pareteum Corporation with Accounting and Disclosure Fraud. [online] Available at: <<https://www.sec.gov/enforce/33-10975-s>>
- Sec.gov. (2021). SEC Charges The Kraft Heinz Company and Two Former Executives for Engaging in Years-Long Accounting Scheme. [online] Available at: <<https://www.sec.gov/news/press-release/2021-174>>
- Spătăcean, I., (2019). Testing the Beneish Model Relevance in Case of Entities with Confirmed Reputational Risk. - *Acta Marisiensis. Seria Oeconomica*, 13(1), pp.43-48.