Detecting the Probability of Financial Fraud due to Earnings Manipulation in Companies Listed at Athens Stock Exchange Market

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STRUCTURED ABSTRACT

Purpose- The aim of this paper is to detect whether there are companies listed in the General Index of Athens Stock Exchange Market that possibly conduct earnings manipulation during 2017-2018.

Design/methodology/approach- The paper is based upon the Beneish model (M-score) which consists of 8 variables in order to examine the probability of financial statement fraud related to earnings manipulation for 40 companies listed in the Athens Stock Exchange Market. Any company with M-Score -2.22 or above is likely to be a manipulator whereas any company that scores -2.22 or less is unlikely to conduct earnings manipulation.

Findings- After calculating the M-Score for each company, it was found that 33 (out of 40) companies had M-Score value lower than -2.22. Therefore, 82.5% of the sample is considered rather unlikely to conduct earnings manipulation whereas 17.5% of the companies listed in the

General Index of Athens Stock Exchange Market is likely to manipulate its earnings.

Research limitations/implications- In this paper, all institutions related to financial services were left out of the sample due to the fact that M-Score cannot provide reliable results when applied on similar companies.

Originality/value- Beneish model offers a probability of financial fraud and can be therefore used as a supplementary test for auditors, fraud examiners or even national regulators such as the Hellenic Accounting and Auditing Standards Oversight Board or the Hellenic Capital Market Commission. The results of this paper can contribute to the literature concerning financial fraud in Greece during 2017-2018 since no relevant recent researches have been published yet**.**

Keywords: Financial Fraud, Earnings Manipulation, Beneish, Athens Stock Exchange Market, M-Score.

INTRODUCTION

Introductory Comments

Companies have always dealt with fraudulent activity ever since they started running. During recent years many different ways have been invented in order to commit corporate fraud. According to the Report to the Nations (Association of Certified Fraud Examiners, Inc, 2018) on Occupational Fraud issued by the association of Certified Fraud Examiners, 10% of fraud cases found solely in 2018 around the globe refers to financial statement fraud. Financial statement fraud is defined as the act of misinterpreting or misstating the published financial statements in order to deliberately present false information about the company. One of the most notorious techniques of financial fraud is earnings management which constitutes the use of accounting techniques and standards so as to present an overly

positive view of a company's financial statements or to hide a seemingly deficient economic position. The execution of earnings manipulation usually involves activities such as recognition of huge fictitious accruals, capitalization of intangible assets, recognition of large sums of expenses during profitable years.

Therefore, there have been many studies in the academic literature (Persons, 1995), (Green and Choi, 1997), (Summers and Sweeney, 1998), (Beneish, 1999), (Spathis *et al.*, 2002), (Kirkos *et al.*,2007), (Cecchini *et al.*, 2010) concerning ways to discover whether a company commits fraudulent activity. These famous researchers have studied and developed scientific models that examine the probability of financial statement fraud. Some studies use linear regression models in order to exact significant results whereas others use neural network and artificial intelligence models.

Scope and research questions

The purpose of this study is to examine the probability of financial statement fraud due to earnings manipulation in Greece during 2017-2018 using Beneish model. Beneish model (Beneish, 1999) uses eight variables created by information derived from the financial statements (Balance Sheet and Income Statement) of the companies. The results of this study can contribute to the literature concerning financial fraud in Greece since no relevant recent researches have been published yet. The sample involves all company stocks that belong to the General Index of Athens Exchange Stock Market during 2017-2018.

Structure

This paper begins by defining the notion of financial fraud and earnings management using published literature and information from esteemed organizations. The research methodology then follows to describe Beneish model and the used sample, analyze the

methodology and present the results. Finally, the study wraps up with the conclusions produced by the model and some proposals for future studies.

Definition of Financial Fraud and Earnings Management

The subject of fraud has always been a huge topic among the financial institutions and academic studies. There have been many definitions of "financial fraud": According to Koya *et al*., (2014), financial fraud can be defined as an act of misinterpretation or misstatement of the published financial reports by financial market participants in order to deliberately or involuntarily provide false or manipulated information about the company. This misleading financial information can violate any accounting rule, regulatory rule or any type of law. The Association of Certified Fraud Examiners, defines financial statement fraud as the act of overstating the revenue, assets, or profits and understating the expenses, liabilities or losses. This type of fraud includes timing differences between accounting dates, fictitious or understated revenues, concealed or overstated liabilities and expenses, improper asset valuations and improper disclosures. According to the 2018 Report to the Nations by the aforementioned institution, 8% of fraud cases in companies in Western Europe (including Greece) were financial fraud which constitutes the third most popular type of fraud in the area. Specifically, in 2018 there were 22 fraud cases in Greek companies out of 130 cases in Western Europe. The same study reports that a financial statement fraud usually lasts for 24 months.

One of the most notorious means of financial fraud in recent years, is earnings management which constitutes the use of accounting techniques in order to falsely present an overly positive view of a company's financial statements or to hide a seemingly deficient economic position. Earnings management usually takes advantage of the vague accounting rules or misinterpretation of the (GAAP) Generally Accepted Accounting Principles so as to present a retouched image of an organization's financial position. Managers may use legal or illegal techniques to achieve specific earnings goals (Tabassum *et al*., 2015).

RESEARCH METHODOLOGY

Beneish Model

This research is based upon the Beneish model which consists of 8 variables in order to examine the probability of financial statement fraud related to earnings manipulation. More specifically, Beneish uses 8 financial ratios created by information derived from the financial statements (Balance Sheet and Income Statement) of the corporations used in the sample. According to his findings, these variables represent a company's attempt to commit a fraudulent act.

Table I: Presentation of variables used in Beneish model

Calculation of the 8 variables:

$$DSRI = \frac{\text{Receivables}_t / Sales_t}{\text{Receivables}_{t-1} / Sales_{t-1}}$$

$$GMI = \left(\frac{\text{Sales}_{t-1}\text{-Costs of Goods Sold}_{t-1}}{\text{Sales}_{t-1}} \right) / \left(\frac{\text{Sales}_t\text{-Costs of Goods Sold}_t}{\text{Sales}_t} \right)$$

$$AQI = \left(1 - \frac{\text{Current Assets}_t + \text{Property Plant Equipment}_t}{\text{Total Assets}_t} \right) / \left(1 - \frac{\text{Current Assets}_{t-1} + \text{Property Plant Equipment}_{t-1}}{\text{Total Assets}_{t-1}} \right)$$

$$SGI = \frac{\text{Sales}_t}{\text{Sales}_{t-1}}$$

$$\text{DEPI}=\left(\frac{\text{Depreciation}_{t-1}}{\text{Depreciation}_{t-1}+\text{Property Plant Equipment}_{t-1}}\right)/\left(\frac{\text{Depreciation}_{t}}{\text{Depreciation}_{t}+\text{Property Plant Equipment}_{t}}\right)$$

$$SGAI=\left(\frac{\text{Selling General Administrative Expense}_{t}}{\text{Sales}_{t}}\right)/\left(\frac{\text{Selling General Administrative Expense}_{t-1}}{\text{Sales}_{t-1}}\right)$$

$$\text{LVI}=\left(\frac{\text{Long Term Debt}_{t}+\text{Current Liabilities}_{t}}{\text{Total Assets}_{t}}\right)/\left(\frac{\text{Long Term Debt}_{t-1}+\text{Current Liabilities}_{t-1}}{\text{Total Assets}_{t-1}}\right)$$

$$\text{TATA}=[\text{Current Assets}_{t}-\text{Cash}_{t}-\text{Current Liabilities}_{t}-\text{Current Maturities of LTD}_{t}-\text{Income Tax Payable}_{t}-\\ -\text{Depreciation and Amortization}_{t}]\ /\ \text{Total Assets}_{t}$$

These eight variables are then multiplied by eight coefficients calculated by Beneish. Therefore the M-score model created is shown below:

$$\text{M-Score}=-4.84+0.92\times\text{DSRI}+0.528\times\text{GMI}+0.404\times\text{AQI}+0.892\times\text{SGI}+0.115\times\\ \times\ \text{DEPI}-0.172\times\text{SGAI}+4.679\times\text{TATA}-0.327\times\text{LVGI}$$

According to his study, Beneish estimates that any company with M-Score -2.22 or above is likely to be a manipulator whereas any company that scores -2.22 or less is unlikely to conduct earnings manipulation.

Sample

In this study, the sample consists of some of the companies listed in the General Index of Athens Exchange Stock Market on August 31st 2019 using data from their published financial statements for 2017 and 2018. The General Index is made up of 60 companies, the most out of any other Index. The companies that are listed in the General Index were

chosen due to the fact that they outnumber other Indexes and they belong to different commercial branches. However, in order for the model to be accurate, the companies related to financial services are not taken into consideration since Beneish did not include them in his research. Therefore, 5 banks and 3 other financial services companies are deducted from the sample.

Besides, four other companies were excluded from the sample since some of the variables required for the M-Score were not applicable. More specifically, two of them presented zero revenue and/or cost of sales in either 2017 or 2018 or both years. This issue regards companies in consulting or construction sector and thus the cost of sales can be nonexistent. As a result, DSRI, GMI and SGAI variables could not be calculated for none of them. The third company presented zero depreciation regarding tangible assets and a certain amount of depreciation regarding only intangible assets in 2018. Besides, according to the balance sheet by ICAP database, the company had no tangible assets in 2018. Thus, the variable DEPI cannot be calculated and as a result no M-Score can be given for the specific company. The fourth company left out from the sample, includes a disproportionate difference between the assets in 2017 and 2018. Consequently, the AQI variable is immensely large and therefore it is considered as an outlier for the current model. Finally, eight companies were omitted from the sample since they were found to be outliers for at least one of the following variables.

To sum up, the total sample is ultimately made up of 40 publicly listed companies. Table II demonstrates the stock market company symbol used in Athens Stock Exchange Market and the company name included in the sample.

Table II: Companies included in the sample

Methodology

For all the aforementioned companies, the 8 variables mentioned in Beneish model are calculated in order to decide whether there is a possibility of earnings manipulation. The necessary information for the formation of the 8 variables per company were collected

from the Financial Statements of each company via ICAP Database or the website of the corresponding enterprise. In this study, data from 2017 and 2018 financial statements of the 40 companies were used for the model. The variables of Beneish model: DSRI, GMI, AQI, SGI, DEPI, SGAI, LVGI, TATA require information from the balance sheet and income statement of each company for the economic years 2017 and 2018. The formulas described above for every single variable were used to calculate the ratios. After estimating the variables, the M-Score for each company used in the sample was calculated.

Results

After calculating the M-Score for every company included in the sample, the companies were categorized into two groups according to the possibility of conducting earnings management: Manipulators and Non-Manipulators. According to Beneish's model, if the M-Score for a company is higher than -2.22 then it is more likely to use earnings manipulation whereas if a company scores less than -2.22 it is less likely to use earnings management techniques. Therefore, the companies with M-Score higher than -2.22 are described as Manipulators while companies that scored less than -2.22 are characterized as Non-Manipulators. After taking all the aforementioned information into consideration, it was found that 33 (out of 40) companies had a M-Score value lower than -2.22 and thus are categorized as non-manipulators. In the meantime, 7 companies presented M-Score higher than -2.22 and thus are categorized as manipulators. In other words, 82.5% of the sample is considered rather unlikely to conduct earnings manipulation whereas 17.5% of the companies listed in the General Index of Athens Stock Exchange Market is likely to manipulate its earnings. Below the descriptive statistics for manipulators, non-manipulators and the total sample are presented.

The values for each variable are presented in Plate 1 in independent charts. DSRI, GMI, AQI, SGI, DEPI, SGAI and LVGI variables seem to only have positive values in all companies. Most companies had a negative TATA but a small amount seems to have mildly positive value of TATA. On the other hand, M-Score for all companies included in the sample, non-manipulators and manipulators, possess a negative M-Score.

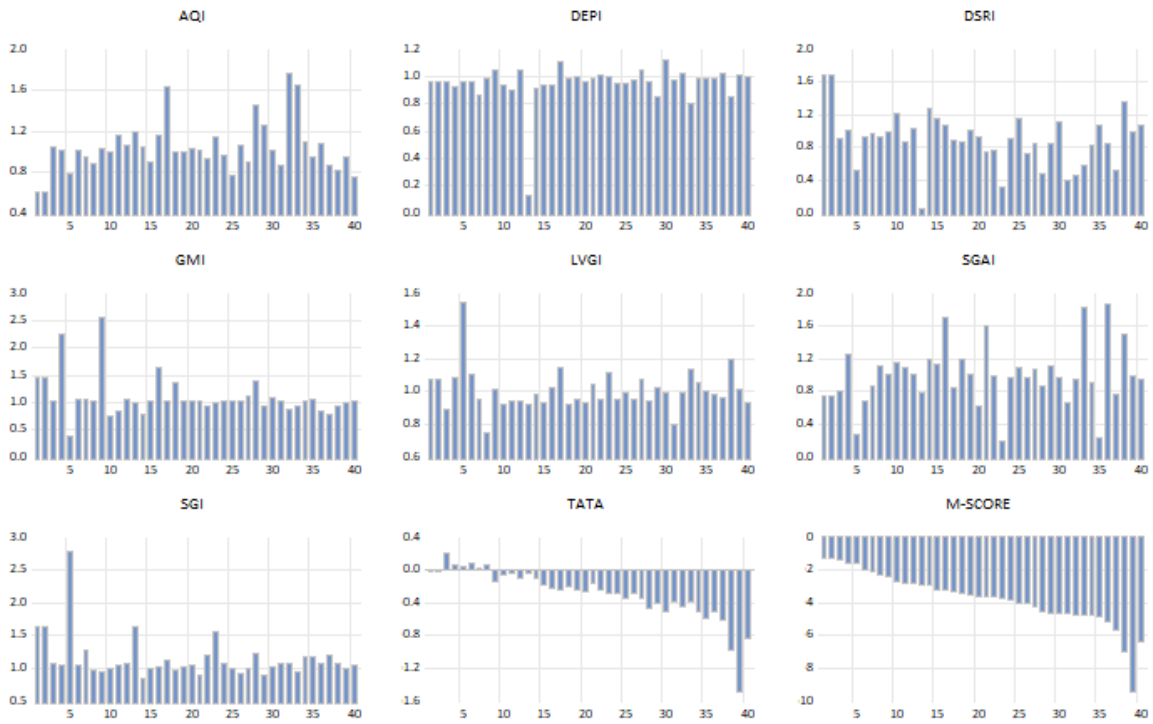

Plate 1: Values of eight variables and M-Score of the sample

The values of the variables of manipulators seem to follow the pattern of the total sample accordingly. More specifically, seven of the variables present only positive values, one variable positive and mildly negative values. The M-Score for manipulators is negative for all companies.

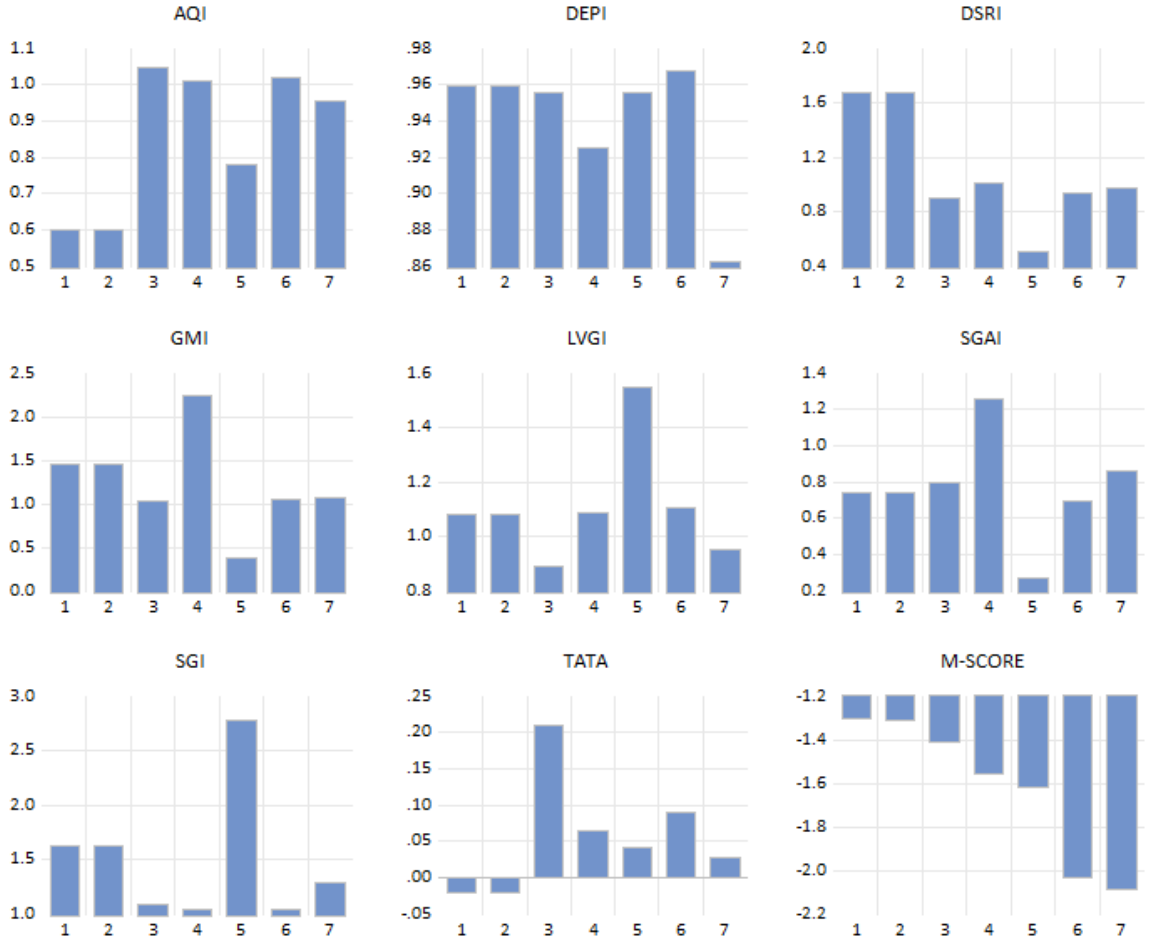

Plate 2: Values of eight variables and M-Score of companies conducting manipulation

The values of the variables regarding non-manipulators present a slight difference than the total sample. Almost all variables except for M-Score have only positive values. One company has positive TATA while all others non-manipulators have negative TATA value. M-Score for all non-manipulators is negative as expected since according to Beneish model, all companies with M-Score lower than -2.22 are rather unlikely to be manipulators and therefore are characterized as non-manipulators.

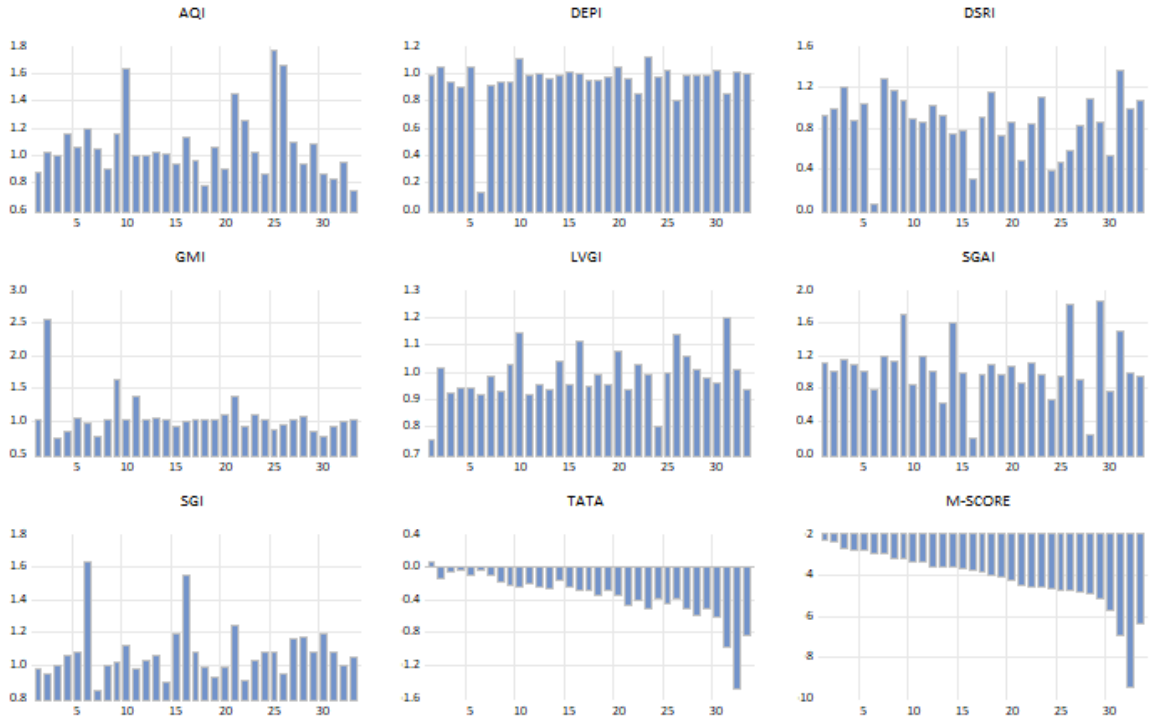

Plate 3: Values of eight variables and M-Score of non-manipulators

According to Table III, the mean M-Score for non-manipulators is -4.161 in contrast to -1.619 for manipulators. The standard deviation of manipulators' M-Score is 0.325 in contrast to 1.445 for the non-manipulators which highlights the fact that the M-Score values for non-manipulators are more scattered among the mean (-4.161) value.

The descriptive statistics for the total sample seem to follow Non-Manipulators' values. The mean total is -3.716 compared to -4.1611 for non-manipulators. The standard deviation for total sample is 1.639 and for non-manipulators 1.445. The median regarding the total sample follows a similar pattern.

Table III: M-Score descriptive statistics

Below are presented the descriptive statistics for each variable for each group separately: manipulators and non-manipulators. The highest mean out of the eight variables regarding manipulators is observed in Sales Growth Index (SGI) which signifies that companies who are likely to commit earnings manipulation, prefer to present higher Sales in relation to

sales between two successive years in order to tamper with the income statement. The second highest mean out of the eight variables belongs to Gross Margin Index (GMI) which showcases the sales to the cost of goods sold in relation to the sales to the cost of goods sold value for two consecutive economic years. The mean of LVGI regarding manipulators is the third highest which shows the leverage index between two consecutive economic years. This finding further supports the accuracy of the model since manipulators are more likely to tamper with the sales growth indexes as a form of earnings manipulation in order to ameliorate the financial profile of the company. Besides, the highest maximum value of a manipulator's variable belongs to Sales Growth Index (SGI). The lowest standard deviation among the eight variables belongs to DEPI index whereas the highest belongs to SGI.

Table IV: Variables descriptive statistics for manipulators

Table V: Variables descriptive statistics for non-manipulators

Descriptive statistics for the whole sample show that the highest mean belongs to SGI variable like manipulators and non-manipulators. GMI, AQI and LVGI follow not very far behind. The largest standard deviation is observed in GMI values while the lowest one belongs to LVGI variable.

Table VI: Descriptive statistics for total sample

In order to examine the significance of every variable independently in relation to M-Score which represents Beneish model, least squares regression is formed. The same formula is reiterated for each and every of the eight variables. Therefore, eight hypotheses and a null hypothesis are formed including the variables:

H_0: There is not significant relationship between a variable and M-Score (variable coefficient=0)

H_1: There is a significant relationship between DSRI and M-Score (DSRI coefficient≠0)

H_2: There is a significant relationship between GMI and M-Score (GMI coefficient≠0)
H_3: There is a significant relationship between AQI and M-Score (AQI coefficient≠0)
H_4: There is a significant relationship between SGI and M-Score (SGI coefficient≠0)
H_5: There is a significant relationship between DEPI and M-Score (DEPI coefficient≠0)
H_6: There is a significant relationship between SGAI and M-Score (SGAI coefficient≠0)
H_7: There is a significant relationship between LVGI and M-Score (LVGI coefficient≠0)
H_8: There is a significant relationship between TATA and M-Score (TATA coefficient≠0)

The M-Score in the study expresses the earnings management conducted by the examined companies. In order to test the aforementioned hypotheses, correlation coefficient, least squares regression, R square, t-statistic and p-value of the t-statistics are used.

First, the relation of the DSRI variable and M-Score is examined. According to the results of the regression in table VII, the model is not significant at 95% confidence level since the t-statistics is 1.046 and p-value of t-test is 0.302 which is higher than the significance level of 0.05. Therefore, the null hypothesis (H_0) is accepted which means that Days Sales in Receivables Index (DSRI) does not have a significant relationship with the M-Score. Besides, the R square value of 0.028 signifies that the equation explains only 2.8% of the M-Score.

Table VII: Results of regression using DSRI and M-Score

Next, the relation of the GMI variable and M-Score is examined. According to the results of the regression in Table VIII, the model is not significant at 95% confidence level since the t-statistics is 1.723 and p-value of t-test is 0.092 which is higher than the significance level of 0.05. Therefore, the null hypothesis (H_0) is accepted which means that Gross Margin Index (GMI) does not have a significant relationship with the M-Score. Besides, the R square value of 0.073 signifies that the equation explains only 7.3% of the M-Score.

Table VIII: Results of regression using GMI and M-Score

In the next table (Table IX) the relation of the AQI variable and M-Score is examined. According to the results, the model is not significant at 95% confidence level since the t-statistics is -0.773 and p-value of t-test is 0.445 which is higher than the significance level of 0.05. Therefore, the null hypothesis (H_0) is accepted which means that Asset Quality

Index (AQI) does not have a significant relationship with the M-Score. Besides, the R square value of 0.015 signifies that the equation explains only 1.5% of the M-Score.

Table IX: Results of regression using AQI and M-Score

Below, the relation of the SGI variable and M-Score is examined. According to the results of the regression in Table X, the model is significant at 95% confidence level since the t-statistics is 2.010 and p-value of t-test is 0.05. Therefore, the null hypothesis (H_0) is rejected which means that Sales Growth Index (SGI) has a significant relationship with the M-Score. Besides, the R square value of 0.096 signifies that the equation explains only 9.60% of the M-Score.

Table X: Results of regression using SGI and M-Score

Next, the relation of the DEPI variable and M-Score is examined. According to the results of the regression in Table XI, the model is not significant at 95% confidence level since the t-statistics is -0.655 and p-value of t-test is 0.516 which is higher than the significance level of 0.05. Therefore, the null hypothesis (H_0) is accepted which means that Depreciation Index (DEPI) does not have a significant relationship with the M-Score. Besides, the R square value of 0.011 signifies that the equation explains only 1.1% of the M-Score.

Table XI: Results of regression using DEPI and M-Score

Below, the examination of the relation of the SGAI variable and M-Score is presented. According to the results of the regression in Table XII, the model is not significant at 95% confidence level since the t-statistics is -1.125 and p-value of t-test is 0.268 which is higher than the significance level of 0.05. Therefore, the null hypothesis (H_0) is accepted which means that Sales General and Administrative Expenses Index (SGAI) does not have a significant relationship with the M-Score. Besides, the R square value of 0.032 signifies that the equation explains only 3.2% of the M-Score.

Table XII: Results of regression using SGAI and M-Score

Next, the relation of the LVGI variable and M-Score is examined. According to the results of the regression in Table XIII, the model is not significant at 95% confidence level since the t-statistics is 0.400 and p-value of t-test is 0.691 which is higher than the significance level of 0.05. Therefore, the null hypothesis (H_0) is accepted which means that Leverage Index (LVGI) does not have a significant relationship with the M-Score. Besides, the R square value of 0.004 signifies that the equation explains only 0.4% of the M-Score.

Table XIII: Results of regression using LVGI and M-Score

Finally, the relation of the TATA variable and M-Score is examined. According to the results of the regression in Table XIV, the model is significant at 95% confidence level since the t-statistics is 26.408 and p-value of t-test is 0.00 which is lower than the significance level of 0.05. Therefore, the null hypothesis (H_0) is rejected (and the alternative H_8 hypothesis is accepted) which means that Total Accruals to Total Assets (TATA) has a significant relationship with the M-Score. Besides, the R square value of 0.948 signifies that the equation explains 94.8% of the M-Score.

Table XIV: Results of regression using TATA and M-Score

In order to further examine the relationship between each variable independently and M-Score, a covariance analysis with the software Eviews is presented. In Plate 4, the results of the analysis are presented. For every set of variables (two per set) the correlation, t-statistic and p-value of the t-statistic are shown. This matrix presents in short, the results mentioned above regarding the relationship of each and every of the eight variables with the M-Score. According to the findings, only TATA and SGI seem to have a significant relationship with earnings manipulation at 95% confidence level. In the other lines of the analysis the relationship and the significance between the variables are examined. Thus, AQI and DSRI variables seem to have a significant negative relationship since t-statistic is -3.645 and p-value 0.001 which is lower than significance level of 0.05. DEPI and DSRI also seem to have a significant relationship since t-statistic is 2.226 and p-value 0.03. The correlation value is 0.340 which implies a positive relation between the two variables. Plate 4 also shows that LVGI and SGI are positively related with correlation value of 0.630, t-statistic 5.003 and p-value 0.000. The last set of variables that seem to have a significant relationship according to the covariance analysis is SGAI and SGI. With a correlation value

of -0.541, t-statistic -3.963 and p-value of 0.00, there seems to be a significant negative relation between these two variables.

Covariance Analysis: Ordinary
Date: 12/08/19 Time: 14:16
Sample: 1 40
Included observations: 40

Correlation t-Statistic Probability Observations	AQI	DEPI	DSRI	GMI	LVGI	M_SCORE	SGAI	SGI	TATA
AQI	1.000000 ----- ----- 40								
DEPI	-0.096219 -0.595899 0.5548 40	1.000000 ----- ----- 40							
DSRI	-0.509020 -3.645413 0.0008 40	0.339579 2.225551 0.0321 40	1.000000 ----- ----- 40						
GMI	-0.055986 -0.345662 0.7315 40	0.090412 0.559628 0.5790 40	0.250563 1.595469 0.1189 40	1.000000 ----- ----- 40					
LVGI	0.007011 0.043222 0.9658 40	0.059442 0.367074 0.7156 40	0.023598 0.145510 0.8851 40	-0.102943 -0.637970 0.5273 40	1.000000 ----- ----- 40				
M_SCORE	-0.124367 -0.772651 0.4445 40	-0.105705 -0.655284 0.5162 40	0.167236 1.045637 0.3023 40	0.270004 1.728621 0.0920 40	0.064806 0.400333 0.6912 40	1.000000 ----- ----- 40			
SGAI	0.219571 1.387381 0.1734 40	-0.055206 -0.340835 0.7351 40	0.182762 1.145922 0.2590 40	0.131550 0.818041 0.4184 40	-0.130196 -0.809473 0.4233 40	-0.179434 -1.124356 0.2679 40	1.000000 ----- ----- 40		
SGI	-0.246252 -1.566230 0.1256 40	-0.212422 -1.340037 0.1882 40	-0.181828 -1.139863 0.2615 40	-0.218155 -1.377988 0.1763 40	0.630154 5.002802 0.0000 40	0.309927 2.009466 0.0516 40	-0.540811 -3.963392 0.0003 40	1.000000 ----- ----- 40	
TATA	-0.034731 -0.214226 0.8315 40	-0.160683 -1.003556 0.3219 40	0.023433 0.144490 0.8859 40	0.162824 1.017293 0.3154 40	-0.023190 -0.142993 0.8871 40	0.973820 26.40796 0.0000 40	-0.120632 -0.749093 0.4584 40	0.223101 1.410845 0.1664 40	1.000000 ----- ----- 40

Plate 4: Covariance Analysis between variables and M-Score

CONCLUSIONS

Conclusion

Companies have and will always try to find ways to prettify their financial statements and their earnings potential in order to appeal to all stakeholders. Their survival and prosperity depends on the funds from investors, their ability to borrow funds with low interest rate and the satisfaction of their customers. Therefore, when companies go through less profitable or even loss periods, they feel the pressure to seek alternative and sometimes even illegal ways to cover up less favorable financial results. The act of purposefully misstating a company's financial information in order to present a misleading and rather favorable financial image is considered as financial statement fraud.

This study is based on Beneish model and the total sample is ultimately made up of 40 publicly listed companies in the General Index of Athens Exchange Stock Market. After calculating the M-Score for each company, it was found that 33 (out of 40) companies had a M-Score value lower than -2.22 and thus are categorized as non-manipulators. More specifically, 82.5% of the sample is considered rather unlikely to conduct earnings manipulation whereas 17.5% of the companies listed in the General Index of Athens Stock Exchange Market is likely to manipulate its earnings.

In order to examine the significance of every variable independently in relation to M-Score which represents Beneish model, least squares regression is formed. The same formula is reiterated for each and every of the eight variables. With t-statistics values of 26.408 and 2.010 respectively it was found that TATA and SGI variables have a significant relation with the M-Score.

A covariance analysis between the eight variables and M-Score was calculated in order to examine the significant relationship between them. Thus, AQI and DSRI, SGAI and SGI variables seem to have a significant negative relationship whereas DEPI and DSRI, LVGI and SGI seem to have a significant positive correlation.

Even though Beneish model examines the probability of financial statement fraud due to earnings management and this study's results regarding seven potential company manipulators are significantly important, the information should be treated very carefully. Beneish model offers a probability of financial fraud and should be therefore used as a supplementary test for auditors, fraud examiners and official regulators. Further evidence is needed before a company can be called responsible for conducting financial fraud due to earnings management. However, M-Score model is a cheap and convenient way for auditing services to serve as an early indication of probable fraudulent action in a company.

Discussion for Future Studies

Beneish model can be applied to all companies except for those related to financial services. Therefore, more research could be focused on achieving accuracy of the model for financial institutions. In this study, all the banks and credit institutions were left out of the sample due to the fact that M-Score cannot provide reliable results when applied on similar companies.

There could also be more research on examining companies that are included in other indexes. This study, uses a sample of the companies that make up the General Index of Athens Stock Exchange Market in 2017-2018. However, the same model could be applied to all publicly traded companies that might belong to other indexes such as Mid cap, large cap or small cap indexes.

In order to test the accuracy and the significance of the results, another model or formula can be used for the same sample and the same period. There are already plenty of models in academic literature that study ways so as to predict the possibility of financial statement fraud. Some studies are based on linear regression while some others use more modern methods of examining a company's financial position such as neural networks or artificial intelligence. Thus, there could be a reiteration of the same sample using another model in order to compare and verify the outcome.

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