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USING BENEISH MODEL TO DETECT CORPORATE FINANCIAL STATEMENT FRAUD IN GREECE

1. Introduction

Financial statement fraud continues to be significant problem for businesses of all sizes. It used to be that the biggest problems with fraudulent statements were found in smaller companies but that before Enron, Worldcom, Tyco, Adelphia, Xerox and Parmalat.

The generally accepted definition of financial statement fraud is "the *deliberate misrepresentation* of the financial condition of an enterprise accomplished through the *intentional misstatement* or *omission* of amounts or disclosures in the financial statements in order to *deceive* financial statement users".

Financial statement fraud is like all occupational frauds in some ways. Perpetrators have motivation and opportunity, and are able to rationalize their actions. So, the analysis of financial statement frauds falls into the three points of the Fraud Triangle developed by Donald Cressey (1973). Motivation, opportunity and rationalization in financial statement fraud show up as: a)situational pressures that motivate management to commit fraud, b)perceived opportunity to commit and conceal the dishonest act and c)some way to rationalize the act as justifiable.

But while most economic fraud is undertaken solely to enrich the perpetrator, financial statement fraud is often committed out of other desires than purely for self-enrichment. Owners or managers of companies falsify accounting entries to further the interest of the company itself.

Management may be motivated to commit financial statement fraud to maintain their own status, obtain higher stock prices, demonstrate compliance with financing covenants, meet company projections and investor expectations, obtain financing or obtain more favorable terms on existing financing.

Financial statement fraud is estimated to occupy 9% of all occupational frauds, in ACFE *Report to the Nations 2014*, with a median loss of $ 1 million. Because the maintenance of financial records involves a double-entry system, fraudulent accounting entries usually affect two accounts and therefore, at least two categories on the financial statement.

Financial statement fraud schemes fit into five broad classifications:

- Fictitious revenues,

- Timing differences,

- Concealed liabilities and expenses,

- Improper disclosures,

- Improper asset valuation.

The main challenge faced by financial statement researchers is that are not always able to observe, or measure the earnings management. The Beneish model, or Beneish M-Score, is a useful tool to detect financial statement fraud and earnings manipulation.

The next section of the paper provides a previous research discussion, while section 3 describes the data and the methodology. Section 4 presents the empirical results and finally, section 5 provides some concluding remarks.

2. <u>Previous Research</u>

Management sometimes exploits the quest of shareholders for higher return on equity capital, by taking advantage of accounting rules gaps or violating them (Curtis and Thalassinos, 2005).

Beneish model (Beneish, 1999), is a mathematical model created by Professor Messod Daniel Beneish who has formulated several analysis ratios and eight variables to identify occurrence of financial fraud or tendency to engage in earning manipulation. Later, Beneish and Nichols (2009), explain further to determine the probability of financial statement fraud using two alternative fraud detection models that involve five variables and eight variables.

The analysis of the financial statement requires at least two period of financial reporting to detect unusual event. An M-Score of less than -2.2 suggests that the company will not be a manipulator. An M-Score of greater than -2.2 signals that the company is likely to be a manipulator. It is interesting to note that in testing out his model, Beneish (1999) used all the companies in the Compustat database between the years 1982-1992. Data consisted of 74 firms that manipulated earnings and 2,332 non-manipulators matched by industry. On average, manipulators were smaller, less profitable, more levered and experienced faster growth than industry controls. This model is a cost-effective tool. Beneish et al., (2011) used also a probit model to calculate the chance of earning manipulation for a given financial report, hence the often cited denotation *Beneish probit model*.

Most false financial statements in Greece can be identified on the basis of the quantity and content of the qualifications in the reports filed by the auditors on the accounts (Spathis, 2002). Spathis (2002), used univariate and multivariate statistical techniques, such as logistic regression, to develop a model to identify factors associated with false financial statements. The model is accurate in classifying the total sample (76 firms, including 38 with false financial statements and 38 non false financial statements) correctly with accuracy rates exceeding 84%. Also, in Greece results indicate that, despite the detailed accounting regulation, creative accounting is practiced frequently, especially the legitimate one and to a considerable extent (Baralexis, 2004). As for the direction of earnings management, the large companies overstate profit, the overriding motive being the demand for external financing while the small companies understate profit in order to reduce income taxes.

Tax evasion reduces tax compliance and Value Added Tax Efficiency in Greece especially since the start of 2009 when the contraction of Greek economy accelerated

(Tagkalakis, 2014). This requires strengthening tax enforcement mechanism to combat tax evasion by using techniques to detect fraudulent financial statements.

In Greece, tax accounting and financial accounting coincide and it is expected that tax considerations will influence management's accounting policy decisions (Bellas and Tzovas, 2008). The level of dependency of Greek industrial firms on bank financing might affect accounting policy decisions of firms and prompt them to deviate from a tax-reducing policy.

There is only one study about Greek firms, using Beneish model. Based on Beneish model, during the massive equity fund raising in Athens Stock Exchange for the period 1999-2000, financial statement interventions were used by the management in order to accomplish the desired results, which was to "prettify" economic data and make prices of their stocks look attractive in the upcoming capital increase (Curtis and Thalassinos; 2005).

3. Data and Methodology

The Beneish earning detection manipulation model is an attempt to reveal illegal or at least unethical practices. Beneish model is a useful tool that credit department of banks and official bodies which supervise firms in Greece can use to protect their interests and investors from speculative games, and ensure smooth operation and efficient capital allocation in economy. In present study, is used the Beneish Model (1997; 1999). Beneish model is followed with the eight variables forms, as below:

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

Where:

- DSRI: days sales in receivable index (CY AR/sales)/(PY AR/sales).
- GMI: gross margin index ((PY sales − PY cost of sales) / PY sales) / ((CY sales − CY cost of sales) / CY sales).
- AQI: asset quality index (1 − (CY CA + CY Net FA)/CY TA)) / (1 − (PY CA + PY Net FA) / PY TA)).
- SGI: sales growth index (CY Sales/PY Sales).
- DEPI: depreciation index (PY DE / (PY DE + PY Net PPE)) / (CY DE/(CY DE + CY Net PPE)).
- SGAI: selling, general and administrative expenses index (CY SG&A/CY Sales) / (PY SG&A/PY Sales)
- LI: leverage index ((CY LTD + CY CL) / CY TA)) / ((PY LTD + PY CL)/PY TA)).
- TATA: total accruals to total assets index ((CY WC − PY WC) - (CY Cash − PY Cash) + (CY Income Tax payable − PY Income Tax payable) + (CY Current LTD − PY Current LTD) − CY DE)) / CY TA.

and:

- CA = current assets.
- CY = current year or current period.
- DE = depreciation expense.
- FA = fixed assets.
- GM = gross margin.
- LTD = long-term debt.
- PPE = property, plant and equipment.
- PY = prior year or prior period.
- SG&A = selling, general and administrative.
- TA = total assets.
- WC = working capital (current assets – current liabilities).

This model initially consists of eight ratios that capture either financial statement distortions that can result from earnings manipulation (DSR, AQI, DEPI and Accruals) or indicate a predisposition to engage in earnings manipulation (GMI, SGI, SGAI, LEVI). The predictive ratios focusing on financial statement distortions capture unusual accumulations in receivables (DSR, indicative of revenue inflation), unusual expense capitalization and declines in depreciation (AQI and DEPI, both indicative of expense deflation), and the extent to which reported accounting profits are supported by cash profits (Accruals).

Each one of above indexes may show manipulation in financial statements of a company:

a) DSRI (Days' Sales in Receivables Index): A large increase in accounts receivables as a percentage of sales might indicate an overstatement of accounts receivables and sales to boost earnings.

b) GMI (Gross Margin Index): Firms with weaker profitability a more likely to engage in earnings manipulation.

c) AQI (Asset Quality Index): An increase in the proportion indicates increased efforts to defer costs.

d) SGI (Sales Growth Index): The need for low-cost external financing might motivate sales manipulation.

e) DEPI (Depreciation Index): Slowing of the rate of depreciation and thereby increasing earnings.

f) SGAI (Selling, General and Administrative Expenses): larger or equal to 1 indicates increased marketing expenditures and expected increased sales.

g) TATA (Total Accruals to Total Assets): Indicates the volume of earnings resulting from accruals instead of from cash.

h) LVGI (Leverage Index): Increase in the proportion of debt might entail a violation of debt covenants.

It's possible to use the various component calculations to find unusual anomalies in receivables, unusual expense capitalization, declines in depreciation and charges in gross profits. The model also provides a general benchmark to use when comparing various

indices within the formula. For all components, with the exception of TATA (total accruals to total assets index), the general benchmark is *one*, while the benchmark for TATA is *zero*.

Fraud, by its nature, is easy to conceal and difficult to detect (Wells, 2001). An entity that manipulates its earning only once might avoid discovery altogether. But manipulating financial statements is usually a continuous process that grows and deepens.

Examining historical data is a requisite factor in deterring, detecting, preventing, investigating and prosecuting fraudulent financial statement activity. To calculate research variables, was used information of financial statements of firms from ICAP Group data bank for years 2011 and 2012. Financial statements of banks are excluded. ICAP Group is the largest business services group in Southeastern Europe, founded in 1964 and Coface, one of the world's largest Credit Insurers and Business Information providers, is its minority shareholder.

The explanatory variables in the model are primarily based on year-to-year changes and in addition, there were cases where the denominator of the Asset Quality Index variable was zero as assets in the reference year (period t-1) consisted exclusively of current assets and property, plant and equipment. Since in such cases the Asset Quality Index was not defined, its value set to one (its neutral value) instead of treating the observation as missing. Similarly, the Depreciation and SGA indices set to values of one, when elements of the computation were not available on the database.

To examine the effects of independent variables on Beneish Model score simultaneously for manipulators companies, a multiple regression of the formula is used based on regression coefficients and t-values.

Also, the significance and correlation of each one of the eight variables with Beneish M-Score is examined, testing eight hypotheses based on correlation coefficient and ordinary least square regression.

4. **Empirical Results**

Descriptive statistical data derived from analysis of all 25,468 companies, *Société Anonyme* and *Limited Liability Companies*, that publish annual financial statements for years 2011 and 2012, are presented in Table 1.

Table 1. Descriptive statistics of all companies (N=25,468)

	Mean	Median	Standard deviation	Minimum	Maximum
DSRI	6.307005	1	373.885075	0	55.033,23186
GMI	1.521876	1	79.616357	-1,173.18176	12,450.75809
AQI	-4.625327	0.995276	901.788986	-139,993.600	10.690,93457
SGI	2.092087	0.925909	55.903501	0	6,414.34
DEPI	1.666750	1	20.330823	0	1,897.787793
SGAI	1.698429	1	54.191022	0	8,458.556426
TATA	-0.057108	-0.042284	1.066169	-42.887483	142.828154
LVGI	1.902857	0.982862	25.584076	0	2,246.671005
Beneish	0.773607	-2.628087	505.315787	-56,560.8844	50.627,4941

By calculating Beneish Model, results show that 8,486 companies or 33% of the whole sample has a greater than -2.2 score, which is a signal that companies is likely to be manipulators (Table 2). Beneish M-Score for the rest of companies, 16,982 or 67% of the whole sample is less than -2.2 (Table 3).

Table 2. Descriptive statistics of manipulators (N=8,486)

	Mean	Median	Standard deviation	Minimum	Maximum
DSRI	16.971958	1.175714	647.646712	0	55,033.23186
GMI	3.821084	1	136.746963	-399.174768	12,450.75809
AQI	4.671279	0.862974	128.627334	-0.000004	10,690.93457
SGI	4.491503	1	96.772983	0	6,414.34
DEPI	2.823397	1	35.168149	0	1,897.787793
SGAI	1.550060	1	13.118372	0.000452	973.67604
TATA	0.142519	0.069701	1,630157	-17.797285	142.828154
LVGI	1.424618	0.989848	25.694919	0	2,246.671005
Beneish	18.944430	-1.234331	608.126668	-2.219968	50,627.49417

Table 3. Descriptive statistics of non-manipulators (N=16,982)

	Mean	Median	Standard deviation	Minimum	Maximum
DSRI	0.978579	1	0.473779	0	10.532762
GMI	0.373107	1	12.641101	-1,173.1817	10.348658
AQI	-9.270673	1.034241	1,100.585584	-139,993.600	43.444194
SGI	0.893309	0.898074	1.933814	0	243.493670
DEPI	1.088877	1	0.987714	0	64.492928
SGAI	1.772599	1	65.713207	0	8,458.556426
TATA	-0.156858	-0.084142	0,589254	-42.887483	4.554527
LVGI	2.141858	0.980056	25.526668	0	1,976.245079
Beneish	-8.305220	-3.044740	444.897207	-56,560.8844	-2.220249

To examine the effects of independent variables on Beneish model score simultaneously for manipulators companies, a multiple regression of the formula is used based on regression coefficients and t-values (Table 4). As a whole, using F-distribution, results show that at least one explanatory variable is significant in its effect on Beneish M-Score (H_1 hypothesis is accepted). Thus, based on regression coefficients and t-values, it is found that DSRI, AQI, DEPI, SGAI, TATA, LVGI, are significant at 99% confidence level. Most important indexes are DSRI and TATA because 1% increase in DSRI or 1% increase in TATA, is correlated with 0.92 increase and 4.679 increase respectively in Beneish M-Score.

Table 4. Multiple regression coefficients of Beneish model for manipulators (N=8,486)

	Coefficients	t-value
Constant	-4.84	-7.90939E+13
DSRI	0.92	9.90785E+15
GMI	0.528	1.20082E+15
AQI	0.404	8.64027E+14
SGI	0.892	1.43316E+15
DEPI	0.115	6.72596E+13
SGAI	-0.172	-3.75084E+13
TATA	4.679	5.46045E+13
LVGI	-0.327	-6.01333E+13
R^2 and Adjusted R^2		1
F		1.27929E+31

Also, in the present study, the following eight hypotheses are examined:

H_1: There is a significant relationship between DSRI and earning management.

H_2: There is a significant relationship between GMI and earning management.

H_3: There is a significant relationship between AQI and earning management.

H_4: There is a significant relationship between SGI and earning management.

H_5: There is a significant relationship between DEPI and earning management.

H_6: There is a significant relationship between SGAI and earning management.

H_7: There is a significant relationship between TATA and earning management.

H_8: There is a significant relationship between LVGI and earning management.

Earning management in the study is expressed as the Beneish M-score. To test the hypotheses, correlation coefficient and ordinary least square regression were used.

H_1: There is a significant relationship between DSRI and earning management.

Results of testing H_1 were studied using linear regression and are shown in Table 5. The model is significant at 90%, 95% and 99% confidence levels and there is a significant relationship between Days' Sales in Receivables Index (DSRI) and earnings management as expressed by Beneish score. So, H_1 is accepted and the equation explains 95.92 per cent of the variation in Beneish M-Score, in statistical terms.

Table 5. Results of the first hypothesis

	coefficient	t-value
Constant	3.335221	2.502577
DSRI	0.919659	447.018810
R^2	0.959272	

H_2: There is a significant relationship between GMI and earning management.

Results of testing H_2 were studied using linear regression and are shown in Table 6. The model is significant at 90%, 95% and 99% confidence levels and there is a significant relationship between Gross Margin Index (GMI) and earnings management as expressed by Beneish score. So, H_2 is accepted however, model R^2 is not significant.

Table 6. Results of the second hypothesis

	coefficient	t-value
Constant	16.989381	2.589716
GMI	0.511043	10.655366
R^2	0.013205	

H₃: There is a significant relationship between AQI and earning management.

Results of testing H$_3$ were studied using linear regression and are shown in Table 7. The model is significant at 90%, 95% and 99% confidence levels and there is a significant relationship between Asset Quality Index (AQI) and earnings management as expressed by Beneish score. So, H$_3$ is accepted however, model R^2 is not significant.

Table 7. Results of the third hypothesis

	coefficient	t-value
Constant	17.077141	2.594421
AQI	0.399246	7.806119
R^2	0.007131	

H₄: There is a significant relationship between SGI and earning management.

Results of testing H$_4$ were studied using linear regression and are shown in Table 8. The model is significant at 90%, 95% and 99% confidence levels and there is a significant relationship between Sales Growth Index (SGI) and earnings management as expressed by Beneish score. So, H$_4$ is accepted however, model R^2 is not significant.

Table 8. Results of the fourth hypothesis

	coefficient	t-value
Constant	15.048244	2.299054
SGI	0.866993	12.830675
R^2	0.019034	

H₅: There is a significant relationship between DEPI and earning management.

Results of testing H$_5$ were studied using linear regression and are shown in Table 9. The model is not significant so there is not a significant relationship between earnings management as expressed by Beneish score and Depreciation Index (DEPI). Thus, H$_5$ is rejected and alternatively null hypothesis is accepted. Model R^2 is not significant.

Table 9. Results of the fifth hypothesis

	coefficient	t-value
Constant	18.695730	2.822995
DEPI	0.087217	0.464583
R^2	0.000025	

H_6: There is a significant relationship between SGAI and earning management.

Results of testing H_6 were studied using linear regression and are shown in Table 10. The model is significant at 90%, 95% confidence levels and there is a significant relationship between Selling, General and Administrative Expense Index (SGAI). So, H_6 is accepted however, model R^2 is not significant.

Table 10. Results of the sixth hypothesis

	coefficient	t-value
Constant	17.239515	2.594138
SGAI	1.098350	2.182976
R^2	0.000561	

H_7: There is a significant relationship between TATA and earning management.

Results of testing H_7 were studied using linear regression and are shown in Table 11. The model is not significant so there is not a significant relationship between earnings management as expressed by Beneish score and Total Accruals to Total Assets (TATA). Thus, H_7 is rejected and alternatively null hypothesis is accepted. Model R^2 is not significant.

Table 11. Results of the seventh hypothesis

	coefficient	t-value
Constant	18.877883	2.848770
TATA	0.449635	0.111018
R^2	0.000001	

H_8: There is a significant relationship between LVGI and earning management.

Results of testing H_8 were studied using linear regression and are shown in Table 12. The model is not significant so there is not a significant relationship between earnings management as expressed by Beneish score and Leverage Index (LVGI). Thus, H_8 is rejected and alternatively null hypothesis is accepted. Model R^2 is not significant.

Table 12. Results of the eighth hypothesis

	coefficient	t-value
Constant	18.862402	2.852916
LVGI	0.055846	0.217345
R^2	0.000005	

5. Final Discussion, Conclusions and Policy Recommendations ή Concluding Remarks

Financial statements information influence credit decisions of banks because debt agreements include terms based upon accounting numbers. This paper investigated empirically the eight variables Beneish M-model, to identify occurrence of financial statement fraud or tendency to engage in earning manipulation. A data set of 25,468 companies (*Société Anonyme* and *Limited Liability Companies)* in Greece was analyzed during two years period 2011 – 2012. Financial statements of banks are excluded.

The results showed that 8,486 companies or 33% of the whole sample has a greater than -2.2 score, which is a signal that companies is likely to be manipulators. Also, for manipulators, results using F-distribution showed that DSRI, AQI, DEPI, SGAI, TATA and LVGI are significant at 99% confidence level in its effect on Beneish M-Score. Also there is a significant relationship between earning management, as expressed by Beneish M-Score and each one of variables, DSRI, AQI, GMI, SGI, SGAI, LVGI. Most of all, DSRI (Days' Sales in Receivables Index) explains 95.92 per cent of the variation in Beneish M-Score, in statistical terms.

Researchers should be cautioned, though, that no one irregularity is a sign of financial statement manipulation. With more available data we should carefully observe patterns over a longer period of time.

Although a new revolution has taken us by evolving strategies, data-mining techniques and powerful software, using a tool like Beneish Model, it's a cheap and easy way for examiners of possible fraudulent activity. Given how easy it is to calculate and its accuracy in predicting earnings manipulation, there really is no excuse for not considering it.

Findings have important implications not only for banks but also for users of Greek accounts, especially to investors, auditors, regulators, to taxation and other state authorities.

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