"Detecting false financial statements: evidence from Greece in the period of economic crisis"

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DETECTING FALSE FINANCIAL STATEMENTS: EVIDENCE FROM GREECE IN THE PERIOD OF ECONOMIC CRISIS

Abstract

The purpose of this study is the examination of the financial fraud in Greek companies, listed on the Athens Exchange for the period of 2008–2015 during the economic crisis in Greece. The data of all the listed companies that were used comprise financial statements, reviews in the reports by the auditors and the figures and information based on the reports of the Athens Exchange. A total of twelve companies were found and they comprise the primary research sample with fraud in their financial statements (FFS), while another twelve companies were employed as a control sample (non-FFS) for various comparisons. From thirty financial ratios, several statistical tests to the sample and the control sample are applied in order to create a model that will use ratios as "predictors" in the analysis of financial statements for fraud. The model is accurate in classifying the total sample correctly with accuracy rates exceeding 90 percent. Theresults demonstrate that the model functions effectively in detecting FFS in a period of economic crisis and could be used as a tool to the banking system, from internal and external auditors and taxation or other state authorities.

INTRODUCTION

The markets and societies of modern times are characterized by the phenomenon of globalization of markets and capitals, intense competition, inequality and high concentration of funds by large financial units. In recent years, a financial crisis spread rapidly in developed countries around the world and even more cases of accounting fraud through falsification of the financial statements are revealed (Zarzeski, 1996). The beginning of the crisis started in the US in 2007 with the outbreak of the financial crisis. The high-risk doubtful debts and inability to service mortgage loans, constituted the main elements of the financial crisis which subsequently led to a global recession and recently threatened most European countries (Pantelidis et al., 2014). There are three main factors that comprise the range of the crisis: a) the fall of the prices in the real estate in the US naturally led to over-consumption causing exaggerated activities in the economy and increasing the current account deficit, b) the rapid spread of subprime mortgages and uncontrolled lending capital to businesses and households, c) finally, the transfer of risk from bank's balance sheets to the public and investors through securitization.

Nowadays, Greece is in the midst of an international economic crisis. In autumn 2008, the global economic crisis affected the Greek economy. There was a rapid growth in both the deficit and debt. In January

2009 the credit rating agency Standard & Poor's raised the country's borrowing costs by downgrading the long-term credit rating of Greece from A to A–. The Greek government has been unable to borrow at reasonable interest rates from the markets so as to finance the current budget deficit and refinance the debt. As a result, the 'risk of bankruptcy and default' of the Greek government approached. In 2010 the European Commission issued a report on the 'Statistics of Debt and Deficit' of the Greek government, which pinpoints the "deliberate false data reporting" problems and expressed some additional doubts about the accuracy of the information beyond the latest revision of October 20, 2009. We refer to the year that the country resorted to the 'support mechanism'. The International Monetary Fund, the European Union and the European Central Bank set up this mechanism.

During this period of the economy, with the third memorandum in progress, the Greek companies despite the size and industry were faced with a multitude of complex financial problems (Georgantopoulos & Filos, 2017). These problems are related to the lack of liquidity, which constitutes the main factor that can lead them to failure (Pantelidis et al., 2014). Businesses used all possible means to face new challenges with less cost, but also created new opportunities that would help them to survive and thrive in this changing world (Giovanis et al., 2016). In their effort to survive, some of the companies resorted to falsification of the financial statements, accounting tricks and various methods incompatible with the principles methods, which govern the establishment of financial statements, by aiming to glamorize their results.

In Greece, as a control mechanism, the International Standard on Auditing–ISA 240 is valid which refers to the falsification of financial statements that can arise from either fraud or error. The distinction between fraud and error lies in the voluntary or involuntary action that leads to error. The term "fraud" means: a) distortion of falsification of compliance data and documents, b) embezzlement of assets, c) concealment or omission of transactions, d) listing of virtual trade in books, and e) misappropriation of accounting policies. The unintentional errors in the financial statements, such as: a) mistakes in figures in basic accounting entry and accounting information, b) oversights or misinterpretations of events, and c) misuse of accounting policies, are reflected in the term 'error'.

Also, International Accounting Standards (IAS) are adopted from all listed Greek companies, while the IAS 8 is designed to determine the classification, disclosure and accounting treatment of certain economic events (data of the income statement), so as to achieve the comparability not only with the entity's financial statements of previous years, but also with those of other businesses. Such elements are: a) profit or loss from ordinary activities, b) extraordinary items, and c) the accounting of changes in accounting estimates, the basic errors and accounting methods.

The falsification of the financial statements (FFS) refers in general to the manipulation of business assets, which are recorded in their books. In particular, overvaluation of assets, sales, and profit or underestimation of liabilities, projections, expenses or losses are carried out in order to achieve the desired amount and result for their business image (Doukakis, 2010). The result of these manipulations is the alteration of the appearance of the financial statement (Iatridis & Rouvolis, 2010). To manage these falsifications, several methods have been used, which are indicated as creative or imaginative accounting (Baralexis, 2004).

Such cases of accounting fraud or deception of investors through publishing data that does not correspond to the reality, have been detected in Greek listed companies on the Athens Exchange. In response to these circumstances, an extensive debate has been initiated about the falsification of financial statements issue and how this phenomenon is related to the developments in the stock market, the role of auditing companies and the application of International Accounting Standards (Pazarskis et al., 2014). The falsifications of financial statements were primarily aimed to reduce profits and as a consequence the reduction of the corresponding tax through an inflation of costs (Iatridis & Rouvolis, 2010). This three particular factors: a) the entry of many companies to the Stock Exchange in previous years, b) the increased involvement of investors, and c) the economic crisis that exists in the business world in Greece

in combination with its negative effects, intensified the companies' efforts to focus on how they can increase their revenues and rapidly evolve so as to gain greater profits and attract more investors.

The aim of this study is the examination of the financial fraud with financial ratios of all listed Greek companies on the Athens Exchange for the period of 2008–2015 during the economic crisis in Greece. From the examined sample and financial ratios, a model is developed to identify factors associated with FFS in a period of economic crisis. Thus, the structure of the paper is as follow: Section 1 provides the relevant literature review. Section 2 describes the dataset and methodology of the research, while section 3 presents the empirical results. Final section provides the main conclusions of the study.

1. LITERATURE REVIEW

One initial research that utilizes the company's primary elements of tax audits carried out by Kanellopoulos (2002) and in conjunction with other economic variables assesses the extent and characteristics of fraud in business. The subject of this research is not only the estimation of tax evasion but also an empirical effort to assess multivariate models. Interpreting the survey' result, Kanellopoulos (2002) concluded that there are appreciable differences of evasions either measured as the tax audit or as the rate of tax compliance among sectors of economic activity. Kirkos et al. (2005) researched the effectiveness of data mining classification techniques to find the companies that issued falsified financial statements and the factors related to them. The three methods of data mining used are: decision trees, neural networks and bayesian belief networks. These methods concluded that the published figures of the financial statements contained falsified evidence.

According to Spatacean (2012), falsified financial information can be achieved with certain illegal acts, such as: manipulation of accounting documents, misrepresentation of events, transactions or other significant information and intentional misapplication of accounting principles. According to Zager et al. (2016) the most common technique that is used for falsifying financial statements-financial reporting is the overvaluation of assets (increased value of assets). Realizing the highly competitive business environment, Moisiadou et al. (2012) sought to cite an integrated framework, based on empirical data on the general categories of contraventions and their incidence on the financial statements of Greek enterprises; specifically, the biggest percentage of errors concern in provisions, such as: "projections for bad debts" and "projections for staff compensa-

tion due to retirement", or "projections for unaudited tax years" and "predictions for litigation cases".

Koumanakos et al. (2008) examined whether the certified auditor's reports in Greece associated with different levels of discretionary earnings manipulation (earnings management). The findings of this research are interesting for the Greek regulatory authorities. Despite the comprehensive and restrictive character of Greek law, it offers many opportunities for earnings manipulation in Greek businesses, either by exploiting IFRS weaknesses or by violating them. Furthermore, Spathis (2002) examined the effect of accounting fraud through falsification of financial statements by making an effort to evolve a disclosure falsifications model. The most common scheme that is used in falsifying financial statements includes income handling. A further form of manipulation on financial statements is the intentional manipulation of expenses. According to Spathis (2002) these falsifications could cause considerable damage and have significant impact on unions, customers, investors and finally could lead the business to an economic impasse. Baralexis (2004) researched the falsifying financial statements on the part of revenue management. The results demonstrate that "creative accounting" is used often, greatly and legitimately. According to Baralexis (2004), income manipulation is achieved by large companies in order to increase their profits while by small businesses in order to underestimate them. These findings have important implications for the users of financial statements, especially for investors, auditors and regulators.

According to Firth et al. (2010), the decline in stock prices, the cost of the increasing capital, the reduced access to capital markets and widening spreads are the main negative impacts of financial statements falsification, which mainly affect the

developed country's regions. Omoye and Eragbhe (2014) in their survey researched the main falsifications of financial statements concluding that investors and liquidity are at the top of the list. Kotsiantis et al. (2006) researched the effectiveness of techniques for identifying the companies issuing falsified financial statements. Furthermore, they identify factors associated with them, pointing out the importance of financial ratios. The results demonstrate that the published data of the financial statements contain various falsification indices.

The magnitude and complexity of the portfolio management's activities require the implementation and monitoring of adequate internal control over financial reporting. Tsipouridou and Spathis (2014) studied the relationship between the opinion of the auditors and the management of the company's profits. The survey results claim that the control mechanisms are weak and there is a high risk that the auditing process does not occur with transparency. In his research Spatacean (2012) focuses on the relationship between the effectiveness of internal control and the risk of the fraud. The survey results suggest that the more effective the internal audit on the financial statements is, the smaller the size of the falsification of the financial report that can be detected. In their study, Dimitropoulos and Asteriou (2009) examined how the information on accounting profit varies, depending on the size and composition of the listed company in the Greek capital board. Greece ranks among the poorest countries on indicators of financial ratios and governance transparency among European countries. Dunn (2004) examined falsified financial statements and concluded that this form of illegal business behavior is more likely to happen when there is a concentration of power in executive hands.

2. RESEARCH DESIGN

2.1. Sample selection

The survey sample in the empirical part of this study consists of all listed companies and the reporting period covers the years 2008–2015 (i.e., annual financial statements from the start of the economic crisis in Greece, the year 2008, up to the latest annual financial statements which are available, the year 2015). The sample of the survey composed

by twelve companies, which their financial statements auditors identified falsifications (FFS) and this was recorded in their reports. The falsifications were expressed in nineteen cases by the auditors with the types of audit opinion, according to the International Standard on Auditing-ISA 700, as "qualified", or in rare cases as "disclaimer" and "adverse" (Tsipouridou & Spathis, 2014). By controlling the sample of falsified businesses, 73 manipulations for the period 2008–2015 were reported. Afterwards, the falsifications were classified in "falsifications categories". A total of eight categories were created (Moisiadou et al., 2012). These categories are: Stocks, Debt instruments and Value Holdings, Costs, Asset Depreciation, Provisions, Long Term and Short Term Liabilities, Income and Other falsifications.

Afterwards, in order to complete the whole sample, the control sample was selected. It consisted of twelve companies without falsification in their financial statements (non-FFS). The determining selection factors of the control sample were: a) the companies which belong to the same industry with falsified businesses and b) total assets, turnover and the number of employees are equivalent to the size of the falsified businesses (according to the published data on the Athens Exchange's website). These selected factors (accounting data) in this survey were used in many studies in the relevant worldwide literature (Spathis, 2002). The ratios-variables that help in comparing the appropriate control sample and sample of falsification in financial statements are: operating revenue, total asset, P/L for period, shareholders' funds, cash flow (see Table 1 below: VAR_1 – VAR_5).

2.2. Ratios-Quantitative variables

The sample processing and examination of elements of financial statements in the study were carried out by ratios. Financial ratios provide useful information regarding the listed companies' falsifications of financial statements (Dunn, 2004; Kotsiantis et al., 2006; Koumanakos et al., 2008; Tsipouridou & Spathis, 2014; Kanapickiene & Grundiene, 2015). All the ratios that were used are presented and analyzed in the following table.

The selection of indexes was made so as to cover the four main categories of financial ratios (profitability, liquidity, activity, and capital structure)

Table 1. Classification of financial ratios

Variable	Ratio	Ratio analysis
Ratios sized companies (for sample & control sample comparison)		
VAR_1	Operating revenue	Net sales + Other operating revenues = Turnover
VAR_2	Total Assets	Total Assets
VAR_3	P/L for period	Profit or Loss for period = Net Income
VAR_4	Shareholders' funds	Shareholders' funds
VAR_5	Cash flow	Cash flow
Efficiency ratios		
VAR01	Profit margin	Profit / Sales
VAR02	Gross Margin	Gross profit / Sales
VAR03	EBITDA Margin	Profit before Interest, Taxes, Depreciation / Sales
VAR04	P/L before tax	Profit or loss before taxes
VAR05	ROCE using P/L before tax	Profit or loss before taxes / (Shareholders funds + Reserves + Long-term loans)
VAR06	ROCE using Net income	Net income / (Total Assets – short-term liabilities)
VAR07	ROA using P/L before tax	Profit or loss before taxes / Total Assets
VAR08	ROE using P/L before tax	Profit or loss before taxes / Stakeholders Equity
VAR09	EBIT Margin	Profit before interest and taxes / Sales
VAR10	ROE using Net income	Net Income / Stareholders' Equity
VAR11	ROA using Net income	Net Income / Total Assets
Liquidity ratios		
VAR12	Current ratio	Current assets / Current Liabilities
VAR13	Liquidity ratio	(Current assets – Stocks) / Current Liabilities
Activity ratios		
VAR14	Net assets turnover	Sales / (Shareholders Funds + Non-current liabilities)
VAR15	Collection period	(Debtors / Sales)*360
VAR16	Credit period	(Creditors / Sales)*360
VAR17	Stock turnover	Net sales / Stocks
VAR18	Cash flow / Operating Revenue	Cash flow / Operating Revenue
VAR19	Enterprise value / EBITDA	Enterprise value / EBITDA
VAR20	Export revenue / Operating revenue	Export revenue / Operating revenue
Capital structure ratios		
VAR21	Solvency ratio (Asset based)	Shareholders' Funds / Total assets
VAR22	Solvency ratio (Liability based)	Shareholders' Funds / Total liabilities
VAR23	Gearing	Long term debt / Shareholders Funds
VAR24	Shareholders Liquidity ratio	Shareholders' funds / (long-term liabilities + risk provisions & expenses)
VAR25	Interest cover	Earnings before interest and taxes / Interest expenses

(Kanapickiene & Grundiene, 2015). Using the above ratios, the financial statements of listed companies in the sample will be compared and evaluated. Specifically, for the period 2008–2015, all Greek listed companies with falsification are examined and analyzed with the use of these ratios and then they are compared to the corresponding companies in the sector (respectively per year) which present no falsification in their financial statements.

The financial data of enterprises, financial statements and reports of auditors, are pooled data from published financials statements of businesses on their websites, as well as EC's data and information based on the Athens Exchange page. Finally, some other data were drawn from the library's database of the University of Macedonia and Technological Education Institute of Central Macedonia.

2.3. Methodology

To research the relationship between the sampled companies with falsification and companies without falsification the mean of all the thirty ratios should be calculated. Initially, the comparisons of the average ratios (more specifically, the comparisons of the average of two independent samples mean t-test) of the first five variables show us whether there is a relationship between the selected sample and the appropriate control sample, where

and how they significantly differ from each other (i.e., in which ratios). Subsequently, the comparisons of the remaining twenty five ratios average show us if there are major differences in mean values of the sample ratios (companies with falsifications) and the control sample. The statistically high significance of these ratios is possibly related to the manipulation in the financial statements of businesses.

Last, the logistic regression analysis as a statistical method (DeMaris, 1992; Menard, 2002) is applied for the detection of FFS. Thus, the following logit model was formulated using financial ratios from the firms to see which of the ratios were related to FFS. By including the data set of FFS and non-FFS the study try to find out what factors significantly influence the firms with FFS (Spathis, 2002):

$$E(y) = \frac{\exp(\beta_o + \beta_1 \cdot x_1 + \beta_2 \cdot x_2 + ... + \beta_n \cdot x_n)}{1 + \exp(\beta_o + \beta_1 \cdot x_1 + \beta_2 \cdot x_2 + ... + \beta_n \cdot x_n)}, (1)$$

where $y = 1$ if FFS firm occurs; $y = 0$ if non-FFS firm occurs; $E(y) = p(\text{FFS firms occurs}) = \prod$; $\prod$ – denotes the probability that $y = 1$; β_0 – the intercept term; β_1, β_2, ... β_n – the regression coefficients of independent variables; x_1, x_2, ... x_n – the independent variables.

Thus, the model is presented as:

$$FFS = b_o + b_1(VAR01) + b_2(VAR02) + ... + b_{25}(VAR25) + e, \quad (2)$$

where $FFS = 1$ if FFS discovered group, 0 otherwise.

3. RESULTS

Primary results concerning the falsification of the financial statements in Greek companies are drawn, as the falsifications that were identified in the sample are analyzed. The 73 falsifications that were found in the sample were classified into eight categories (table2). The above analysis shows that the provisions are the first form of falsification with a rate of 24.67% and then the long-term and short-term liabilities of the corporation follow with 20.55%. This classification showed that the highest percentage of falsifications concerned the projections accounts and the industry that is more prone to falsification is the manufacturing industry. Moisiadou et al. (2012) have reached the same conclusion in their research.

Table 2. Analysis of falsifications in categories

Categories falsification	Falsification Number	Percentage
Inventories	9	12.33%
Holding Value and Debt instruments	3	4.10%
Expenses	7	9.59%
Assets Depreciation	10	13.70%
Provisions	18	24.67%
Long-term and short-term liabilities	15	20.55%
Revenues	8	10.96%
Other falsifications	3	4.10%
Total	73	100.00%

Furthermore, we have five ratios that are considered important for the comparison of characteristics of the sample and the control sample. These ratios are: total asset, operating revenue, cash flow, shareholders' funds, P/L for period (VAR_1 – VAR_5). From

Table 3. Comparison results (t-tests) of characteristics of FFS and non-FFS

Variables	Mean FFS	Mean non-FFS	Std dev. FFS	Std dev. non-FFS	t-value	p-value	95% CI
VAR_1	422136	553709	1489083	2167493	–0.21	0.836	113532; 1150386
VAR_2	1272363	277506	3996673	858666	0.85	0.413	1581256; 3570971
VAR_3	–27217	–8808	56444	26690	–1.20	0.245	–50496; 13678
VAR_4	404985	123058	1443204	426719	0.66	0.522	–650527; 1214381
VAR_5	7738	–3814	78513	13868	0.54	0.595	–34298; 57402

Note: ***,**,* indicate that the change of the mean is significantly different from zero at a significance level of 0.01, 0.05, and 0.10, respectively, as calculated by comparing the average of two independent subassemblies (two independent sample mean t-tests) at ratios of sample. More specifically, for the three above cases the classification levels relative to the value of the p-value are the following: p < 0.01 as strong evidence against Ho (see. on, ***); 0.01 ≤ p <0.05 moderate evidence against Ho (see. on, **); 0.05 ≤p <0.10 minimum evidence against Ho (see. on *); 0.10 ≤ p no real evidence against Ho.

Table 4. Comparison results (t-tests) of ratios from FFS and non-FFS

Variables	Mean FFS	Mean non-FFS	Std dev. FFS	Std dev. non-FFS	t-value	p-value	95% CI
VAR01	−20.0	−6.1	20.0	22.5	−1.67	0.111	−31.32; 3.50
VAR02	1.4	18.6	31.5	31.9	−1.53	0.137	−40.4; 5.9
VAR03	−7.4	−2.1	19.3	24.8	−0.60	0.556	−23.60; 13.07
VAR04	−23030	−4546	43727	16188	−1.51	0.152	−44621; 7652
VAR05	−49.5	−6.6	77.4	45.3	−1.38	0.211	−116.5; 30.8
VAR06	−38.3	−8.3	44.7	42.4	−1.53	0.158	−73.7; 13.8
VAR07	−15.3	−1.6	16.8	11.6	−2.56	0.019**	−25.01; −2.49
VAR08	−152	−10.4	282	55.0	−1.40	0.203	−379; 97
VAR09	−14.3	−7.0	6.6	26.1	−0.79	0.439	−26.30; 11.86
VAR10	−88	−13.0	133	52.4	−1.84	0.088*	−162.2; 12.9
VAR11	−18.9	−3.1	12.5	10.1	−4.13	0.000***	−23.62; −8.00
VAR12	0.59	1.682	0.507	0.967	−4.33	0.000***	−1.609; −0.575
VAR13	0.363	1.124	0.391	0.835	−3.52	0.002***	−1.206; −0.316
VAR14	1.88	8.6	2.68	32.0	−0.91	0.376	−22.26; 8.82
VAR15	331	177	326	233	1.47	0.158	−65; 373
VAR16	145	149	125	275	−0.06	0.954	−159.0; 150.4
VAR17	2.13	5.68	2.30	4.24	−3.05	0.005***	−5.93; −1.17
VAR18	−10.1	−4.9	15.8	21.5	−0.68	0.505	−21.20; 10.84
VAR19	37.8	12.2	51.4	14.4	0.98	0.398	−57.3; 108.5
VAR20	34.3	15.0	43.0	28.1	1.42	0.173	−9.2; 47.7
VAR21	−2.4	42.0	40.2	28.7	−3.43	0.003***	−71.4; −17.4
VAR22	25.9	50.2	24.3	42.4	−1.41	0.184	−61.9; 13.3
VAR23	280	64.8	272	54.1	2.21	0.062**	−14.7; 444.7
VAR24	−0.46	3.80	2.66	4.22	−3.50	0.002***	−6.75; −1.77
VAR25	−9.1	2.75	13.9	9.57	−2.31	0.041**	−23.06; −0.56

Note: ***, **, * rejection of the null hypothesis at a significance level of 0.01, 0.05, 0.1, respectively.

the obtained results of comparisons we observe that the main indexes were not affected significantly. Therefore, the sample and the control sample do not vary significantly between the above five selected indexes. Thus, there is no relation between the chosen sample and the control sample.

Then, the research progresses in the audit of twenty five ratios covering the range of four major categories of ratios regarding: the profitability, the liquidity, the capital structure and the cash flow. The audit of mean values with statistical analysis showed that ten out of twenty-five ratios are affected significantly (see Table 4). Specifically, the ratios VAR07, VAR10 and VAR11 that measure the efficiency of companies are the variables that significantly influenced more and companies without falsification in their financial statements present better results. The following ratios are VAR12 and VAR13 that count the liquidity of companies. These ratios are significantly associated with the likelihood of falsification of companies' financial statements. Once again, companies

without falsification exhibit better results. Finally, the activity ratio VAR17 and the capital structure ratios VAR21, VAR23, VAR24 and VAR25 are significantly associated with the likelihood of falsification and in these cases companies' rates without falsification have better results than companies with falsification.

As the inferences of the analysis showed that ten of the twenty-five ratios are statistically significant, this could reveal the manipulation in the financial statements. In particular, the averages of these financial ratios were outperformed in businesses without falsification in their financial statements rather than those with falsification (Tsipouridou & Spathis, 2014). The problem of corporations' efficiency, namely the capacity of the profits seems to be a motive for falsifying financial statements. The evaluation of the financial ratios' efficiency could help to detect falsification. The ratio VAR11 that measures the efficiency of invested capital is statistically significant ($p < 0.000$) and is associated with the likelihood of falsification existence in

Table 5. Stepwise logistic regression results of FFS and non-FFS

Independent variables	Unstandardized coefficient	S.E.	Sig.
VAR11	−0.02142	0.00904	0.030**
VAR12	−0.178	0.103	0.101
VAR23	0.0010	0.000362	0.013**
VAR25	0.0228	0.0116	0.066*
Constant	0.262	0.197	0.201
χ^2	17.40		0.000
R_L^2	0.675		
N	22		
Correctly predicted:			
FFS	83.33%		
non-FFS	93.75%		
Overall	90.91%		

Note: ***, **, * rejection of the null hypothesis at a significance level of 0.01, 0.05, 0.1, respectively.

the financial statements (Spathis 2002; Kirkos et al., 2005; Tsipouridou & Spathis, 2014; Omeye & Eragbhe, 2014). Also, the ratio VAR07 is used to determine the efficiency of the capital invested in conditions of gains or losses before taxes and shows significance ($p < 0.05$) in falsifying financial statements. The ratio VAR10 measures the performance of equity and is significantly associated with the probability of falsification ($p < 0.1$). The index number that measures the level of efficiency of the enterprise VAR17 ($p < 0.01$) is influenced significantly and could reveal falsifying in financial statements. The ability of businesses to fulfill their current liabilities and the determination of the short-term economic position is reflected in the ratios VAR12 and VAR13 ($p < 0.01$) which are significantly associated with the likelihood of fraud in the financial statements (Omeye & Eragbhe, 2014). Finally, ratios VAR21 and VAR24 ($p < 0.05$) estimate the long term ability of businesses to fulfill their obligations and the level of investor protection as well as the ratios of leverage VAR23 (Spathis 2002; Kirkos et al., 2005; Kanapickiene & Grundiene, 2015) and the ratio of coverage of interest VAR25 (Omeye & Eragbhe, 2014) formed with $p < 0.1$ and are significantly affected by the existence of falsification in financial statements, with the means of companies without falsification having better results.

Subsequently, as the univariate tests provide valuable information regarding a large number of variables over a sample, the results should be viewed cautiously. Every possible case of falsification of financial statements is a particular case and several variables not significant in a univariate test may still be useful indicators for FFS (Spathis, 2002). Thus, the aim of this study is to develop a model that includes all variables. There were twenty five possible variables in this study. In order to test if there is any variable association, the study applies a multivariate testing with stepwise logistic regression to find from the examined ratios those that fit best or that have the highest explanatory power for the examined falsifications of financial statements. The results for the stepwise logistic regression of the model are presented in Table 5.

The model is accurate in classifying the total sample correctly with accuracy rates 90.91 per cent. More analytically, 93.75 per cent of the non-FFS firms and 83.33 per cent of the FFS firms were classified correctly. The relationship between the dependent – non-FFS and FFS firms – and the independent variables is statistically significant $\left(\chi^2 = 17.40, \ p = 0.000 \right)$ and the maximum number of the ratios' rows used in the regression

equation is twenty two from the twenty four examined companies, while $R_L^2 = 0.675$, which indicates an efficient relationship.

Regarding the ratio results, the stepwise logistic regression of the model reveals three variables with significant coefficients: VAR11, VAR23, VAR25. More analytically, the first variable (VAR11) has an increased probability of being classified with FFS firms ($b = -0.02142$, $p = 0.030$) and this indices that companies with a high ROA ratio (net income to total assets) is not very probable to present falsifications of their financial statements. Similar results for Greek compa-

nies before the economic crisis were by found Spathis (2002). Also, VAR 23 has a positive effect ($b = 0.0010$, $p = 0.013$) and this reveals that companies with high long-term debt have an increased probability of being classified with FFS firms. Last, VAR25 ($b = 0.0228$, $p = 0.066$) presents a significant positive effect, which actually indices that firms with decreased the following ratio: earnings before interest and taxes to interest expenses presents a higher probabilty of being classified with the firms that endorse falsifications of their financial statements. Consequently, non-FFS firms achieve higher values in the VAR25.

CONCLUSION

In accordance with the signs of our time companies are trying to survive in an unstable economic environment. The turmoil of the financial crisis renders them prone and vulnerable to a multitude of complex financial problems. The corollary of this situation is that businesses are resorting to falsification methods of their financial statements. Based on surveys that were presented in the literature review, "creative accounting" is used often and widely. The majority of faults are detected in projections of financial statements.

The purpose of this survey was to research the effects of financial statement falsification in Greek listed companies on the Athens Exchange during the period 2008–2015. The survey analyzed twelve companies whose financial statements include falsifications according to the auditors' reports and twelve more companies in the same industry which did not have any falsifications. The research was conducted through the utilization and analysis of thirty ratios. These ratios cover the size ratios of the enterprises and the four main categories of ratios (profitability ratios, liquidity ratios, ratios of capital structure and cash flow ratios).

Based on the results that were found from the statistical analysis of ratios financial statement falsifications significantly affect ten out of twenty-five ratios, which could be partially utilized in auditing for the existence or not of falsification in financial statements. The results of the present study that arise by comparing the average values of ratios outperform in businesses without falsification.

Furthermore, a multivariate test with all the financial ratios, in the form of a stepwise logistic regression, was applied to the sample and the control sample in order to develop a model that could identify factors associated with falsification of financial statements (FFS). The model provides three variables with significant coefficients, which entered our model. These ratios are: ROA, Gearing, Interest cover, which could serve as "red flags" in the auditing process.

The model is accurate in classifying the total sample correctly with accuracy rates exceeding 90 per cent. Thus, our results suggest there is potential in detecting FFS through analysis of publicly available financial statements, as our model functions effectively in detecting FFS in a period of economic crisis. The proposed model could be used: a) to auditing and accounting research for FFS detection and with alternative methods (neural networks, multicriteria analysis) or within different time intervals, for listed and non-listed firms, b) as a tool to the banking system, from internal and external auditors, taxation and other state authorities or alert investors to their potential investments in an economic crisis.

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