

Preventing the Unpleasant: Financial Fraudulent Statements Detection using Financial Ratios

Michail Pazarskis, Grigorios Lazos, Andreas Koutoupis, George Drogalas

- Michail Pazarskis, Assistant Professor, Department of Economics, International Hellenic University, Greece
- Grigorios Lazos, Adjunct Assistant Professor, Department of Economics, International Hellenic University, Greece
- Andreas Koutoupis, Associate Professor, Department of Accounting and Finance, University of Thessaly, Greece
- George Drogalas, Assistant Professor, Department of Business Administration, University of Macedonia, Greece

Abstract

The aim of this study is to investigate financial fraud in companies listed on the Athens Stock Exchange, during the period 2008-2018, in which a major economic crisis took place in Greece. Based on thirty financial indicators, several statistical tests are applied to the primary sample and the control sample, in order to create a model, which will use the indicators resulting from the analysis of financial statements, as “forecasts”, to detect possible fraud. The data used in the research were obtained from the financial statements of the listed companies, the reviews of the auditors’ reports and the available data and information of the reports of the Athens Stock Exchange. The proposed model achieves an accuracy of 78.4 percent in the correct classification of the total sample. The results of the research show that the model works effectively in detecting fraudulent financial statements (FFS), when the economy is operating in crisis conditions. This model with the use of financial ratios, signals red flags in the audit process and could be used as an effective tool by the banking system, internal and external auditors, tax authorities or other government authorities.

Keywords: financial statements, fraud, financial ratios, Greece, economic crisis

JEL Classification: M41, M42

Introduction

One of the most important issues concerning the annual financial reports of companies is the issue of falsified data in them (Dunn, 2004; Koumanakos et al., 2008; Firth et al., 2010; Omar et al., 2017; Aboud & Robinson, 2020). The falsification of the financial statements (FFS) generally refers to the deliberate alteration of the financial data of the companies, which are registered, or should be registered in their accounting books. More specifically, in the falsification of financial statements, an overstatement of assets, sales and profits or an underestimation of liabilities, projections, expenses or losses, or a combination of the above two practices, is attempted, in order to achieve the desired financial result, which will give fictitious value to business (Spatacean, 2012; Young, 2020). These manipulations have the effect of changing the appearance of the financial statements of companies (Baralexis, 2004; Churyk et al., 2009; Zager et al., 2016; Albizri et al., 2019). In order to achieve the falsifications of the financial statements, several methods are used, in the context of the so-called creative or imaginative accounting (Zainudin & Hashim, 2016; Wei et al., 2017; Chimonaki et al., 2019; Temponeras et al., 2019). The consequences of such phenomena are very significant and have a decisive influence on those who are interested in the performance of companies, such as investors, creditors, regulators, company shareholders and consumers. In addition, as technology evolves rapidly, this type of fraud becomes increasingly complex and more difficult to detect (Kanellopoulos, 2002; Moisiadou et al., 2012; Riad Shams et al., 2020).

More specifically, traditional detection methods, which are non-automated and simple to apply, are a safe haven for some reliable evidence of falsification (Omoye & Eragbhe, 2014; Kanapickiene & Grundiene, 2015). However, these methods may not be able to meet the analysis of large volumes of data. For these reasons, the auditing authorities and administrations of financial institutions are making significant efforts to develop and optimize automated methods based on statistical and computational intelligence or to use many new technologies to detect manipulating (Kotsiantis et al., 2006; Gaganis & Pasiouras, 2007; Pazarskis et al., 2017; Feess & Timofeyev, 2020). Given the enormous importance of timely detection of falsified financial statements of companies, it is not surprising that there is a large volume of research conducted in

recent years on this subject (Kirkos et al., 2005; Churyk et al., 2009; Omar et al., 2017; Lokanan et al., 2019; Dimitrijevic et al., 2020).

The global financial crisis of 2008 affected, among others, the Greek economy, with the result that Greece fell into a dire economic position for a long period. The problem in the Greek economy intensified in 2009, when the government could not borrow at reasonable interest rates from the capital markets to finance the current budget deficit and refinance the large public debt. The European Commission in 2010, considered that there were major problems in the Greek economy, which were covered by the submission of false data, by the Greek governments, to its regulatory authorities. In order to deal with this difficult situation as much as possible, the Greek economy joined the support mechanism created by the European Union, the European Central Bank and the International Monetary Fund. During the period of Greece's accession to this mechanism, Greek companies faced complex financial problems, as a result of the general macroeconomic environment. The basis of these problems was the limited liquidity, which in many cases was the beginning of the contraction of economic activity and the consequent failure of many companies (Pantelidis et al., 2014; Pazarskis et al., 2017).

In this difficult economic environment, some of the companies resorted to various methods, incompatible with generally accepted principles and methods of preparation of financial statements, and ultimately to falsify financial statements, in an attempt to avoid the worst, and to present a improved situation in their financial position and financial results (Spathis, 2002; Dunn, 2004; Liou, 2008; Spatacean, 2012; Karlos et al., 2017; Borisova et al., 2021). In the context of the present investigation, Greek companies listed on the Athens Stock Exchange were identified, which used tricks of accounting fraud or deception of investors, through the publication of data that do not correspond to the actual financial data. In this case, the falsifications of the financial statements occurred with the deliberate increase of expenses and costs and were mainly aimed at reducing profits and, consequently, reducing the corresponding tax (Kanellopoulos, 2002; Moisiadou et al., 2012; Young, 2020).

The purpose of this study is to investigate the financial fraud of all listed Greek companies on the Athens Stock Exchange, during the financial crisis, of the years 2008-2018, using financial ratios. Based on the sample data and the analysis of

financial ratios, a model was developed to find the key factors related to FFS, during the period of financial crisis. The study's contribution lies in adding its findings to the body of a growing literature on fraud financial reporting, as well as in examining the case in a time of financial crisis, while providing a reflection of recent experience in a small open economy, which is a member state of the European Union. In addition, in this study, financial ratios are presented that could be used as red flags in the audit process in a period of economic crisis. Therefore, the research contributes significantly to the existing literature in this field and could be appropriately utilized for the exercise of government policy by tax authorities or other governmental authorities. The structure of the paper is: next section provides the relevant literature review. The following describes the dataset and methodology of the research. After that, the empirical results are presented. Last, final section concludes the study.

1. Literature Review

A first study in this field was conducted by Kanellopoulos (2002), who using tax audit data and other financial variables, determined the characteristics and extent of financial fraud of companies. His research concluded that the economic activity sector is an important determinant of tax compliance. Kirkos et al. (2005) using data mining techniques, identified companies with falsified financial statements, and studied the factors associated with them.

Manipulation of accounting documents, or fragmentary recording of facts, transactions or other important information and intentional incorrect application of accounting principles, are methods of falsifying financial information according to Spatacean (2012). Overvaluation of assets, according to Zager et al. (2016) is the most common technique used to falsify financial statements. Moisiadou et al. (2012) found that the largest percentage of voluntary errors in the financial statements of Greek companies is related to the provisions concerning "doubtful receivables", "retirement compensation", "unaudited tax years" and "litigation cases".

Koumanakos et al. (2008) examined the relationship between the reports of certified auditors in Greece and different levels of discretionary earnings manipulation. According to Spathis (2002) falsifying financial statements, which usually occur with

revenue management and deliberate expenditure management, could cause significant financial damage and have a significant impact on unions, customers and investors. FFS can be done in order to increase the price of shares, to take loans from banks, or to distribute smaller dividends to shareholders (Ravisankar et al., 2010). According to Habib et al. (2014), the financial hardship faced by companies is a key incentive to manipulate the financial results, which is used by managers of companies in difficulty, to a much greater extent than their counterparts in healthy companies. Furthermore, according to Baralexis (2004), through creative accounting, small companies resort to income manipulation in order to devalue their profits, while large companies in order to increase them.

Too often the motive for falsifying financial statements is the emergence of lower taxable incomes, in order to minimize tax liabilities and evade taxation (Spathis, 2002; Ravisankar et al., 2010; Jan, 2018). In Greece, especially after the beginning of 2009, when the contraction of the economy accelerated, there was an increase in the phenomenon of tax evasion that led to a reduction in tax compliance (Tagkalakis, 2014). This necessitates the strengthening of the mechanisms of enforcement of the tax system, which can be achieved by utilizing the appropriate techniques for detecting falsified financial statements (Repousis, 2016). The falsification of the financial statements in order to show lower taxable incomes, however, has the impact of increasing the cost of attracting new capital. On the contrary, the beautification of financial statements, in order to attract capital, has as an impact the highest tax burden. Therefore, if accounting income is linked to taxable income, then this fact acts as a safeguard against attempts to manipulate financial statements (Eilifsen et al., 1999).

The main negative effects of falsifying financial statements are reduced access to capital markets, falling stock prices, cost of raising funds and widening spreads. Of the companies that falsify financial statements, those located in highly developed regions suffer the most serious consequences (Firth et al., 2010). Omoye & Eragbhe (2014) in their research concluded that investors and liquidity are the main reasons that push companies to falsify financial statements. Kotsiantis et al. (2006) highlighted the importance of analyzing the financial ratios of companies publishing false financial statements.

The complexity and size of portfolio management activities require the implementation of a strong internal control system over financial reporting. Tsipouridou & Spathis (2014) studying the relationship between the opinion of auditors and the management of the company's profits, found that when the control mechanisms are weak, there is a high risk of non-transparent audit process. Spatacean (2012) investigating the relationship between the effectiveness of internal control and the risk of fraud, found that the more effective the internal control over financial statements, the smaller the magnitude of their falsification.

2. Research design

2.1 Sample selection

The reference period of the research covers the years 2008-2018, starting from the years 2008, during which the beginning of the economic crisis in Greece took place. The sample of the investigation consists of twenty-three companies, listed on the Athens Stock Exchange, for which the auditors of their financial statements, as recorded in their reports, detected fraud (FFS). According to the International Standard on Auditing-ISA 700, in nineteen cases, the falsifications were expressed by the auditors, with the types of audit opinion, as "qualified", or in rare cases as "disclaimer" and "adverse" (Tsipouridou & Spathis, 2014; Pazarskis et al., 2017).

Then, in order to complete the entire sample, the control sample was selected, which consists of twenty-three companies without falsification of their financial statements (without FFS). The selection of the companies of the control sample was made with the criterion of their inclusion in the same sector with the companies that falsified their financial statements, as well as with the criteria of the total assets, the turnover and the number of employees, which should be equivalent to the corresponding sizes of falsified companies. These data were obtained from the published data of the Athens Stock Exchange. The specific factors used in this research have been used in many other studies in the relevant scientific literature (Spathis, 2002; Omoye & Eragbhe, 2014; Kanapickiene & Grundiene, 2015; Zainudin & Hashim, 2016). The accounting measures-variables that used to compare the financial statements, on the one hand of the control sample and on the other hand, of the sample of companies,

with falsified statements, are: operating revenue, total assets, P/L for period, shareholders' funds and cash flow (see below table 1: VAR_1-VAR_5).

2.2 Ratios-Quantitative variables

As the financial ratios provide useful information about the falsifications of the listed companies (Dunn, 2004; Kotsiantis et al., 2006; Koumanakos et al., 2008; Tspouridou & Spathis, 2014; Kanapickiene & Grundiene, 2015), in the present study, the processing of the sample and the examination of the financial statements was performed using appropriate ratios. The table below shows all the financial ratios that have been used and analyzed:

Table 1: Classification of financial ratios

<i>Variable</i>	<i>Ratio</i>	<i>Ratio analysis</i>
<i>Ratios sized companies (for sample & control sample comparison)</i>		
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
<i>Efficiency ratios</i>		
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
<i>Liquidity ratios</i>		
VAR12	Current ratio	Current assets / Current Liabilities
VAR13	Liquidity ratio	(Current assets - Stocks) / Current Liabilities
<i>Activity ratios</i>		
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 /	Enterprise value / EBITDA

	EBITDA	
VAR20	Export revenue / Operating revenue	Export revenue / Operating revenue
<i>Capital structure ratios</i>		
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

The financial statements of the companies, the financial data and the auditors' reports were taken from the website of the Athens Stock Exchange, which provides relevant financial data. Also, some more required data were obtained from the database of the library of the International Hellenic University.

2.3 Methodology

To investigate the relationship between the companies in the sample with the counterfeit and the companies without counterfeiting, the average of the thirty ratios used was calculated. The t-test was used to compare the means of the ratios of the two independent variables, and was carried out in total, for the whole period of ten years. For the statistical processing of the data, the software spss, ver. 25 was used. Comparisons of the mean ratios of the first five variables show the relationship between the selected sample and the appropriate control sample, as well as the differences between the samples in individual ratios. Furthermore, comparisons of the average of the remaining twenty-five ratios indicate any significant differences in the mean values of the proportions of the two samples. Manipulation of companies' financial statements is probably related to the emergence of statistically high significance of these ratios.

Also, the statistical method of logistic regression analysis (DeMaris, 1992; Menard, 2002), was used to detect FFS. Thus, the following logit model was formulated, using companies' financial ratios, to identify FFS-related ratios. The study seeks to find out

what factors significantly affect companies with FFS, including the set of FFS and non-FFS data (Spathis, 2002; Pazarskis et al., 2017).

$$E(y) = \frac{\exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n)}{1 + \exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n)}$$

where,

$y = 1$ if FFS firm occurs

$y = 0$ if non-FFS firm occurs

$$E(y) = p(\text{FFS firms occurs}) = \Pi$$

Π = denotes the probability that $y=1$

β_0 = the intercept term

$\beta_1, \beta_2, \dots, \beta_n$ = the regression coefficients of independent variables

x_1, x_2, \dots, x_n = the independent variables

Thus, the model is presented as:

$$\text{FFS} = \beta_0 + \beta_1(\text{VAR01}) + \beta_2(\text{VAR02}) + \dots + \beta_{25}(\text{VAR25}) + e$$

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

3. Results

The initial processing of the survey data showed that, for the comparison of the characteristics of the sample and the control sample, five important variables-accounting measures are highlighted (VAR_1-VAR_5). The results of the comparisons show that the main accounting measures were not significantly affected. Therefore, the sample and the control sample do not differ significantly in the above five selected accounting measures. Consequently, there is no relationship between the selected sample and the control sample.

Table 2: Comparison results (t-tests) of characteristics of FFS and non-FFS

Variables	Mean	Mean	Std dev.	Std dev.	t-value	p-value	95% CI
	FFS	non-FFS	FFS	non-FFS			
VAR_1	221914	341225	1073888	1645231	-0.34	0.734	(-818692; 580071)
VAR_2	600011	230023	2726097	652858	0.68	0.504	(-751496; 1491472)
VAR_3	-15396	-8916	42627	21950	-0.75	0.459	(-23977; 11017)
VAR_4	180763	102813	980630	325877	0.39	0.700	(-332138; 488038)
VAR_5	3459	-5260	56840	13810	0.76	0.451	(-14679; 32117)

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 H_0 (see. on, ***)

$0.01 \leq p < 0.05$ moderate evidence against H_0 (see. on, **)

$0.05 \leq p < 0.10$ minimum evidence against H_0 (see. on *)

$0.10 \leq p$ no real evidence against H_0

The twenty-five ratios belonging to four main categories of ratios, namely: profitability, liquidity, capital structure and cash flows, were examined using statistical methods. From the statistical analysis with the audit of the average values, it emerged that, nine out of twenty-five ratios are significantly affected (see Table 3). In particular, the ratios VAR01, VAR07 and VAR11, which evaluate the efficiency of companies, are the variables that were significantly most affected, since the companies without falsification show better results in their financial statements. The following ratios VAR12 and VAR13 that determine the liquidity of companies are largely related to the increased likelihood of falsification of their financial statements. And in these ratios, companies without falsification show better results. In addition, the VAR15 activity ratio and the VAR21, VAR23 and VAR25 capital structure ratios indicate a significant likelihood of falsification of financial statements, with the result that FFS sample companies perform worse than companies without falsifying their financial statements.

Table 3: 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	-23.5	-7.3	22.5	22.1	-2.55	0.014**	(-28.99; -3.39)
VAR02	10.2	27.4	34.2	34.1	-1.94	0.057*	(-34.91; 0.52)
VAR03	-11.7	-3.9	23.5	25.4	-1.11	0.273	(-21.93; 6.35)
VAR04	-12456	-6348	32249	15622	-0.92	0.366	(-19630; 7415)
VAR05	-32.3	-9.1	61.8	43.6	-1.19	0.252	(-64.7; 18.3)
VAR06	-25.4	-8.4	42.6	36.3	-1.23	0.237	(-46.5; 12.3)
VAR07	-12.4	-4.7	13.6	12.2	-2.27	0.027**	(-14.45; -0.89)
VAR08	-153	-2	262	110	-1.70	0.110	(-279.9; 31.6)
VAR09	-18.5	-11.3	23.0	25.7	-1.06	0.295	(-20.85; 6.48)
VAR10	-78	-31	119	111	-1.31	0.200	(-119.9; 26.1)
VAR11	-15.8	-6.2	13.0	12.0	-3.07	0.003***	(-15.89; -3.36)
VAR12	0.578	1.54	0.503	1.14	-4.44	0.000***	(-1.402; -0.526)
VAR13	0.426	1.086	0.393	0.995	-3.51	0.001***	(-1.040; -0.281)
VAR14	1.49	6.0	2.06	25.5	-0.96	0.343	(-14.10; 5.06)
VAR15	293	157	253	184	2.28	0.027**	(15.9; 254.7)
VAR16	188	141	192	253	0.80	0.429	(-71.2; 165.0)
VAR17	6.6	7.46	13.5	7.90	-0.28	0.781	(-7.20; 5.45)
VAR18	-17.2	-10.4	25.7	25.5	-0.86	0.395	(-22.68; 9.18)
VAR19	30.0	18.7	41.7	26.6	0.61	0.565	(-33.9; 56.4)
VAR20	19.1	15.8	33.8	28.8	0.40	0.690	(-13.18; 19.75)
VAR21	-1.3	34.3	43.2	39.4	-3.13	0.003***	(-58.6; -12.7)
VAR22	24.3	39.2	22.4	38.4	-1.21	0.239	(-40.4; 10.7)
VAR23	302	96	264	140	2.63	0.019**	(39.3; 373.8)
VAR24	2.6	0.5	29.8	19.5	0.32	0.749	(-11.29; 15.57)
VAR25	-4.9	1.36	10.4	7.89	-2.21	0.035**	(-12.14; -0.46)

Note:

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

Given that the analysis showed that nine of the twenty-five ratios are statistically significant, it is presumed that this could reveal the manipulation of the financial statements. Specifically, it turned out that the averages of these financial ratios are much better, in companies without falsification and not with falsification in their financial statements (Tsipouridou & Spathis, 2014). Profitability, which refers to the efficiency of companies, seems to be a strong incentive to falsify financial statements. Therefore, the evaluation of the effectiveness of financial ratios could contribute to the detection of counterfeiting. The VAR11 ratio that measures the return on invested capital is statistically significant ($p < 0.01$) and is closely related to the increased likelihood of falsification of financial statements (Spathis 2002; Kirkos et al., 2005; Tsipouridou & Spathis, 2014; Omeye & Eragbhe, 2014). Furthermore, the VAR07 ratio, which is also used to determine the effectiveness of invested capital, taking into account pre-tax results, is statistically significant ($p < 0.05$), and provides strong indications of falsification of financial statements. The ratio of profit margin (VAR01)

is also significantly related to the probability of counterfeiting ($p < 0.05$). In addition, the VAR15 collection period activity ratio ($p < 0.05$) appears to be significantly affected.

The determination of the short-term financial position of the companies and their ability to fulfill their current obligations is reflected in the ratios VAR12 and VAR13 ($p < 0.01$), which show a significant correlation with the probability of fraud in the financial statements (Omeye & Eragbhe, 2014). In addition, the long-term ability of companies to meet their obligations and the protection provided to investors, as expressed by the VAR21 ratio ($p < 0.01$), as well as the VAR23 leverage ratio (Spathis 2002; Kirkos et al., 2005; Kanapickiene & Grundiene, 2015) and the VAR25 interest coverage ratio (Omeye & Eragbhe, 2014), which took a value of $p < 0.05$, seem to be directly related to the occurrence of falsification in the financial statements, given that, the means of the companies' ratios without falsification, they are obviously better.

Since univariate tests provide valuable information about a large number of variables in a sample, in the present study it was decided that they should be utilized. Each possible case of falsification of financial statements, presents peculiarities and many variables that are not important in a univariate test, are likely to be useful indicators for the FFS (Spathis, 2002). Furthermore, this study also aimed to develop a model that includes, if possible, all the variables at the same time. In order to determine whether there is any correlation between the variables, in the present study a number of multivariate tests with stepwise logistic regression were applied to find which of the examined ratios fits best and illustrate better the financial statements. Table 4 presents the results for the gradual accounting regression of the model.

Table 4: Stepwise logistic regression results of FFS and non-FFS

Independent variables	Unstandardized Coefficient (β)	S.E.	Sig.
VAR15	0.006	0.002	0.019**
VAR23	-0.006	0.003	0.045**
Constant	2.697	0.832	0.001***
χ^2	13.65		0.001***
R_L^2	0.425		
N	23		
Correctly predicted:			
FFS	53.8%		
non-FFS	91.7%		
Overall	78.4%		

Note:

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

The final proposed model classifies correctly the total sample with an accuracy of 78.4 percent. In particular, 91.7 per cent of companies without FFS and 53.8 per cent of companies with FFS were classified correctly. The relationship between the dependent variable, concerning the non-existence or existence of FFS, and the independent variables is statistically significant ($\chi^2 = 13.65$, $p < 0.001$), while $R_L^2 = 0.43$, which points out a satisfactory relationship.

Specifically, the first variable (VAR15) shows an increased probability of classification for companies with FFS ($b = 0.006$, $p = 0.019$). This fact shows that companies with a high collection period ratio are very likely to present falsifications of their financial statements. On the other hand, companies without FFS achieve higher values in VAR23. Spathis (2002) found similar results for Greek companies before the financial crisis. The variable VAR 23 has a negative impact ($b = -0.006$, $p = 0.045$) and this reveals that companies with a high interest coverage, have an increased probability of being classified in the category of companies without FFS.

Conclusions

It is a fact that, in the modern economic environment, which is characterized by its instability, companies make great efforts in order to survive. The shocks brought about by the financial crisis of the markets, create insurmountable obstacles in the course of companies and make them vulnerable. The purpose of this research was to investigate the effects of the falsification of financial statements, during the period 2008-2018, on listed companies on the Athens Stock Exchange. In the context of the present investigation, the financial data of twenty-three companies whose financial statements include falsifications, according to the auditors' reports, were analyzed, as well as the corresponding data of twenty-three other companies in the same sector that did not present falsifications of their financial statements. The research was carried out through the use and analysis of thirty ratios-variables. The specific ratios refer to the size ratios of the examined companies and the four main categories of ratios (profitability ratios, liquidity ratios, capital structure ratios and cash flow ratios).

From the results obtained after the statistical analysis of the ratios, it emerged that the falsifications of financial statements significantly affect nine out of twenty-five ratios. These nine ratios could be used in part to audit for fraud in the financial statements. In particular, the results of the investigation showed that the average values of the companies' ratios, in which falsification of the financial statements was found, do not exceed the corresponding values of the companies that do not present falsification. Also, in the present work, multiple variations of combinations with all financial ratios have been attempted, in the form of stepwise logistic regression, in order to develop a comprehensive model that could detect factors related to falsification of financial statements (FFS). The proposed model contains two variables-ratios with significant coefficients. These ratios are "Collection Period" and "Gearing", and could be "red flags" in an audit process.

The proposed model achieves accuracy in the correct classification of the total sample with an accuracy rate of over 78%. Therefore, based on the results of the research, it appears that it is possible to detect FFS through the analysis of published financial statements, as in a time of financial crisis, the model works effectively in detecting FFS. The resulting model could be used for accounting research and audit to detect FFS, in combination with alternative methods (multi-criteria analysis, neural

networks), for both listed and unlisted companies, as well as for different time periods. The model could be used as a tool by internal and external auditors, the banking system, as well as tax and other government authorities, in order to reliably inform those directly concerned, especially in times of economic crisis, about the real financial situation of examined companies. Further research could be carried out to identify the specific characteristics of companies that are more likely to falsify financial statements, related to the sector in which they operate, size, corporate governance and the effectiveness of internal and external audit.

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