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Analysing the profitability and the relations among its determinants of the retail sector: Evidence from Greece

Georgios Kolias* and Nikolaos Arnis

Department of Accounting and Finance, Faculty of Economics and Administrative Sciences, University of Ioannina, Greece.

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This study aimed to investigate the existence of differences in retail firms' strategy towards accomplishing profitability targets. By using data of Greek retail sector, we find that profitability, evaluated in terms of return on equity, as well as the average sales growth rate, does not differ statistically within the sub-sectors of the Retail Sector. However, significant differences not only among the sub-sectors but also among firms are observed in the other elements that define profitability, namely gross profit margin, asset turnover ratio and the general expenses to sales ratio. Moreover, by using random coefficient panel data methods, it was found that gross margin is positively related with general expenses to sales ratio and negatively correlated with asset turnover ratio. These impacts vary widely across retail sub-sectors. It is concluded that the retail firms use different strategies to achieve similar return on equity. Besides, the hypothesis that firms face steep reductions in operating income conditional to high proportion of fixed to variable costs is verified. Additionally, our results do not support the hypothesis that the rapid developing firms show less profitability as it is expressed by return on assets. Finally, it is seen that the financial crisis in Greece has affected the accounting ratios of Greek retailers and especially return on assets. The results of this paper can be used by academics and practitioners to assess the reasons the performance of retail firms are above or below the industry standards.

Key words: Retail sector, random coefficient modeling, panel data, return on assets, sales growth.

INTRODUCTION

A firm's value is considered to be a function of its profitability and rate of growth (Freeman et al., 1982; Ohlson, 1995). Focusing on these objectives and factors affecting the ability of firms to achieve their financial goals can be a useful framework in assessing an optimum firm strategy. Different strategies, however, towards achieving profitability goals are determined by the business environment where the firm functions. It is concluded

*Corresponding author. E-mail: koliasg@otenet.gr.

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(Selling and Stickney, 1989) that microeconomic features lead firms to choose different ways to achieve profitability and growth goals. In addition, empirical studies (Gombola and Ketz, 1983) show that there are differences between manufacturing firms in relation to retail firms, in many financial and accounting ratios. The retail sector is considered to be working capital intensive – as opposed, for instance, to the manufacturing sector which is fixed assets intensive - so the small fixed to variable cost ratio generates lower volatility in firm profits as sales increase, and thus lower variability in profitability ratios. Hence, the behavior of profits is less volatile in retail sector since operating leverage is lower than that in manufacturing sector. However, although the profitability in retailers may be less volatile, they follow different approaches for achieving similar return on assets. An efficient retail company tries to maximize all the factors which affect the return on assets. Past research shows that decomposing the return on assets into its components, for example net profit margin and asset turnover, and also examining the determinants of these factors, may assessing the retailers profit strategy.

This discussion on the objectives that direct the development of the retailers' strategy leads us to examine the behavior and the relations between various accounting ratios such as asset turnover, sales growth rate, selling and administrative expenses to sales ratio, gross margin, return on assets and return on equity. However, quite a few studies investigate the above relationships taken into account the particular features of the retail subsectors as well.

This paper mainly explores the existence of different practices followed by Greek retail firms regarding achieving profitability goals. To our best knowledge, there are few studies on analyzing the determinants of the profitability in retail sector expanding the analysis to retail subsector level. Additionally, using panel data techniques we tried to address the consequences of Greek economic crisis.

This work used data from published financial statements (balance sheets and profit and loss statements) of companies that are classified into the retail sector and operated in Greece for the period 2003-2014. Our sample firms are classified into ten sub-sectors according to the Statistical Industry Classification.

The most important findings of the paper are summarized as follows:

There are no statistically significant differences in *sales growth rate and* return on equity across the retail sub-sectors. There is a strong positive correlation between *gross profit margin* and *selling, administrative and general expenses as a percentage of sales*. There is a strong negative correlation between *gross profit margin* and *asset turnover ratio*. Additionally, we find that the impact of gross margin on Roa varies widely across retailers as well as retail sub sectors. The *sales growth rate* for most of the sub-sectors shows, for the period 2003-2014, a statistically significant average decrease. The *return on equity* shows a positive correlation with the *growth rate of sales*. The assumption that firms face sharp decreases in operating income conditional to high proportion of fixed to variable costs is verified by our data. Additionally, our results do not support the hypothesis that the rapid developing firms show less profitability as it is expressed by return on assets.

Finally, we find that the financial crisis in Greece in 2008 onwards seems to have affected the accounting ratios of Greek retailers and especially the ratio of return on assets. During the crisis, our data support a steep reduction of Roa, after controlling for sales growth, operating leverage and unobservable firm-specific effects.

This study contributes to the accounting and business literature. This paper is the first to present empirical evidence on the difference between retail sectors in factors that affect the retailers' profitability behavior. Second, it provides evidence for the behavior of Roa across retailers during economic crisis. Furthermore, this study demonstrates that there are significant relations between gross margin and *asset turnover ratio, and* gross margin and general expenses using an appropriate econometric method (random coefficient modeling on panel data). Moreover, this is the first study that analyzes the impact of gross margin on Roa and test the variation of this effect across retailers as well as retail sub sectors.

The results of this paper can be used from academics and practitioners to assess the reasons the performance of the retail firm is above or below the industry (sector or subsector) standards. We firmly believe that the findings of our study can be applied to virtually any industry and the sectors within it. Managers in any sub-sector could benefit greatly by reviewing the accounting ratios of firms in their industries and over time to formulate their strategy.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Although in the international literature there is no extensive empirical research on support for theoretical models of retail firm development, many of them have been accepted by both academics and firms' management.

In one of these, the *"wheel of retailing model"*, the retail firm development process is described as follows (Hollander, 1960): The firm enters the sector with a low-price policy. Sustainable firms, then, after stabilizing in the market where they are active, trade more expensive

products and services as well as turning to more expensive areas to develop their business. This creates a gap in the market for cheaper retail products, which is covered by newly introduced low-price firms.

Levy et al. (2005) introduce the concept of "Big Middle". According to this hypothesis, retailers may function in one of the four regions: innovative, Big Middle, low price, and in trouble. Retailers in innovative region focus on quality-conscious markets while low-price retailers on price sensitive market segment. Big middle-retailers have shifted from innovative or low price regions to a mixture of the two, appealing into larger segment giving superior value to customers and therefore, receiving higher revenues. Authors argue that although the Big Middle segment is a desirable region to function in, it is also the most dangerous and competitive marketplace.

The movement of retail firms in this circle according to the "wheel of retailing" hypothesis, or the transition through the four regions relative to the Big Middle concept, leads the sector as a whole to vary in terms of profit margins and profitability ratios, regarding the asset turnover ratios and finally in terms of sales growth rates. However, many empirical studies show that financial ratios of the firms tend to convergence to the average value of the industry (Davis and Peles, 1993; Ho et al. 1997; Konings and Vandenbussche, 2004; Lev, 1969; Fama and French, 2000).

Additionally, many studies in business strategy literature investigate the importance of business environment in firms' performance. For example McGahan and Porter (2002) state that industry specific effects and business–specific effects are important in explaining accounting profitability and that industry-specific effect keep on over longer periods. Hawawini et al. (2003) investigate the importance of industry and firm specific factors on the determination of various performance measures such as return on assets, economic profit and market to book values. Among other conclusions, they state that firm and industry factors have different impact on firms that do not outperform or underperform their peers in the same industry.

Interestingly, however, the different strategies applied by firms lead either to acceptable return on equity (*Roe)* values or to abnormal values. Such research requires the study of the variables defining *Roe*. These variables are the return on assets and capital structure. Return on assets (*Roa*) is influenced by operating management and investment management, while capital structure is influenced by a firm's financial management and dividend policy (Palepu et al., 2004).

Return on equity

The return on equity (*Roe*) ratio is used as a measure of profitability, as it is considered to provide indications of how a firm's management manages the shareholders' invested funds (Palepu et al., 2004).

Roe is calculated algebraically as follows:

$$Roe = \frac{ebit}{Equity} \Rightarrow \text{Roe} = \frac{ebit}{Equity} x \frac{ta}{ta} \Rightarrow \text{Roe} = \frac{ebit}{ta} x \frac{ta}{Equity}$$

Where, Equity is owner's equity, while *ta* stands for Total Asset sand, *ebit* for earnings before interest and taxes. This approach is a credit to the Du Pont Company's pioneering application to measure diverse operational strategies.

Although *Roe* may be useful in the evaluation process and in the brief description of the firms' current financial position, it can hardly be a predictor of future profits. The literature on performance indicators regarding their behavior both over time and between sectors but also between firms, although relatively limited, has been developing in recent years. It is argued that overtime, *Roe* exhibits a mean-reverting, pattern and firms with *Roe* greater or less than average tend to approach this mean in no more than 10 years (Penman, 1991; Bernard, 1994). Assuming that *Roe* is not influenced ("directed") by earnings management, it is then concluded that *Roe* converges to a point of equilibrium imposed by competitive pressures (for example Healy et al., 2014), which is roughly equal to the firms' cost of capital. If there are no barriers to entry for a firm to switch from one retail sub-sector to another, then it is reasonable that the sub-sector with the highest return on equity attracts more and more firms until Roe between sub-sectors is equal, so there will be no incentive for movement between sub-sectors. At the same time, in sub-sectors with low average *Roe*, some firms with lower than average Roe may be out. As a result, the average return on equity of the remaining firms in the sector would rise.

We thus make the hypothesis that there are no significant differences in Roe between retail sub-sectors.

Return on assets and its components

Roa can be analyzed in its components as follows:

$$Roa = \frac{ebit}{ta} \Rightarrow \text{Roa} = \frac{ebit}{ta} x \frac{sales}{sales} \Rightarrow \text{Roa} = \frac{ebit}{sales} x \frac{sales}{ta} \Rightarrow \text{Roa} = \frac{(gm - sag)}{sales} x \frac{sales}{ta}$$

Where, gm stands for gross margin and sag for selling,

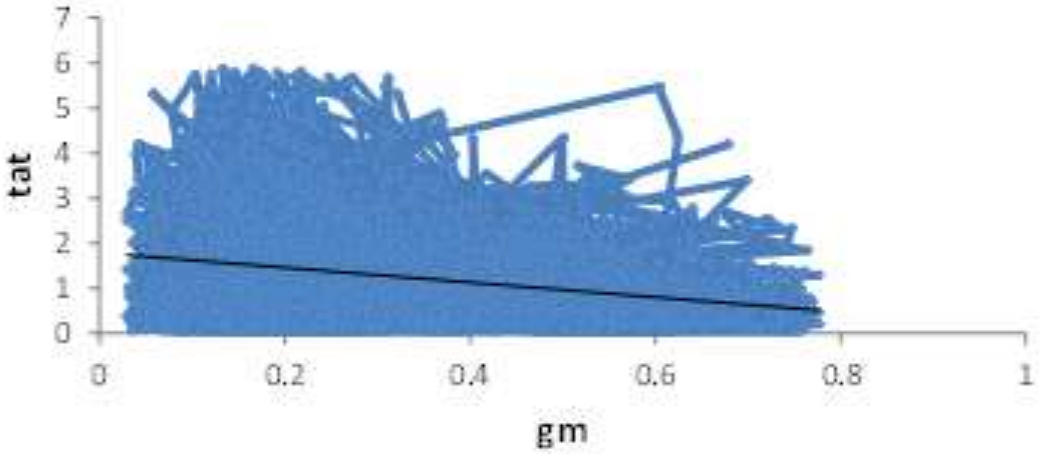

Figure 1. Graph of gross profit margin (gm) and total asset turnover (tat).

administrative and general expenses.

Penman (1991) found that, although ROA is mean reverting, it also includes a persistent component that allows firms with high ROA to continue to outperform in the future (Healy et al., 2014). Additionally, firms that continuously outperform the market can frequently be observed across economic sectors (Hirsch et al., 2014). Fama and French (2000) demonstrate that rate of mean reversion is greater for extreme values of accounting rates of returns.

From one approach, determinants of asset profitability arise if it is analyzed in its components. Many textbooks in financial statement analysis (Stickey and Brown, 1999; Wild et al., 2007) show that *Roa*'s components are *gross profit margin*, *the ratio of selling, administrative and general expenses to sales - which express cost effectiveness* - and *asset turnover ratio*. Selling and Stickney (1989) state that the variation in RoA is due to differences in the mixtures of fixed and variable costs. When the proportion of fixed costs is getting higher, the operating income increases as sales increases. This is because of economies of scope and scale exploited by the firms. However, the authors argue that when sales decline, firms face sharp decreases in operating income conditional to high proportion of fixed to variable costs. Empirical studies demonstrate that companies with greater levels of tangible assets tend to be less profitable than companies with lower levels of tangible assets (Griliches and Lichtenberg, 1984; Deloof, 2003; Nucci et al., 2005). Hence, one more variable that may explain the variation of RoA between firms and across sub sectors is the ratio of fixed assets to current assets which represents the operating leverage of firms.

Overall, differences that are expected both between companies and between sub-sectors can be proxied by the variation and the correlation of *gross profit margin*, the *ratio of selling, administrative and general expenses* to *sales*, *asset turnover ratio* and *fixed assets to current assets ratio*.

Exploring the relations between these variables allows us to investigate the degree of the firm's success as well as the policy pursued. For example, a retail firm may choose the policy of high profit margins and a "low turnover path" while another firm pursues the policy of a more intensive use of assets in relation to sales, with a parallel policy of "low profit path" to achieve similar goals (Levy et al., 2012). *Using the appropriate econometric model, we investigate the relation between gross profit margin and asset turnover ratio by assuming that the two variables show a negative correlation*.

Figure 1 gives a first assessment of this relation. Fairfield et al. (2001), in an empirical research, argue that the combination of gross profit margin and asset turnover ratio can provide information on the business strategy followed, but it does not provide information on future variations in profitability. Thus, our model focuses on the correlation between the variables and not on the cause-effect relation, noting that it cannot be used for predictions.

However, we also expect a positive correlation between gross profit margin and the ratio of selling, administrative and general expenses. The graph of the two variables in Figure 2 strengthens this hypothesis.

The positive correlation between the two variables can be explained as follows:

Firms with a high ratio of general expenses to sales spend more funds on advertising and promoting their products, so they are capable of pricing their products higher, increasing gross profit margin. Additionally,

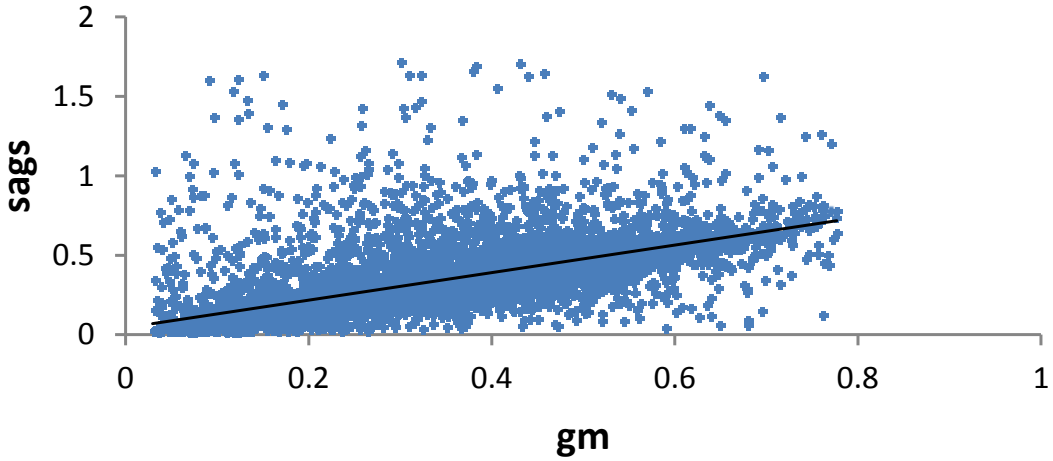

Figure 2. Graph of gross profit margin (gm) and selling, administrative and general expenses to sales (sags).

regarding firms that operate in large shopping centers, department stores etc., on the one hand because of their location there is no need for large advertising costs, while on the other hand, investment in fixed assets is much higher in relation to other regional retail firms. Thus, depreciation of fixed assets that burdens the cost of sales reduces gross profit margin, while firms also present lower advertising and promotional costs in proportion to their sales. Therefore, we can assume that companies with higher gross profit margins have higher selling, administrative and general expenses as a percentage of sales and vice versa.

Growth rate

As in the case of Roe, we can assume that, at least in the medium term, the average rate of sales growth will not differ significantly between sub-sectors due to competition. Even among companies, the differences in sales growth from the average of the sector to which they belong should be smoothed in the medium term. Of course, how fast it will converge with the average, depends on the particular characteristics of the companies and sub-sectors to which they belong.

Firm growth (as this can be expressed with the sgr variable) depends on the age of firms. Studies show that new businesses have higher rates of growth (Navaretti et al., 2014; Yazdanfar and Öhman, 2015; Coad et al., 2013). Additionally, high growth is associated with other firm characteristics such as willingness to grow, abilities and opportunities (Stenholm and Toivonen, 2009) as well as with the age of the chief executive officers (Navaretti et al. 2014). Mazzucato and Parris (2015) mention that there exists an inverse relationship between firm size and growth. Furthermore, Ipinnaiye et al. (2017) reveal that, between other factors, the prevailing industry growth rate is an important determinant of productivity growth. In most studies, the variable used to represent the firm growth, is the sales growth rate variable.

Figure 3 presents the graph of the means of the sales growth rate of each sub-sector as well as of the overall mean over time. Our initial assessment of the general trend is that it is negative.

This trend may have been shaped by the effects of the financial crisis in Greece during the period 2009-2014.

Return on assets and growth rate

The suggesting sign of the relation between RoA and firm growth is not profound. Previous studies show an unclear relationship (Delmar et al., 2003; Wiklund et al., 2003). On the other hand some other studies state that there exists positive relation of sales growth on profitability (Nunes et al., 2009; Fitzsimmons et al. 2005; Claver et al., 2002). For the Greek case Asimakopoulos et al. (2009) examined the factors affect the profitability of Greek non-financial publicly listed firms 1995-2003. They sate that firm profitability is positively correlated with size, sales growth and negatively by leverage and current assets.

However, retail companies seek rapid growth in a specific period, for example by setting up new stores. New stores are usually presented, at least temporarily, as less profitable than the older ones. Moreover, an "aggressive" policy to gain a larger market share is usually based on a low-price strategy. The result is a low

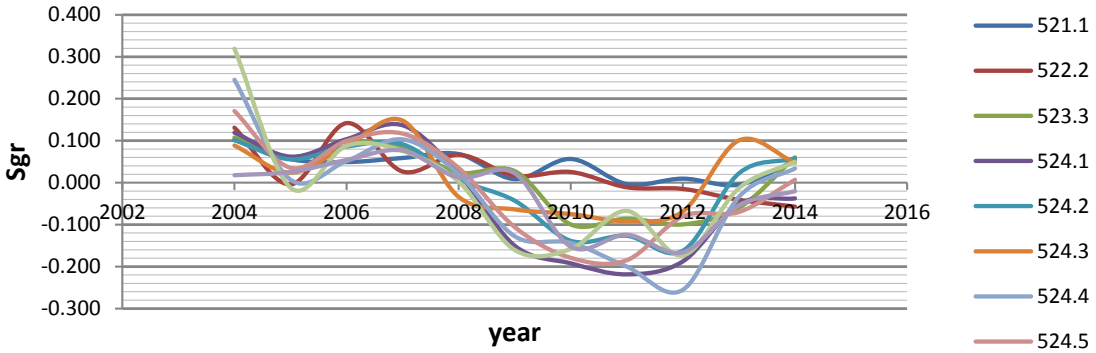

Figure 3. Graph of average sales growth rate for the period 2003-2015.

Table 1. Sub-sectors of the Retail Trade Sector of the sample.

SIC	Description of subsectors
521.1	Super Markets
522.2	Retail sale of meat and meat products
523.3	Perfumes, Cosmetics, and Other Toilet Preparations
524.1	Textile goods, not elsewhere classified
524.2	Retail sale of clothing
524.3	Retail sale of footwear and leather goods
524.4	Retail sale of furniture, lighting equipment and household articles
524.5	Retail sale of electrical household appliances
524.6	Retail sale of hardware, paints and glass
524.7	Books, Periodicals, and Newspapers

return on assets. The assumption for negative correlation is supported by empirical studies (Hoy et al., 1992; Kaen and Baumann, 2003).

Data presentation

We used data drawn from the balance sheets and the profit and loss statements of the Greek companies that are classified into the retail sector for the period 2003-2014. Firms are categorized according to SIC classification into ten sub-sectors (Table 1).

The final sample includes 9080 firm-year observations in our twelve years data (Table 2).

The variables we used for the needs of our study are given in Table 3. where indices ***s***, ***i*** and ***t*** represent the 10 sectors, the firms and the 12 years of the sample, respectively.

Table 4 shows the means with the standard deviations. The statistics refer to the total of observations for each variable, that is, 9080 observations, except the variable *sgr* (sales growth), for which 6927 observations are available due to the method of its calculation.

Table 5 presents the correlation matrix of the variables.

METHODOLOGY

In order to test the equality hypotheses of the means of *gm, tat, Roe, Roa* and *sgr* variables between the sub-sectors, we use the ANOVA method. We test the null hypothesis that all the means (of all 10 sub-sectors) are equal to each other versus the alternative hypothesis that at least one pair of the 45 formed has different means. In case the null hypothesis is rejected, we use the Tukey-Kramer testing procedure to see how many and what sub-sector pairs present different means.

To investigate the relation between *RoA* and *sgr*, we used a panel data model by also introducing the quadratic term of *sales growth rate* to explanatory variables in order to test for the existence of any marginal effect of *Roa* on *sgr*.

The hypotheses regarding the correlation between the *gm-sags*, *gm-tat* variables are investigated by econometric models using a *random coefficient model on panel data.* We estimate those relations allowing for variations in parameters across firms to take

Table 2. Sample description.

SIC	Year												
	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**Total**
521.1	105	95	95	101	127	117	106	107	110	98	83	82	1,226
522.2	24	22	29	29	36	32	29	42	37	31	22	18	351
523.3	45	45	46	48	54	54	45	45	44	40	39	38	543
524.1	34	39	40	42	45	40	36	37	33	26	22	19	413
524.2	195	208	215	224	259	262	232	247	206	168	136	118	2,470
524.3	32	33	31	31	35	38	33	36	30	29	23	19	370
524.4	92	105	119	127	156	157	146	143	105	90	71	58	1,369
524.5	92	86	90	96	116	115	102	113	111	111	88	76	1,196
524.6	65	62	59	61	68	60	54	65	50	46	38	52	680
524.7	23	22	20	24	28	29	26	30	24	21	16	19	282
Total	707	717	744	783	924	904	809	865	750	660	538	499	8,900

Table 3. Variables description.

Variable	Discription	Calculation
Sales	sales turnover	-
CGS	cost of goods sold	-
SAG	selling, administrative and general expenses	-
Equity	shareholders' equity	-
TA	total assets	-
fa	fixed assets	-
ca	current assets	-
ebit	Earnings before interest and taxes	-
Sags	selling, administrative and general expenses to sales	$sags = \frac{sag}{Sales}$
gm	gross profit margin	$gm = \frac{Sales - cgs}{Sales}$
Roe	return on equity	$Roe = \frac{ebit}{Equity}$
Roa	return on assets	$Roa = \frac{ebit}{TA}$
tat	total asset return	$tat = \frac{Sales}{TA}$
sgr	sales growth	$sgr = \frac{Sales_{sit} - Sales_{si,t-1}}{Sales_{si,t-1}}$

Where indices ***s***, ***i*** and ***t*** represent the 10 sectors, the firms and the 12 years of the sample, respectively.

into account the interfirm and intersegment heterogeneity. Thus, the following model was estimated:

$y_{it} = \mathbf{x}'_{it}\boldsymbol{\beta}_i + u_{it}$ representing a random coefficient (intercept and slope) model. We allow b_i to vary across firms treating them as random variables with common means plus a random part. We suppose that $\boldsymbol{b_i}$ can be viewed as random draws from a common population uncorrelated with the explanatory variables. This is the reason for we consider b_i as random coefficients instead of fixed (Hsiao, 2003; p. 149-150):

$$b_i = b_1 + a_{1,i}$$

Where, b_1 represents the common mean and $\alpha_{1,i}$ the random part

Table 4. Means and standard deviations of the variables Roe, Roa, sags,gm ,tat and sgr.

SIC	Roa Mean (Std. Dev.)	Roe Mean (Std. Dev.)	gm Mean (Std. Dev.)	tat Mean (Std. Dev.)	sags Mean (Std. Dev.)	sgr Mean (Std. Dev.)
521.1	0.04(0.079)	0.178 (0.541)	0.19(0.076)	2.262(1.118)	0.182(0.116)	0.040(0.261)
522.2	0.062(0.106)	0.161(0.546)	0.194(0.105)	2.375(1.473)	0.191(0.168)	0.027(0.266)
523.3	0.052(0.086)	0.268(0.649)	0.313(0.124)	1.317(0.582)	0.313	0.014(0.236)
524.1	0.011(0.078)	-0.029(0.636)	0.454(0.137)	0.761(0.496)	0.464(0.202)	-0.024(0.29)
524.2	0.018(0.095)	0.042(0.644)	0.377(0.135)	1.023(0.716)	0.394(0.208)	-0.004(0.318)
524.3	0.026(0.101)	0.054(0.69)	0.352(0.118)	1.087(0.577)	0.346(0.156)	0.013(0.299)
524.4	0.007(0.094)	0.013(0.632)	0.372(0.139)	0.955(0.73)	0.408(0.228)	-0.030(0.353)
524.5	0.028(0.076)	0.119(0.569)	0.236(0.115)	1.227(0.716)	0.224(0.153)	-0.019(0.278)
524.6	0.032(0.085)	0.076(0.624)	0.259(0.114)	0.945(0.609)	0.255(0.191)	-0.003(0.33)
524.7	0.007(0.096)	0.055(0.715)	0.35(0.142)	1.347(0.985)	0.362(0.215)	-0.028(0.262)
Total	0.025(0.09)	0.086(0.622)	0.313(0.146)	1.27(0.937)	0.32(0.21)	-0.002(0.302)

Table 5. Correlation matrix of the variables.

Variables	gm	tat	sags	roa	roe	sgr
gm	1					
tat	-0.279	1				
sags	0.668	-0.341	1			
roa	0.053	0.314	-0.393	1		
roe	0.020	0.225	-0.273	0.675	1	
sgr	-0.032	0.140	-0.157	0.225	0.170	1

with zero mean and constant variance uncorrelated with the idiosyncratic disturbances (u_{sit}).

Actually, we assume the presence of unobserved effects in firms' level and relaxing the assumption of homogeneity at firm level we also introduce random firm-specific slopes of the explanatory variable *gross margin*. A relative study and similar to our work as far as the methodology having been used, is that of Short's et al. (2006), who used Random Coefficient Modeling on panel data (Hsiao and Pesaran, 2004; Raudenbush and Bryk 2002) to investigate multilevel determinants of firms' performance overtime.

More detailed specification of the models is presented in the following corresponding sections together with the results of our study

HYPOTHESES TESTING DEVELOPMENT – RESULTS

Test of equality of means of the Roe between the sub-sectors

Table 4 presents the results of the test of equality of means of the Roe variable analysis. With F-statistic = 2.37 (p_value=0.0113) we cannot reject the null hypothesis of equality of the means for *all* possible pairs of the sub-sectors at 99% CI. Therefore, our hypothesis is verified that the mean value of return on equity between the sub-sectors of the Retail sector does not differ statistically (Table 5).

Test of equality of means of the Roa variable between the sub-sectors

Tables 6 and 7, present the results of the test of equality of means of the Roa variable analysis. With F-statistic 26.9 (p-value<0.001) *we cannot accept* the null hypothesis of means equality for all possible pairs of the sub-sectors. This leads us to the conclusion that at least one pair of sub-sectors out of the 45 possible, presents differences at means. Applying the Tukey-Kramer procedure, we find that the mean value of the Roa variable of the Retail sale of furniture, lighting equipment and household articles sub-sector (524.4) differs statistically from at least 7 of those of the remaining 9 sub-sectors. Moreover, Roa variable of the Retail sale of meat and meat products (522.2) differs from at least 8 of those of the remaining 9 sub-sectors. Similar differences are observed regarding the behavior of Roa in Perfumes,

Table 5. Test of equality of means of the Roe variable between the sub-sectors.

Method	df	Value	Probability
Anova F-test	(9, 8890)	2.37	0.0113
Welch F-test*	(9, 2218.51)	2.45	0.009
Analysis of Variance			
Source of variation	**df**	**Sum of Sq.**	**Mean Sq.**
Between	9	307.59	34.176
Within	8890	106707.6	12.003
Total	8899	107015.2	12.026
Included observations: 8900			

*Test allows for unequal cell variances.

Table 6. Test of equality of means of the Roa variable between the sub-sectors.

Method	df	Value	Probability
Anova F-test	(9, 8718)	26.916	0.000
Welch F-test*	(9, 2082.15)	25.338	0.000
Analysis of Variance			
Source of Variation	**df**	**Sum of Sq.**	**Mean Sq.**
Between	9	1.901	0.211
Within	8718	68.416	0.008
Total	8727	70.317	0.008
Included observations: 8728			

*Test allows for unequal cell variances.

Table 7. Differences of means (p-values are shown in parentheses) of Roa-pairwise comparisons.

SIC	521.1	522.2	523.3	524.1	524.2	524.3	524.4	524.5	524.6
522.2	0.02(0.00)								
523.3	0.01(0.22)	-0.01(1.00)							
524.1	-0.03(0.00)	-0.05(0.00)	-0.04(0.00)						
524.2	-0.02(0.00)	-0.04 (0.00)	-0.03(0.00)	0.01(1.00)					
524.3	-0.01(0.31)	-0.04(0.00)	-0.03(0.00)	0.01(0.65)	0.01(1.00)				
524.4	-0.03(0.00)	-0.05 (0.00)	-0.05(0.00)	0.00(1.00)	-0.01(0.01)	-0.02(0.02)			
524.5	-0.01(0.06)	-0.03(0.00)	-0.02(0.00)	0.02 (0.03)	0.01(0.06)	0.00(1.00)	0.02 (0.00)		
524.6	-0.01(0.95)	-0.03 (0.00)	-0.02(0.00)	0.02(0.01)	0.01(0.02)	0.01(1.00)	0.03(0.00)	0.00(1.00)	
524.7	-0.03(0.00)	-0.05(0.00)	-0.05(0.00)	0.00(1.00)	-0.01(0.91)	-0.02(0.35)	0.00(1.00)	-0.02(0.02)	-0.02(0.01)

Cosmetics and Other Toilet Preparations Retail sector (523.3).

DISCUSSION

From these results, since Roe appears not to differ between sub-sectors, it is concluded that there are systematic differences in capital structure (as expressed by debt-equity ratio) between the *Retail sale of furniture, lighting equipment and household articles*, *Retail sale of meat and meat products, Perfumes, Cosmetics and Other Toilet Preparations Retail sector and* the other sub-sectors of the Retail Sector. It is, of course, difficult to

Table 8. Test of equality of means of the sgr variable between the sub-sectors.

Method	df	Value	Probability
Anova F-test	(9, 6920)	0.752	0.661
Welch F-test*	(9, 1607.25)	1.635	0.100
Analysis of Variance			
Source of Variation	**df**	**Sum of Sq.**	**Mean Sq.**
Between	9	8925.001	991.667
Within	6920	9119451	1317.84
Total	6929	9128376	1317.416
Included observations: 6930			

*Test allows for unequal cell variances.

Table 9. Model (1) estimation results.

sgr	Coef.	Std. Err.	z	P>|z|	95% Conf.Interval	
Year	-0.025	0.001	-20.040	0.000	-0.028	-0.023
Cons	50.470	2.518	20.040	0.000	45.535	55.405

argue that firms entering these sub-sectors use systematically a specific capital structure different from that of the rest in the retail sector. We believe that firms, for example, in the sub-sector 524.4 may have mixed activity: apart from the retail trade, they may also perform manufacturing activity, for example furniture industries-manufacturers that have also exhibitions of their products and are ranked in the retail trade sector, because the bulk of their sales comes from retail trade.

Without being able to generalize our conclusion, perhaps the difference we observed is due to the mixed activity of the sub-sector.

However, we note that the purpose of our study is not to investigate the relationship between the capital structure and the economic characteristics of the firms (profitability, growth, activity, size of firm, asset structure, etc.). For exploring these relations there is rich bibliography including empirical studies such as, for example, Altman (1983), Chung (1993) and for Greece, Voulgaris et al. (2002).

Test of equality of means of sales growth rate between the sub-sectors

Assessment of the trend for the period 2001-2005

From the ANOVA data (Table 8) with F-statistic = 0.752 (p-value=0.661), *we cannot reject* the null hypothesis of means equality for all possible pairs of the sub-sectors for any CI. Therefore, the hypothesis that *sales growth rate* does not differ statistically between retail sub-sectors is verified.

For the estimation of the general trend, we used model (1):

$$sgr_{sit} = f_i + b_1 year + u_{sit} \quad (1)$$

The estimation of the model results in a negative value (and statistically significant) for the time factor (Table 9). We conclude that, according to our data, sales growth rate showed an average decrease of 2.25% over the period considered (2003-2014). The model estimation was made using the *fixed effects* method, assuming that the real model is *fixed effects* The choice of method between *random* and *fixed effects* was made after Hausman's test was applied (Hausman, 1978).

Test of equality of means of gross profit margin, general expenses and asset turnover ratio between the sub-sectors

The results of ANOVA on equality of means of the *gm, sags* and *tat* variables showed that there are statistically significant differences between the sub-sectors (Tables 10 to 15). In fact, for the *gm* and the *sags* variable, only for four and five pairs out of 45 respectively were not found any significant differences. In *asset turnover ratio* (*tat*), there were no differences in 10 pairs out of 45. These results confirm our hypothesis about significant

Table 10. Test of equality of means of the gross margin between the sub-sectors.

Method	df	Value	Probability
Anova F-test	(9,8890)	419.282	0.000
Welch F-test*	(9, 2116.82)	548.080	0.000
Analysis of Variance			
Source of Variation	**df**	**Sum of Sq.**	**Mean Sq.**
Between	9	56.781	6.309
Within	8890	133.768	0.015
Total	8899	190.548	0.021
Included observations: 8900			

*Test allows for unequal cell variances.

Table 11. Differences of means (p-values are shown in parentheses) of gross margins-pairwise comparisons

SIC	521.1	522.2	523.3	524.1	524.2	524.3	524.4	524.5	524.6
522.2	0.004(1.000)								
523.3	0.124(0.000)	0.119 (0.000)							
524.1	0.264(0.000)	0.260(0.000)	0.140(0.000)						
524.2	0.187(0.000)	(0.000)	0.063(0.000)	-0.077(0.000)					
524.3	0.162(0.000)	0.158(0.000)	0.038(0.000)	-0.102(0.000)	-0.025(0.010)				
524.4	0.183(0.000)	0.178(0.000)	0.059(0.000)	-0.082(0.000)	-0.005(1.000)	0.021(0.177)			
524.5	0.046(0.000)	0.042(0.000)	-0.078(0.000)	-0.218(0.000)	-0.141(0.000)	-0.116(0.000)	-0.136(0.000)		
524.6	0.069(0.000)	0.065 (0.000)	-0.055 (0.000)	-0.195 (0.000)	-0.118 (0.000)	-0.093 (0.000)	-0.114(0.000)	0.023(0.005)	
524.7	0.160(0.000)	0.156 (0.000)	0.036(0.002)	-0.104(0.000)	-0.027(0.021)	-0.002(1.000)	-0.022(0.219)	0.114(0.000)	0.091(0.000)

Table 12. Test of Equality of Means of *sags* variable.

Method	df	Value	Probability
Anova F-test	(9, 8476)	237.256	0.000
Welch F-test*	(9, 2051.72)	304.359	0.000
Analysis of Variance			
Source of Variation	**df**	**Sum of Sq.**	**Mean Sq.**
Between	9	71.325	7.925
Within	8476	283.123	0.033
Total	8485	354.448	0.042
Included observations: 8486			

*Test allows for unequal cell variances.

differences of these ratios across retail sub-segments.

Relation between general expenses and asset turnover ratio with gross profit margin.

The relation is investigated by estimating the models as follows:

$$\log(sags)_{sit} = c_t + f_i + b_i \log(gm)_{sit} + u_{sit} \quad (2)$$

$$\log(tat)_{sit} = c_t + f_i + b_i \log(gm)_{sit} + u_{sit} \quad (3)$$

The variables and indices in (1) and (2) are as presented

Table 13. Differences of means (p-values are shown in parentheses) of *sags*-pairwise comparisons

Col Mean	521.1	522.2	523.3	524.1	524.2	524.3	524.4	524.5	524.6
522.2	0.009(1.000)								
523.3	0.131(0.000)	0.122(0.000)							
524.1	0.281(0.000)	0.272(0.000)	0.150 (0.000)						
524.2	0.211(0.000)	0.202 (0.000)	0.081(0.000)	-0.070(0.000)					
524.3	0.163(0.000)	0.154(0.000)	0.032(0.436)	-0.118(0.000)	-0.048(0.000)				
524.4	0.226(0.000)	0.217(0.000)	0.095 (0.000)	-0.056(0.000)	0.014 (0.726)	0.062(0.000)			
524.5	0.042(0.000)	0.033(0.174)	-0.089(0.000)	-0.239(0.000)	-0.169 (0.000)	-0.121 (0.000)	-0.183(0.000)		
524.6	0.073(0.000)	0.064 (0.000)	-0.058(0.000)	-0.208(0.000)	-0.139(0.000)	-0.090(0.000)	-0.153(0.000)	0.031(0.036)	
524.7	0.180(0.000)	0.171(0.000)	0.049 (0.018)	-0.101 (0.000)	-0.032(0.294)	0.017(1.000)	-0.046(0.009)	0.138(0.000)	0.107(0.000)

P values are shown in parentheses.

Table 14. Test of Equality of Means of *total asset turns* variable.

Method	df	Value	Probability
Anova F-test	(9, 8724)	355.244	0.000
Welch F-test*	(9, 2069.73)	219.953	0.000
Analysis of Variance			
Source of Variation	**df**	**Sum of Sq.**	**Mean Sq.**
Between	9	2060.923	228.991
Within	8724	5623.523	0.645
Total	8733	7684.447	0.880
Included observations: 8734			

*Test allows for unequal cell variances.

Table 15 Differences of means (p-values are shown in parentheses) of *total asset turns* -pairwise comparisons.

SIC	521.1	522.2	523.3	524.1	524.2	524.3	524.4	524.5	524.6
522.2	0.112(0.727)								
523.3	-0.946(0.000)	(0.000)							
524.1	-1.501(0.000)	-1.614(0.000)	-0.556(0.000)						
524.2	-1.239(0.000)	-1.351 (0.000)	-0.293 (0.000)	0.262(0.000)					
524.3	-1.175(0.000)	-1.288(0.000)	-0.229(0.001)	0.326(0.000)	0.064(1.000)				
524.4	-1.308(0.000)	-1.420(0.000)	-0.362(0.000)	0.194(0.001)	-0.069(0.401)	-0.132(0.213)			
524.5	-1.036(0.000)	-1.148(0.000)	-0.090(0.732)	0.466(0.000)	0.203(0.000)	0.139(0.154)	0.272(0.000)		
524.6	-1.318(0.000)	-1.430(0.000)	-0.372(0.000)	0.184(0.011)	-0.079(0.654)	-0.143(0.249)	-0.010(1.000)	-0.282(0.000)	
524.7	-0.916(0.000)	-1.028(0.000)	0.030(1.000)	0.586(0.000)	0.323(0.000)	0.260(0.002)	0.392(0.000)	0.120(0.649)	0.402(0.000)

in previous sections and, furthermore, c_t represent the unobserved factors that remain stable between firms and change over time, f_i the unobserved factors that remain constant over time and change between firms, and u_{sit} the residuals.

In the hypotheses development section it is argued that there is a positive correlation between *gross margin* (*gm*) and the ratio of *sales, administration and general expenses to sales (sags)*.

We expect, therefore, that the coefficient ***b*** of the model is presented as positive and statistically significant. The results (Table 16) of the estimation of (2) verify our

Table 16. Model (2) estimation results.

Log(sags)	Coef.	Std. Err.	z	P>|z|	95% Conf.	Interval
Log(gm)	0.492	0.016	31.680	0.000	0.461	0.522
Year						
2004	-0.033	0.013	-2.570	0.010	-0.058	-0.008
2005	0.002	0.013	0.150	0.883	-0.023	0.027
2006	0.006	0.013	0.450	0.653	-0.019	0.031
2007	0.004	0.012	0.310	0.757	-0.021	0.028
2008	0.063	0.012	5.030	0.000	0.038	0.087
2009	0.111	0.013	8.700	0.000	0.086	0.136
2010	0.176	0.013	13.710	0.000	0.151	0.201
2011	0.233	0.013	17.620	0.000	0.207	0.259
2012	0.252	0.014	18.360	0.000	0.225	0.279
2013	0.183	0.014	12.750	0.000	0.155	0.211
2014	0.161	0.014	11.190	0.000	0.133	0.189
_cons	-0.771	0.021	-36.260	0.000	-0.813	-0.730
Random-effects Parameters	**Coef.**	**Std. Err.**	**95% Conf.**	**Interval**		
var(loggm)	0.098	0.006	0.087	0.110		
var(cons)	0.151	0.010	0.133	0.172		
var(Residual)	0.052	0.001	0.050	0.054		

Table 17. Averages of the Empirical Bayes estimations of the coefficients of gross margin in model (2) across Retail Segments.

sic	Coefficient of log (gm)
521.1	0.587
522.2	0.59
523.3	0.508
524.1	0.417
524.2	0.423
524.3	0.46
524.4	0.404
524.5	0.576
524.6	0.52
524.7	0.491

hypothesis, since the coefficient of *gm* is equal to 0.492 and statistically significant (p_value <0.001).

In Table 17 we present the by-segment averages of the empirical Bayes estimations of $b_{i,}$ coefficients. The coefficient of gross margin are bounded by 0.404 (*Retail sale of furniture, lighting equipment and household articles*) and 0.59 (Retail sale of *Meat and meat products retail stores*).

The estimate of the relation between the *tat* and *gm* variables was made by the estimation of model (3). The results are presented in Table 18. The coefficient of the gross profit margin was found to be negative (-0.192) and statistically significant (p_{value}<0.001).

Again, in Table 19 we present the by-segment averages of the empirical Bayes estimations of $b_{i,}$ coefficients. The coefficient of gross margin are bounded by -0.34 (*Super Markets*) and -0.096 (*Retail sale of furniture, lighting equipment and household articles*).

Figure 4 shows the plot of the impact of time-specific effects (c_t) on *sags* and *tat* (models 2 and 3 respectively) over the years 2003-2014. The estimates represent the values of the variables *sags* and *tat* during the period, controlling for the impact of gross margin. After 2008, the impact of the economic crisis in Greece on both tat and sags is clear. In particular, it seems that Greek retailers since the beginning of the crisis and during the crisis have decreased their total assets turns (the tat variable has decreased) while the proportion of sales, administration and general expenses to sales has increased (the sags variable has increased). Regarding the decrease in total assets turnover, this situation was due to the increase in total assets in relation to sales volume.

Relation between return on assets and sales growth rate

As we mentioned at methodology section we use the

Table18. Model (3) estimation results.

log(tat)	Coef.	Std. Err.	z	P>|z|	95% Conf.	Interval
log(gm)	-0.192	0.020	-9.670	0.000	-0.231	-0.153
year						
2004	0.139	0.017	8.070	0.000	0.105	0.173
2005	0.097	0.017	5.650	0.000	0.063	0.130
2006	0.078	0.017	4.570	0.000	0.044	0.111
2007	0.080	0.017	4.810	0.000	0.048	0.113
2008	0.016	0.017	0.970	0.330	-0.016	0.049
2009	-0.070	0.017	-4.070	0.000	-0.103	-0.036
2010	-0.139	0.017	-8.090	0.000	-0.172	-0.105
2011	-0.239	0.018	-13.480	0.000	-0.274	-0.204
2012	-0.341	0.018	-18.550	0.000	-0.377	-0.305
2013	-0.352	0.019	-18.370	0.000	-0.390	-0.314
2014	-0.325	0.019	-16.940	0.000	-0.363	-0.288
cons	-0.203	0.030	-6.660	0.000	-0.262	-0.143
Random-effects Parameters						
	Estimates	**Std. Err.**	**95% Conf. Interval**			
var(loggm)	0.139	0.011	0.119	0.162		
var(cons)	0.441	0.023	0.398	0.488		
var(Residual)	0.095	0.002	0.091	0.098		

Table 19. Averages of the Empirical Bayes estimations of the coefficients of gross margin in model (3) across retail segments.

sic	Coefficient of log(gm)
521.1	-0.34
522.2	-0.309
523.3	-0.242
524.1	-0.165
524.2	-0.15
524.3	-0.178
524.4	-0.096
524.5	-0.197
524.6	-0.1
524.7	-0.209

following model to estimate the impact of *sgr* on *Roa:*

$$Roa_{sit} = c_t + f_i + b_1 sgr_{sit} + b_2 sgr_{sit}^2 + b_3 operlev_{sit} + u_{sit} \quad (4)$$

We also include in the model the variable *operlev* as explanatory variable which represents the operating leverage of the firms. The results are presented in Table 20.

The estimations of b_1 and b_2 coefficients allow us to conclude that our data do not support the negative correlation hypothesis between asset turnover ratio and sales growth rate. Interpreting the results, we conclude that as sales increase, *RoA* also increases. The negative sign in the quadratic term indicates that there is a maximum for Roa at the point where:

$$sgr = \left| -\frac{\hat{b}_1}{2\hat{b}_2} \right| \approx 106\%$$

Beyond this point, an increase in sales growth rate results in a decrease in Roa. However, an increase in sales of more than 106% has been observed in 1.2% of our sample observations. Thus, although the coefficient of the quadratic term is statistically significant, it is of little economic significance, at least for our data. These results are consistent with Pattitoni et al. (2014). The authors show that when the level of growth is extremely high, the relationship between profitability and growth becomes negative, reverted from the initial argument which show a positive effect.

Moreover, the coefficient of the variable *operlev* is found negative and statistically significant. Thus, the hypothesis that firms face sharp decreases in operating income conditional to high proportion of fixed to variable costs is verified.

Figure 5 depicts the plot of time-specific effects (c_i) of

Table 20. Results of the estimation of model (4).

Roa	Coef.	Std. Err.	t	P>|t|	95% Conf.	Interval
sgr	0.070	0.004	18.540	0.000	0.063	0.078
sgr^2	-0.033	0.003	-11.760	0.000	-0.039	-0.028
operlev	-0.007	0.001	-5.810	0.000	-0.009	-0.004
cons	0.070	0.004	18.540	0.000	0.063	0.078
Year						
2005	-0.005	0.003	-1.490	0.136	-0.012	0.002
2006	-0.009	0.003	-2.510	0.012	-0.015	-0.002
2007	-0.006	0.003	-1.670	0.094	-0.012	0.001
2008	-0.016	0.003	-4.710	0.000	-0.023	-0.009
2009	-0.026	0.003	-7.370	0.000	-0.033	-0.019
2010	-0.042	0.004	-11.540	0.000	-0.049	-0.035
2011	-0.049	0.004	-13.040	0.000	-0.056	-0.042
2012	-0.056	0.004	-14.160	0.000	-0.063	-0.048
2013	-0.041	0.004	-10.220	0.000	-0.049	-0.033
2014	-0.035	0.004	-8.200	0.000	-0.043	-0.026
F test that all f_i=0 : F(1080,4452)= 2.52(Prob>F=0.000)						

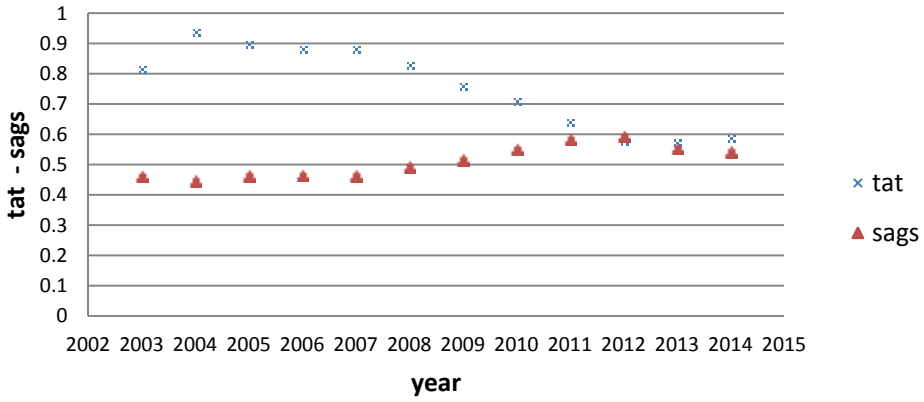

Figure 4. Plot for time specific effects (models 1 and 2).

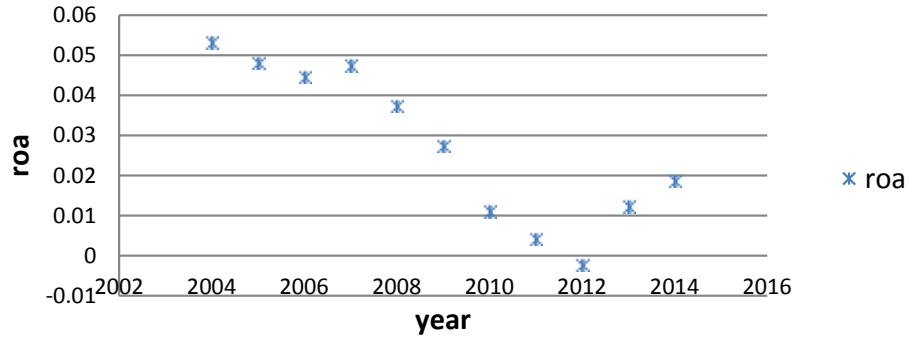

Figure 5. Plot for time specific effects (models 4).

in RoA- after controlling for sales growth, operating leverage and unobservable firm-specific effects- is presented after the year 2008, showing the consequences of the economic crisis. The reduction of Roa continues until 2012. At this point a negative value is estimated. In the coming years for which data are available, an increasing trend has been observed in Roa.

Conclusions

We used data drawn from financial statements of Greek companies that are classified into 10 sub-sectors of the Retail Trade sector for the years 2003-2014.

We attempted to answer a number of questions about the profitability and the strategies followed by the firms of the sector in order to achieve their goals.

Our data support the hypothesis that average return on equity does not show significant differences between sub-sectors. Thus, we cannot argue that, for example, firms engaged in the *retail sale of furniture* have higher returns on equity than retail firms of *electrical appliances* or those in the *retail sale of clothing*. The same conclusion is reached regarding sales growth rate. However, regarding the return on assets we cannot accept the null hypothesis of means equality for all possible pairs of the sub-sectors.

Also, according to our data, there are significant differences in means between the sub-sectors in relation to gross profit margin, asset turnover ratio and the ratio of selling, administrative and general expenses to sales.

We also find a negative correlation between gross profit margin and asset turnover ratio.

Thus we find that firms belonging to different sub-sectors use different practices to achieve similar results in terms of profitability of capital employed. For example, super markets operate with much lower profit margins than retail clothing stores, but achieve similar returns by using their assets more intensively. The opposite strategy (high profit margins and low asset turnover ratio) may be followed by firms with short-lived products such as clothing, footwear, toys, etc.

We also find that there is a positive correlation between gross profit margin and the ratio of selling, administrative and general expenses to sales.

In this case, it can be argued that the two strategies, that is, a high gross profit margin and at the same time high selling, administrative and general expenses or a low gross profit margin and, at the same time, low selling, administrative and general expenses lead to similar profitability ratios.

It also appears, against our initial hypothesis, that firms that are experiencing increasing sales rates achieve an increasing return on assets. Fisher et al. (2002) reach the same conclusion in a similar study of the Retail Trade sector in the US. It would be interesting to re-examine this hypothesis with both a larger database and other sectors of the economy (for example manufacturing). The assessment of the general trend of sales growth rate over the period 2003-2015 is presented as negative while on average there is no significant difference in the sales growth rate between sub-sectors.

The financial crisis in Greece in 2008 onwards, seems to have affected the accounting ratios of Greek retailers and especially the ratio of return on assets. During the crisis, our data supports a sharp reduction of Roa, after controlling for sales growth, operating leverage and unobservable firm-specific effects.

Finally, we note that the impact of managing the determinants of firms' profitability on their stock market value is an issue that could be included in our study. Unfortunately, our sample does not include publicly listed companies, so there is no data available for this kind of analysis. Future research in this direction would also be interesting.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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