The impact of capital structure on profitability. Evidence from the FTSE 100 and FTSE 250.

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I hereby declare that the work submitted is mine and that where I have made use of another’s work, I have attributed the source(s) according to the Regulations set in the Student’s Handbook.

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Abstract

This dissertation was written as part of the MSc in Banking and Finance at the International Hellenic University.

The present study addresses the effect of capital structure on profitability of listed non-financial firms in the London Stock Exchange and more especially in FTSE 100 and FTSE 250 Indexes. The objectives of the study are to identify the nature of the relationship between capital structure and firm performance, as well as explore the impact of capital structure on firm performance.

The issue is important since the capital structure is a decision that firms take and influence all stakeholders. Models structured as having dependent variables ROA, ROE, and Gross Profit Margin, whereas Debt (Long term debt, Short term debt and Total debt) was the independent variable. Research models were developed for each group of the data as well as for each independent variable. The Simple linear regression analysis conducted using OLS, fixed effects, and random effects methods.

According to the research results, capital structure affects profitability, to a greater or lower extent. There is not a specific rule for firms to follow since the capital structure is also an internal decision and can be affected by several factors. Nevertheless, the present study adds in the existing literature by confirming previous research results as well as by revealing new relationships between the variables selected for the research.

Keywords: capital structure, leverage, profitability, index analysis

Antonios Serafeimidis
15/12/2019
Preface

This thesis is consecrate to the memory of my father Ilias.

First of all, I would like to thank my professor Athanasio Fassa for his valuable support and contribution, but also his orientation and correspondence to all my questions for this project. As well as my family for the patience they showed during the difficult and demanding period of the preparation of the present study. Also, I would like to thanks my friend Kostas for his contribution. I would also like to acknowledge the hospitality of all the personnel of the International Hellenic University. Last but not least I would like to thank my friends that I met during my MSc in IHU and specifically, Stelios Grigoriadis, Aris Vaitsidis and Nikolaos Moutzoglou.

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Table of Contents

Abstract ......................................................................................................................... iii
Preface ......................................................................................................................... iv
2. Introduction ........................................................................................................... 1
   2.1 Purpose of this Study ......................................................................................... 1
   2.2 The Structure of this Study .............................................................................. 1
3. Literature Review .................................................................................................. 3
   3.1 The determinants of capital structure ............................................................... 3
      3.1.1 The size of a firm ...................................................................................... 3
      3.1.2 Asset tangibility ...................................................................................... 3
      3.1.3 Growth ..................................................................................................... 4
      3.1.4 Profitability .............................................................................................. 4
      3.1.5 Debt tax shields ...................................................................................... 4
      3.1.6 Non-debt-tax shield ............................................................................... 5
      3.1.7 Age .......................................................................................................... 5
      3.1.8 Risk .......................................................................................................... 5
   3.2 The impact of Capital Structure on Profitability ............................................... 6
4. Research Methodology ......................................................................................... 23
   4.1 Data ............................................................................................................... 23
   4.2 Modeling ......................................................................................................... 24
   4.3 Population ....................................................................................................... 25
   4.4 Research Hypotheses ...................................................................................... 25
5. Empirical Results & Analysis ............................................................................. 27
   5.1 FTSE 100 Period: 2002 – 2010 ...................................................................... 27
   5.2 FTSE 100 Period: 2011 – 2018 ...................................................................... 47
   5.3 FTSE 250 Period: 2002 - 2010 ..................................................................... 65
   6.4 FTSE 250 Period: 2011 – 2018 ..................................................................... 82
6. Conclusions .......................................................................................................... 100
   6.1 Key Results ..................................................................................................... 100
   6.2 Further Research ............................................................................................ 103
Bibliography ............................................................................................................ 104
Appendix ................................................................................................................... 1
List of Figures

Figure 1: Hypothesized Relations among the selected variables, Tailab (2015, p.56) .......... 15
Figure 2: conceptual model, source: Stekla & Grycova (2015, p. 35) .............................. 17
Figure 3: Number of Companies for each Sector .............................................................. 27
Figure 4: Number of Companies for each Sector .............................................................. 65

List of Tables

Table 1: Descriptive statistics for FTSE100 data for the years 2002-2010 .......................... 28
Table 2: Correlation matrix for FTSE100 data for the years 2002-2010 .......................... 29
Table 3: Regression Analysis Results, ROA/Short-term Debt. Method Random Effects, period 2002-2010, FTSE100 ................................................................. 31
Table 4: Regression Analysis Results, ROA/Long-term Debt. Method Random Effects, period 2002-2010, FTSE100 ................................................................................. 33
Table 5: Regression Analysis Results, ROA/Total Debt. Method Random Effects, period 2002-2010, FTSE100 ................................................................................................. 35
Table 6: Regression Analysis Results, ROE/Short-term Debt. Method Random Effects, period 2002-2010, FTSE100 ......................................................................................... 37
Table 7: Regression Analysis Results, ROE/Long-term Debt. Method Random Effects, period 2002-2010, FTSE100 ................................................................................................. 39
Table 8: Regression Analysis Results, ROE/Total Debt. Method Random Effects, period 2002-2010, FTSE100 ................................................................................................. 41
Table 9: Regression Analysis Results, Gross Profit Margin/Short-term Debt. Method Random Effects, period 2002-2010, FTSE100 ................................................................. 43
Table 10: Regression Analysis Results, Gross Margin/Long-term Debt. Method Random Effects, period 2002-2010, FTSE100 ................................................................. 45
Table 11: Regression Analysis Results, Gross Margin/Total Debt. Method RE, period 2002-2010, FTSE100 ................................................................................................. 46
Table 12: Descriptive statistics for FTSE100 data for the years 2011-2018 .......................... 47
Table 13: Correlation matrix for FTSE100 data for the years 2011-2018 .......................... 48
Table 15: Regression Analysis Results, ROA/Long-term Debt. Method Random Effects, period 2011-2018, FTSE100 ................................................................. 51
Table 17: Regression Analysis Results, ROE/Short-term Debt. Method Random Effects, period 2011-2018, FTSE100 ................................................................. 55
Table 18: Regression Analysis Results, ROE/Long-term Debt. Method Random Effects, period 2011-2018, FTSE100 ................................................................. 57
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>Regression Analysis Results, ROE/Total Debt. Method Random Effects, period 2011-2018, FTSE100</td>
</tr>
<tr>
<td>20</td>
<td>Regression Analysis Results, Gross Profit Margin/Short-term Debt. Method Random Effects, period 2011-2018, FTSE100</td>
</tr>
<tr>
<td>21</td>
<td>Regression Analysis Results, Gross Profit Margin/Long-term Debt. Method Random Effects, period 2011-2018, FTSE100</td>
</tr>
<tr>
<td>22</td>
<td>Regression Analysis Results, Gross Profit Margin/Total Debt. Method Random Effects, period 2011-2018, FTSE100</td>
</tr>
<tr>
<td>23</td>
<td>Descriptive statistics for FTSE250 data for the years 2002-2010</td>
</tr>
<tr>
<td>24</td>
<td>Correlation matrix for FTSE250 data for the years 2002-2010</td>
</tr>
<tr>
<td>25</td>
<td>Regression Analysis Results, ROA/Short-term Debt. Method Random Effects, period 2002-2010, FTSE250</td>
</tr>
<tr>
<td>26</td>
<td>Regression Analysis Results, ROA/Long-term Debt. Method Random Effects, period 2002-2010, FTSE250</td>
</tr>
<tr>
<td>27</td>
<td>Regression Analysis Results, ROA/Total Debt. Method Random Effects, period 2002-2010, FTSE250</td>
</tr>
<tr>
<td>28</td>
<td>Regression Analysis Results, ROE/Short-term Debt. Method Random Effects, period 2002-2010, FTSE250</td>
</tr>
<tr>
<td>29</td>
<td>Regression Analysis Results, ROE/Long-term Debt. Method Random Effects, period 2002-2010, FTSE250</td>
</tr>
<tr>
<td>30</td>
<td>Regression Analysis Results, ROE/Total Debt. Method Random Effects, period 2002-2010, FTSE250</td>
</tr>
<tr>
<td>31</td>
<td>Regression Analysis Results, Gross Profit Margin/Short-term Debt. Method Random Effects, period 2002-2010, FTSE250</td>
</tr>
<tr>
<td>32</td>
<td>Regression Analysis Results, Gross Margin/Long-term Debt. Method Fixed Effects, period 2002-2010, FTSE250</td>
</tr>
<tr>
<td>33</td>
<td>Regression Analysis Results, Gross Profit Margin/Total Debt, Method FE, period 2002-2010, FTSE250</td>
</tr>
<tr>
<td>34</td>
<td>Descriptive statistics for FTSE250 data for the years 2011-2018</td>
</tr>
<tr>
<td>35</td>
<td>Correlation matrix for FTSE250 data for the years 2011-2018</td>
</tr>
<tr>
<td>37</td>
<td>Regression Analysis Results, ROA/Long-term Debt, Method FE, period 2011-2018, FTSE250</td>
</tr>
<tr>
<td>38</td>
<td>Regression Analysis Results, ROA/Total Debt. Method Fixed Effects, period 2011-2018, FTSE250</td>
</tr>
</tbody>
</table>
Table 39: Regression Analysis Results, ROE/Short-term Debt. Method Random Effects, period 2011-2018, FTSE100 .......................................................... 90

Table 40: Regression Analysis Results, ROE/Long-term Debt. Method Random Effects, period 2011-2018, FTSE250 .......................................................... 92

Table 41: Regression Analysis Results, ROE/Total Debt. Method Random Effects, period 2011-2018, FTSE250 .......................................................... 94

Table 42: Regression Analysis Results, Gross Profit Margin/Short-term Debt. Method Fixed Effects, period 2011-2018, FTSE250 .......................................................... 95

Table 43: Regression Analysis Results, Gross Margin/Long-term Debt. Method Fixed Effects, period 2011-2018, FTSE250 .......................................................... 97

Table 44: Regression Analysis Results, Gross Profit Margin/Total Debt, Method FE, period 2011-2018, FTSE250 .......................................................... 98
2. Introduction

2.1 Purpose of this Study

The financing decision is very important for companies since financing represents the way that firms use to fund their operations. The basic financing decision is whether a company will seek funding by issuing equity either by using their earnings or by borrowing from financial institutions. There are a lot of different determinants that firms use to choose the ideal capital structure, i.e. the proportion of debt in their assets. Profitability is one of these determinants and examined in the present study. Specifically, this study addresses the effect of capital structure on profitability of listed non-financial firms in the London Stock Exchange and more especially in FTSE 100 and FTSE 250 Indexes. The objectives of the study are to:

i. Identify the nature of the relationship between capital structure and firm performance.

ii. Explore the impact of capital structure on firm performance.

2.2 The Structure of this Study

In order to fulfill the project’s aim, the study structured as follows. First, the literature review on the subject realized. The literature review concentrates on the determinants of capital structure as well as previous research on the impact of Capital Structure on profitability. The capital structure represents a very important but also complex decision for companies because it is highly related to several other aspects of the organizational performance, as well as external environmental factors. As mention above, widely presented during the literature review section.

Then research methodology and results follow — the present cross-sectional study based on secondary research data. The data from the annual financial report and Thomson- EIKON database collection were administrated contemporaneously for the entire selected population. The descriptive analysis used to systematize and present the data. Panel data analysis was used, beginning with the calculation of mean, median and standard deviation to transmit the orientation of the distribution
of overall data. Correlation tests were conducted to observe the correlation coefficient of variables at significant levels (5% and 10%). Then, the simple linear regression analysis conducted using OLS, fixed effects and random effects methods. Furthermore, research models presented, and research analysis follows. Last, concluding remarks follow.
3. Literature Review

3.1 The determinants of capital structure

Capital structure is an issue that has long occupied economists all over the world. It is highly related to market value, and firms wish to find the best combination to achieve the ultimate profitability and market value. Researchers have used data of different kinds of firms in terms of volume, sector, and country in which they operate. The theory on Capital structure based on Modigliani & Miller's (1958) work argued that the need for making decisions on a capital structure derived by the fact that the markets are not frictionless. Instead, there are some elements in the markets, such as the risk of bankruptcy or the need to pay taxes, which makes the capital structure of firms important for their value increase. Moreover, researchers who have dealt with capital structure note that there are several factors, such as taxation, financial distress costs or regulatory decisions, which influence a firm’s change in value, thus an optimal degree of leverage need to be found by each company. Research has revealed that the determinants of capital structure are the following:

3.1.1 The size of a firm
As far as the size of the firms concerned, it would be expected – as the pecking order theory suggests - that large firms generate more profits than small ones. Thus, they have the resources to fund their operations.

On the other hand, there is the theory according to which large firms are prone to leverage since the debt interest rate is deductible. Also, it is easier for large firms to access the debt market because they are more reliable, enjoy lower information asymmetry and are more diversified. It is obvious that, generally, researchers tend to support the idea that large firms are probable to leveraged than smaller ones (Sibindi, 2016).

3.1.2 Asset tangibility
Tangible assets are the assets that lenders value more in a transaction than intangible ones. They represent assets that can be used as collaterals when firms
need to borrow, something that reduces the risk for lenders. Thus, according to the trade-off theory, as firms grow and their tangible assets grow, they are more likely to borrow more (Antoniou et al., 2008). As a result, there is a positive relationship between debt and asset tangibility. On the other hand, some researchers support the argument that high tangibility is related to low information asymmetry, something that reduces equity issuance cost and leads to a negative relationship between asset tangibility and leverage (Frank & Goyal, 2009).

3.1.3 Growth
According to the trade-off theory, growth negatively related to debt, since growth offers greater value to shareholders, the cost of financial distress increases, and firms prefer to reduce debt. Besides, growing firms that expect to grow further, issue equity instead of debt (Barkley & Smith, 2005). On the other hand, some researchers argue that growing firms are more probable to have financing needs, and – according to the pecking order theory – they issue debt before equity (Sibindi, 2016).

3.1.4 Profitability
Profitability, which is the factor that is investigated by the author of the present study, is also a determinant factor of firms’ capital structure. Generally, researchers support the argument, which aligned with the pecking order theory, that profitability negatively correlated with debt. Profitable firms have their resources to finance their operations, and they do not need external funding through debt (Ahmed et al., 2010). On the other hand, according to the trade-off theory, there is a positive correlation between leverage and profitability. In this case it is assumed that firms that are profitable use debt to take advantage of the debt-interest tax shield. More specifically, the positive correlation between debt and profitability is explained by the savings due to interest rate deduction and the reduction of bankruptcy probability (Myers, 2001).

3.1.5 Debt tax shields
According to the trade-off theory, there is a positive correlation between debt and tax rate, due to interest tax benefits of debt. The tax shield, which is the result of tax savings, is a very important reason for firms to increase debt (Frank & Goyal, 2009). There is also the pecking order theory, which suggests that high tax rates increase
the cost of capital for firms, something that leads to a negative relationship between tax rate and debt of a firm (Rasiah & Kim, 2011).

3.1.6 Non-debt-tax shield
Generally, researchers agree that there is negative correlation between leverage and non-debt tax shield. According to them, tax deductions for depreciation, or other intangible assets, substitute tax benefits from lending. Thus, firms that enjoy non-debt tax shields have lower leverage levels (Frank & Goyal, 2009). Some researchers support the inverse, where there is positive correlation between debt and non-debt-tax shields. Nevertheless, this is attached to firms’ anomalous behavior (Sibindi, 2016).

3.1.7 Age
Age is a determinant factor of capital structure because it is related to characteristics that are related to decisions on capital structure. The most important factor is reputation, where old firms enjoy a better reputation, thus lower lending costs, something that creates a positive relationship between age and leverage (Harris & Raviv, 1991). On the other hand, old firms are expected to be more profitable. Thus, it is easier for them to finance their needs by using their internal resources (Ahmed et al., 2010).

3.1.8 Risk
Risk is a term that is related to firms’ performance. It is an indicator of the volatility of the earning of a company. According to the trade-off theory, there is negative correlation between risk and debt. It argued that when the risk is high, the probability of the firm not being able to fulfill its commitments concerning debt increased. So is the probability of bankruptcy. Thus, companies that demonstrate volatile earnings should avoid leverage (Antoniou et al., 2008). On the other hand, the pecking order theory supports the positive relationship between debt and risk, because in this way the adverse selection problem is avoided (Frank & Goyal, 2009).

Below, a literature review on the impact of one of these determinants, profitability, on the Capital Structure presented.
3.2 The impact of Capital Structure on Profitability

Below, an extended literature review on the subject is presented to set the theoretical framework for the empirical part of the present study, the impact of Capital Structure on the Profitability of Companies listed in the London Stock Exchange, and belonging to the FTSE 100 and the FTSE 250 index. The literature review that follows is presented by the date, starting from the earlier research on the subject.

Titman & Wessels (1988) investigated the determinants of the optimal capital structure choice. More specifically, they examined the existing theories on the determinants of capital structure by analyzing short term, long term and convertible debt measures and they used the linear structural modeling technique in their research. According to the researchers, the determinants of Capital Structure are the following:

- Inventory, gross plant, and equipment/total assets present positive relationship with Collateral Value.
- Non-debt tax Shields (companies which enjoy the important volume of non-debt tax shields, concerning their cash flow, form their capitals with less debt)
- Growth (the negative relationship between debt and growth opportunities)
- Uniqueness (negative correlation between uniqueness and debt)
- Industry classification (heavy industry firms are financed with less debt than others since their liquidation is costly)
- Size (researchers do not agree on the correlation between leverage and firm size, since large firms are less prone to bankruptcy, thus more leveraged, while small firms can also be more leveraged since it is less costly for them to borrow short-term by banks.
- Volatility (debt level is a decreasing factor of the earnings’ volatility)
● Profitability (profitability is negatively correlated to debt since firms prefer to use their capitals as a result of asymmetric information and transaction costs)

The variables used by Titman & Wessels (1988), as Capital structure measures are long term debt, short term debt, and convertible debt, dividend by market and dividend by the book value of equity. They used data from 469 firms in the USA during the period 1974-1982. According to their linear structural modeling technique results, debt negatively related to the uniqueness of a firm. Also, transaction costs affect debt structure, while short term debt is negatively related to firm size.

Voulgaris et al. (2002), tried to reveal the factors that influence capital structure of Large Size Enterprises (LSEs) in Greece, to present the implications involved after the financial integration of Greece and the EU, under the use of the single monetary unit, the euro. According to the researchers, there are three major theories concerning the capital structure of companies and are based on the so call M-M (from Modigliani & Miller) model, where only the ability of a company to generate profit affects its market value, whereas the company’s financial structure does not affect market value. The first theory based on the tax advantages that a company has due to its debt. According to this theory, companies that generate high profits should use more debt than equity, since interest rates have tax benefits. Of course, this choice leads to a tradeoff between tax benefits and increased bankruptcy possibility, something that may increase the cost of capital. The second theory is known as the “agency cost” theory where firms finance their needs according to the following order: first, they use funds that are created internally by the firm’s operation, then they use debt and, last, they issue new equity. Thus, profitability and debt are negatively related. The third theory is asymmetric information. According to this theory, companies with large free cash flow and low growth opportunities tend to have higher levels of debt. Also, according to the asymmetric information theory, capital structure depends on the firms’ size. Consider the previous theory; there is a positive correlation between debt and asset structure.

Voulgaris et al. (2002) used data of the Balance Sheets and the Income Statements of 75 Greek manufacturing LSEs. They calculated twenty-two financial ratios, which belong to the following categories:
The dependent variables of their model were Total Debt/Total Assets, Long-term Debt/Total Debt, and Short-term Debt/Total Assets. According to the results of their analysis, there is negative correlation between Total Debt and profitability. In other words, LSEs prefer to use their profits to finance their activities; the higher the profits, the lower the debt.

Furthermore, profitability was found correlated with long term debt, rather than short-term borrowing, while total debt correlated to Total Assets turnover. Companies with high growing ratios and financing needs seem to prefer debt to new equity issuing. Besides, long term debt is positively affected by gross profit margins and negatively correlated with assets productivity and growth, as well as sales. Voulgaris et al. (2002) did not find significant correlation between capital structure and ratios such as return on equity and asset profitability.

Pasiouras & Kosmidou (2007) examined the factors that influence profitability in the case of foreign and domestic banks in the EU 15, for the years 1995 – 2001. Deregulation, according to the authors, was a factor that enhanced competition among banks in the EU15, since the official authorities permitted more freedom concerning the establishment, operation, and control of banks. Competition increased and banks needed to issue new, attractive financial products for their customers. Also, mergers and acquisitions used as a strategy that helped banks become larger and more competitive. All these changes were vital, and the authors wished to examine the factors that affect profitability in this new environment. Pasiouras & Kosmidou (2007) used their model’s dependent variable Return on Average Assets (ROAA), which is an indicator of the profits earned per euro of assets. The independent variables of their model based on both internal and external factors. Internal factors were measured using the following:
- Capital adequacy ratio
- Cost/ Income Ratio
- Liquidity Ratio
- Size (accounting value of assets)

Macroeconomic factors’ measures were inflation rate, gross GDP, Total deposits / GDP, Stock Market Capitalization / Total Assets, Stock Market Capitalization / GDP, Concentration (Assets of the five major banks / Total assets of banks).

The researchers used a sample of 584 commercial banks, from the EU15 countries, for the years 1995 – 2001. They further divided their sample into two sub-categories, domestic banks (332 banks) and foreign banks (218 banks), while 34 banks not classified at this second stage. According to research results, all independent variables, except for concentration in the case of domestic banks, were found significant for banks’ profitability. Capital adequacy and Cost / Income Ratio seem to be the most important determinant of profitability. The cost of income has a significant, negative correlation with profitability, especially in the case of foreign banks. Liquidity is positively correlated with profitability, in the case of domestic banks, whereas it negatively correlated with profitability in the case of foreign banks. Size in negatively correlated to profitability, for domestic as well as for foreign banks.

Furthermore, all macroeconomic factors affect profitability, but in different ways for domestic and foreign banks. Inflation positively correlated with profitability, in the case of domestic banks, and negatively correlated with profitability in the case of foreign banks. GDP Growth positively affects profitability for domestic banks, whereas foreign banks not favored by GRD growth. Stock market capitalization and Total Assets / Deposits positively correlated with profitability in both cases.

Chen & Chen (2011), wanted to explore the way profitability affects firm value, by using the capital structure as a mediator and the firm size as well as industry as control variables. Specifically, the researchers, based on previous literature on the subject, developed the following hypotheses:

- Profitability has a positive relationship with firm value
Profitability harms leverage

Leverage harms the firm value

The industry type has a moderating effect

The firm’s size has a moderating effect

The researchers, to test their hypotheses, used data of 302 Taiwanese companies belonging to the electronic industry and 345 companies belonging to other sectors, for the years 2005 – 2009. Profitability was measured using ROA, and leverage was measured using debt/equity ratio and liability capitalization ratio. The firm value was measured using the stock price per share at the end of the year. Firm size was measured using the Log of the Total Assets. Regression analysis results revealed the following:

Profitability is positively correlated with firm value and negatively correlated with leverage

Leverage negatively correlated with value

Profitability has a mediating effect, which is influenced by the industry in which the firm operates. Thus, the negative effect of profitability on non-electronic firms is stronger

When firms have the same level of profitability, no effect on firms’ value detected due to industry differences

When firms have the same leverage, no effect on firms’ value detected due to profitability differences

Size has no significant effect on firm value

The negative effect of profitability on debt is stronger for large companies.

Gill et al. (2011) investigated the effect of the capital structure of firms in the USA on their profitability. Specifically, they used a sample of 272 firms that belonged to the services and manufacturing factors. They used the regression analysis
technique, and their data covered the period from 2005 to 2007. They used profitability as their dependent variable and measured it using EBITDA, scaled by ROE. They also used short term debt to total assets, long term debt to total assets and total debt to total assets as independent variables. Last, they included three control variables to their model, firm size, sales growth, and sector. The researchers used data derived from the financial reports of the firms included in the sample. Gill et al. (2011), regression analysis results revealed the following:

- There is a positive relationship between short term debt/total assets and profitability, for all the firms in the sample.
- There is no significant correlation between sales growth and firm size and profitability for all the firms in the sample.
- There is positive correlation long term debt/total assets and profitability, only for the firms belonging to the manufacturing sector.
- There is a positive correlation between total debt/total assets and profitability, for all the firms of the sample.

Consequently, the researchers argue that there is a positive correlation between debt and profitability and that profitable companies tend to depend on debt, but they also have to consider the risk entailed, so they should choose a structure were debt represents a proportion in the capital structure.

Shubita & Maroof (2012), concentrated their research on industrial companies listed in the Amman Stock Exchange, to reveal capital structure on profitability. They used data from 39 companies for the years 2004 - 2009. Their dependent variable was ROE. The variables selected as independent were Short term debt / Total Assets, Long Term Debt /Total Assets and Total debt / Total Assets. Also, they used Firms’ Size and Growth as control variables. Regression analysis results revealed negative relationship between profitability and all debt variables (short-term debt, long-term debt, and total debt). Also, size and growth positively influence profitability.

Chisti et al. (2013) examined the impact of the capital structure of firms in India on their profitability. For their study, they used a sample of ten firms that belong to
the automobile sector of Pakistan for the period 2007 – 2012. All the companies of the sample listed in Stock Exchanges in India. Profitability Ratios used as independent variables and capital structure ratios used as dependent variables. More specifically, the independent variables used were:

- Gross profit ratio
- Net profit ratio
- Operating profit ratio
- Return on capital employed
- Return on investment

Capital structure ratios used were:

- Debt/Assets ratio
- Debt / Equity ratio
- Interest Coverage ratio

Regression analysis results revealed that there is a negative relationship between Debt / Equity ratio and profitability ratios, and a significant positive relationship between Debt/Assets ratio and interest coverage ratio and profitability ratios. Also, among capital structure ratios, the following correlations were noticed: Debt/Asset ratio, as well as the interest coverage ratio negatively correlated with Debt / Equity Ratio. Debt/Assets ratio is significantly correlated, in a positive way, with interest coverage ratio.

Addae et al. (2013) examined the effects of capital structure on profitability for 34 firms listed in the Ghana Stock exchange, for the years 2005 - 2009. The researchers had two objectives, to investigate the effect of capital structure on profitability, and to reveal the different forms of capital structure, according to the different industry sectors. Specifically, they included industries of twelve different sectors, with the Banking & Finance and the manufacturing sectors being the dominant ones. The Banking and Finance Sector is characterized by the need for
regulated capital structure, whereas the manufacturing sector characterized by heavy tangible assets and may have long-term capital requirements. The researchers used ROE as their dependent variables and capital structure ratios as their independent variables. Capital Structure ratios used were Short term Debt, Long term Debt/ and Total Debt to the total capital ratio. Log of sales and Sales growth used as the regression’s control variables. Addae et al. (2013) used the Panel data method analysis. The results of their research revealed the following:

- There is a positive correlation between Short term Debt and profitability, whereas 52% of the firms of the sample used short term debt to finance their needs.

- There is a significant negative correlation between profitability and long-term debt. Also, companies in Ghana do not rely on long term debt, since they only finance 11% of their operation using long-term debt.

- There is a significant and negative relationship between Total debt and profitability, while the firms in Ghana finance 63% of their operations using debt instead of equity.

Ahmad (2014) examined the impact of capital structure on profitability for firms in Pakistan that belong in the cement sector. They used data for 16 (out of 21) cement manufacturing firms listed in the Karachi Stock Exchange for the years 2005 – 2010. Their model’s dependent variable was ROE, whereas they used the following independent variables:

- Debt to Equity Ratio
- Debt Ratio
- Interest Coverage ratio
- Short Term Debt/ Total Assets
- Long Term Debt / Total Assets
Regression analysis results revealed that there is a positive correlation between Short term Debt and ROE, while there is negative correlation between long term debt and ROE. These results demonstrate that companies belonging in the specific sector should use more short-term debt to finance their operation, and they should reduce long-term debt – by increasing equity resources utilization – since it has negative impact on ROE.

Oino & Ukaegbu (2015), investigated non-financial firms listed in the Nigerian Stock exchange to reveal the impact of capital structure on their performance. They also investigated the speed of adjustment of these firms to the desired capital structure. The researchers used panel data analysis for 30 firms for the period 2007 – 2012. According to their regression analysis results, there is negative correlation between total leverage and profitability. Also, the size of the firms is positively related to leverage.

Furthermore, profitability negatively correlated with both long term and total debt. Growth was found positively correlated to leverage. Tangibility positively correlated with long term and total debt. Taxation and leverage were also positively correlated, and this is mainly since interest payment is tax deducted. As far as speed of adjustment concerning leverage, Nigerian firms seem to have a speed of 47%, which is a good percentage, compared to firms that operate in developed countries. This percentage demonstrates the leverage target accomplishment of each firm.

De Mesquita & Lara (2015), examined the correlation between capital structure and profitability for companies in Brazil. They used ROE as their model’s dependent variable and the following independent variables:

- Short term debt/Total liabilities
- Long term debt / Total liabilities
- Equity on total liabilities
- Long term debt / Total equity

They used data of 70 industrial, commercial and service companies for the years 1995 – 2001. The regression analysis results showed that Long term debt was not
significant in the model and excluded. Also, Long term debt / total equity was found negatively correlated to ROE, thus the larger the debt, the lower the profitability. Short term debt was positively correlated to profitability, while equity on total liabilities was found to have positive relationship with profitability. The Brazilian economy is unstable, and the theoretical models are not the ideal ones for describing the optimal capital structure for firms in the country. Specifically, the firms demonstrate low debt levels compared to developed countries, something indicative of the conservative management of these firms, as far as capital structure is concerned.

Tailab (2015), wished to analyze the effect of Capital Structure on Profitability in the energy sector in the USA. He used a sample of 30 firms and used data from the period 2005-2013. The dependent variables of this analysis were ROA and ROE, while the independent variables were Short Term Debt, Long Term Debt, Total debt, Debt / Equity and Size (measured using sales and assets). The hypothesized Relations among the selected variables shown below:

Figure 1: Hypothesized Relations among the selected variables of Tailab (2015) research, where: ROE = return on equity; ROA = return on assets; STD = short-term-debt; LTD = long-term-debt; TD = total debt, DER = debt-equity ratio; Size1= log of sales, Size2= log of assets, source: Tailab (2015, p.56)

Regression analysis revealed the following:

- Total debt is negatively correlated, at a significant level, with both ROE and ROA
➢ Size (measured using sales) harms ROE

➢ Short-term Debt has a significant and positive impact on ROE

Sultan & Adam (2015), investigated the effect of capital structure on profitability of listed firms in Iraq. The authors argue that capital structure decision, which is determined by the size and composition of debt and equity, is essential for the efficient performance and the development of companies because it helps them become competitive and well-known and, as a result, attract investors. Sultan & Adam (2015) study’s objectives were the following:

➢ To specify the way capital structure and profitability are correlated

➢ To specify the way capital structure affects profitability evaluation

➢ To reveal the best capital structure choice

The researchers used data from companies listed in the Iraq Stock exchange for the period 2004 – 2013. The independent variables that they used in their regression analysis were:

➢ Profit Margin Ratio, which is a performance and profitability ratio and it demonstrates the net income generated by each monetary unit of sales

➢ Return on Assets Ratio (ROA), which is an efficiency ratio that measures the effectiveness of using available resources to generate profit

➢ Return on Equity (ROE), which demonstrates the profit generated by equity

Capital structure was measured using the following ratios:

➢ Financial Leverage Ratios (EL), which include Debt Ratio and Debt/Equity Ratio and demonstrate the percentage of debt a company has, compared to its assets or equity

➢ Capital Turnover, which is an indicator of the company’s efficiency in using its capital to generate profit. It is considered a long-term profitability ratio
According to Sultan & Adam's (2015) regression analysis results, Capital Structure positively correlated with profitability and firms should pay attention to create a capital structure that can make them operate efficiently. Equity is positively correlated to profitability, while debt negatively correlated to profitability.

Stekla & Grycova (2015), examined the way capital structure and profitability are interrelated, and they used data of 706 limited liability companies of the agricultural sector in the Czech Republic, for the years 2008-2013. They used two ratios to measure capital structure, Debt to Equity and Debt to Assets. To measure profitability, the researchers used the following four ratios:

- Interest coverage ratio
- Gross profit ratio
- Net profit ratio
- Return on Capital employed

The researchers to test the interrelations of their variables, they developed the following conceptual model:

Figure 2: Stekla & Grycova (2015) conceptual model, source: Stekla & Grycova (2015, p. 35)
According to their research results, there is a negative correlation between Debt to equity ratio and Debt to Total Asset Ratio and the following ratios:

- Return on Capital
- Interest Coverage
- Net Profit / Gross profit

Stekla & Grycova (2015), research took place during the years of crisis and revealed that during that period, Debt to assets and Debt to equity ratios were lower than the recovery period that followed. Also, the variation of profitability ratios is higher than the variation of the debt ratios.

Hamid et al. (2015), also researched in order to reveal whether a relationship exists between profitability and capital structure, using data of 46 Family and 46 Non-family firms listed in the Malaysian Stock Exchange, Bursa. The period of the study was from 2009 to 2011. They used ROE as their dependent variable and leverage ratios as independent variables (short term debt/total assets, long term debt/total assets, total debt/total assets). Firm size, Sales growth, and industry type used as control variables.

According to their research results, ROE for family firms is higher than that of non-family firms something which demonstrates that family firms are more profitable. Also, as far as the independent variables are concerned, short term Debt/Total assets and Total debt/Total assets are higher for family firms, while, on the other hand, non-family firms seem to finance their operation with long-term debt.

According to the regression analysis results, there is significant negative correlation between capital structure and profitability, which refers to all independent variables for both firm categories, except for Short term debt/Total Assets for family firms. These results are under the pecking order theory, where firms follow a specific pattern when they wish to finance their activities, and the first use internal funding, then they use debt and, last, they use equity issuing. On the other hand, results are not following the trade-off theory, where profitable firms use debt to finance their activities, something that leads them to further profitability.
Mashavave & Tsaurai (2015) used data of firms listed in the Johannesburg Stock Exchange in South Africa and examined the effect of capital structure on profitability. The researchers used data for the years 2001 – 2013 and calculated the debt/equity ratio and profit margin. They found no relationship between capital structure and profitability for none of the companies of the sample. There were periods where the ratios were positively correlated and others where they were negatively correlated, without following a specific pattern. The authors argue that there are external factors that influence the relationship between capital structure and profitability.

Abeywardhana (2015), investigated the correlation between capital structure and profitability for SMEs in the United Kingdom, for the years 1998 – 2008. The study used the dynamic model and used ROA and ROCE (Return on Capital Employed) as dependent variables, whereas the independent variables of the model were:

- Debt/Assets
- Total debt/Total Assets
- Long term debt / Total Assets
- Short term debt/ Total Assets
- Short term Debt / Total Debt

Firm Size, Sales Growth, and Liquidity chosen as control variables. Panel data analysis revealed a negative correlation between capital structure and profitability for both the dependent variables. Also, a positive correlation between firm size and profitability revealed.

Petria et al. (2015) investigated the determinants of profitability in a special sector, that of banks in the EU27. The European Banking system has encountered a lot of changes during the last decades, mainly due to European integration, which took place in several stages, beginning in 1957. The authors use data of 1098 European banks for the period 2001 – 2011. They used Average ROA (ROAA) and Average ROE (ROAE) as their model’s dependent variables, whereas the independent variables were:
- Business Mix Indicator (Other operating Income / Average Bank Assets)
- Liquidity Risk (Loans / Customer Deposits)
- Management Efficiency (Cost / Income Ratio)
- Credit Risk (Impaired Loans / Gross Loans)
- Capital Adequacy (Equity / Total Assets)
- Bank Size (Log of Total Assets)

Also, Inflation, Economic Growth, and Market Concentration were the external factors used in the model. Petria et al. (2015), research results revealed the following correlations:

- ROAE is not affected by the size of the bank, while ROAA is slightly and positively affected by the size of the bank
- Both ROAA and ROAE negatively correlated with the Cost / Income Ratio
- Credit Risk is negatively correlated with ROAA and with ROAE, the latter correlation being stronger
- ROAA and ROAE are not significantly affected by Capital Adequacy
- Operating Income affects both ROAA and ROAE, with the effect being much stronger in the case of ROAE
- Market concentration reduces profitability; GDP growth is positively correlated to profitability, while inflation is not significantly correlated to profitability.

Nasimi (2016) used data from British listed companies to investigate the effect on capital structure on firm profitability. The sample of his study consisted of 30 firms of the top 100 companies that were listed in the FTSE100 Index, in the London Stock Exchange for the period 2005 – 2014. The researcher developed three different models, using debt/equity and interest coverage as independent variables and return on equity (ROE), return on assets (ROA) and return on invested capital.
(ROIC) as dependent variables. They tested the effect on independent variables in each of the dependent variables. Their analysis results revealed the following:

- There is a positive relationship between Debt/equity and ROE and ROIC
- There is a negative relationship between Debt/equity and ROA
- Interest Coverage positively correlated with all three independent variables
- Debt /equity negatively correlated with Interest Coverage
- There is a positive correlation between the independent variables

Vaicondam & Ramakrishnan (2017), examined the effect of capital structure on profitability for firms that registered in the Malaysian Stock Exchange. They conducted longitudinal research between the years 2001 and 2014, using 9,912 observations. They used ROA as their dependent variable and long-term debt / total debt and short-term debt / total debt as independent variables. They found that short term debt is positively and significantly correlated to ROA, thus to profitability. On the other hand, long term debt was found to negatively correlated with ROA.

Singh & Bagga (2019) studied Nifty 50 companies listed in the National Stock Exchange of India, for the period 2008 – 2017, to reveal the effect of Capital Structure on profitability. Specifically, they used panel data methodology, and ROA and ROE were the dependent variables of the models they tested, while Total Liabilities/Total Assets and Total Equity/Total Assets chosen as the independent variables. Also, Tangibility (Fixed Assets/Total Assets), Tax (EBIT), Business Risk (% change in EBIT and %change in Net Sales), Liquidity (Current Assets/Current Liabilities), and Annual Inflation Rate chosen as the models’ control variables.

Singh & Bagga (2019) their regression panel data analysis resulted that there is a significant impact of Capital structure on profitability, and specifically results revealed the following:

- Random effect model: results show that there is negative correlation between total Debt and ROA and positive relationship between equity and ROA.
Fixed effects model: results reveal a positive correlation between Total Debt and ROE and a negative correlation between equity and ROE.

After having presented extended literature on the influence of Capital Structure on Profitability, empirical research follows, to examine, based in above-presented theory, the impact of capital structure on profitability for companies listed in the FTSE100 Index as well as companies listed in the FTSE250 Index, in the London Stock Exchange.
4. Research Methodology

4.1 Data

In order to investigate the impact of capital structure on profitability, data of 150 non-financial listed firms were used. Specifically, the author downloaded data via Thomson-EIKON in the IHU database as well as the London Stock exchange, for the years 2002-2018. Data referred to 50 companies listed in the FTSE100 Index as well as 100 companies listed in the FTSE250 Index. Financial firms were not chosen since the Financial Sector operates with a high proportion of debt, compared to assets, as a result, these data would not be comparable with other sectors. Furthermore, data were divided into two sub-periods, the one from 2002 to 2010 and the other from 2011 to 2018. The variables that were included in the analysis are the following:

Dependent Variables:

- **ROA (Return on Assets)**
  
  Return on Assets is calculated using the following type:
  
  \[ \text{ROA} = \frac{\text{Net Income}}{\text{Total Assets}} \]
  
  It is an efficiency ratio that demonstrates the proportion of profitability in total assets. In other words, it demonstrates the ability of the company to generate a profit using its assets.

- **ROE (Return on Equity)**
  
  Return on Equity is calculated using the following type:
  
  \[ \text{ROE} = \frac{\text{Net Income}}{\text{Shareholders’ Equity}} \]
  
  It is also an efficiency ratio, and, in simple words, it demonstrates the profit a company generates using each monetary unit of shareholders’ equity. In other words, it demonstrates the ability of the company to generate profit using shareholders’ equity.

- **Gross Profit Margin (%)**: \( \frac{(\text{Revenue} – \text{Cost of Goods Sold})}{\text{Revenue}} \)
  
  Gross Profit Margin is an indicator of the company’s profit, before costs and taxes, and it demonstrates how successful the company is in providing products and services in a profitable way.
Independent Variables:

- Long-term Debt
  Long-term Debt is calculated using the following type:
  \[
  \frac{\text{Long-term Debt}}{\text{Total Assets}}
  \]
  Represents the proportion of the debt the company holds - that has a maturity of more than twelve months – compared to its total assets

- Short-term Debt
  Short-term Debt is calculated using the following type:
  \[
  \frac{\text{Short-term Debt}}{\text{Total Assets}}
  \]
  Short-term Debt– or current liabilities – represents the proportion of the debt that is to be paid within a year, compared to the total assets.

- Total Debt
  Total Debt is calculated using the following type:
  \[
  \frac{\text{Total Debt}}{\text{Total Assets}}
  \]
  Total Debt consists of Long-Term Debt and Short-Term Debt.

Control Variable:

- Sales Growth
  Sales Growth was calculated by using the following formula:
  \[
  \frac{(\text{Current Year’s Sales} - \text{Previous Year’s Sales})}{\text{Previous Year’s Sales}}
  \]
  The control variable is used as it has been demonstrated by other researchers who had also investigated the effect of capital structure on profitability.

4.2 Modeling

The research aims at fulfilling the following objectives:

- Identify the nature of the relationship between Capital Structure and Firm Performance.

- Explore the impact of Capital Structure on Firm Performance.
  More specifically, the research questions that were developed in order to fulfil the research objectives are the following:

  - Is there an impact of Capital structure on ROA?
  - Is there an impact of Capital Structure on ROE?
Is there an impact of Capital Structure on Gross Profit Margin?

4.3 Population

As mentioned above, the research population consists of LSE non-financial shareholding companies listed in the FTSE100 and FTSE250 in London Stock Exchange for the study period (2002-2010) and (2011-2018). Specifically, the sample consists of 50 companies listed in the FTSE 100 (50% of the population) and 100 companies listed in the FTSE 250 (40% of the population).

4.4 Research Hypotheses

To fulfill the research objectives, the following hypotheses were developed:

Model 1:
H0: There is no significant impact of Independent Variables on Return on Asset
H1: There is a significant impact of Independent Variables on Return on Asset.

Model 2:
H0: There is no significant impact of Independent Variables on Return on Equity.
H1: There is significant impact of Independent Variables on Return on Equity.

Model 3:
H0: There is no significant impact of Independent Variables on Gross Profit Margin.
H1: There is significant impact of Independent Variables on Gross Profit Margin.

The above-mentioned hypotheses need to be checked for each of the three independent variables and for the two periods of investigation (2002-2010 and 2011 – 2018). Also, companies are divided according to the database they are included (FTSE100 or FTSE250) Thus, 9 different models were developed and regressed, following the analysis by Abor (2005) and Gill et al. (2011). These models are the following (which are estimated for the two different periods, 2002-2010 and 2011-2018 as well as the two groups of companies):
1. \( \text{ROA}_{it} = \beta_0 + \beta_1 \text{SDA}_{it} + \beta_2 \text{SG}_{it} + \epsilon_1 \)
2. \( \text{ROA}_{it} = \alpha_0 + \alpha_1 \text{LDA}_{it} + \alpha_2 \text{SG}_{it} + \epsilon_2 \)
3. \( \text{ROA}_{it} = \lambda_0 + \lambda_1 \text{DA}_{it} + \lambda_2 \text{SG}_{it} + \epsilon_3 \)

4. \( \text{ROE}_{it} = \beta_0 + \beta_1 \text{SDA}_{it} + \beta_2 \text{SG}_{it} + \epsilon_1 \)
5. \( \text{ROE}_{it} = \alpha_0 + \alpha_1 \text{LDA}_{it} + \alpha_2 \text{SG}_{it} + \epsilon_2 \)
6. \( \text{ROE}_{it} = \lambda_0 + \lambda_1 \text{DA}_{it} + \lambda_2 \text{SG}_{it} + \epsilon_3 \)

7. \( \text{GM}_{it} = \beta_0 + \beta_1 \text{SDA}_{it} + \beta_2 \text{SG}_{it} + \epsilon_1 \)
8. \( \text{GM}_{it} = \alpha_0 + \alpha_1 \text{LDA}_{it} + \alpha_2 \text{SG}_{it} + \epsilon_2 \)
9. \( \text{GM}_{it} = \lambda_0 + \lambda_1 \text{DA}_{it} + \lambda_2 \text{SG}_{it} + \epsilon_3 \)

Where:
\( \beta_0, \alpha_0, \lambda_0 \): The intercept of equation.
\( \beta, \alpha, \lambda \): Coefficients for independent variables.
ROE: Net Income/average equity
ROA: Net Income/Total Assets
Gross Margin (GM): Revenue – Cost of Goods Sold/Revenue
SDA: Short-term debt/total assets.
LDA: Long-term debt/total assets.
DA: Total debt/total assets
SG: Sales Growth (Current year’s sales minus previous year’s sales divided by previous year’s sales.)
i: firm
t: time = 1, 2, …, 16 years.
\( \epsilon_{it} \): Error term

Stationarity tests were realized for all the different variables that are included in the analysis below. Stationarity tests’ results are included in the appendix.
5. Empirical Results & Analysis

5.1 FTSE 100 Period: 2002 – 2010

Results concerning the 50 companies of the FTSE100 Index, for the years 2002-2010 are listed below. The 50 companies of the sample belong to the following sectors:

- Industrials, 34%
- Consumer Discretionary, 14%
- Consumer Staples, 16%
- Oil Exploration & Production, 0
- Energy, 8%
- Real Estate, 4%
- Technology, 4%
- Utilities, 2%
- General Retailers, 0
- Health Care, 6%
- Basic Materials, 8%
- Telecommunications, 4%

Figure 3: Number of Companies for each Sector FTSE100
First descriptive statistics for the variables were calculated and are demonstrated on table 1 below:

Table 1: Descriptive statistics for FTSE100 data for the years 2002-2010

<table>
<thead>
<tr>
<th></th>
<th>GROSS_M</th>
<th>ROA</th>
<th>ROE</th>
<th>STD_TA</th>
<th>LTD_TA</th>
<th>TD_TA</th>
<th>SALES_GR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean</strong></td>
<td>0.564037</td>
<td>0.094338</td>
<td>0.404259</td>
<td>0.301879</td>
<td>0.223754</td>
<td>0.285212</td>
<td>0.100525</td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td>0.353002</td>
<td>0.074200</td>
<td>0.196700</td>
<td>0.286316</td>
<td>0.193497</td>
<td>0.254238</td>
<td>0.076567</td>
</tr>
<tr>
<td><strong>Maximum</strong></td>
<td>11.60000</td>
<td>0.588500</td>
<td>25.18000</td>
<td>3.566988</td>
<td>2.288464</td>
<td>2.549304</td>
<td>1.402397</td>
</tr>
<tr>
<td><strong>Minimum</strong></td>
<td>0.029192</td>
<td>-0.174700</td>
<td>-0.455800</td>
<td>0.001573</td>
<td>0.000000</td>
<td>0.012050</td>
<td>-0.894500</td>
</tr>
<tr>
<td><strong>Std Dev</strong></td>
<td>1.104372</td>
<td>0.073465</td>
<td>1.479368</td>
<td>0.227600</td>
<td>0.190352</td>
<td>0.209657</td>
<td>0.192192</td>
</tr>
<tr>
<td><strong>Skewness</strong></td>
<td>7.081705</td>
<td>1.426032</td>
<td>12.59246</td>
<td>8.006252</td>
<td>5.425190</td>
<td>5.861256</td>
<td>1.512808</td>
</tr>
<tr>
<td><strong>Kurtosis</strong></td>
<td>71.24848</td>
<td>10.69165</td>
<td>191.4734</td>
<td>106.6375</td>
<td>53.52432</td>
<td>60.51473</td>
<td>13.52071</td>
</tr>
<tr>
<td><strong>Jarque-Bera</strong></td>
<td>31908.16</td>
<td>1258.990</td>
<td>675428.0</td>
<td>205738.4</td>
<td>49959.44</td>
<td>64872.37</td>
<td>2281.554</td>
</tr>
<tr>
<td><strong>Probability</strong></td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
</tr>
<tr>
<td><strong>Sum</strong></td>
<td>253.3740</td>
<td>37.80771</td>
<td>181.5121</td>
<td>135.5430</td>
<td>100.4656</td>
<td>128.6062</td>
<td>45.13559</td>
</tr>
<tr>
<td><strong>Sum Sq. Dev.</strong></td>
<td>546.3974</td>
<td>2.417097</td>
<td>990.4607</td>
<td>23.21935</td>
<td>18.23285</td>
<td>19.59240</td>
<td>18.54814</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>449</td>
<td>449</td>
<td>449</td>
<td>449</td>
<td>449</td>
<td>449</td>
<td>449</td>
</tr>
</tbody>
</table>

Table 1 demonstrates the descriptive statistics for the variables that are used for all the models, for the companies that belong to the FTSE Index, for the years 2002 – 2010. It seems that there is important deviation among the Gross Profit Margins and ROE for the companies of the sample. Nevertheless, the average Gross Profit Margin as well as ROE is high, something indicative of the effectiveness with which the companies of the sample were operating during the period 2002 – 2010. As far as Short-term Debt and Long-term Debt are concerned, there is also substantial difference between the minimum and maximum values; nevertheless, standard deviation is not high. It is also important to note that 449 observations were included.
Table 2: Correlation matrix for FTSE100 data for the years 2002-2010

<table>
<thead>
<tr>
<th></th>
<th>GROSS_M_</th>
<th>ROA</th>
<th>ROE</th>
<th>STD_TA</th>
<th>LTD_TA</th>
<th>TD_TA</th>
<th>SALES_GR</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROSS_M_</td>
<td>1.00000</td>
<td>-0.012855</td>
<td>-0.028334</td>
<td>-0.073942</td>
<td>0.050600</td>
<td>0.019077</td>
<td>0.012732</td>
</tr>
<tr>
<td>ROA</td>
<td>0.012855</td>
<td>1.00000</td>
<td>0.121368</td>
<td>-0.065619</td>
<td>-0.185717</td>
<td>-0.19120</td>
<td>0.145745</td>
</tr>
<tr>
<td>ROE</td>
<td>-0.028334</td>
<td>0.121368</td>
<td>1.000000</td>
<td>0.037306</td>
<td>0.155364</td>
<td>0.159004</td>
<td>0.024412</td>
</tr>
<tr>
<td>STD_TA</td>
<td>-0.073942</td>
<td>-0.065619</td>
<td>0.037306</td>
<td>1.000000</td>
<td>0.251820</td>
<td>0.260322</td>
<td>-0.043149</td>
</tr>
<tr>
<td>LTD_TA</td>
<td>0.058560</td>
<td>-0.185717</td>
<td>0.155364</td>
<td>0.251820</td>
<td>1.000000</td>
<td>0.952415</td>
<td>0.002588</td>
</tr>
<tr>
<td>TD_TA</td>
<td>0.019077</td>
<td>-0.191200</td>
<td>0.139841</td>
<td>0.296032</td>
<td>0.952415</td>
<td>1.000000</td>
<td>-0.012810</td>
</tr>
<tr>
<td>SALES_GR</td>
<td>0.012732</td>
<td>0.145745</td>
<td>-0.024412</td>
<td>-0.043149</td>
<td>0.002588</td>
<td>-0.012810</td>
<td>1.000000</td>
</tr>
</tbody>
</table>

According to table 2 above, there is a negative correlation between ROA and the independent variables. Specifically, there is 6.7% negative correlation between ROA and Short-term Debt/Total assets, 18.7% negative correlation between ROA and Long-term Debt/Total Assets and 19% negative correlation between ROA and Total Debt/Total Assets.

As far as ROE is concerned, there is 3.7% positive correlation between ROE and Short-term Debt/Total Assets, 1.6% positive correlation between ROE and Long-term Debt/Total Assets, 1.4% positive correlation between ROE and Total Debt/Total Assets.

As for Gross Profit Margin, there is 7.4% negative correlation between Gross Profit Margin and Long-term Debt/Total Assets, 5% positive correlation between Gross Profit Margin and 1.9% positive correlation between Gross Profit Margin and Total Debt/Total Assets.

Model 1:
The first group of hypotheses is the following:

**H0:** There is no significant impact of Independent Variables on Return on Asset

**H1:** There is significant impact of Independent Variables on Return on Asset.

Thus, the following regression models are checked for the period 2002-2010 for the companies belonging to FTSE100:
\[ ROA_t = \beta_0 + \beta_1 SDA_t + \beta_2 SGI_t + \epsilon_t \]

First, the method OLS was applied to estimate the regression function. The results are included in the appendix. Short-term Debt is not statistically important in the 95% significance level, something that indicates that there is not significant correlation between ROA and Short-term Debt, or in other words, there is not significant impact of Short-term Debt on ROA. The lack of significance is also indicated by the “t-statistics” value, which demonstrates the statistical importance of the co-efficient. Also, in this case, t-statistics for Short-term Debt is -1,3, which is lower than 1,96, thus not statistically important (UCLA, 2015).

Next, the method Fixed Effects (FE) was applied, to obtain better results since the bias is minimized (the regression is realized for each data group separately). Results are included in the appendix. According to FE method, Short-term Debt is not statistically important in the 95% significance level, \( p=0,06 \) something that indicates that there is not significant correlation between ROA and Short-term Debt, or in other words, there is not significant impact of Short-term Debt on ROA. The lack of significance is also indicated by the “t-statistics” value, which demonstrates the statistical importance of the co-efficient. Also, in this case, t-statistics for Short-term Debt is -1,85, which is lower than 1,96, thus not statistically important (UCLA, 2015).

Then, the Random Effects method was applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Short-term Debt) on the dependent variable (ROA), when the independent variable changes one unit, through time and among companies. The results are shown in Table 3 below.
According to the RE method, for the 449 observations, Short-term Debt is not statistical important in the 95% significance level, p=0.0649, something that indicates that there is not a significant correlation between ROA and Short-term Debt, or in other words, there is no significant impact of Short-term Debt on ROA. The lack of significance is also indicated by the “t-statistics” value, which demonstrates the statistical importance of the co-efficient. Also, in this case, t-statistics for Short-term Debt is -1.85, which is lower than 1.96, thus not statistically important (UCLA, 2015).

Last, the Hausman Test was applied to decide on the best method between RE and FE. According to results that are included in the appendix, there is no significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

Taking the above under consideration, all the three methods of regression analysis, indicate that there is not significant importance between the dependent variable (ROA) and the independent variable (Short-term Debt) for the companies of FTSE100 and the period 2002-2010. Thus, H0 is accepted.
1.2. \[\text{ROA}_{it} = \alpha_0 + \alpha_1 \text{LDA}_{it} + \alpha_2 \text{SG}_{it} + e_2\]

First, the method OLS was applied in order to estimate the regression function. Results are shown in appendix. For the 449 observations, Long-term Debt is statistical important in the 95% significance level, something that indicates that there is significant correlation between ROA and Long-term Debt, or in other words, there is significant impact of Long-term Debt on ROA.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). Results are shown in appendix. According to FE method, Long-term Debt is statistical important in the 95% significance level, \(p=0.0013\), something that indicates that there is significant correlation between ROA and Long-term Debt, or in other words, there is significant impact of Long-term Debt on ROA.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Long-term Debt) on the dependent variable (ROA), when the independent variable changes one unit, through time and among companies. Results are demonstrated on table 4, below.
Table 4: Regression Analysis Results, ROA/Long-term Debt. Method Random Effects, period 2002-2010, FTSE100

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.095635</td>
<td>0.008158</td>
<td>11.72261</td>
<td>0.0000</td>
</tr>
<tr>
<td>LTD_TA</td>
<td>-0.060248</td>
<td>0.016949</td>
<td>-3.554552</td>
<td>0.0004</td>
</tr>
<tr>
<td>SALES_GROWTH</td>
<td>0.023671</td>
<td>0.014165</td>
<td>1.667603</td>
<td>0.0961</td>
</tr>
</tbody>
</table>

According to RE method, for the 449 observations Long-term Debt is statistical important in the 95% significance level, p=0.0004, something that indicates that *there is significant correlation between ROA and Long-term Debt*. The model that can be developed according to Random Effects Method is the following:

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

Taking the above under consideration, all the three methods of regression analysis, indicate that there is significant correlation between the dependent variable (ROA) and the independent variable (Long-term Debt). Thus, H0 is rejected. Also, since the RE Method is the most appropriate, the equation that explains the correlation between the variables is the following:

$$\text{ROA} = 0.095635 - 0.060248 \text{LDA}_t + 0.023671 \text{SG}_t + e_1$$
The equation above shows that 1% increase in Long-term Debt (Ceteris paribus), results to an average decrease of 6.02% of ROA.

\[ 1.3 \ ROA_{it} = \lambda_0 + \lambda_1 DA_{it} + \lambda_2 SG_{it} + e_3 \]

First, the method OLS is applied in order to estimate the regression function. Results are shown in appendix. For the 449 observations R-squared is 5.7%, something that indicates that 5.7% of the variation of the dependent variable is explained by the independent variables. Also, Total Debt is statistical important in the 95% significance level, \( p=0.0001 \), something that indicates that there is significant correlation between ROA and Total Debt, or in other words, there is significant impact of Total Debt on ROA. Also, there is negative correlation between the dependent and the independent variable.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). Results are shown in appendix. According to FE method, Total Debt is statistical important in the 95% significance level, \( p=0.0017 \), something that indicates that there is significant correlation between ROA and Total Debt.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Total Debt) on the dependent variable (ROA), when the independent variable changes one unit, through time and among companies. Results are demonstrated on table 5, below.
Table 5: Regression Analysis Results, ROA/Total Debt. Method Random Effects, period 2002-2010, FTSE100

According to RE method, for the 449 observations R-squared is 3.2%, something that indicates that 3.2% of the variation of the dependent variable is explained by the independent variables. Also, Total Debt is statistical important in the 95% significance level, p=0.0005, something that indicates that there is significant correlation between ROA and Total Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

All the three methods of regression analysis indicate that there is significant correlation between the dependent variable (ROA) and the independent variable (Total Debt). Thus, H0 is rejected. Also, since the RE Method is the most appropriate, the equation that explains the correlation between the variables is the following:

\[
\text{ROA} = 0.097357 \cdot 0.053173 \cdot DA_t + 0.023260 \cdot SG_t + e_t
\]
The equation above shows that 1% increase in Total Debt (Ceteris paribus), results to an average decrease of 5.3% of ROA.

As far as the first Model is concerned, the regression analysis results revealed that there is significant negative correlation between ROA and two of the three independent variables (Long-term Debt and Total Debt).

Model 2:

$H_0$: There is no significant impact of Independent Variables on Return on Equity.

$H_1$: There is significant impact of Independent Variables on Return on Equity.

2.1 $ROE_{it} = \beta_0 + \beta_1SDA_{it} + \beta_2SG_{it} + e_1$

First, the method OLS is applied in order to estimate the regression function. Results are shown in appendix. Short-term Debt is not statistical important in the 95% significance level, something that indicates that there is not significant correlation between ROE and Short-term Debt, $p=0.4424$, or in other words, there is not significant impact of Short-term Debt on ROA.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). Results are shown in appendix. According to FE method, for the 449 observations R-squared is 21.8%, something that indicates that 21.8% of the variation of the dependent variable is explained by the independent variables. Also, Short-term Debt is not statistical important in the 95% significance level, $p=0.1470$, something that indicates that there is not significant correlation between ROE and Short-term Debt.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Short-term Debt) on the dependent variable (ROE), when the independent variable changes one unit, through time and among companies. Results are demonstrated on table 6, below.
Table 6: Regression Analysis Results, ROE/Short-term Debt. Method Random Effects, period 2002-2010, FTSE100

According to RE method, Short-term Debt is not statistical important in the 95% significance level, p=0.8215, something that indicates that there is not significant correlation between ROE and Short-term Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

Taking the above under consideration, all the three methods of regression analysis, indicate that there is not significant correlation between the dependent variable (ROE) and the independent variable (Short-term Debt). Thus, H0 is accepted.
\[ 2.2 \ ROE_{it} = \alpha_0 + \alpha_1 \ LDA_{it} + \alpha_2 \ SG_{it} + e_2 \]

First, the method OLS is applied in order to estimate the regression function. Results are shown in appendix. For the 449 observations Long-term Debt is not statistical important in the 95% significance level, \( p=0.7419 \), something that indicates that there is not significant correlation between ROE and Long-term Debt, or in other words, there is not significant impact of Long-term Debt on ROE.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). Results are shown in appendix. According to FE method, Long-term Debt is not statistical important in the 95% significance level, \( p=0.8582 \), something that indicates that there is not significant correlation between ROE and Long-term Debt.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Long-term Debt) on the dependent variable (ROE), when the independent variable changes one unit, through time and among companies. Results are demonstrated on table 7, below.
According to RE method, Long-term Debt is not statistical important in the 95% significance level, p=0.9267, something that indicates that there is not significant correlation between ROE and Long-term Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

Taking the above under consideration, all the three methods of regression analysis, indicate that there is not significant correlation between the dependent variable (ROE) and the independent variable (Long-term Debt). Thus, H0 is accepted.

2.3 \( \text{ROE}_{it} = \lambda_0 + \lambda_1 \text{DA}_{it} + \lambda_2 \text{SG}_{it} + \epsilon_{3} \)

First, the method OLS is applied in order to estimate the regression function. Results are shown in appendix. For the 449 observations Total Debt is not statistical important in the 95% significance level, p=0.7728, something that indicates that
there is not significant correlation between ROE and Total Debt, or in other words, there is not significant impact of Total Debt on ROE.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). Results are shown in appendix. According to FE method, for the 449 observations, Total Debt is not statistical important in the 95% significance level, p=0.7361, something that indicates that there is not significant correlation between ROE and Total Debt.

Then, the Random Effects method was applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Total Debt) on the dependent variable (ROE), when the independent variable changes one unit, through time and among companies. Results are demonstrated on table 8, below.
According to RE method, Total Debt is not statistical important in the 95% significance level, \( p=0.9938 \), something that indicates that there is not significant correlation between ROE and Total Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

As far as the second Model is concerned, the regression analysis results revealed that there is not significant correlation between ROE and the three independent variables (Short-term Debt, Long-term Debt and Total Debt). In fact, the lack of correlation is important, since all \( p \)-values are close to 1.
Model 3:

H0: There is no significant impact of Independent Variables on Gross Profit Margin

H1: There is significant impact of Independent Variables on Gross Profit Margin

\[ GM_{it} = \beta_0 + \beta_1 SDA_{it} + \beta_2 SG_{it} + \epsilon_{it} \]

First, the method OLS is applied in order to estimate the regression function. Results are shown in appendix. Short-term Debt is not statistical important in the 95% significance level, \( p=0.1205 \), something that indicates that there is not significant correlation between Gross Profit Margin and Short-term Debt.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). Results are shown in appendix. According to FE method, Short-term Debt is not statistical important in the 95% significance level, \( p=0.9310 \), something that indicates that there is not significant correlation between Gross Profit Margin and Short-term Debt.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Short-term Debt) on the dependent variable (Gross Profit Margin), when the independent variable changes one unit, through time and among companies. Results are demonstrated on table9, below.
According to RE method, Short-term Debt is not statistical important in the 95% significance level, p=0,9045, something that indicates that there is not significant correlation between Gross Profit Margin and Short-term Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

Taking the above under consideration, all the three methods of regression analysis, indicate that there is not significant correlation between the dependent variable (Gross Profit Margin) and the independent variable (Short-term Debt). Thus, H0 is accepted.
\[ 3.2 \ GM_t = \alpha_0 + \alpha_1 \ LDA_t + \alpha_2 \ SGit + e_t \]

First, the method OLS is applied in order to estimate the regression function. Results are shown in appendix. Long-term Debt is not statistical important in the 95% significance level, \( p=0.2864 \), something that indicates that there is not significant correlation between Gross Profit Margin and Long-term Debt, or in other words, there is not significant impact of Long-term Debt on Gross Profit Margin.

Next, the method Fixed Effects (FE) was applied. Long-term Debt is not statistical important in the 95% significance level, \( p=0.4330 \), something that indicates that there is not significant correlation between Gross Profit Margin and Long-term Debt.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Long-term Debt) on the dependent variable (Gross Profit Margin), when the independent variable changes one unit, through time and among companies. Results are demonstrated on table 10, below.
Table 10: Regression Analysis Results, Gross Margin/Long-term Debt. Method Random Effects, period 2002-2010, FTSE100

According to RE method, Long-term Debt is not statistical important in the 95% significance level, $p=0.3937$, something that indicates that there is not significant correlation between Gross profit Margin and Long-term Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

Taking the above under consideration, all the three methods of regression analysis, indicate that there is not significant correlation between the dependent variable (Gross Profit Margin) and the independent variable (Long-term Debt). Thus, $H_0$ is accepted.

$$3.3 \ GM_{it} = \lambda_0 + \lambda_1 \ DA_{it} + \lambda_2 \ SG_{it} + e_3$$

First, the method OLS is applied in order to estimate the regression function. Results are shown in appendix. Total Debt is not statistical important in the 95% significance
level, $p=0.6846$, something that indicates that there is not significant correlation between Gross Profit Margin and Total Debt, or in other words, there is not significant impact of Total Debt on Gross Profit Margin.

Next, the method Fixed Effects (FE) was applied. According to FE method, Total Debt is not statistical important in the 95% significance level, $p=0.9310$, something that indicates that there is not significant correlation between Gross Profit Margin and Total Debt.

Then, the Random Effects method was applied. Results are demonstrated on table 11, below.

Table 11: Regression Analysis Results, Gross Margin/Total Debt. Method RE, period 2002-2010, FTSE100

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.556662</td>
<td>0.142827</td>
<td>3.897037</td>
<td>0.0001</td>
</tr>
<tr>
<td>TD_TA</td>
<td>0.026576</td>
<td>0.204945</td>
<td>0.124792</td>
<td>0.9007</td>
</tr>
<tr>
<td>SALES_GROWTH</td>
<td>-0.0003255</td>
<td>0.188861</td>
<td>-0.017237</td>
<td>0.9863</td>
</tr>
</tbody>
</table>

According to RE method, Total Debt is not statistical important in the 95% significance level, $p=0.9007$, something that indicates that there is not significant correlation between Gross profit Margin and Total Debt.
Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

_Taking the above under consideration, all the three methods of regression analysis, indicate that there is not significant correlation between the dependent variable (Gross Profit Margin) and the independent variable (Total Debt). Thus, H0 is accepted._

5.2 FTSE 100 Period: 2011 – 2018

Results concerning the 50 companies of the FTSE100 Index, for the years 2011-2018 are listed below.

First descriptive statistics for the variables were calculated and are demonstrated in table 12 below:

_Table12: Descriptive statistics for FTSE100 data for the years 2011-2018_

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Std Dev</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>0.070380</td>
<td>0.06100</td>
<td>0.840000</td>
<td>-0.750000</td>
<td>0.082574</td>
<td>-0.376331</td>
<td>45.43778</td>
</tr>
<tr>
<td>ROE</td>
<td>0.364278</td>
<td>0.198700</td>
<td>10.76850</td>
<td>-1.172800</td>
<td>1.238472</td>
<td>11.50937</td>
<td>164.3716</td>
</tr>
<tr>
<td>GROSS_M</td>
<td>0.442550</td>
<td>0.354050</td>
<td>3.749484</td>
<td>0.047044</td>
<td>0.327814</td>
<td>3.859756</td>
<td>34.46306</td>
</tr>
<tr>
<td>LTD_TA</td>
<td>0.220424</td>
<td>0.211303</td>
<td>1.322101</td>
<td>0.000000</td>
<td>0.118965</td>
<td>2.128476</td>
<td>20.32282</td>
</tr>
<tr>
<td>STD_TA</td>
<td>0.283518</td>
<td>0.259150</td>
<td>4.032620</td>
<td>0.008806</td>
<td>0.258278</td>
<td>9.286160</td>
<td>123.7309</td>
</tr>
<tr>
<td>TD_TA</td>
<td>0.258446</td>
<td>0.254730</td>
<td>1.787560</td>
<td>-0.324500</td>
<td>0.147198</td>
<td>3.261100</td>
<td>34.71737</td>
</tr>
<tr>
<td>SALES_GR</td>
<td>0.055068</td>
<td>0.039450</td>
<td>0.885370</td>
<td>-0.324500</td>
<td>0.138351</td>
<td>1.414451</td>
<td>10.01646</td>
</tr>
</tbody>
</table>

The figure above, demonstrates the descriptive statistics for the variables that are used for all the models, for the companies that belong to the FTSE Index, for the years 2011 – 2018. It seems that there is important deviation among the Gross Profit Margins and ROE for the companies of the sample. Nevertheless, the average Gross Profit Margin as well as ROE is high, something that indicates that the companies continued to demonstrate efficiency even during the years of the financial crisis (2011 – 2018). Of course, compared to the descriptive statistics of the same sample
for the years 2002-2010, all independent variables’ values were reduced, something indicative of the influence – even not very important – of the financial crisis on the performance of the companies.

Table 13: Correlation matrix for FTSE100 data for the years 2011-2018

According to figure above, the correlation between the dependent and the independent variables, negative or positive, is not significant.

Model 1:

The first group of hypotheses is the following:

\[ H_0: \text{There is no significant impact of Independent Variables on Return on Asset} \]

\[ H_1: \text{There is significant impact of Independent Variables on Return on Asset.} \]

Thus, the following regression models are checked for the period 2011-2018 for the companies belonging to FTSE100:

1.1 \[ \text{ROA}_t = \beta_0 + \beta_1 \text{SDA}_t + \beta_2 \text{SG}_t + \epsilon_t \]

First, the method OLS was applied in order to estimate the regression function. Results are shown in appendix. Short-term Debt is not statistical important in the 95% significance level, \( p=0.0918 \), something that indicates that there is not significant correlation between ROA and Short-term Debt.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). Results are shown in appendix. According to FE method, Short-term Debt is not statistical important in the 95% significance level, \( p=0.1350 \) something that indicates that there is not significant correlation between ROA and Short-term Debt.
Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Short-term Debt) on the dependent variable (ROA), when the independent variable changes one unit, through time and among companies. Results are demonstrated on Table 14, below.

Table 14: Regression Analysis Results, ROA/Short-term Debt. Method Random Effects, period 2011-2018, FTSE100

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.058979</td>
<td>0.006333</td>
<td>9.313580</td>
<td>0.0000</td>
</tr>
<tr>
<td>STD_TA</td>
<td>0.026855</td>
<td>0.015885</td>
<td>1.690559</td>
<td>0.0917</td>
</tr>
<tr>
<td>SALES_GROWTH</td>
<td>0.068762</td>
<td>0.029655</td>
<td>2.318757</td>
<td>0.0209</td>
</tr>
</tbody>
</table>

According to RE method, for the 400 observations Short-term Debt is not statistical important in the 95% significance level, p=0.0917, something that indicates that there is not significant correlation between ROA and Short-term Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.
Taking the above under consideration, all the three methods of regression analysis, indicate that there is not significant importance between the dependent variable (ROA) and the independent variable (Short-term Debt) for the companies of FTSE100 and for the period 2011-2018. Thus, H0 is accepted.

1.2. ROA\textsubscript{it} = \alpha_0 + \alpha_1 LDA\textsubscript{it} + \alpha_2 SG\textsubscript{it} + e_2

First, the method OLS was applied in order to estimate the regression function. Results are shown in appendix. Long-term Debt is not statistical important in the 95% significance level, something that indicates that there is not significant correlation between ROA and Long-term Debt.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). Results are shown in appendix. For the 400 observations, Long-term Debt is not statistical important in the 95% significance level, p=0,5348, something that indicates that there is not significant correlation between ROA and Long-term Debt.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Long-term Debt) on the dependent variable (ROA), when the independent variable changes one unit, through time and among companies. Results are demonstrated on table15, below.
According to RE method, for the 400 observations, Long-term Debt is not statistically important in the 95% significance level, p=0.5344, something that indicates that there is not significant correlation between ROA and Long-term Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

Taking the above under consideration, all the three methods of regression analysis, indicate that there is not significant correlation between the dependent variable (ROA) and the independent variable (Long-term Debt). Thus, H0 is accepted.
\[ \text{ROA}_{it} = \lambda_0 + \lambda_1 \text{DA}_{it} + \lambda_2 \text{SG}_{it} + e_{i3} \]

First, the method OLS is applied in order to estimate the regression function. Results are shown in appendix. Total Debt is not statistical important in the 95% significance level, \( p=0.3269 \), something that indicates that there is not significant correlation between ROA and Total Debt.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). Results are shown in appendix. According to FE method, Total Debt is not statistical important in the 95% significance level, \( p=0.3104 \), something that indicates that there is not significant correlation between ROA and Total Debt.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Total Debt) on the dependent variable (ROA), when the independent variable changes one unit, through time and among companies. Results are demonstrated on table 16, below.
Table 16: Regression Analysis Results, ROA/Total Debt. Method Random Effects, period 2011-2018, FTSE100

According to RE method, for the 400 observations Total Debt is not statistical important in the 95% significance level, p=0,3210, something that indicates *that there is not significant correlation between ROA and Total Debt*.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

*All the three methods of regression analysis indicate that there is not significant correlation between the dependent variable (ROA) and the independent variable (Total Debt). Thus, H0 is accepted.*

*As far as the first Model is concerned, the regression analysis results revealed that there is not significant correlation between ROA and the three independent variables (Short-term Debt, Long-term Debt and Total Debt) for the FTSE100 Index companies for the years 2011-2018.*
Model 2:

H0: There is no significant impact of Independent Variables on Return on Equity.
H1: There is significant impact of Independent Variables on Return on Equity.

2.1 \( \text{ROE}_i = \beta_0 + \beta_1 \text{SDA}_i + \beta_2 \text{SG}_i + e_1 \)

First, the method OLS was applied in order to estimate the regression function. Results are shown in appendix. Short-term Debt is statistical important in the 95% significance level, \( p=0.0092 \), something that indicates that there is significant correlation between ROE and Short-term Debt, or in other words, there is significant impact of Short-term Debt on ROA.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). Results are shown in appendix. According to FE method, Short-term Debt is statistical important in the 95% significance level, \( p=0.0069 \), something that indicates that there is significant correlation between ROE and Short-term Debt.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Short-term Debt) on the dependent variable (ROE), when the independent variable changes one unit, through time and among companies. Results are demonstrated on table 17, below.
According to RE method, for the 400 observations Short-term Debt is statistically important in the 95% significance level, $p=0.0094$, something that indicates that **there is significant correlation between ROE and Short-term Debt**.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

Taking the above under consideration, all the three methods of regression analysis, indicate that there is not significant correlation between the dependent variable (ROE) and the independent variable (Short-term Debt). Thus, $H_0$ is accepted. Also, since the RE method is the most appropriate the model that is derived by the regression analysis is the following:

$$\text{ROE} = 0.191935 + 0.624611 \text{SDA}_{it} - 0.086181 \text{SG}_{it} + e_1$$
The equation above shows that there is positive correlation between the variables and that 1% increase in Short-term Debt (Ceteris paribus), results to an average increase of 62.5% of ROE.

2.2 $ROE_{it} = \alpha_0 + \alpha_1 LDA_{it} + \alpha_2 SG_{it} + e_2$

First, the method OLS was applied in order to estimate the regression function. Results are shown in appendix. For the 400 observations Long-term Debt is not statistical important in the 95% significance level, $p=0.0908$, but it is statistically important in the 90% significance level. Something that indicates that there is significant correlation between ROE and Long-term Debt, or in other words, there is significant impact of Long-term Debt on ROE. The regression is the following:

$$ROE_t = 0.175859 + 0.882476 \text{LDA}_t - 0.110775 \text{SG}_t + e_t$$

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). Results are shown in appendix. According to FE method, of which the results are shown on figure above, Long-term Debt is not statistical important in the 95% significance level, $p=0.1110$, something that indicates that there is not significant correlation between ROE and Long-term Debt.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Long-term Debt) on the dependent variable (ROE), when the independent variable changes one unit, through time and among companies. Results are demonstrated on Table 18, below.
Table 18: Regression Analysis Results, ROE/Long-term Debt. Method Random Effects, period 2011-2018, FTSE100

According to RE method, Long-term Debt is not statistical important in the 95% significance level, \( p=0.0921 \), but it is statistically important in the 90% significance level, something that indicates that there is significant correlation between ROE and Long-term Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

Taking the above under consideration, there is significant correlation between the dependent variable (ROE) and the independent variable (Long-term Debt), at 90% significant level. Thus, \( H_0 \) is rejected. Also, since the RE Method is the most appropriate, the equation that explains the correlation between the variables is the following:

\[
\text{ROE}_t = 0.175859 + 0.882476 \text{LDA}_t - 0.110775 \text{SGI}_t + e_t
\]
The equation above shows that there is positive correlation between the variables and that 1% increase in Long-term Debt (Ceteris paribus), results to an average increase of 88.25% of ROE.

2.3 \( ROE_{it} = \lambda_0 + \lambda_1 DA_{it} + \lambda_2 SG_{it} + e_3 \)

First, the method OLS is applied in order to estimate the regression function. Results are shown in appendix. Total Debt is not statistically important in the 95% significance level, \( p=0.0692 \), but it is statistically important in at 90% significance level, something that indicates that there is significant correlation between ROE and Total Debt.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). Results are shown in appendix.

According to FE method, of which the results are shown on figure above, Total Debt is not statistically important in the 95% significance level, \( p=0.0811 \), but it is statistically important in at 90% significance level, something that indicates that there is significant correlation between ROE and Total Debt.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Total Debt) on the dependent variable (ROE), when the independent variable changes one unit, through time and among companies. Results are demonstrated on table 19, below.
Table 19: Regression Analysis Results, ROE/Total Debt. Method Random Effects, period 2011-2018, FTSE100

According to RE method, Total Debt is not statistical important in the 95% significance level, p=0.0703, but it is statistically important in the 90% significance level. something that indicates that there is significant correlation between ROE and Total Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

Taking the above under consideration, there is significant correlation between the dependent variable (ROE) and the independent variable (Total Debt), at 90% significant level. Thus, H0 is rejected. Also, since the RE Method is the most appropriate, the equation that explains the correlation between the variables is the following:

$$\text{ROE}_{it} = 0.156472 + 0.795286 \text{DA}_{it} - 0.103236 \text{SG}_{it} + e_{2}$$

The equation above shows that there is positive correlation between the variables and that 1% increase in Total Debt (Ceteris paribus), results to an average increase of 79.53% of ROE.
As far as the second Model is concerned, the regression analysis results revealed that there is significant correlation between ROE and the three independent variables (Short-term Debt, Long-term Debt and Total Debt), at the 95% and the 90% significance level.

Model 3:

H0: There is no significant impact of Independent Variables on Gross Profit Margin

H1: There is significant impact of Independent Variables on Gross Profit Margin

3.1 \( GM_{it} = \beta_0 + \beta_{1}SDA_{it} + \beta_{2}SG_{it} + e_{t} \)

First, the method OLS was applied in order to estimate the regression function. Results are shown in appendix. According to figure above, Short-term Debt is statistically important in the 95% significance level, \( p=0.0023 \), something that indicates that there is significant negative correlation between Gross Profit Margin and Short-term Debt.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). Results are shown in appendix. According to FE method, for the 400 observations, Short-term Debt is statistically important in the 95% significance level, \( p=0.0019 \), something that indicates that there is significant correlation between Gross Profit Margin and Short-term Debt.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Short-term Debt) on the dependent variable (Gross Profit Margin), when the independent variable changes one unit, through time and among companies. Results are demonstrated on table20, below.
Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

*Taking the above under consideration, all the three methods of regression analysis, indicate that there is significant correlation between the dependent variable (Gross Profit Margin) and the independent variable (Short-term Debt). Thus, \( H_0 \) is rejected. Also, since the RE Method is the most appropriate, the model that is developed is the following:

\[
\text{GM}_{it} = 0.501995 - 0.193493 \text{SDA}_{it} - 0.083274 \text{SG}_{it} + e_{it}
\]

The equation above shows that there is negative correlation between the variables and that 1% increase in Long-term Debt (Ceteris paribus), results to an average decrease of 19,35% of Gross Profit Margin.
\[3.2 \ GM_{it} = \alpha_0 + \alpha_1 \ LDA_{it} + \alpha_2 \ SGit + e_2\]

First, the method OLS is applied in order to estimate the regression function. Results are shown in appendix. For the 400 observations Long-term Debt is not statistical important in the 95% significance level, \(p=0.8014\), something that indicates that there is not significant correlation between Gross Profit Margin and Long-term Debt, or in other words, there is not significant impact of Long-term Debt on Gross Profit Margin.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). Results are shown in appendix. According to FE method, Long-term Debt is not statistical important in the 95% significance level, \(p=0.7717\), something that indicates that there is not significant correlation between Gross Profit Margin and Long-term Debt.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Long-term Debt) on the dependent variable (Gross Profit Margin), when the independent variable changes one unit, through time and among companies. Results are demonstrated on table 21, below.

Table 21: Regression Analysis Results, Gross Profit Margin/Long-term Debt. Method Random Effects, period 2011-2018, FTSE100

\[
\begin{array}{cccccc}
\text{Variable} & \text{Coefficient} & \text{Std. Error} & t-\text{Statistic} & \text{Prob.} \\
C & 0.438957 & 0.035499 & 12.36543 & 0.0009 \\
LTD\_TA & 0.034782 & 0.139153 & 0.249956 & 0.8028 \\
SALES\_GROWTH & -0.073963 & 0.119655 & -0.618135 & 0.5386 \\
\end{array}
\]
According to RE method, Long-term Debt is not statistical important in the 95% significance level, \(p=0.8028\), something that indicates that there is not significant correlation between Gross Profit Margin and Long-term Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

Taking the above under consideration, all the three methods of regression analysis, indicate that there is not significant correlation between the dependent variable (Gross Profit Margin) and the independent variable (Long-term Debt). Thus, \(H_0\) is accepted.

3.3 \(GM_{it} = \lambda_0 + \lambda_1 DA_{it} + \lambda_2 SG_{it} + e_3\)

First, the method OLS is applied in order to estimate the regression function. Results are shown in appendix. Total Debt is not statistical important in the 95% significance level, \(p=0.2741\), something that indicates that there is not significant correlation between Gross Profit Margin and Total Debt.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). Results are shown in appendix.

According to FE method, Total Debt is not statistically important in the 95% significance level, \(p=0.2803\), something that indicates that there is not significant correlation between Gross Profit Margin and Total Debt.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Total Debt) on the dependent variable (Gross Profit Margin), when the independent variable changes one unit, through time and among companies. Results are demonstrated on table 22, below.
Table 22: Regression Analysis Results, Gross Profit Margin/Total Debt. Method Random Effects, period 2011-2018, FTSE100

According to RE method, Total Debt is not statistical important in the 95% significance level, p=0.2773, something that indicates that there is not significant correlation between Gross Profit Margin and Total Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

As far as the third Model is concerned, the regression analysis results revealed that there is not significant correlation between Gross Profit Margin and the three independent variables (Short-term Debt, Long-term Debt and Total Debt).
5.3 FTSE 250 Period: 2002 - 2010

Results concerning the 100 companies of the FTSE250 Index, for the years 2002-2010 are listed below. The 100 companies of the sample belong to the following sectors:

![Figure 4: Number of Companies for each Sector FTSE250](image)

First descriptive statistics for the variables were calculated and are demonstrated on figure below:

Table 23: Descriptive statistics for FTSE250 data for the years 2002-2010

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Std. Dev.</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>GROSS M</th>
<th>STD_TA</th>
<th>LTD_TA</th>
<th>TD_TA</th>
<th>SALES_GR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>0.063147</td>
<td>0.262843</td>
<td>0.403357</td>
<td>0.305529</td>
<td>0.210301</td>
<td>0.258569</td>
<td>0.108634</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROE</td>
<td>0.058460</td>
<td>0.164100</td>
<td>0.352397</td>
<td>0.219555</td>
<td>0.198559</td>
<td>0.254371</td>
<td>0.085162</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>0.321400</td>
<td>0.249275</td>
<td>0.269492</td>
<td>0.168800</td>
<td>0.324060</td>
<td>0.000000</td>
<td>0.000000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>-1.046000</td>
<td>-2.084100</td>
<td>-0.324060</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.086242</td>
<td>0.233412</td>
<td>0.309492</td>
<td>0.219275</td>
<td>0.189977</td>
<td>0.000000</td>
<td>0.000000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skewness</td>
<td>2.961197</td>
<td>28.11477</td>
<td>0.072893</td>
<td>10.15700</td>
<td>1.878884</td>
<td>1.821388</td>
<td>1.105640</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kurtosis</td>
<td>37.53733</td>
<td>864.5240</td>
<td>4.417335</td>
<td>206.9401</td>
<td>16.25749</td>
<td>15.00788</td>
<td>8.77522</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jarque-Bera</td>
<td>40040.31</td>
<td>27960595</td>
<td>217.3096</td>
<td>1575.159</td>
<td>7119.444</td>
<td>5801.522</td>
<td>1463.447</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Probability</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum</td>
<td>5883685</td>
<td>23658248</td>
<td>3630210</td>
<td>2875962</td>
<td>1974520</td>
<td>2327120</td>
<td>9777027</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum Sq. Dev</td>
<td>686512</td>
<td>4890331</td>
<td>6053495</td>
<td>5585227</td>
<td>3200800</td>
<td>3210548</td>
<td>4493368</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 23 demonstrates the descriptive statistics for the variables that are used for all the models, for the companies that belong to the FTSE Index, for the years 2002 – 2010. It seems that there is important deviation among the ROE and ROA for the companies of the sample. Nevertheless, the average Gross Profit Margin as well as ROE is high, something indicative of the effectiveness with which the companies of the sample were operating during the period 2002 – 2010. As far as Short-term Debt
and Long-term Debt are concerned, there is also substantial difference between the minimum and maximum values. 900 observations were included.

Table 24: Correlation matrix for FTSE250 data for the years 2002-2010

According to table 24 above, there is 15.9% positive correlation between ROA and Short-term Debt/ Total assets, 15.5% negative correlation between ROA and Long-term Debt/Total Assets and 18% negative correlation between ROA and Total Debt / Total Assets.

As far as ROE is concerned, there is 4.8% positive correlation between ROE and Short-term Debt / Total Assets, 3.1% positive correlation between ROE and Long-term Debt / Total Assets, 2.9% positive correlation between ROE and Total Debt / Total Assets.

As for Gross Profit Margin, there is 26.9% negative correlation between Gross Profit Margin and Long-term Debt / Total Assets, 29.7% positive correlation between Gross Profit Margin and 25.2% positive correlation between Gross Profit Margin and Total Debt / Total Assets.

Model 1:

The first group of hypotheses is the following:

**H0:** There is no significant impact of Independent Variables on Return on Asset

**H1:** There is a significant impact of Independent Variables on Return on Asset.

Thus, the following regression models checked for the period 2002-2010 for the companies belonging to FTSE2500:

1.2 \( ROA_{it} = \beta_0 + \beta_1SDA_{it} + \beta_2SG{i}t + e_t \)
First, the method OLS was applied. The results included in the appendix. Short-term Debt is statistically important in the 95% significance level, \( p=0,00 \), something that indicates that there is a significant correlation between ROA and Short-term Debt.

Next, the method Fixed Effects (FE) was applied, to obtain better results since the bias is minimized (the regression is realized for each data group separately). The results are included in the appendix. According to FE method, Short-term Debt is statistically important in the 95% significance level, \( p=0,04 \), something that indicates that there is a significant correlation between ROA and Short-term Debt, or in other words, there is not the significant impact of Short-term Debt on ROA.

Then, the Random Effects method was applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Short-term Debt) on the dependent variable (ROA), when the independent variable changes one unit, through time and among companies. Results are shown on table 25, below.
Table 25: Regression Analysis Results, ROA/Short-term Debt. Method Random Effects, period 2002-2010, FTSE250

According to RE method, for the 900 observations, Short-term Debt is not statistical important in the 95% significance level, p=0.00, something that indicates that there is a significant correlation between ROA and Short-term Debt.

Last, the Hausman test applied in order to decide on the best method between RE and FE. According to results that included in the appendix, there is not a significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

Taking the above under consideration, all the three methods of regression analysis, indicate that there is significant importance between the dependent variable (ROA) and the independent variable (Short-term Debt) for the companies of FTSE250 and for the period 2002-2010. Thus, H0 is rejected. The model developed is the following:
\[
\text{ROA}_t = 0.044403 + 0.042990 \text{SDA}_t + 0.051320 \text{SG}_t + e_t
\]

The equation above shows that there is positive correlation between the variables and that 1\% increase in Short-term Debt (Ceteris paribus), results to an average decrease of 4.3\% of ROA.

1.2. \( \text{ROA}_t = \alpha_0 + \alpha_1 \text{LDA}_t + \alpha_2 \text{SG}_t + e_2 \)

First, the method OLS applied to estimate the regression function. The results are shown in the appendix. Long-term Debt is statistical important in the 95\% significance level, \( p=0.00 \), something that indicates that there is a significant correlation between ROA and Long-term Debt, or in other words, there is a significant impact of Long-term Debt on ROA.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). The results are shown in the appendix. According to FE method, Long-term Debt is statistical important in the 95\% significance level, \( p=0.00 \), something that indicates that there is significant correlation between ROA and Long-term Debt, or in other words, there is significant impact of Long-term Debt on ROA.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Long-term Debt) on the dependent variable (ROA), when the independent variable changes one unit, through time and among companies. Results are demonstrated on table 26, below.
Table 26: Regression Analysis Results, ROA/Long-term Debt. Method Random Effects, period 2002-2010, FTSE250

According to RE method, for the 900 observations Long-term Debt is statistically important in the 95% significance level, $p=0.00$, something that indicates that there is a significant correlation between ROA and Long-term Debt.

Last, the Hausman Test applied to decide on the best method between RE and FE. According to results that are shown in the appendix, there is no significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

Taking the above under consideration, all three methods of regression analysis indicate that there is a significant correlation between the dependent variable (ROA) and the independent variable (Long-term Debt). Thus, $H_0$ rejected. Also, since the RE Method is the most appropriate, the equation that explains the correlation between the variables is the following:
The equation above shows that 1% increase in Long-term Debt (Ceteris paribus) results in an average decrease of 7.1% of ROA.

\[ \text{ROA}_t = \lambda_0 + \lambda_1 \text{DA}_t + \lambda_2 \text{SG}_t + \epsilon_t \]

First, the method OLS is applied in order to estimate the regression function. The results are shown in the appendix. For the 900 observations, Total Debt is statistical important in the 95% significance level, \( p=0.00 \), something that indicates that \textit{there is a significant correlation between ROA and Total Debt}, or in other words, there is a significant impact of Total Debt on ROA. Also, there is a negative correlation between the dependent and the independent variable.

Next, the method Fixed Effects (FE) applied, to obtain better results since the bias minimized (the regression is realized for each data group separately). The results are shown in the appendix. According to FE method, Total Debt is statistical important in the 95% significance level, \( p=0.00 \), something that indicates that \textit{there is a significant correlation between ROA and Total Debt}.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Total Debt) on the dependent variable (ROA), when the independent variable changes one unit, through time and among companies. Results are demonstrated on figure 27, below.
According to RE method, Total Debt is statistically important in the 95% significance level, p=0.00, something that indicates that there is a significant correlation between ROA and Total Debt.

Last, the Hausman test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is no significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

All three methods of regression analysis indicate that there is a significant correlation between the dependent variable (ROA) and the independent variable (Total Debt). Thus, H0 rejected. Also, since the RE Method is the most appropriate, the equation that explains the correlation between the variables is the following:

\[
\text{ROA} = 0.080175 - 0.088037 \, \Delta \text{TA}_t + 0.052799 \, \text{SG}_t + e_t
\]

The equation above shows that 1% increase in Total Debt (Ceteris paribus), results in an average decrease of 8.8% of ROA.
As far as the first Model is concerned, the regression analysis results revealed that there is a significant negative correlation between ROA and two of the three independent variables (Long-term Debt and Total Debt), whereas there is a significant positive correlation between ROA and Short-term Debt.

Model 2:

H0: There is no significant impact of Independent Variables on Return on Equity.

H1: There is a significant impact of Independent Variables on Return on Equity.

2.1 \( ROE_t = \beta_0 + \beta_1 SDA_t + \beta_2 SG_t + e_t \)

First, the method OLS is applied to estimate the regression function. The results are shown in the appendix. Short-term Debt is not statistical important in the 95% significance level, something that indicates that there is no significant correlation between ROE and Short-term Debt, \( p=0.1428 \), or in other words, there is no significant impact of Short-term Debt on ROA.

Next, the method Fixed Effects (FE) was applied to obtain better results since the bias is minimized (the regression is realized for each data group separately). The results are shown in the appendix. According to FE method, Short-term Debt is not statistical important in the 95% significance level, \( p=0.7513 \), something that indicates that there is no significant correlation between ROE and Short-term Debt.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Short-term Debt) on the dependent variable (ROE), when the independent variable changes one unit, through time and among companies. Results are demonstrated on Table28, below.
According to RE method, Short-term Debt is not statistical important in the 95% significance level, $p=0.1705$, something that indicates that there is not a significant correlation between ROE and Short-term Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in the appendix, there is no significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

Taking the above under consideration, all the three methods of regression analysis, indicate that there is not significant correlation between the dependent variable (ROE) and the independent variable (Short-term Debt). Thus, $H_0$ is accepted.

2.2 $ROE_{it} = \alpha_0 + \alpha_1 LDA_{it} + \alpha_2 SG_{it} + e_2$

First, the method OLS is applied in order to estimate the regression function. The results are shown in appendix. For the 900 observations Long-term Debt is not statistical important in the 95% significance level, $p=0.3572$, something that indicates that there is no significant correlation between ROE and Long-term Debt, or in other words, there is not significant impact of Long-term Debt on ROE.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group
According to FE method, Long-term Debt is not statistical important in the 95% significance level, \( p=0.2711 \), something that indicates that there is not significant correlation between ROE and Long-term Debt.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Long-term Debt) on the dependent variable (ROE), when the independent variable changes one unit, through time and among companies. The results are demonstrated in table 29, below.

Table 29: Regression Analysis Results, ROE/Long-term Debt. Method Random Effects, period 2002-2010, FTSE250

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTD_TA</td>
<td>0.403373</td>
<td>0.431630</td>
<td>0.934535</td>
<td>0.3503</td>
</tr>
<tr>
<td>SALES_GROWTH</td>
<td>0.028352</td>
<td>0.353456</td>
<td>0.808241</td>
<td>0.9361</td>
</tr>
</tbody>
</table>

According to RE method, Long-term Debt is not statistical important in the 95% significance level, \( p=0.3503 \), something that indicates that there is not significant correlation between ROE and Long-term Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not
significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

Taking the above under consideration, all the three methods of regression analysis, indicate that there is not significant correlation between the dependent variable (ROE) and the independent variable (Long-term Debt). Thus, H0 is accepted.

2.3 ROE_{it} = \lambda_0 + \lambda_1 DA_{it} + \lambda_2 SG_{it} + \epsilon_3

First, the method OLS is applied in order to estimate the regression function. Results are shown in appendix. For the 900 observations Total Debt is not statistical important in the 95% significance level, p=0,3776, something that indicates that there is not significant correlation between ROE and Total Debt, or in other words, there is not significant impact of Total Debt on ROE.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). Results are shown in appendix. According to FE method, for the 900 observations, Total Debt is not statistical important in the 95% significance level, p=0,6024, something that indicates that there is not significant correlation between ROE and Total Debt.

Then, the Random Effects method was applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Total Debt) on the dependent variable (ROE), when the independent variable changes one unit, through time and among companies. Results are demonstrated on table30, below.
According to RE method, Total Debt is not statistical important in the 95% significance level, p=0.3943, something that indicates that there is not a significant correlation between ROE and Total Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

As far as the second Model is concerned, the regression analysis results revealed that there is not significant correlation between ROE and the three independent variables (Short-term Debt, Long-term Debt and Total Debt).

Model 3:

H0: There is no significant impact of Independent Variables on Gross Profit Margin

H1: There is significant impact of Independent Variables on Gross Profit Margin

3.1 \( GM_i = \beta_0 + \beta_1SDA_i + \beta_2SG_i + e_i \)

First, the method OLS is applied in order to estimate the regression function. Results are shown in appendix. Short-term Debt is statistical important in the 95%
significance level, $p=0.00$, something that indicates that there is significant
correlation between Gross Profit Margin and Short-term Debt.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results
since the bias is minimized (the regression is realized for each data group
separately). Results are shown in appendix. According to FE method, Short-term
Debt is not statistical important in the 95% significance level, $p=0.5132$, something
that indicates that there is not significant correlation between Gross Profit Margin
and Short-term Debt.

Table 31: Regression Analysis Results, Gross Profit Margin/Short-term Debt. Method
Random Effects, period 2002-2010, FTSE250

Then, the Random Effects method is applied. According to RE method, Short-term
Debt is not statistical important in the 95% significance level, $p=0.1704$, something
that indicates that there is not significant correlation between Gross Profit Margin
and Short-term Debt.

Last, the Hausman Test was applied in order to decide on the best method
between RE and FE. According to results that are shown in appendix, there is
significant correlation between FE and RE methods; thus, the Fixed Effects Model is
the most appropriate.
Taking the above under consideration, all the three methods of regression analysis, indicate that there is not significant correlation between the dependent variable (Gross Profit Margin) and the independent variable (Short-term Debt). Thus, H0 is accepted.

3.2 $GM_{it} = \alpha_0 + \alpha_1 LDA_{it} + \alpha_2 SG_{it} + \epsilon_i$

First, the method OLS is applied in order to estimate the regression function. Results are shown in appendix. Long-term Debt is statistically important in the 95% significance level, $p=0.00$, something that indicates that there is significant correlation between Gross Profit Margin and Long-term Debt, or in other words, there is not significant impact of Long-term Debt on Gross Profit Margin.

Next, the method Fixed Effects (FE) was applied. Long-term Debt is not statistically important in the 95% significance level, $p=0.2462$, something that indicates that there is not significant correlation between Gross Profit Margin and Long-term Debt.

Table 32: Regression Analysis Results, Gross Margin/Long-term Debt. Method Fixed Effects, period 2002-2010, FTSE250
Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Long-term Debt) on the dependent variable (Gross Profit Margin), when the independent variable changes one unit, through time and among companies. Results are demonstrated in appendix. According to RE method, Long-term Debt is not statistical important in the 95% significance level, \( p=0.9341 \), something that indicates that there is not significant correlation between Gross profit Margin and Long-term Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in appendix, there is significant correlation between FE and RE methods; thus, the Fixed Effects Model is the most appropriate.

Taking the above under consideration, all the three methods of regression analysis, indicate that there is not significant correlation between the dependent variable (Gross Profit Margin) and the independent variable (Long-term Debt). Thus, \( H0 \) is accepted.

3.3 \( GM_{it} = \lambda_0 + \lambda_1 DA_{it} + \lambda_2 SG_{it} + e_3 \)

First, the method OLS is applied in order to estimate the regression function. Results are shown in appendix. Total Debt is not statistical important in the 95% significance level, \( p=0.00 \), something that indicates that there is significant correlation between Gross Profit Margin and Total Debt, or in other words, there is not significant impact of Total Debt on Gross Profit Margin.

Next, the method Fixed Effects (FE) was applied. According to FE method, Total Debt is not statistical important in the 95% significance level, \( p=0.2494 \), something that indicates that there is not significant correlation between Gross Profit Margin and Total Debt.
Then, the Random Effects method was applied. The results demonstrated in the appendix.

According to RE method, Total Debt is not statistical important in the 95% significance level, $p=0.8011$, something that indicates that there is not a significant correlation between Gross profit Margin and Total Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to the results shown in the appendix, there is a significant correlation between FE and RE methods; thus, the Fixed Effects Model is the most appropriate.

Taking the above under consideration, all the three methods of regression analysis indicate that there is no significant correlation between the dependent variable (Gross Profit Margin) and the independent variable (Total Debt). Thus, $H_0$ is accepted.
6.4 FTSE 250 Period: 2011 – 2018

Results concerning the 100 companies of the FTSE250 Index for the years 2011-2018 are listed below.

First descriptive statistics for the variables were calculated and demonstrated in the figure below:

Table 34: Descriptive statistics for FTSE250 data for the years 2011-2018

Table 34 demonstrates the descriptive statistics for the variables that used for all the models, for the companies that belong to the FTSE250 Index, for the years 2011 – 2018. It seems that there is an important deviation among the ROE for the companies of the sample.

Nevertheless, the average Gross Profit Margin, as well as ROE, is high. As far as Short-term Debt and Long-term Debt are concerned, there is also a substantial difference between the minimum and maximum values. 900 observations were included.
According to table 35 above, there is 5.3% negative correlation between ROA and Short-term Debt/Total assets, 19.4% negative correlation between ROA and Long-term Debt/Total Assets and 21.5% negative correlation between ROA and Total Debt/Total Assets.

As far as ROE is concerned, there is 9.2% positive correlation between ROE and Short-term Debt/Total Assets, 5.2% negative correlation between ROE and Long-term Debt/Total Assets, 6.2% negative correlation between ROE and Total Debt/Total Assets.

As for Gross Profit Margin, there is 31.8% negative correlation between Gross Profit Margin and Long-term Debt/Total Assets, 19.2% positive correlation between Gross Profit Margin and Total Debt/Total Assets.

Model 1:
The first group of hypotheses is the following:

\textit{H0: There is no significant impact of Independent Variables on Return on Asset}

\textit{H1: There is a significant impact of Independent Variables on Return on Asset.}

Thus, the following regression models checked for the period 2011-2018 for the companies belonging to FTSE250:
### 1.3 \(ROA_{it} = \beta_0 + \beta_1 SDA_{it} + \beta_2 SG_{it} + e_{it}\)

First, the method OLS was applied. Results are included in appendix. Short-term Debt is not statistically important in the 95% significance level, \(p=0.2776\), something that indicates that there is not significant correlation between ROA and Short-term Debt.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). Results are included in the appendix. According to FE method, Short-term Debt is statistically important in the 95% significance level, \(p=0.0458\), something that indicates that there is significant correlation between ROA and Short-term Debt, or in other words, there is not significant impact of Short-term Debt on ROA.

Then, the Random Effects method was applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Short-term Debt) on the dependent variable (ROA), when the independent variable changes one unit, through time and among companies. The results are shown in table 36, below.
According to RE method, for the 900 observations Short-term Debt is not statistical important in the 95% significance level, $p=0.0665$, but it is statistically important in the 90% significance level, something that indicates that there is significant correlation between ROA and Short-term Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are included in the appendix, there is not significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

Taking the above under consideration, all the three methods of regression analysis, indicate that there is significant importance between the dependent variable (ROA) and the independent variable (Short-term Debt) for the companies of
FTSE250 and the period 2011-2018. Thus, \( H0 \) is rejected. The model developed is the following:

\[
{\text{ROA}}_{it} = 0.075063 - 0.027926 {\text{SDA}}_{it} + 0.044818 {\text{SG}}_{it} + e_{i}
\]

The equation above shows that there is a positive correlation between the variables and that 1% increase in Short-term Debt (Ceteris paribus) results in an average decrease of 2.8% of ROA.

1.2. \( {\text{ROA}}_{it} = \alpha_0 + \alpha_1 {\text{LDA}}_{it} + \alpha_2 {\text{SG}}_{it} + e_2 \)

First, the method OLS was applied to estimate the regression function. The results are shown in appendix. Long-term Debt is statistical important in the 95% significance level, \( p=0.00 \), something that indicates that there is a significant correlation between ROA and Long-term Debt, or in other words, there is significant impact of Long-term Debt on ROA.

Next, the method Fixed Effects (FE) applied to obtain better results since the bias minimized (the regression is realized for each data group separately). According to the FE method, Long-term Debt is statistical important in the 95% significance level, \( p=0.1157 \), something that indicates that there is no significant correlation between ROA and Long-term Debt.

Table 37: Regression Analysis Results, ROA/Long-term Debt, Method FE, period 2011-2018, FTSE250
Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Long-term Debt) on the dependent variable (ROA), when the independent variable changes one unit, through time and among companies. The results demonstrated in the appendix. According to RE method, Long-term Debt is statistical important in the 95% significance level, p=0,0128, something that indicates that there is a significant correlation between ROA and Long-term Debt.

Last, the Hausman Test applied in order to decide on the best method between RE and FE. According to results that are shown in the appendix, there is a significant correlation between FE and RE methods; thus, the Fixed Effects Model is the most appropriate.

Taking the above under consideration, since the fixed effects method is the most appropriate, there is no significant correlation between the dependent variable (ROA) and the independent variable (Long-term Debt). Thus, H0 is accepted.

1.3 \( ROA_{it} = \lambda_0 + \lambda_1 DA_{it} + \lambda_2 SG_{it} + e_3 \)

First, the method OLS is applied to estimate the regression function. The results are shown in the appendix. For the 900 observations, Total Debt is statistical important in the 95% significance level, p=0,00, something that indicates that there is a significant correlation between ROA and Total Debt, or in other words. There is a significant impact of Total Debt on ROA. Also, there is a negative correlation between the dependent and the independent variable.

Next, the method Fixed Effects (FE) applied, to obtain better results since the bias minimized (the regression is realized for each data group separately). According to FE method, Total Debt is not statistical important in the 95% significance level, p=0,0844, but it is statistically important in the 90% significance level, something that indicates that there is a significant correlation between ROA and Total Debt.
Then, the Random Effects method is applied. According to the RE method, Total Debt is statistical important in the 95% significance level, p=0,00, something that indicates that there is a significant correlation between ROA and Total Debt. 

Last, the Hausman Test was applied to decide on the best method between RE and FE. According to results that are shown in the appendix, there is a significant correlation between FE and RE methods; thus, the Fixed Effects Model is the most appropriate.

All three methods of regression analysis indicate that there is a significant correlation between the dependent variable (ROA) and the independent variable (Total Debt). Thus, H0 rejected. Also, since the FE Method is the most appropriate, the equation that explains the correlation between the variables is the following:

$$\text{ROA} = 0.070633 - 0.013573 \text{DA}_t + 0.042332 \text{SG}_t + e_1$$

The equation above shows that 1% increase in Total Debt (Ceteris paribus), results to an average decrease of 1,36% of ROA.
As far as the first Model is concerned, the regression analysis results revealed that there is significant negative correlation between ROA and two of the three independent variables (Short-term Debt and Total Debt).

**Model 2:**

**H0:** There is no significant impact of Independent Variables on Return on Equity.

**H1:** There is a significant impact of Independent Variables on Return on Equity.

2.1 \( ROE_i = \beta_0 + \beta_1 SDA_i + \beta_2 SG_i + \varepsilon_i \)

First, the method OLS is applied to estimate the regression function. The results are shown in the appendix. Short-term Debt is not statistical important in the 95% significance level, something that indicates that there is a significant correlation between ROE and Short-term Debt, \( p=0.00 \), or in other words, there is a significant impact of Short-term Debt on ROA.

Next, the method Fixed Effects (FE) was applied, to obtain better results since the bias is minimized (the regression is realized for each data group separately). The results are shown in appendix. According to FE method, Short-term Debt is not statistical important in the 95% significance level, \( p=0.4228 \), something that indicates that there is not a significant correlation between ROE and Short-term Debt.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Short-term Debt) on the dependent variable (ROE), when the independent variable changes one unit, through time and among companies. The results are demonstrated in table39, below.
According to RE method, Short-term Debt is not statistically important in the 95% significance level, p=0.6229, something that indicates that there is not significant correlation between ROE and Short-term Debt.

Last, the Hausman Test applied in order to decide on the best method between RE and FE. According to results that are shown in the appendix, there is no significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

Taking the above under consideration, there is not a significant correlation between the dependent variable (ROE) and the independent variable (Short-term Debt). Thus, H0 is accepted.
2.2 \( ROE_{it} = \alpha_0 + \alpha_1 LDA_{it} + \alpha_2 SG_{it} + e_{2} \)

First, the method OLS is applied in order to estimate the regression function. The results are shown in the appendix. Long-term Debt is not statistical important in the 95% significance level, \( p=0,5068 \), something that indicates that there is no significant correlation between ROE and Long-term Debt, or in other words; there is not the significant impact of Long-term Debt on ROE.

Next, the method Fixed Effects (FE) was applied, to obtain better results since the bias is minimized (the regression is realized for each data group separately). The results are shown in the appendix. According to FE method, Long-term Debt is not statistical important in the 95% significance level, \( p=0,6846 \), something that indicates that there is not a significant correlation between ROE and Long-term Debt.

Then, the Random Effects method is applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Long-term Debt) on the dependent variable (ROE), when the independent variable changes one unit, through time and among companies. The results are demonstrated in table 40, below.
According to the RE method, Long-term Debt is not statistical important in the 95% significance level, p=0,5068, something that indicates that there is no significant correlation between ROE and Long-term Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in the appendix, there is no significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

Taking the above under consideration, all the three methods of regression analysis, indicate that there is no significant correlation between the dependent variable (ROE) and the independent variable (Long-term Debt). Thus, H0 is accepted.

2.3 \( ROE_{it} = \lambda_0 + \lambda_1 DA_{it} + \lambda_2 SG_{it} + \varepsilon_3 \)

First, the method OLS is applied in order to estimate the regression function. The results are shown in the appendix. Total Debt is not statistical important in the 95% significance level, p=0,1307, something that indicates that there is no significant
correlation between ROE and Total Debt, or in other words; there is not a significant impact of Total Debt on ROE.

Next, the method Fixed Effects (FE) was applied, in order to obtain better results since the bias is minimized (the regression is realized for each data group separately). The results are shown in the appendix. According to FE method, Total Debt is not statistical important in the 95% significance level, p=0.6211, something that indicates that there is not a significant correlation between ROE and Total Debt.

Then, the Random Effects method was applied. The results of this method, and specifically the coefficients, take into account the differences among the companies as well as the differences among the years for a specific company. Thus, results show the average impact of the independent variable (Total Debt) on the dependent variable (ROE), when the independent variable changes one unit, through time and among companies. The results are demonstrated in table41 below.
According to RE method, Total Debt is not statistical important in the 95% significance level, \( p=0.4258 \), something that indicates that there is not a significant correlation between ROE and Total Debt.

Last, the Hausman Test was applied in order to decide on the best method between RE and FE. According to results that are shown in the appendix, there is no significant correlation between FE and RE methods; thus, the Random Effects Model is the most appropriate.

As far as the second Model is concerned, the regression analysis results revealed that there is no significant correlation between ROE and the three independent variables (Short-term Debt, Long-term Debt, and Total Debt).

Model 3:

\[ H_0: \text{There is no significant impact of Independent Variables on Gross Profit Margin} \]

\[ H_1: \text{There is a significant impact of Independent Variables on Gross Profit Margin} \]

3.1 \( GM_{it} = \beta_0 + \beta_1 SDA_{it} + \beta_2 SG_{it} + \epsilon_{it} \)
First, the method OLS is applied to estimate the regression function. The results are shown in the appendix. Short-term Debt is statistically important in the 95% significance level, p=0.00, something that indicates that there is a significant correlation between Gross Profit Margin and Short-term Debt.

Next, the method Fixed Effects (FE) applied, to obtain better results since the bias is minimized (the regression is realized for each data group separately). The results are shown in the appendix. According to FE method, Short-term Debt is not statistically important in the 95% significance level, p=0.00, something that indicates that there is a significant correlation between Gross Profit Margin and Short-term Debt.

Table 42: Regression Analysis Results, Gross Profit Margin/Short-term Debt. Method Fixed Effects, period 2011-2018, FTSE250

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.461014</td>
<td>0.007171</td>
<td>64.29293</td>
<td>0.0000</td>
</tr>
<tr>
<td>STD_TA</td>
<td>-0.092912</td>
<td>0.023778</td>
<td>-3.907471</td>
<td>0.0001</td>
</tr>
<tr>
<td>SALES_GROWTH</td>
<td>-0.024405</td>
<td>0.013006</td>
<td>-1.881074</td>
<td>0.0307</td>
</tr>
</tbody>
</table>

Then, the Random Effects method is applied. According to RE method, Short-term Debt is not statistically important in the 95% significance level, p=0.00, something that indicates that there is no significant correlation between Gross Profit Margin and Short-term Debt.
Last, the Hausman Test applied in order to decide on the best method between RE and FE. According to results that are shown in the appendix, there is a significant correlation between FE and RE methods; thus, the Fixed Effects Model is the most appropriate.

Taking the above under consideration, all the three methods of regression analysis, indicate that there is a significant correlation between the dependent variable (Gross Profit Margin) and the independent variable (Short-term Debt). Thus, \( H_0 \) is rejected. Since the FE model is most appropriate, the equation is the following:

\[
GM_{it} = 0.461014 - 0.092912 SDA_{it} - 0.024465 SG_{it} + e_1
\]

3.2 \( GM_{it} = \alpha_0 + \alpha_1 LDA_{it} + \alpha_2 SG_{it} + e_2 \)

First, the method OLS is applied to estimate the regression function. The results are shown in the appendix. Long-term Debt is statistically important in the 95% significance level, \( p=0.00 \), something that indicates that there is a significant correlation between Gross Profit Margin and Long-term Debt, or in other words, there is not the significant impact of Long-term Debt on Gross Profit Margin.

Next, the method Fixed Effects (FE) was applied. Long-term Debt is not statistical important in the 95% significance level, \( p=0.3168 \), something that indicates that there is not a significant correlation between Gross Profit Margin and Long-term Debt.
Table 43: Regression Analysis Results, Gross Margin/Long-term Debt. Method Fixed Effects, period 2011-2018, FTSE250

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.437337</td>
<td>0.003564</td>
<td>122.7093</td>
<td>0.0000</td>
</tr>
<tr>
<td>LTD_TA</td>
<td>-0.010972</td>
<td>0.010951</td>
<td>-1.001872</td>
<td>0.3168</td>
</tr>
<tr>
<td>SALES_GROWTH</td>
<td>-0.021376</td>
<td>0.013140</td>
<td>-1.629239</td>
<td>0.1037</td>
</tr>
</tbody>
</table>

Then, the Random Effects method is applied. The results demonstrated in the appendix. According to the RE method, Long-term Debt is not statistical important in the 95% significance level, p=0.4881, something that indicates that there is not a significant correlation between Gross profit Margin and Long-term Debt.

Last, the Hausman Test applied in order to decide on the best method between RE and FE. According to the results shown in the appendix, there is a significant correlation between FE and RE methods; thus, the Fixed Effects Model is the most appropriate.

Taking the above under consideration, there is no significant correlation between the dependent variable (Gross Profit Margin) and the independent variable (Long-term Debt). Thus, H0 is accepted.
\[ 3.3 \, GM_{it} = \lambda_0 + \lambda_1 \, DA_{it} + \lambda_2 \, SG_{it} + e_3 \]

First, the method OLS is applied to estimate the regression function. The results are shown in the appendix. Total Debt is not statistical important in the 95% significance level, \( p=0.00 \), something that indicates that there is a significant correlation between Gross Profit Margin and Total Debt, or in other words, there is no significant impact of Total Debt on Gross Profit Margin.

Next, the method Fixed Effects (FE) was applied. According to the FE method, Total Debt is not statistical important in the 95% significance level, \( p=0.17 \), something that indicates that there is no significant correlation between Gross Profit Margin and Total Debt.

Table 44: Regression Analysis Results, Gross Profit Margin/Total Debt, Method FE, period 2011-2018, FTSE250

![Table 44](image)

Then, the Random Effects method was applied. The results are demonstrated in the appendix.

According to the RE method, Total Debt is not statistical important in the 95% significance level, \( p=0.2728 \), something that indicates that there is no significant correlation between Gross Profit Margin and Total Debt.
Last, the Hausman test was applied to decide on the best method between RE and FE. According to the results shown in the appendix, there is a significant correlation between FE and RE methods; thus, the Fixed Effects Model is the most appropriate.

Taking the above under consideration, there is not a significant correlation between the dependent variable (Gross Profit Margin) and the independent variable (Total Debt). Thus, H0 is accepted.
6. Conclusions

6.1 Key Results

- For the period 2002 – 2010, for the FTSE100 companies:
  - In respect of the first model is concerned, long term debt and Total Debt have significant, negative impact on ROA, whereas there is no significant impact of short-term debt on ROA. Thus, H0 is partly accepted.
  - As far as the second Model is concerned, the regression analysis results revealed that there is no significant correlation between ROE and the three independent variables (Short-term Debt, Long-term Debt and Total Debt). Thus, H0 is accepted.
  - There is not a significant correlation between the dependent variable (Gross Profit Margin) and the independent variables. Thus, H0 is accepted

- For the period 2010 – 2018, for the FTSE100 companies:
  - Concerning the first model, all the three methods of regression analysis indicate that there is not significant importance between the dependent variable (ROA) and the independent variables. Thus, H0 is accepted.
  - Towards the second model concerned, there is a significant correlation between ROE and the three independent variables (Short-term Debt, Long-term Debt and Total Debt), at the 95% and the 90% significance level. These results are under other researchers' findings (Gill et al., 2011).
  - As far as the third Model is concerned, the regression analysis results revealed that there is no significant correlation between Gross Profit Margin and the two independent variables (Long-term Debt and Total Debt). There is a significant correlation between Short-term Debt and Gross Profit Margin.
For the period 2002-2010, for FTSE250 companies:

- Because of the first Model, the regression analysis results revealed that there is a significant negative correlation between ROA and two of the three independent variables (Long-term Debt and Total Debt), whereas there is a significant positive correlation between ROA and Short-term Debt. These results are in consistence with other researchers’ results (Chen & Chen, 2011; Tailab, 2015; Vaicondam & Ramakrishnan, 2017).

- As far as the second Model is concerned, the regression analysis results revealed that there is not a significant correlation between ROE and the three independent variables (Short-term Debt, Long-term Debt and Total Debt).

- For the third model, all three methods of regression analysis indicate that there is not a significant correlation between the dependent variable (Gross Profit Margin) and the independent variables. Thus, H0 is accepted.

For the period 2011-2018, for FTSE250 companies:

- As far as the first Model is concerned, the regression analysis results revealed that there is a significant negative correlation between ROA and two of the three independent variables (Short-term Debt and Total Debt).

- As far as the second Model is concerned, the regression analysis results revealed that there is no significant correlation between ROE and the three independent variables (Short-term Debt, Long-term Debt and Total Debt).

- All the three methods of regression analysis indicate that there is a significant correlation between the dependent variable (Gross Profit Margin) and the independent variable (Short-term Debt), whereas there is not significant correlation between Gross Profit Margin and the other two independent variables. Previous research has revealed an only positive correlation between gross profit margin and long-term debt (Voulgaris, 2002).
These results reveal that profitable firms do not rely on debt to finance their operations. The fact that ROA is the ratio that is correlated with profitability, maybe since most of the companies in the sample belong to the industrial sector. On the other hand, the positive correlation between profitability and short-term debt is since companies, in the short term, want to borrow from banks because of the benefits they receive since interest tax is deductible (Sibindi, 2016). The correlation, even if it exists, it is not always important in terms of percentage.

The important correlation applies to the following cases:

i. Short term debt (62.4%), Long-term debt (88.2%), and Total debt (79.5%) to ROE, for the period 2011-2018 for the companies of the FTSE100 Index, something that shows that debt structure choice for firms can alter their operating profit significantly.

ii. Short-term debt (19.3% & 38.2%) to Gross Profit Margin for the period 2011-2018 for the companies of the FTSE100 and the FTSE250 Index respectively, something that shows that the capital structure choice for these firms can alter their operating profit.

Also, as far as the two different periods of investigation are concerned, for FTSE100 Index companies, results are almost the same, i.e., only ROA is correlated with firms Capital Structure. The difference is that short-term debt is not significantly correlated with ROA for the years before the crisis, whereas it positively correlated with ROA during the years of crisis. This may be since during crisis, firms needed to borrow to increase their profitability, since revenues decreased. For the FTSE250 Index, during the years of crisis, only one dependent variable, Gross Profit Margin, is negatively correlated with one of the independent variables, Short-term debt. For the years before the crisis, ROA correlated with long-term debt and total debt. These results indicate that the effect of capital structure on profitability changed during the years of crisis.

Last, between the two periods, descriptive statics reveal that all dependent variables changed. It is indicative that the companies of the FTSE100 Index were more affected than the companies of the FTSE250 Index.

Generally, the results indicate that capital structure affects profitability, to a greater or lower extent. There is not a specific rule for firms to follow since the
capital structure is also an internal decision and can be affected by several factors. Nevertheless, the present study adds in the existing literature by confirming previous research results as well as by revealing new relationships between the variables selected for the research.

6.2 Further Research

Eventually, wider research on this topic could be done by adding more independent variables and presenting Total Assets instead of Total Debt. It would still be possible to add additional control variables to be more stable in our sample. Moreover, the balanced participation of all sectors in the research it would be an extra clue about the needs of each business area separately.
Bibliography


55. Information about Indexes are taken from London Stock Exchange: [https://www.londonstockexchange.com/home/homepage.htm](https://www.londonstockexchange.com/home/homepage.htm)
Appendix

The tables below summarize the above-described results for all the methods, for the two periods and the two different companies’ groups.

**Period 2002 – 2010, FTSE100**

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### GROSS PROFIT MARGIN

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