UNIVERSIDADE CATÓLICA PORTUGUESA

A Comparative Analysis of Financing Decisions

in export and non-export sectors in Portugal

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by

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Resumo

O âmbito deste trabalho passa por analisar as diferenças das decisões de financiamento entre setores exportadores e não exportadores em Portugal e examinar se a intensidade das exportações afeta o nível de endividamento das empresas Portuguesas. Para dar resposta ao propósito deste trabalho, foi recolhida uma amostra de 32 912 empresas Portuguesas não cotadas durante o período 2011-2015, as quais foram categorizadas como pertencendo a setores exportadores versus não exportadores.

Tendo subjacente a literatura sobre as decisões de financiamento nas empresas, procedeu-se à análise: (i) de como os determinantes da estrutura de capital comummente apresentados, nomeadamente, os Impostos, a Tangibilidade, a Rentabilidade, a Dimensão, a Indústria, o Risco de Negócio, Outros Benefícios Fiscais para além da Dívida (OBFD) e a Taxa de Inflação afetam o nível de endividamento das empresas; e (ii) da influência da intensidade das exportações no nível de endividamento das empresas.

Os resultados demonstram que apesar de certos fatores - Tangibilidade, Rentabilidade, Dimensão, OBFD e Taxa de Inflação - influenciarem de forma semelhante o nível de endividamento das empresas pertencentes tanto aos setores exportadores como aos não exportadores, existem fatores - Impostos, Indústria e Risco de Negócio - com impactos distintos na estrutura de capital das empresas pertencentes aos dois grupos de setores. De acordo com os resultados obtidos, os impactos verificados por algumas variáveis, nomeadamente os OBFD e a Taxa de Inflação, não estão em linha com os impactos sugeridos pela literatura.

Palavras-chave: Decisões de Financiamento, Exportações, Estrutura de Capitais, Dados em Painel, Análise Setorial.

Abstract

The main goal of this empirical work is to study the differences in the financing decisions between export and non-export sectors in Portugal and to examine if the export intensity affects the Portuguese firms' leverage levels. In order to give an answer to the purpose of this work, we collected a sample of 32 912 Portuguese non-public firms with data during the 2011-2015 period, and we divided those firms in export and non-export sectors.

Having in mind the prominent capital structure literature, we analyzed the influence of (i) the capital structure determinants, namely the Taxes, Tangibility, Profitability, Size, Industry, Business Risk, Non-Debt Tax Shields and Inflation Rate in the firms' leverage levels; and (ii) the influence of the export intensity in firms' capital structures.

Our results suggest that while some factors influence similarly the debt level of firms belonging to both export and non-export sectors - Tangibility, Profitability, Size, NDTS and IR -; specific variables - Taxes, Industry and BR variables - affect differently the capital structure of firms belong to the export vis-à-vis non-export sectors. According to the obtained results, the impact in firms' debt levels of some of these variables, namely the Non-Debt Tax Shields and Inflation Rate, is not in line with the expected impact suggested by the existing literature.

Keywords: Financing Decisions, Exportations, Capital Structure, Panel Data, Sector Analysis.

Index

Pictures Index

Tables Index

Appendices Index

Acronyms List

BR: Business Risk

CAE: Portuguese Classification of Economic Activities

CAPEX: Capital Expenditures

D&A: Depreciations and Amortizations

EBITDA: Earnings Before Interest, Taxes, Depreciation and Amortization

EBIT: Earnings Before Interest and Taxes

ECB: European Central Bank

EI: Export Intensity

IMF: International Monetary Fund

IR: Inflation Rate

Lev: Leverage

NDTS: Non-Debt Tax Shields

NPV: Net Present Value

POC: Official Accounting Plan in Portugal (Plano Oficial de Contas)

SNC: Accounting Standardization System in Portugal (Sistema de Normalização Contabilística)

UP: Unique Products

WACC: Weight Average Cost of Capital

Introduction

Theories of capital structure attempt to explain the proportions of debt and equity observed on the right-hand side of a firm's balance sheets.

The firm capital structure problem has been a source of intense debate based on the central question of the relevance of strategic financing decisions on a firm's valuation. Most research assumes that: (i) firms are public; (ii) non-financial firms raise capital primarily from outside investors, not from the firm's entrepreneurs, managers or employees; (iii) firms are assumed to have access to Anglo-Saxon capital markets and institutions, characterized by a broad, efficient public market for shares and corporate debt, and by reasonably good protection of the rights of outside investors. Several studies have examined the capital structure problem since the pioneering work of Modigliani and Miller (1958), which showed the implications of market equilibrium conditions for firm financing structure and valuation.

We decided to contribute for this literature by examining the financing decisions of Portuguese export and non-export sectors because we have seen an increasing trend in the volume of total Portuguese firms' exportations during the past years.

Examining the major differences in the financing decisions between firms belonging to export and non-export sectors in Portugal is the major objective of this work. To our knowledge, there is no empirical study trying to address this subject. Thus, we will search for an answer to the following research questions: (i) What are the major differences in the financing decisions between firms belonging to export and non-export sectors in Portugal?; and (ii) Does the export intensity affects Portuguese firms' leverage level?

Existing literature argues that some factors influence the capital structure of corporations (and, consequently, the financing decisions). Those factors were presented by some theories, such as: the Capital structure irrelevance theory (Modigliani and Miller, 1958); the Trade-off theory (Kraus and Litzenberger, 1973); the Pecking Order theory (Myers and Majluf, 1984); and the Market Timing theory (Baker and Wurgler, 2002).

These theories state basically that market imperfections influence the capital structure (and the financing decisions) that a company displays. That market imperfections are, for example, the agency costs (Jensen and Meckling, 1976), taxes (Modigliani and Miller 1963), and information asymmetries (Myers and Majluf, 1984).

At the same time, empirical literature presents several factors used as proxies for the above mentioned market imperfections that can be determinant to the selection of an optimal capital structure, namely: nature of assets (Jensen and Meckling, 1976), profitability (Myers and Majluf, 1984), growth opportunities (Myers, 1977), firm size (Titman and Wessels, 1988), industry conditions (Bradley, Jarrell and Kim, 1984), business risk (Bradley et al., 1984) and the non-debt tax shields (DeAngelo and Masulis, 1980).

As the dissertation purpose is to analyze the export and non-export sectors in Portugal, it's important to review the literature regarding to the macroeconomic effects and the exportation effect on the firms' capital structure. Concerning the macroeconomic variables effect in the firms' capital structure, the evidence argues that firms tend to borrow more during expansions (Frank and Goyal, 2009). The literature examining the exportation effect in the company's capital structure is quit scarce and suggests that export intensity drives the firm to a lower debt ratio (Chen and Yu, 2011).

Several studies discuss and analyze the capital structure and capital structure determinants for public/listed companies but few studies focus their

sample on non-public/unlisted companies. In addition to this fact, numerous studies focus their analysis in one country or in international comparisons that hardly never takes into account Portugal.

Therefore, the objective of this work is to analyze the export intensity and the capital structure determinants of Portuguese firms. Similarly to Chen and Yu (2011) study, we will analyze the impact of export intensity and the common capital structure determinants on the firms' debt levels.

The main conclusions of this study suggests that some factors, namely the Tangibility, Profitability, Size, NDTS and IR affect equally the debt levels of firms that belong to both export and non-export sectors; while the Taxes, Industry and BR variables influence differently the debt levels of firms that belong to the export vis-à-vis non-export sectors.

The present study is important because: (i) it studies the capital structure determinants that are relevant according to the literature and applies that knowledge to a country that has been poorly studied: Portugal; (ii) it analyzes a sample of non-public/unlisted companies and, as consequence, gives an important contribution to the literature which focus the analysis on listed companies; (iii) it reveals the determinants that more affect (positively or negatively) the use of debt (financing decision) in both export and non-export sectors and, in some cases, the impacts are not in line with suggested by the literature and; (iv) it shows that the export intensity does not significantly affects the firms' debt levels and, most important, this conclusion is not in line with the existing literature.

This document is organized as follows: Chapter 1 offers a general framework for this study. Chapter 2 presents both the capital structure theories and determinants. Chapter 3 details the research questions and hypotheses that will be tested. Chapter 4 presents the variables, sample and methodology. Chapter 5 presents the regression results and tests. It also describes possible

deviations from the literature. Our limitations and contributions with this work are discussed in Chapter 6. Finally, our final conclusions, references and appendices are presented at the end of this work.

Chapter 1

1. General framework

1.1 Portuguese Exportations: 2006-2015 period

An important section in the balance of payments of a country is the exportations[1] item. In the last decade, Portugal has shown an increasing trend in exportations, which has a positive impact in the Portuguese balance of payments. More specifically, both exportations of goods and supply services present an increasing trend in the period of 2006-2015, as shown in Figure 1[2]. In 2009 occurred a sharp fall in the total exportations in both exportation of sales and supply services as a consequence of the 2007 financial crisis.

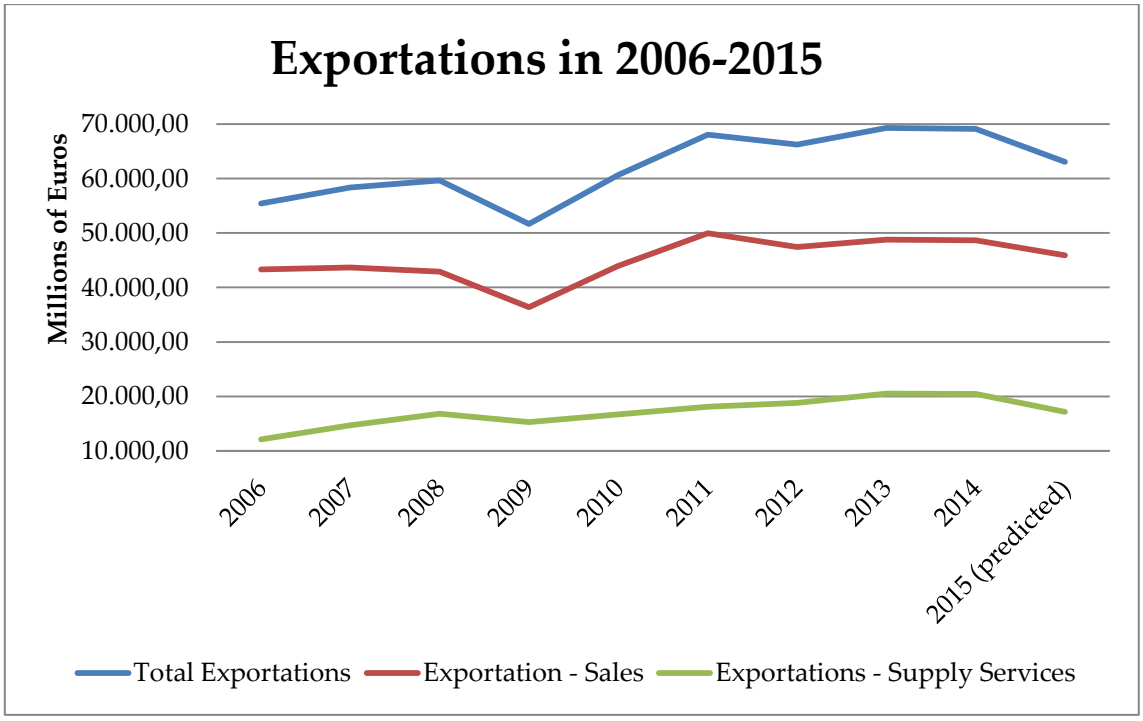

Figure 1 - Exportations in the 2006-2015 period.

[1] Exports of goods and services means the transactions of goods and services (sales, direct exchanges and offers) from residents to non-residents (Parlamento Europeu e do Conselho, 2013).
[2] The numerical data is available in the Appendix A.

Considering the importance of exportations for economic growth and the balance of a country's public accounts and knowing that exports have shown a positive trend, it becomes relevant to analyze which sectors had the greatest impact in this trend.

1.2 Export sectors: 2010-2015 period

In the 2010-2015 period, some sectors have shown a greater contribution to the increase in exports than other sectors. The 10 CAE sectors3 that most contributed to the positive trend of exports during the 2010-2015 period are presented in the table below and their combined weight in total exports amounted to 37,09%[4].

CAE Code	CAE Description	Sector weight in total exportations[5]
CAE 29	Manufacture of motor vehicles, trailers and semi-trailers	7,27%
CAE 19	Manufacture of coke and refined petroleum products	4,54%
CAE 51	Air transport	4,46%
CAE 25	Manufacture of fabricated metal products, except machinery and equipment	3,45%
CAE 71	Architectural and engineering activities; technical testing and analysis	3,20%
CAE 22	Manufacture of rubber and plastic products	3,13%
CAE 14	Manufacture of wearing apparel	3,03%
CAE 42	Civil engineering	2,94%
CAE 20	Manufacture of chemicals and chemical products	2,59%
CAE 27	Manufacture of electrical equipment	2,48%

Table 1 – 10 CAE sectors with more weight in total exports during the period of 2010-2015.

[3] The division of those sectors follows CAE Rev.3 because this is the division used by SABI database. In order to see the CAE Rev. 3 division, see *Decreto-Lei nº 381/2007* from *Diário da República, 2007*.

[4] For more detail, see Appendix B.

[5] The weight of the sector was calculated using the average of the sector's weight in the total exports in each year during the period 2010-2015.

The CAE sectors presented in the table above will be, from now on, considered as export sectors and will be the base of our study in both the methodological and empirical sections.

1.3 Non-export sectors: 2010-2015 period

On the opposite side to the export sectors, other sectors have more importance in the Portuguese internal market (internal sales plus internal supply services). The 10 CAE sectors with more weight[6] in the internal market during the period 2010-2015 are presented in the table below and their combined weight in total internal market amounted to 45,57%[7].

CAE Code	CAE Description	Sector weight in total internal market
CAE 47	Retail trade, except of motor vehicles and motorcycles	15,19%
CAE 35	Electricity, gas, steam and air conditioning supply	7,13%
CAE 45	Wholesale and retail trade and repair of motor vehicles and motorcycles	5,48%
CAE 10	Manufacture of food products	3,74%
CAE 86	Human health activities	3,13%
CAE 41	Construction of buildings	3,01%
CAE 61	Telecommunications	2,29%
CAE 52	Warehousing and support activities for transportation	1,97%
CAE 56	Food and beverage service activities	1,94%
CAE 43	Specialized construction activities	1,68%

Table 2 – 10 CAE sectors with more weight in total internal market in the period of 2010-2015.

The CAE sectors presented in the table above will be, from now on, considered as non-export sectors.

[6] The weight of each sector was calculated using the average of the sector's weight in the total internal market in each year during the period 2010-2015.
[7] For more detail, see Appendix C.

Considering that we have already determined the export and non-export sectors, the scope of this research involves identifying and analyzing what are the differences between export and non-export sectors relatively to financing decisions. Examining what affects the financing decisions of firms belonging to export *versus* non-export sectors in Portugal is what motivates this dissertation. In addition, this work contributes for the existing literature on firms' capital structure decisions because (*i*) the export sectors became very important in the Portuguese economy (during the recent crisis); (*ii*) analyzing the financial decisions of the selected sectors are important once there are few studies about those sectors and even more about the Portuguese economy; and (*iii*) there is few information about the Portuguese economy and Portuguese firms, which gained increased relevance since Portugal asked in 2011 for international assistance to the International Monetary Fund (IMF), the European Commission and the European Central Bank.

Chapter 2

2. Literature Review

2.1 Capital structure theories

The dominant paradigm in corporate finance views the firm as a nexus of contracts among various agents, in particular managers and investors. Allen and Winton (1995) point out that "[B]eginning with Jensen and Meckling (1976), an ever-increasing volume of papers has addressed optimal corporate financial structure within this basic framework." These papers can be divided into two major areas of research: one addressing the issue of corporate financing and capital structure – that is, the mix of securities and financing sources used to finance real investments by corporations – and the other deriving optimal financial contracts as optimal mechanisms for prevailing frictions between agents – the so-called security design literature. Theories of capital structure attempt to explain the proportions of debt and equity observed on the right-hand side of a firm's balance sheets. These theories focus on financing strategy, referred by Myers (2003) as "… the determination of overall debt ratios for a particular type of the firm in a particular setting."

Several studies have examined the capital structure problem since the pioneering work of Modigliani and Miller (1958), which showed the implications of market equilibrium conditions for firm financing structure and valuation. In order to refer to useful surveys on both theoretical and empirical corporate literatures in relation to capital structure, see among others, Myers (1977), Titman and Wessels (1988), Harris and Raviv (1991), Rajan and Zingales (1995) and Myers (2003).

2.1.1 Traditional view

Durand (1952) was an apologist of the traditional (or classical) approach of the capital structure, arguing that it is possible to achieve an optimal capital structure in the classical model (capital structure that maximizes the value of a firm). As the cost of equity is higher than the cost of debt, the company can borrow up until reaching a minimum weighted average cost of capital (WACC). The company can borrow until this minimum WACC but always must take into account its own solvency and the solvency cannot be affected by leveraging.

2.1.2 Capital structure irrelevance-Modigliani and Miller (1958)

Modigliani and Miller (1958) appear as key authors in the capital structure theories, presenting the principle of capital structure irrelevance. This principle states that, in the absence of market imperfections[8], the value of a firm is independent of its financing decisions. According to Modigliani and Miller (1958) Proposition I (Proposition that implies the irrelevant argument), the value of a firm is constant[9] and is not affected by the proportions of equity and debt. In addition, Proposition I states that the debt ratio does not affect the firms cost of capital, which is constant. Regarding Modigliani and Miller (1958) Proposition II, the firm WACC is not influenced by its capital structure and is constant.

[8] Market imperfections are the existence of taxes, information asymmetries, bankruptcy costs, transaction costs and agency costs (Modigliani and Miler, 1958).
[9] As the assets and growth opportunities do not change, the value does not change.

Modigliani and Miller (1958) theory was subject to several comments. Kraus and Litzenberger (1973) present results and evidence that support Modigliani and Miller (1958) theory. The authors state that, in the absence of market imperfections and in a perfect market, the value of a firm is independent of its capital structure.

On the opposite side, Durand (1959) argues that Modigliani and Miler (1958) would reach a substantial theory evolution if the authors assumed the existence of market imperfections and the firms' value maximization results from minimizing capital costs, but minimizing capital costs using only the changes in proportions of equity and debt will not always be a possible solution. Scott (1976) states that using Modigliani and Miller (1958) theory is dangerous because the theory does not take into account the harmful effect of increasing debt on the firm[10].

Therefore, in order to develop the 1958 paper about the capital structure irrelevance, Modigliani and Miller (1963) introduce into the model the tax effect; i.e., examines the effect of corporate taxes on firms' market value. According to Modigliani and Miller (1963), the value of a company is no more independent from its financing decisions and the optimal capital structure is reached by maximizing the firms' debt level.

Other authors, like Kraus and Litzenberger (1973) and Scott (1976), relaxed Modigliani and Miller (1958) model including one additional market imperfections: bankruptcy costs. These studies constitute the basis of the so-called Trade-off theory, which is one of the prominent capital structure policy models[11].

[10] For more details, see Scott (1976) p. 34.

[11] The capital structure policy models are the Trade-off theory, the Pecking order theory, the Neutral mutations theory and the Market-timing theory. All these theories will be discussed in the next sections.

2.1.3 Trade-off theory

Myers (2001)[12] points out that according to the Trade-off theory, firms choose debt levels that offset the tax advantages of extra debt with the possible costs of financial distress[13]. At the same time, the Trade-off theory suggests that firms which pay taxes should be cautious when they are increasing leverage.

From the definition above, we conclude that there are two important concepts under the Trade-off theory, which are taxes and costs of financial distress. Information asymmetries and the agency costs[14] will be developed later, as determinants of the capital structure. The role of bankruptcy costs (considered as part of the direct costs of financial distress[15]) and corporate taxes in the development of Trade-off theory will be discussed further in the present section.

Baxter (1967) argues that when a firm heavily relies on debt, the risk associated with excessive leverage drives the firm to an increase of its cost of capital[16] but the presence of corporate taxes mitigates this effect.

Kraus and Litzenberger (1973) conclude that since interests are tax deductible, the firm will choose to finance itself using debt to catch tax advantages. However, if it is not capable to pay debt obligations, the firm faces significantly bankruptcy penalties. Kraus and Litzenberger (1973) also conclude that debt policy is not irrelevant and the optimal capital structure is determined by the level of debt that maximizes the firm value without facing insolvency (and then bankruptcy costs).

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[12] See Myers (2001), p. 81.

[13] The costs of financial distress include bankruptcy costs and agency costs (Bradley *et al.*, 1984), p. 876.

[14] The agency costs (more specifically, the conflicts between shareholders and creditors) are considered as indirect costs of financial distress under the Trade-off theory (see Myers, 2003).

[15] When firms pass through bankruptcy and reorganizations, they incur in direct costs of financial distress (Myers, 2003).

[16] According to the author, this happens because the probability of bankruptcy (the risk of ruin) increases when a firm increases its high degree of leverage and, as consequence, excess leverage reduces the value of a firm.

In the same line of reasoning, Scott (1976) argues that the value of a non-bankrupt firm is not only a function of the expected future earnings but also a function of the liquidating value of the firm's assets. The research conducted by Scott (1976) shows the existence of a unique optimal capital structure. Similarly, Kim (1978) proves that the market value of a firm increases when a firm has low debt levels and decreases when a firm heavily relies on debt financing. This occurs because when a firm is subject to income taxes and bankruptcy costs, its debt capacity does not reach the total debt financing that the firm can use from the market and, as consequence, firms have optimal capital structures that have less debt financing than their global debt capacities.

Other important authors with strong influence on the Trade-off theory are Bradley *et al.* (1984). The authors argue that a firm needs to balance the tax advantages of debt with the various leverage-related costs[17] to obtain its optimal capital structure. Another important contribution states that average firm leverage ratios are related to industry classification.

Titman (1984) develops another aspect of the bankruptcy costs linked to other indirect costs of financial distress. The author concludes that conservatively financed firms have a competitive advantage when the value of a firm's service or product relies on the firm's continued existence.

All these authors contributed significantly to the Trade-off theory and their ultimately implications state that, under the Trade-off theory, it is possible to achieve an interior optimal capital structure by doing a trade-off between costs - bankruptcy and agency costs - and benefits - the tax deductibility of interests and the reduction of free cash flow problems - of debt financing (Fama and French, 2002).

Empirically, several studies gave important contributions to the Trade-off theory. Smith and Watts (1992) argue that "growth firms borrow less", that

[17] The leverage-related costs involve bankruptcy and agency costs of debt and loss of non-debt tax shields.

is a firm will borrow less today if the firm's future investment opportunities are more valuable[18]. The ratio of the firm's market-to-book value is used as a proxy of the firm's value of future investment opportunities and in the financial literature it is possible to denote that exist an inverse relationship between market-to-book ratio and debt levels, which is consistent with Smith and Watts (1992). Rajan and Zingales (1995) proved that this statement does not work only in the United States of America (USA) but also in Japan, United Kingdom and Canada.

Harris and Raviv (1991) and Rajan and Zingales (1995) prove that firms have a propensity to borrow less when they have higher profitability and valuable growth opportunities. At the same time, larger and safer firms with tangible assets[19] tend to borrow more than small and risky firms with intangible assets[20].

Although the above studies proved the importance of the Trade-off theory, there are cases where this theory does not appear with the same importance; for example, cases of highly profitable and successful firms working with low debt levels, but these cases are not the rule. Studies, like Fama and French (2002)[21], about the determinants of actual debt ratios constantly discover that the majority of the profitable firms, in a given sector or industry, have a propensity to borrow the least[22]. At the same time, it is frequent to see studies that appear with statistical results consistent with the Trade-off theory and other theories, such as the Pecking order theory.

[18] Smith and Watts (1992) called this statement as "investment opportunity set".
[19] According to Harris and Raviv (1991), p. 303, tangible assets are those with higher liquidation value.
[20] See Harris and Raviv (1991), p. 303 and p. 334 and Frank and Goyal (2003).
[21] In Harris and Raviv (1991) it is possible to see more studies about this problematic. Rajan and Zingales (1995) present results of negative correlation between profitability and leverage.
[22] Myers (1984) highlighted this problematic.

2.1.4 Pecking order theory

The Pecking order theory was developed by Myers and Majluf (1984) and Myers (1984), who were inspired by the initial studies proposed by Donaldson (1961)[23].

According to Myers (1984) and Myers and Majluf (1984), the Pecking order theory states that the selection of the source of financing of a firm follows an order of preference, being primarily internal financing[24]. The authors argue that dividends are "sticky" and, for that reason, dividend cuts are not used to finance capital expenditures (CAPEX). If firms do not have enough internal funds and external financing is necessary, the firm should choose debt[25], then possibly hybrid securities such as convertible bonds and, only in the latter case, the firm choose equity[26].

Myers (1984) also argues that, under the Pecking order theory, there is no optimal target for the debt-to-equity ratio and, as consequence, there is no optimal capital structure under the Pecking order theory. From this, the author concludes that each firm exhibits a debt ratio that reflects its necessities for external financing.

According to the Pecking order theory, the managers of a firm work to ensure the interest of the existing shareholders. However, Myers and Majluf (1984) do not show why managers behave in this way. Ross (1977) develops this research field and proposed the "Ross's signaling equilibrium". In the equilibrium proposed by Ross (1977), the design and the aspects of the manager's compensation package drive the selection between debt and equity

[23] For more detail see Myers (1984), p. 581.
[24] In internal financing, the information asymmetries are not relevant. The information asymmetries will be discussed in the next section, as one of the capital structure determinants.
[25] Debt is the safest security. If internally generated cash flows are more than the required to fulfill the investments, the surplus is used to pay down debt rather than making a share buyback or retiring equity (see Myers and Majluf, 1984).
[26] See also Lemmon and Zender (2010), p. 1163 description.

and, as a result, the managers' information about the intrinsic value of the firm is exposed by the financing decisions taken by them (managers).

From this, as argued by Myers (2001), the Pecking order theory cannot clarify why financing tactics are not studied to avoid the financing consequences of the asymmetry of information (that is, managers have more information that investors)[27]. Another appreciation to Myers and Majluf (1984) argument states that the authors consider that firms only need to choose, as an external financing source, debt or equity to finance new investments. According to Myers (2001), this reveals a very simplest way to look to the financing world and, as consequence, in more complicating choices[28] the Pecking order theory is not necessarily verifiable.

To conclude, the Pecking order theory demonstrate that exists a hierarchy of the financing sources' selection to finance new investment opportunities and there is no optimal capital structure as a target of a firm (Myers, 1984).

Empirically, several authors gave important contributions to the Pecking order theory. Shyam-Sunder and Myers (1999) test the Pecking order *versus* the Trade-off theory and prove that the Pecking order theory has more statistically power than the Trade-off theory. Baskin (1989), using a sample of 378 firms in the 1960-1972 period, presents results that strongly support the Pecking order theory. Lemmon and Zender (2010) study a sample of 67 203 firm-year observations from both the Center for Research in Security Prices (CRSP) and Compustat database in 1971-2001 period and strongly support the Pecking order theory. In the same line of reasoning, Jensen, Solberg and Zorn (1992) study regulated and financial firms and support the Pecking order theory.

[27] See Myers (2001).
[28] See Myers (2001).

However, Helwege and Liang (1996), using data of 367 firms located in the USA and considering the 1983-1988 period, do not support this theory.

2.1.5 Trade-off theory and Pecking order theory

According to the Pecking order theory, the debt ratio is influenced by firms' cumulative financial deficit (that is the firms' cumulative necessity for external financing) and the Trade-off theory involves a target-adjustment model.

Shyam-Sunder and Myers (1999) test the above theories under the same regression model and the same sample and concluded that the Trade-off theory was "consistent with" the financing decisions motivated exclusively by the Pecking order theory. At the same time, Shyam-Sunder and Myers (1999) conduct the test in the other way around[29] and conclude that, for their sample, the Pecking order theory was the best explanatory theory of the financing decisions of a firm. According to Myers (2003), the Pecking order debt levels will mean-revert and the Trade-off theory will explain financing decisions.

The regression model developed by Shyam-Sunder and Myers (1999) is tested by Frank and Goyal (2003), which conclude that the financing decisions are much more complicated than the predictions suggest by the Pecking order theory[30]. For this reason, the authors suggest that the Pecking order theory should be applied for a subsample of small, growth firms that rely on stock issues for external financing[31] because this type of firms face large information asymmetries. At the same time, Frank and Goyal (2003) find that for larger

[29] That is the simulation of firm's debt levels on hypothesis of the Trade-off theory.
[30] As Frank and Goyal (2003) present, for smaller firms and for firms with data missing, the Pecking order theory does not work so well.
[31] In this subsample, the financing deficit almost has no effect on debt issues.

firms with reasonable levels of leverage, the Pecking order theory is the one that better explains the capital structure[32].

Fama and French (2002) examine the predictions of the Pecking order and Trade-off theories and study different types of the Pecking order theory. They conclude that both the Trade-off and the Pecking order face problems in explaining, respectively, the inverse relationship of profitability and leverage and the small growth firms' heavy dependence on equity issues.

Hence, as Myers (2003) points out, each theory face problems when trying to explain the financing decision of some types of firms and, at the end, both are necessary to explain firms' financing decisions.

2.1.6 Neutral mutations theory

The neutral mutations theory about capital structure policies were developed and suggested by Miller (1977)[33]. The author argues that firms drop into financing patterns which does not have influence in their values. As argued by the author, those patterns make managers fell confident about their actions and, as their actions do not hurt anyone, no one worries to stop or change those actions. Therefore, a researcher that identifies and studies those patterns to predict the managers' financing behavior would not be adding value to the world.

Myers (1984) concludes that the argument defended by Miller (1977) is significant as an advice because researchers can develop models explaining a random event but if they take the neutral mutation theory as a null hypothesis it makes the research more difficult to implement[34]. In another observation to

[32] See also Fama and French (2002).
[33] P. 272-273.
[34] See Myers (1984) p. 576 example.

Miller's (1977) theory, Myers (1984) argues that investors are interested in the firms' financing decisions because stock prices adjust when financing decisions are announced and this adjustment might reflects the "information effect". If someone assumes that managers have more information, a new model appears to explain how that information influences the financing decisions and, as result, some development will be made. This reasoning contradicts the Miller (1977) idea, which states that patterns studies do not add value to the world.

In short, the Neutral mutations theory suggests that firms keep historical financing patterns and there is no optimal capital structure.

2.1.7 Market timing theory

As defined by Baker and Wurgler (2002), the market timing theory states that capital structure changes as the cumulative outcome of past efforts to time the equity market[35].

According to Baker and Wurgler (2002), it is possible to observe two versions of the equity market timing that drives to similar capital structure dynamics. The first version is a dynamic form as presented by Myers and Majluf (1984) and applied to rational managers and investors facing adverse selection costs. The result of this version is that market timing theory has large and constant effects on capital structure. The second version implies irrational investors or managers and time-varying mispricing[36]. The result of this version suggests that firms prefer equity (debt) when the relative cost of equity is low (high). As noticed by Baker and Wurgler (2002), the net equity issues will be positively related to market-to-book if managers try to exploit too-extreme

[35] See Baker and Wurgler (2002) p. 27.

[36] This version of market timing does not require an inefficient market and managers predicting stock returns with success. However, the authors suggest that a critical assumption to this version is that managers think that they can time the market (Baker and Wurgler, 2002) p. 28.

expectations. No addition, if an optimal capital structure does not exist, managers do not need to reverse these decisions when the firm shows to be properly valued and the cost of equity emerges to be normal. As result, the temporary fluctuations in market-to-book ratios have permanent effects on leverage.

Baker and Wurgler (2002) find that low (high) leverage firms raise funds (sell their securities) when their market value is high (low). Their market value is measured by the market-to-book ratio. At the same time, the authors argue that leverage is negatively related to historical market valuations.

Huang and Ritter (2009) study the theories of capital structure and conclude that, consistent with the market timing theory, firms finance a big quantity of their financing deficit with external equity when the relative cost of equity is small. At the same time, the authors argue that the market timing theory is similar to the pecking order theory because the observed capital structure is the result of historical external financing decisions rather than the main goal in itself.

From the literature presented above, the Market timing theory states that market valuation and leverage are negatively correlated and low (high) leveraged firms tend to raise funds when market cap is perceived as high (low). Thus, managers sell securities according to time-varying relative costs of equity and debt and these selling decisions have long-lasting consequences on capital structure. As consequence, under the Market timing theory, there is no optimal capital structure.

2.1.8 Static and dynamic capital structures

As Leary and Roberts (2005) point out, the traditional literature of capital structure states that firms try to maintain their optimal capital structure and, when this equilibrium is disturbed, firms rebalance their leverage to achieve the optimal capital structure defined previously. However, some literature [37] denotes that should be interesting to know whether firms put into practice a dynamic rebalancing of their capital structures. Fischer, Heinkel and Zechner (1989) developed a model of dynamic capital structure decisions and the results obtained support the relevance of dynamic capital structures. According to their model, in a dynamic capital structure, the debt level observations are not satisfactory measures of firms' capital structure policy but a more important measure is a debt level range. As Shyam-Sunder and Myers (1999) argue, the model developed by Fischer *et al.* (1989) is a dynamic and inventory-adjustment capital structure model that could work with more objectivity than other target-adjustment models. Titman and Tsyplakov (2007) develop a dynamic capital structure model[3839] and show that firms move relatively slowly towards their target debt levels. At the same time, they conclude that firms that do not observe conflicts of interests between shareholders and creditors and are subject to financial distress costs must adjust more quickly their capital structure to their target debt levels.

Some authors, such as Hovakimian, Opler and Titman (2001), Fama and French (2002), Leary and Roberts (2005), Flannery and Rangan (2006) and Kayhan and Titman (2007) empirically demonstrated that firms pursue and adjust dynamically their capital structure according their target debt levels. As

[37] Myers (1984) states that an optimal dynamic strategy for a firm under asymmetry of information is a field to explore.
[38] The model presented by Titman and Tsyplakov (2007) included continuous investment and financing decisions and bankruptcy costs, financial distress costs and transaction costs.
[39] The literature taken into account is, for example, the studies of Fischer *et al.* (1989).

argued by Hovakimian *et al.* (2001), the target ratio is consistent with theories that balance the costs and benefits of debt (like the Trade-off theory). In another dimension, Baker and Wurgler (2002) documents that capital structures are the cumulative outcome of historical market timing efforts instead of the result of a dynamic strategy.

From what has been said, some theories, such as the pecking order theory, posit that firms try to maintain their optimal capital structure while some authors, such as Leary and Roberts (2005), show that firms adjust dynamically their capital structure. Finally, according to Flannery and Rangan (2006), firms return relatively rapidly to their target leverage ratios.

2.2 Capital structure determinants

The literature on capital structure presents some factors that influence the firm leverage level and, as consequence, their financing decisions. Some of that factors, namely the taxes, the agency costs and the information asymmetries were denoted as market imperfections by Modigliani and Miller (1958) and will be discussed below. Other factors were presented by Harris and Raviv (1991), Rajan and Zingales (1995) and Frank and Goyal (2009). Those factors are the nature of assets, profitability, growth opportunities, firm size, industry conditions, business risk, non-debt tax shields, macroeconomic conditions and exportation effect.

2.2.1 Taxes

According to Modigliani and Miller (1958), under a set of assumptions, the value of a firm is not affected by changes in the capital structure. However, in 1963, Modigliani and Miller introduced the tax effect[40] in their 1958 model and concluded that, in the presence of corporate taxes, the value of a company is not independent of its capital structure. Quite the opposite, the authors concluded that the value of a firm increases with the tax benefits[41] created by leverage. One of the main criticisms regarding Modigliani and Miller (1958, 1963) conclusions is that the authors documented the potential value of interest tax shields but unnoticed the taxes paid by investors (Myers, 2003).

As referred above, Kraus and Litzenberger (1973) argue that, since interests are tax deductible, the firm will choose to finance itself using debt in order to catch tax advantages and the optimal capital structure is determined by the level of debt that maximizes the firm's value without facing bankruptcy costs. Miller (1977) states that the tax-deductibility of interests at the corporate level must be balanced with the tax advantages of equity because they could completely offset each other and, in that situation, Modigliani and Miller (1958) Proposition I is verified regardless of the tax-deductibility of interests.

DeAngelo and Masulis (1980) extended Miller's (1977) analysis and conclude that it is possible to achieve an interior optimum leverage decision for each firm due only to the interaction of personal and corporate tax treatment of debt and equity and this does not involve the introduction of bankruptcy costs, agency costs or other leverage-related costs. In the absence of these leverage costs, a firm is able to determine the optimal capital structure despite of whether non-debt shields are available. The authors also predicted that firms

[40] The tax effect include tax at corporate and investor level.

[41] The tax benefits results from the reduction of the amount which accrued taxes, reduction generated by the deduction of interests resulting from leverage on the results (Modigliani and Miller, 1963).

will choose a debt level which is negatively associated to the level of offered tax shields substitutes for debt[42].

Finally, Brick and Ravid (1985) argue that firms tend to accelerate interest payments in order to maximize the present value of tax benefits while creditors tend to postpone the interest payments to minimize the present value of their tax responsibilities. This will lead firms to think and to select the debt maturity that maximizes the market value for the company[43].

2.2.2 Agency costs

According to Ross (1973)[44] and Jensen and Meckling (1976)[45], the agency costs[46] theory is based on the agency relationship, which is a contract under which one or more individuals - the principal - employ another person - the agent - to execute a service on their behalf, which involves delegating power to the agent for decision making. The authors believe that the agent not always works on behalf of the principal's interests because both have as their objective maximizing a specific utility function. Therefore, the principal and the agent will incur in agency costs, which are the sum of monitoring expenditures incurred by the principal[47], the bonding expenditures by the agent and the residual loss. The agency costs are spending in the creation of appropriate

[42] The tax shields substitutes are, for example, accounting depreciation deductions or investment tax credits (DeAngelo and Masulis, 1980).
[43] For more information about debt maturity topic, see the study developed by Antoniou, Guney and Paudyal (2006).
[44] For more detail, see Ross (1973) p. 134.
[45] See Jensen and Meckling (1976) p. 5 and p. 6.
[46] The agency costs are related with the conflicts of interest and governance between the principal and agent.
[47] As described by Jensen and Meckling (1976) in p. 6, the expression monitoring incorporates more than just measuring or observing the actions of the agent. It includes costs spend by the principal to 'control' the behavior of the agent through budget constraints, compensation policies, operating regulation, etc.

incentives for the agent to mitigate conflicts of interests and ensure that the agent does not make decisions that destroys the principal interests.

In line with the previous theory, Grossman and Hart (1983) develop a methodology to investigate the principal-agent problem in the case where the agent's behavior to income risk is independent of action. The authors proved that an incentive scheme like the principal's and agent's payoff being negatively correlated during the entire outcome range is never optimal, but that relationship can be optimal just in a part of the range. In the same study, the authors argue that a decline in the quality of the principal's information boosts the welfare loss.

The literature emphasizes the agency problems resulting from the conflict of interests between shareholder and creditors - risk-shifting and underinvestment - and between managers and shareholders - capture private benefits and overinvestment.

The risk-shifting problem, in particular the replacement of assets, arises when a firm funded with risky debt has motivation to switch from low to high risk assets. This strategy increases the upside for shareholders while the downside is absorbed by firm creditors (Jensen and Meckling, 1976). The underinvestment or "debt overhang" problem is based on firm's incentive to reject projects that generate value, whenever it is believed that creditors will remain with the majority of the benefits when the investment is complete (Myers, 1977). Stulz and Johnson (1985) suggest, as a technique to control the underinvestment problem, the financing of new investment projects with secured debt in order to limit the transfer of wealth from shareholders to creditors and decrease the shareholders' incentive to reject those projects. Another technique proposed to reduce the underinvestment problem is presented by Smith and Warner (1979). The authors proposed the adoption of

restrictive covenants in debt contracts to reduce the underinvestment problem and the moral hazard that is verified after the debt issue.

The literature also presents the conflicts between managers and shareholders. Jensen and Meckling (1976) argue that managers operate in their own economic interest but this behavior can be readdressed by several ways, such as share ownership, compensation schemes or other tools. However, the authors emphasize that the alignment of different objectives between managers and shareholders is more difficult than it appears.

In line with Jensen and Meckling (1976), Jensen (1986) develops the free cash flow theory, which states that managers have incentives to make their companies grow beyond the optimal size because that would increase the managers' power[48]. According to the author, the problem is how to encourage managers to not invest the free cash flow in investment projects with an internal rate of return lower than the cost of capital or into organizational inefficiencies and motivate them to pass the money out of the company.

In the same line of reasoning, Shleifer and Vishny (1989) develop a model of managerial entrenchment which illustrates that managers can increase their value to shareholders by making specific investments. The authors argue that managers can diminish the probability of being substitute if they make specific investments.

Myers (2001) states that the answer to the problem presented by Jensen (1986) can be debt because it creates an obligation to the firm to pay out cash and, ultimately, this will add value to the firm. However, a high debt level can be dangerous. Thus, it is necessary for companies to carry out a correct measurement of the optimal debt ratio.

[48] The managers' power increase because raise the resources under the manager control.

2.2.3 Information asymmetries and signaling effect

The asymmetric information problem emerges when exist asymmetrical distribution of information[49] among the contracting parties and this asymmetry of information affects the capital structure and the financing decisions of a firm (Leland and Pyle, 1977). The literature also points out that insiders benefit with the access to more information about the firms' financing policy (private or inside information) than the outside investors, the contract counterparts.

As presented by Ross (1977) and Leland and Pyle (1977)[50], the financial policy has the ability, when is used to divulge private information about the firm to outsiders[51], to eliminate or mitigate the asymmetry of information between insiders and outsiders. Investors cannot, *ex-ante*, distinguish good quality firms from bad quality firms because of the information deficit that they face. Hence, investors would not be prepared to price the securities of a firm higher than the security that reveals the average quality of issuing firms. This culminate in the better than average quality firm losing the desired to issue its securities because they are underpriced[52] and only the bad than the average quality firm wish to issue its securities because they are overpriced[53]. As consequence, if there is no information transmission between insiders and outsiders, the market will not perform sustainably and may collapse[54].

Ross (1977) develops the incentive signaling approach. According to the author, insiders can change the market opinion of the firm's risk class by regulating the firm's capital structure in order to maximize the market value of

[49] As Leland and Pyle (1977), p. 371 noticed, several markets are characterized to have information asymmetries between buyers and sellers.
[50] The beginning of the signaling effect on corporate structure theory started with these authors.
[51] According to the authors, this works as a signal to the capital markets (signaling effect).
[52] The perceived intrinsic value of the securities is higher than the price.
[53] The perceived intrinsic value of the securities is lower than the price.
[54] As known by the financial literature, this is denoted as the "lemons problem". Myers and Majluf (1984) applied the lemons problem analysis to financial markets.

the firm. As result, the capital structure that maximizes the market value of the firm is the firm's optimal capital structure. The model developed by Ross (1977) suggests that firms issuing external equity have more probability to have poor prospects because if they have the opportunity to issue debt securities, they will prefer to do it[55][56].

Other authors that contributed to the development of the information asymmetry concept were Leland and Pyle (1977) and Myers and Majluf (1984).

The model developed by Leland and Pyle (1977) suggests that an entrepreneur in a high quality firm should employ his retained shares (his ownership) to give signals to the market about the quality of the firm. The authors present evidence suggesting that firms with higher inside ownership have more probability to maintain higher levels of debt because firms' managers (insiders) have greater demand for funds.

Myers and Majluf (1984) and Myers (1984) point out that managers (insiders) have an informational advantage about the firms' prospects than capital market participants have. Myers (1984) states that, instead of making use of equity to finance new investments, firms will be better off if they use less information-sensitive securities (because equity is perceived as a bad signal by the market). Myers and Majluf (1984) show that firms gain in issuing equity when the firm is overvalued and, for that reason, new equity issues are understood as negative signals by the market and culminate in the decrease of the stock prices. Knowing this, Myers and Majluf (1984) and Myers (1984) establish that firms prefer to finance new investments with internal funds (retained earnings), then choose to issue debt and, as last resort, choose equity

[55] As suggested by the Pecking order theory of capital structures.

[56] As result, firms with poor (good) prospects will (not) want to distribute their downside (upside) with new shareholders. This problem figures as one of the agency conflicts between the existing and future shareholders.

because it reveals a bad signal to the market. This is in line with the Pecking order theory hypothesis.

When firms do not have enough or none internal funds to finance new investment opportunities, the next source of finance to rely on is debt. In order to study the debt financing source, some authors, such as Flannery (1986) and Diamond (1991), study the impact of debt maturity choices in the perception - by the market - of the firm's quality (signaling effect)[57].

2.2.4 Nature of assets

Myers and Majluf (1984) argue that when a firm issues securities in the presence of asymmetrical information between insiders and outsiders, the firm faces costs associated with that issue and, as consequence, it may prefer to sell secured[58] debt. For that reason, as pointed out by Titman and Wessels (1988), firms holding assets that could be used as collateral tend to issue more debt.

The studies presented by Myers (1977) and Jensen and Meckling (1976) suggest that if the debt of a firm can be collateralized by the firm's assets, the firm (borrower) is limited to use the funds for a particular project. If the firm has no assets that can be given as guarantee, creditors may require more favorable conditions and this can culminate with the firm issuing equity rather than use debt to finance the project.

Titman and Wessels (1988) present a case[59] where firms with fewer assets available to give as collateral may choose higher debt levels because this limit the managers actions to consume more than the optimal level of debt. If a firm

[57] For more details about the determinants of debt maturity, see Brick and Ravid (1985), Barclay and Smith (1995) and Antoniou *et al.* (2006).
[58] Secured by property and the market know value of that property.
[59] That was developed by Grossman and Hart (1982). See Titman and Wessels (1988), p. 3.

increases debt levels, bondholders will closely monitor the manager activity and, as result, managers will not be able to consume excessive perquisites.

Frank and Goyal (2009) divide assets in two main types: tangible[60] and intangible assets[61]. Tangible assets are easily valued by outsiders than intangible assets and, consequently, firms with higher asset tangibility face lower expected costs of financial distress. At the same time, it is difficult for shareholders to replace high-risk assets by low-risk assets when there are tangible assets (Frank and Goyal, 2009). For these reasons, when a firm has lower expected costs of financial distress and little agency problems related with debt, it is expected to see a positive correlation between tangibility[62] and leverage (Frank and Goyal, 2009); i.e., the degree of asset tangibility influences the debt ratio and the composition of the assets has an important role in capital structure decision.

However, Frank and Goyal (2009) show that the above relationship is not observed under the Pecking order theory. The authors conclude that a firm tends to issue equity when faces low information asymmetry associated with their tangible assets. As result, a firm with more tangible assets should have lower leverage ratios. However, if there is adverse selection about the firm's assets, tangibility increases the adverse selection effect and the final outcome is a higher leverage level. As concluded by the author, the Pecking order theory reveals an ambiguity.

The results presented by Rajan and Zingales (1995) are in line with Frank and Goyal (2009) because, as defended by Rajan and Zingales (1995), tangible assets are easy to collateralize and, consequently, they reduce the agency costs of debt. As result, there exists a positive correlation between assets tangibility and leverage. Similarly, Myers (1984) and Harris and Raviv (1991) state that

[60] Like property, plant and equipment (Frank and Goyal, 2009).
[61] Like goodwill.
[62] According to Rajan and Zingales (1995), tangibility is the ratio of fixed to total assets.

firms holding mostly tangible assets tend to borrow more that firms that hold valuable intangible assets.

In the same line of reasoning, Scott (1977) presents the secured debt hypothesis, which states that a firm is allowed to borrow at lower interest rates if its debt is secured by tangible assets. Finally, Titman (1984) presents the behavior on product/input markets. According to the author, firms that produces unique products[63] should rely less in debt because that type of firms have more specialized labor, which falls in higher financial distress costs and, as a consequence, should have less debt. Harris and Raviv (1991) also support this argument.

2.2.5 Profitability

According to Myers (1984) and Myers and Majluf (1984), the cost of each type of financing source (equity is costly than debt) may explain why a firm follow the Pecking order theory to finance its investment projects. As argued by Titman and Wessels (1988), the past profitability of a firm (and therefore the quantity of earnings available to be retained by the firm) impacts the firm capital structure. As pointed out by the authors and in line with Myers (1984) and Myers and Majluf (1984), it is possible to observe a negative correlation between past profitability and current debt levels, which suggests that more profitable firms tend to rely less on debt. Similar results are presented in Harris and Raviv (1991), Rajan and Zingales (1995), Fama and French (2002), Kayhan and Titman (2007) and Frank and Goyal (2009).

Jensen (1986) predicts that there is positive relationship between profitability and leverage when the market for corporate control is efficient and

[63] Like durable goods.

forces firms to commit with paying out cash when increasing their leverage level. On the contrary, in the presence of an ineffective corporate control market, managers of profitable firms desire to stay away from the corrective role of debt and, as consequence, firms will present a negative relationship between profitability and debt.

2.2.6 Growth opportunities

Myers (1977) and Myers and Majluf (1984) state that high leverage firms are more likely to let flee and lose profitable investment opportunities[64]. As result, firms that are expecting high future growth opportunities should rely more in equity issues and less in debt financing. Hence, it is expected a negative relationship between growth opportunities and debt. This fact is supported by Rajan and Zingales (1995)[65] and Frank and Goyal (2009), which is consistent with the Trade-off theory[66]. In the same line of reasoning, Jensen (1986) argues that if too much debt financing can result in a problem of underinvestment for growth opportunities, too little debt financing can lead to an overinvestment problem in mature firms[67]. As a result, debt financing can add value just because forces managers to be more critical in financing decision. This also suggests a negative relationship between leverage and growth opportunities.

On the other hand, Jensen and Meckling (1976) suggest that firms with few investment opportunities tend to rely less in debt than high-growth firms[68],

[64] Myers (1977) presents this as the "subinvestment problem". The subinvestment problem arises when managers reject valuable projects once creditors are paid first than shareholders (and shareholders may not receive the expected return).
[65] Rajan and Zingales (1995), p. 1 451 use the ratio of market value of assets to book value of assets as a proxy for growth opportunities.
[66] As exposed by Frank and Goyal (2009), p. 8.
[67] Mature firms are firms facing few growth opportunities.
[68] According to Jensen and Meckling (1976), p.52, if a firm does not have enough internal funds to exploit the investment opportunity, it should use debt (this is the Pecking order theory hypothesis).

as defended by the Pecking order theory. This suggests the existence of a positive relationship between growth opportunities and leverage.

In sum, as presented by Harris and Raviv (1991), the literature suggests a negative correlation between leverage and investment opportunities.

2.2.7 Firm size

Harris and Raviv (1991) and Titman and Wessels (1988) find several evidence in the literature pointing out that large firms rely more in debt than small firms[69], which drives to the conclusion that exist a positive relationship between firm size and leverage. This is, according to Frank and Goyal (2009), a prediction of the Trade-off theory. Simultaneously, the literature presents evidence that the costs of issuing equity are larger for small firms, suggesting that small firms may rely more in debt than large firms. This is a relationship that can be explained by the Pecking order theory. Additionally, Rajan and Zingales (1995) and Frank and Goyal (2009) find a positive relationship between firm size and leverage. The only exception in the Rajan and Zingales (1995) work was obtained for Germany. In a different line of reasoning, Titman and Wessels (1988) show that short-term debt seems to be negatively related to firm size.

[69] This happens because large firms tend to be more diversified and less susceptible to fall in bankruptcy.

2.2.8 Industry conditions

The existing literature (e.g., Bradley *et al.*, 1984) states that leverage ratios show significant deviations across industries[70] and this occurs due to different factors. First, as pointed out by Hovakimian *et al.* (2001) and Flannery and Ragan (2006), managers tend use industry median leverage as a benchmark when they reflect about capital structure. As consequence, the industry median leverage is frequently used as a proxy for the optimal capital structure and firms adjust their debt in order to meet the industry median leverage. Second, as presented by Frank and Goyal (2009), industry effects reveal a set of correlated factors. For example, firms in the same industry face common forces that affect their financing decisions, like competition[71]. Frank and Goyal (2009) state that the Trade-off theory predicts that higher industry median growth ought to result in less debt and higher industry median leverage should result in more leverage. According to the Pecking order theory, the industry only matter as a proxy for the firm's financing deficit but, according to the Market timing theory, the industry is only important if assessments are associated across firms and an industry. Hence, Frank and Goyal (2009) conclude that firms competing in industries with higher median leverage have higher leverage.

[70] Frank and Goyal (2009) cited several authors that contributed to this statement, as well as Harris and Raviv (1991), p. 333. Harris and Raviv (1991) present evidence about the industries with high/low leverage.

[71] For more detail, see Frank and Goyal (2009), p. 8.

2.2.9 Business risk

Bradley *et al.* (1984) develop a model which predicts a negative relationship between firm leverage and the volatility of firm earnings[72] when the costs of financial distress are non-trivial. Myers (1984) supports the negative relationship between firm leverage and risky firms[73]. The author concludes that, before the expected costs of financial distress offset the tax advantages of borrowing, safe firms should be able to borrow more. This evidence suggests that higher risk ought to result in less debt according to the Trade-off theory.

As presented by Frank and Goyal (2009), the financial literature supports both the Trade-off theory (and the authors presented above) and the Pecking order theory. According to the Pecking order theory, firms with more volatile stocks suffer more from adverse selection, which result in riskier firms tend to exhibit higher debt levels. Concluding, the Pecking order theory suggests a positive relationship between leverage and business risk.

2.2.10 Non-debt tax shields

DeAngelo and Masulis (1980) argue that non-debt tax shields are an alternative for the tax advantages of using debt financing. They show that exist a negative relationship between non-debt tax shields and the debt level of a firm. However, as Titman and Wessels (1988) point out, one of the indicators suggested by DeAngelo and Masulis (1980) to measure the non-debt tax shields variable is very difficult to measure. Similarly, Bradley *et al.* (1984) suggest that

[72] The volatility of the firm earnings is the proxy of the business risk. As pointed out by Frank and Goyal (2009), a firm with volatile cash flows expects higher costs of financial distress and thus should use less debt.

[73] In the study developed by Myers (1984), risk means the variance of market value of the firm's assets. The higher the variance rate, higher should be the probability of default of the firm.

there is a negative relationship between leverage and the level of non-tax shields.

2.2.11 Macroeconomic characteristics

As presented by Gungoraydinoglu and Öztekin (2011), the capital structure of a firm is not only affected by its own characteristics but also by the environment and traditions where firms operate. The authors find that high leverage is correlated with high effective tax rates, low bankruptcy costs and taxes, low (high) agency costs of debt (equity) and high adverse selection costs. These results are consistent with both Trade-off and Pecking order theories.

Frank and Goyal (2009) argue that firms tend to borrow more during expansions. However, if debt helps to reduce the agency problems between managers and shareholders and agency problems are heavy during economic contractions, debt should be countercyclical; i.e., should exist a negative relationship between economic cycles and firms borrowing. This negative relationship, as defended by Frank and Goyal (2009), is supported by the Pecking order theory – firms' leverage should decline during expansions because firms have more internal funds available during expansions.

Concerning to debt market conditions, Frank and Goyal (2009) show that the Trade-off theory and the Market timing theory predict a positive relationship between leverage and expected inflation. In a different line, Gungoraydinoglu and Öztekin (2011) argue that, under the Trade-off theory, it is expected a negative relationship between inflation and leverage due to the bankruptcy costs of debt.

2.2.12 Exportations

The existing literature, as argued by Wagner (2001), suggests that it is possible to observe a positive relationship between firm size and direct export activities. In a different dimension, Minetti and Zhu (2011) suggest that exporters tend to be less leveraged and have more liquidity than firms that do not export and exporters are less financially constrained than non-exporters. Thus, it is expected a negative relationship between leverage and export intensity.

Minetti and Zhu (2011) also show, for Italian firms, that credit rationing is a barrier to export. Similarly, Chen and Yu (2011) find for emerging economies that export intensity drives to a lower debt ratio, meaning that there is a negative relationship between leverage and export intensity. The authors show that firms that commit in internationalization activities [74] (such as exportations) tend to show a higher demand for financial support than firms that limit themselves to their domestic market. Additionally, firms that export their products/services relies more in internal than in external financing due to the monitoring problem. Chen and Yu (2011) measure the export intensity similarly to Geringer, Tallman and Olsen (2000) as the ratio of export sales to total firm sales (export sales as percentage of total sales).

Recently, Bernini, Guillou and Bellone (2015) find, using a large sample of French firms during the 1997-2007 period, that (*i*) the capital structure of a firm determines the firm capability to compete through quality on foreign

[74] The authors point out that when firms enter into international markets using export activities, local creditors find themselves unable to monitor the selling activities made by firms because of the complexity of operations. As result, those creditors are less motivated to lend funds to exporters and exporters face problems to borrow in foreign countries because of the high costs of monitoring and auditing a firm in a emerging country.

markets; and (*ii*) that there is evidence of a negative relationship between firm's leverage and export quality[75].

However, as referred by Chen and Yu (2011), the exportation subject has not received the proper attention in prior studies. We thus want to extend the existing literature examining the impact of export intensity on firms' capital structure by performing a comparative analysis between export and non-export sectors in Portugal.

[75] Bernini *et al.* (2015) study if the capital structure of a firm can have influence in the firm's capability to compete in international markets through output quality. The authors argued that "quality is inferred from the estimation of a discrete choice model of foreign consumers' demand".

Chapter 3

3. Research questions and hypotheses

3.1 Research questions

The capital structure theories and determinants outlined in the previous sections allow us to build the framework needed to study firms' financing decisions, namely to answer the following research questions: (*i*) What are the differences in the financing decisions between firms belonging to export and non-export sectors in Portugal?; and (*ii*) Does the export intensity affects Portuguese firms' leverage level?

In order to answer the research questions, different hypotheses were formulated based on existing literature regarding capital structure determinants.

The above questions have significant importance to the literature because (*i*) few literature studied Portuguese firms (because the biggest part of Portuguese firms are non-public firms); (*ii*) Portuguese export firms became very important in the Portuguese economy in recent years; (*iii*) Portugal is under the investors' eyes due to the funding assistance asked to International Monetary Fund (IMF) and, for that reason (*iv*) investors seek more information about the Portuguese economy and, as consequence, about one important part of the Portuguese economy, which is the Portuguese export sectors; and (*v*) study the financing decisions of Portuguese firms belonging to export sectors *versus* non-export sectors.

3.2 Research hypotheses

The questions raised in the previous section help us to develop and test eleven hypotheses with respect to financing decisions. First, Modigliani and Miller (1963) and Kraus and Litzenberger (1973) argue that the tax benefits obtained from debt increase when a firm relies more in debt. This suggests a positive relationship between corporate tax rates and leverage, which is supported by Graham (1996), Graham, Lemmon and Schallheim (1998) and Gungoraydinoglu and Öztekin (2011). As in Graham (1996) and Gungoraydinoglu and Öztekin (2011) we used the ratio between effective taxes paid and pre-tax earnings as a proxy for the effective tax rates.

Hypothesis 1: There is a positive relationship between the effective tax rate and the debt level.

Second, we want to examine what is the impact of agency costs, information asymmetries and the signaling effect on Portuguese export and non-export firms' capital structure. Fama and French (2002) and Frank and Goyal (2009) argue that it is expected a negative relation between leverage and profitability and this relationship is in line with the Pecking order theory. We use the ratio between EBITDA [76] and total assets as a proxy for firms' profitability.

Hypothesis 2: Profitability and leverage have a significant negative relationship for Portuguese firms.

The third hypothesis argues that firms with more growth opportunities have less leverage levels. According to Fama and French (2002), firms in the presence of more growth opportunities have less debt because (*i*) they need to spend the retained internal cash flow in investment opportunities and thus

[76] It was assumed that operating income before depreciation is the same as EBITDA for data available reasons.

there is no internal cash available to invest in organizational inefficiencies; and (ii) they have strong motivation to avoid underinvestment and asset substitution. As in Frank and Goyal (2009), we use the ratio between CAPEX and total assets as a proxy for growth opportunities.

Hypothesis 3: Firms with higher growth opportunities have lower debt levels.

The fourth hypothesis (related with the agency costs) argues that firms with more tangible assets have higher leverage levels. Frank and Goyal (2009) argue that: (*i*) it is difficult for shareholders to replace high-risk assets for low-risk assets when those assets are tangible; and (*ii*) tangible assets are easy to collateralize and, consequently, they reduce the agency costs of debt. As result, tangibility leads to a decrease of agency cost of debt[77], which predicts a positive relationship between assets tangibility and leverage. As in Rajan and Zingales (1995), we use the ratio between tangible assets by total assets as a proxy for assets tangibility.

Hypothesis 4: Firms with more tangible assets have higher leverage levels.

The fifth hypothesis argues that firms that produce unique products should rely less in debt, as supported by Harris and Raviv (1991). This argument predicts a negative relationship between firms that produce unique products and their debt levels. As in Titman and Wessels (1988), we use the ratio between selling expenditures by total sales as a proxy for unique products.

Hypothesis 5: Firms that produce unique products have less debt.

The sixth hypothesis argues that larger firms have a relatively higher leverage level. Harris and Raviv (1991) and Rajan and Zingales (1995) find evidence of a positive relationship between firm size and leverage while Frank

[77] The literature states that the agency costs of debt arises from the agency problems between shareholders and creditors and the agency costs of equity arises from the agency problems between shareholders and managers.

and Goyal (2009) find evidence supporting either a positive and negative relationship between firm size and leverage. As in Rajan and Zingales (1995) and Frank and Goyal (2009), we use the log of total assets as a proxy for the firm size.

Hypothesis 6: Larger firms have relatively higher debt levels.

The seventh hypothesis argues that firms that compete in industries where the median firm has a higher leverage level have a tendency to have more debt (Frank and Goyal, 2009). Bradley *et al.* (1984), Hovakimian *et al.* (2001) and Flannery and Ragan (2006) argue that managers tend use industry median leverage as a benchmark when they reflect about firm's capital structure. As result, firms tend to follow the median sector leverage, which predicts a positive relationship between median sector leverage and firm leverage. As in Frank and Goyal (2009), we use the ratio between the sector median total debt by firm total assets as a proxy for industry conditions.

Hypothesis 7: There is a positive relationship between median sector leverage and firm leverage.

According to Frank and Goyal (2009), firms with more leverage have less volatile earnings. Burgman (1996) use the coefficient of variation of the first differences in EBIT to measure the earnings volatility. In line with Burgman (1996) and Chen and Yu (2011), we use the ratio between the standard deviation of EBIT (for the period 2011-2015) and the average EBIT as a proxy for business risk (BR).

Hypothesis 8: Firms with more volatile earnings have lower debt levels.

The ninth hypothesis argues that firms with higher non-debt tax shields (NDTS) have lower debt levels (DeAngelo and Masulis, 1980). As in Leary and Roberts (2005), we use the ratio between depreciations and amortizations (D&A) by total assets as a proxy for NDTS.

Hypothesis 9: Firms with higher non-debt tax shields have lower debt levels.

The empirical studies on the impact of inflation on leverage present contradictory results. While Frank and Goyal (2009) find a positive and significant relationship between leverage and expected inflation, Gungoraydinoglu and Öztekin (2011) find a negative relationship between inflation and leverage. According to Frank and Goyal (2009), the expected inflation could be the least reliable factor in their model and, for that reason, as Gungoraydinoglu and Öztekin (2011) suggest, we use the annual inflation rate as a proxy for annual inflation rate.

Hypothesis 10: There is a negative relationship between the inflation rate and the debt level.

The eleventh hypothesis argues that firms with higher export intensity have less leverage levels (Chen and Yu, 2011). As in Chen and Yu (2011), we use the ratio between export sales by total sales as a proxy for export intensity.

Hypothesis 11: There is a negative relationship between the export intensity and the debt level.

Table 3 summarizes the research questions as well as the proxies used to study the impact of common capital structure determinants on firms' leverage level.

Determinant	Research hypotheses	Proxy
Taxes	There is a positive relationship between the effective tax rate and the debt level	$\frac{Effective\ tax\ paid}{Pre-tax\ earnings}$
Profitability	Profitability and leverage have a significant negative relationship for Portuguese firms	$\frac{EBITDA}{Total\ assets}$
Growth opportunities	Firms with higher growth opportunities have lower debt levels	$\frac{CAPEX}{Total\ assets}$
Assets	Firms with more tangible assets have higher leverage levels	$\frac{Fixed\ tangible\ assets}{Total\ assets}$
	Firms that produce unique products have less debt	$\frac{selling\ expenditures}{Total\ sales}$
Firm size	Larger firms have relatively higher debt levels	$Log(total\ assets)$
Industry conditions	There is a positive relationship between median sector leverage and firm leverage	$\frac{Median\ total\ debt}{Total\ assets}$
Business risk (BR)	Firms with more volatile earnings have lower debt levels	$\frac{\sigma(EBIT\ period\ 2011\ to\ 2015)}{EBIT\ average\ for\ year\ t}$
Non-debt tax shields (NDTS)	Firms with higher non-debt tax shields have lower debt levels	$\frac{D\&A}{Total\ assets}$
Macroeconomic effect	There is a negative relationship between the inflation rate and the debt level	$Annual\ inflation\ rate$
Exportation effect	There is a negative relationship between the export intensity and the debt level	$\frac{Export\ sales}{Total\ sales}$

Table 3 - Presentation of the determinants, research questions and proxies to study.

Chapter 4

4. Variables, Sample and Methodology

This chapter begins with the definition of the variables as well as the expected impact on leverage. Then, both the dependent and independent variables will be analyzed. Finally, it will be presented the methodology used in the regressions analyses.

4.1 Variables

As described above, the next section presents the explained/dependent and explanatory/independent variables, as well as the proxies used and the expected impact of each independent variable on leverage.

4.1.1 Dependent variable

Leverage (Lev) is our explained/dependent variable. As noted by the existing literature, it is important to define leverage because several alternative classifications of leverage are available (Frank and Goyal, 2009). For this reason, we define leverage as the book ratio between total debt and total assets - we use the book value of debt and assets due to the data available in SABI database[78]. This ratio is in line with Fama and French (2002), Frank and Goyal (2009),

[78] The data available in SABI database is the accounting and financial data and not the market data (SABI database collects their data in the Portuguese tax authority).

Gungoraydinoglu and Öztekin (2011), Graham, Leary and Roberts (2015) and Bernini *et al.* (2015).

4.1.2 Independent variables

The variable **Taxes** is defined as the ratio between effective taxes paid and pre-tax earnings. Several studies, like Graham (1996) and Gungoraydinoglu and Öztekin (2011), use this ratio to test the relationship between effective tax rates and leverage. We expect a positive relationship between effective tax rates and debt levels since firms identify that they can obtain more tax benefits from debt increases (Kraus and Litzenberger, 1973).

The variable **Tangibility** is defined as the ratio between fixed tangible assets and total assets. Authors like Rajan and Zingales (1995) and Gungoraydinoglu and Öztekin (2011) use this ratio to test the relationship between assets tangibility and debt levels. According to the financing literature, it is expected a positive relationship between asset tangibility and debt levels because tangible assets are easy to collateralize and thus they reduce the costs of debt (Frank and Goyal, 2009).

The variable **Unique Product (UP)** is defined as the ratio between selling expenditures and total sales. Titman and Wessels (1988) and Kayhan and Titman (2007) use this ratio to investigate the relationship between firms that produce unique products and their debt levels. Following the existing literature on capital structure, we expect a negative relationship between unique products and debt levels for firms that produce unique products because those firms

have more specialized labor and, for that reason, should rely less in debt (Titman and Wessels, 1988).

The variable **Profitability** is defined as the ratio between EBITDA and total assets. Several authors like Frank and Goyal (2009) and Graham *et al.* (2015) used this ratio to examine the relationship between profitable firms and debt levels. We expect a negative relationship between profitable firms and debt levels since past profitability have strong effects in firms' debt levels (Titman and Wessels (1988), in line with Myers (1984) and Myers and Majluf (1984) studies).

The variable **Growth** is defined as the ratio between CAPEX and total assets. Like authors - Frank and Goyal (2009) and Titman and Wessels (1988) – we use this ratio to investigate the relationship between growth opportunities and debt levels and expect negative relationship between the two variables because high leverage firms are more likely to lose profitable investment opportunities (Frank and Goyal, 2009).

The variable **Size** is defined as the logarithm of assets. Authors like Rajan and Zingales (1995), Frank and Goyal (2009) and Gungoraydinoglu and Öztekin (2011) use the log of total assets to explore the relationship between firm size and debt levels. Following the referred literature, we expect a positive relationship between firm size and debt levels because larger firms tend to be more diversified and less susceptible to fall in bankruptcy (Titman and Wessels, 1988 and Frank and Goyal, 2009).

The variable **Industry** is defined as the ratio between median total debt and total assets[79]. Several authors, like Flannery and Ragan (2006), use this ratio to investigate the relationship between median sector leverage and the firm leverage. The literature states that there is a positive relationship between sector leverage and firm debt levels because managers tend use industry median leverage as a benchmark when they reflect about firm's debt levels (Frank and Goyal, 2009).

The variable **Business Risk (BR)** is defined as the ratio between the standard deviation of EBIT and the EBIT average, in line with Frank and Goyal (2009) and Chen and Yu (2011). We expect a negative relationship between firm earnings volatility and firm debt levels because, as pointed out by Frank and Goyal (2009), a firm with volatile cash flows expects higher costs of financial distress and, consequently, should rely less in debt.

The variable **Non-Debt Tax Shields (NDTS)** is defined as the ratio between depreciations and amortizations to total assets. This ratio was used by Leary and Roberts (2005). Fama and French (2002) and Frank and Goyal (2009) investigate the relationship between NDTS and firms' debt levels and find a negative relationship between the two interconnectors. Following this literature, we expect a negative relationship NDTS and firms' debt levels because the NDTS are an alternative for the tax advantages of using debt financing.

The variable **Inflation Rate (IR)** is defined as the annual inflation rate. We expect a negative relationship between leverage and inflation rate because,

[79] It is always being used the book (accounting) total assets due to the data available.

as pointed out by Gungoraydinoglu and Öztekin (2011), higher inflation levels increase the bankruptcy costs of debt.

The variable **Export Intensity (EI)** is defined as the ratio between export sales and total sales. Chen and Yu (2011) use this measure to study the relationship between exportation activity/intensity and firms' debt levels. We expect a negative relationship between export intensity and firms' debt levels because, as argued by Chen and Yu (2011), exporter firms face high monitoring costs than non-exporter firms.

The next table presents a summary of the variables, their proxies/measures and their expected impact on leverage.

Variable	**Proxy/Measure**	**Expected impact**
Taxes	$\frac{Effective\ tax\ paid}{Pre-tax\ earnings}$	+
Tangibility	$\frac{Fixed\ tangible\ assets}{Total\ assets}$	+
Unique Product (UP)	$\frac{selling\ expenditures}{Total\ sales}$[80]	-
Profitability	$\frac{EBITDA}{Total\ assets}$	-
Growth	$\frac{CAPEX}{Total\ assets}$[81]	-
Size	$Log(total\ assets)$	+
Industry	$\frac{Median\ total\ debt}{Total\ assets}$	+
Business Risk (BR)	$\frac{\sigma(EBIT\ period\ 2011\ to\ 2015)}{EBIT\ average\ for\ year\ t}$	-
Non-debt tax shields (NDTS)	$\frac{D\&A}{Total\ assets}$	-

[80] The "selling expenses" item was obtained from the ratio "debt to cost of sales (%)" provided by SABI database (at the same time was obtained the debt item in order to calculate the cost of sales). During this thesis "selling expenses" was assumed to be the same as the "cost of sales" in the SNC system.

[81] The CAPEX for 2015 (for example) is: fixed tangible assets for 2015 + fixed intangible assets for 2015 – fixed tangible assets for 2014 – fixed intangible assets for 2014 + amortization & depreciation & impairments.

Inflation Rate (IR)	$Annual\ inflation\ rate$	-
Export Intensity(EI)	$\frac{Export\ sales}{Total\ sales}$	-

Table 4 - Summary of the variables, their proxies/measures and expected signals.

4.2 Sample

In order to make a comparative analysis of firms' financing decisions in export and non-export sectors in Portugal for the 2011-2015 period, we defined a sample of exporter firms belonging to 10 CAE sectors and of non-exporter firms belonging to 10 CAE sectors (see chapter 1). From these 20 CAE sectors[82] and considering the 2011-2015 period, we built a sample of 291 355 firms (of the 596 482 firms that exist in Portugal[83]). According to this, it is possible to conclude that we are dealing with a panel data sample. The composition of the sample is presented in Table 5. Firms accounting data was collected from SABI database[84]. In order to collect the data, several limitations were found, which are described in the limitations section (see section 6).

CAE Code	CAE Description	Number of firms
CAE 29	Manufacture of motor vehicles, trailers and semi-trailers	630
CAE 19	Manufacture of coke and refined petroleum products	30
CAE 51	Air transport	115
CAE 25	Manufacture of fabricated metal products, except machinery and equipment	9 492
CAE 71	Architectural and engineering activities; technical testing and analysis	12 124
CAE 22	Manufacture of rubber and plastic products	1 391
CAE 14	Manufacture of wearing apparel	8 282
CAE 42	Civil engineering	4 225
CAE 20	Manufacture of chemicals and chemical products	1 032

[82] The sample was selected by their principal CAE code and, for that reason, there is no possibility of a firms being in more than one CAE code sector.
[83] This is according to SABI database at 2nd of November 2016.
[84] SABI database contains financial information on companies in Spain and Portugal.

CAE 27	Manufacture of electrical equipment	822
Total exporters firms		**38 143**
CAE 47	Retail trade, except of motor vehicles and motorcycles	80 375
CAE 35	Electricity, gas, steam and air conditioning supply	1 059
CAE 45	Wholesale and retail trade and repair of motor vehicles and motorcycles	22 041
CAE 10	Manufacture of food products	7 720
CAE 86	Human health activities	24 137
CAE 41	Construction of buildings	43 406
CAE 61	Telecommunications	966
CAE 52	Warehousing and support activities for transportation	2 726
CAE 56	Food and beverage service activities	46 832
CAE 43	Specialized construction activities	23 950
Total non-exporters firms		**253 212**
Total firms | 2011-2015		**291 355**

Table 5 - Distribution of firm's observations by CAE sectors.

From this initial sample were excluded all the firms that did not fulfill the following requirements:

- Firms with a NIF number[85] that does not start with 5, 6, 7, 8 or 9[86].
- Firms without information about asset[87] or debt[88] values for the 2010-2015 period (2010 data is needed in order to compute the CAPEX item);
- Firms that were classified as exporters (included in the exporters CAE codes) but does not have export records during the entire period of analysis;
- Firms that were classified as non-exporters (included in the non-exporters CAE codes) and had export records in the 2011-2015 period (only firms that had exports equal to zero and sales to the internal market during 2011-2015 period were not excluded);
- Firms that presented negative values in the D&A item.

[85] The NIF number is the tax identification number (TIN).
[86] According to Decreto-lei nº14/2013 de 28/01, firms' NIFs start with the numbers 5, 6, 7, 8 or 9.
[87] As suggested by Frank and Goyal (2009) work.
[88] Firm's debt is an important item in this dissertation because it is used in the explained variable.

After applying these screens we are able to analyze a sample of 40 323 firms, distributed by the 20 CAE sectors presented during the 2011-2015 period. The table below presents the composition of our sample after the cleaning criteria.

CAE Code	CAE Description	Number of firms
CAE 29	Manufacture of motor vehicles, trailers and semi-trailers	142
CAE 19	Manufacture of coke and refined petroleum products	4
CAE 51	Air transport	13
CAE 25	Manufacture of fabricated metal products, except machinery and equipment	1 118
CAE 71	Architectural and engineering activities; technical testing and analysis	384
CAE 22	Manufacture of rubber and plastic products	357
CAE 14	Manufacture of wearing apparel	788
CAE 42	Civil engineering	95
CAE 20	Manufacture of chemicals and chemical products	149
CAE 27	Manufacture of electrical equipment	139
Total exporters firms		**3 187**
CAE 47	Retail trade, except of motor vehicles and motorcycles	5 642
CAE 35	Electricity, gas, steam and air conditioning supply	299
CAE 45	Wholesale and retail trade and repair of motor vehicles and motorcycles	4 145
CAE 10	Manufacture of food products	2 049
CAE 86	Human health activities	7 847
CAE 41	Construction of buildings	4 741
CAE 61	Telecommunications	103
CAE 52	Warehousing and support activities for transportation	489
CAE 56	Food and beverage service activities	7 202
CAE 43	Specialized construction activities	4 619
Total non-exporters firms		**37 136**
Total firms | 2011-2015		**40 323**

Table 6 - Distribution of firm's observations by CAE sectors after cleaning the sample.

The panel data collected (40 323 firms with data for all the 2011-2015 period) used units of Euros as measure. Hence, it is possible to conclude that all the variables in our study use units of Euros as measure.

4.3 Descriptive statistics

Table 7 presents the descriptive statistics for dependent variable Lev and for explanatory variables EI, Taxes, Tangibility, Unique Product, Profitability, Growth, Size, Industry, BR, NDTS and IR.

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
Lev	0.68	0.65	0.59	0.00	25.21
Export Intensity	0.12	0.00	0.27	0.00	1.00
Taxes	0.33	0.22	9.57	-161.37	1 365.73
Tangibility	0.29	0.23	0.23	<0.00	1.20
Unique Product	0.00	0.00	0.00	<0.00	0.44
Profitability	0.09	0.08	0.20	-8.52	13.33
Growth	0.04	0.01	0.10	-2.76	1.11
Size	5.89	5.80	0.76	3.61	9.91
Industry	0.56	0.29	0.90	0.00	22.93
Business Risk	4.64	0.54	182.93	-5 439.05	24 539.69
Non-debt tax shields	0.05	0.04	0.06	<0.00	5.15
Inflation Rate	0.01	0.00	0.01	-0.00	0.04

The number of firm-year observations is 21 866.

Table 7 – Descriptive statistics for all variables.

In Table 7, we have a small number of firm-year observations because the Unique Product and Grow variable drastically reduce the number of observations. Therefore, from now on, it will not be included these variables in our study. Table 8 presents the descriptive statistics for dependent variable Lev and for explanatory variables EI, Taxes, Tangibility, Profitability, Size, Industry, BR, NDTS and IR. With exception of Size and IR variables, all the other variables are ratios (meaning that need to be analyzed as percentages).

Variable	Mean	Median	Standard Deviation (Std. Dev.)	Minimum	Maximum
Lev	0.66	0.59	1.18	-0.10	231.26
Export Intensity	0.05	0.00	0.18	0.00	1.00
Taxes	0.35	0.23	19.13	-1 265.82	6 460.44
Tangibility	0.26	0.17	0.25	<0.00	7.13
Profitability	0.11	0.09	0.34	-61.65	26.63
Size	5.48	5.40	0.67	2.64	9.91
Industry	0.92	0.43	2.70	0.00	432.84
Business Risk	2.05	0.42	159.55	-43 075.29	24 539.69
NDTS	0.05	0.03	0.07	<0.00	11.31
Inflation Rate	0.01	0.00	0.01	-0.00	0.04

The number of firm-year observations is 144 080.

Table 8 – Descriptive statistics of the variables in study.

As presented in Table 7 and Table 8, there are some variables that have abnormal values (for example, the Business Risk maximum is 24 539,69%). In order to eliminate these outliers, we defined intervals of values that the variables can assume, which are presented in Table 9.

Variable	Interval/range of values assumed
Lev	Kayhan and Titman (2007) suggested that this variable should take values between -1 and 1 ([-1; 1]).
Export Intensity	This variable is already well defined.
Taxes	According to the SNC rules[89], this variable can take a vast range of values. For that reason, in line with Frank and Goyal (2003, 2009) we trimmed the variable in order to remove the most extreme values at 0.50% in both tails of the distribution.
Tangibility	It is abnormal a firm presenting tangible fixed assets higher than total assets. Hence, all the observations outside the interval [0; 1] were dropped.
Unique Product	It is abnormal a firm presenting the selling expenses item higher than the total sales. For that reason, all the observations outside the interval [0; 1] were dropped.
Profitability	In line with Frank and Goyal (2003, 2009), this variable was trimmed in order to remove the most extreme values at 0.50% in both tails of distribution.

[89] According to SNC rules, it is possible (to a firm) to postpone the taxes payments under some circumstances.

Growth	It is abnormal a firm presenting the CAPEX item higher than total assets. Thus, all the observations outside the interval [-1; 1] were dropped.
Size	This variable is well defined (logarithm variable).
Industry and Business Risk	In line with Frank and Goyal (2003, 2009), this variable was trimmed in order to remove the most extreme values at 0.50% in both tails of distribution.
Non-debt tax shields	It is abnormal to see depreciations and amortizations higher than total assets. Thus, all the observations outside the interval [0; 1] were dropped.
Inflation Rate	This variable is already well defined.

Table 9 – Definition of values' intervals that the variables can assume.

After defining these variables' intervals, Table 10 presents descriptive statistics of the variables in our study (see Appendix D for more information about the all variables' descriptive statistics). In order to examine whether the population mean ranks differ across samples we use the Wilcoxon rank-sum test - using a firm-export dummy that takes a value equal to 1 if the firm is exporter and 0, otherwise. This test reveals that all variables have different distributions in exporter *versus* non-exporter firms' sub-samples.

Variable	Mean			Median			Std. Dev.	Minimum	Maximum	Wilcoxon test[90]
	All Firms	Export Firms	Non-export Firms	All Firms	Export Firms	Non-export Firms				
Lev	0.52	0.60	0.51	0.54	0.63	0.53	0.28	-0.10	1.00	***
EI	0.05	0.45	---	0.00	0.40	---	0.18	0.00	1.00	***
Taxes	0.25	0.24	0.25	0.24	0.25	0.24	0.53	-16.61	4.70	***
Tangibility	0.25	0.24	0.25	0.17	0.20	0.16	0.25	<0.00	1.00	***
Profitability	0.13	0.10	0.13	0.10	0.09	0.10	0.15	-1.07	0.87	***
Size	5.52	6.18	5.44	5.45	6.12	5.38	0.64	3.79	9.91	***
Industry	0.72	1.14	0.68	0.40	0.50	0.39	0.94	0.00	8.37	***
BR	1.04	0.66	1.10	0.40	0.17	0.43	8.04	-239.77	75.63	***
NDTS	0.05	0.04	0.05	0.03	0.03	0.03	0.05	<0.00	0.85	***
IR	0.01	0.01	0.01	0.00	0.00	0.00	0.01	-0.00	0.04	***
Number of observations	127 151	13 865	113 493	127 151	13 865	113 493	127 151			

*** indicates that the population mean ranks differ significantly between exporter and non-exporter firms at the 1% significance level.

Table 10 - Descriptive statistics of the variables (after defining the intervals of values).

[90]The Wilcoxon Rank Sum test is a nonparametric test and uses two different types of populations (exporter firms and non-exporter firms) to test the null hypothesis that the two populations have different continuous distributions.

4.3.1 Dependent variable

Having in mind that our study did not include the variables UP and Growth, it is observable a slight decrease of firms' debt levels during the 2011-2015 period (Figure 2). In 2011, the median firm in the data had 57.97% of total debt to total assets, while in 2015 had 50.28% of total debt (the variable Leverage decrease 14.23% during this period). This means that firms slightly reduce their amounts of debt in their capital structures. Regarding to a sub-sample of exporter firms (Figure 3), the median firm in the data, in 2011, had 66.23% of total debt to total assets, while in 2015 had 59.29% of total debt (the variable Leverage decrease 4.76% during 2011-2015). Finally, analyzing the non-exporter firms (Figure 4), the median firm in the data, in 2011, had 56.64% of total debt to total assets, while in 2015 had 48.82% (the Leverage variable decrease 9.64% during 2011-2015). In short, it is possible to conclude that the debt levels' reduction was higher in non-exporter firms than in exporter firms and exporter firms relied in more debt than non-exporter firms.

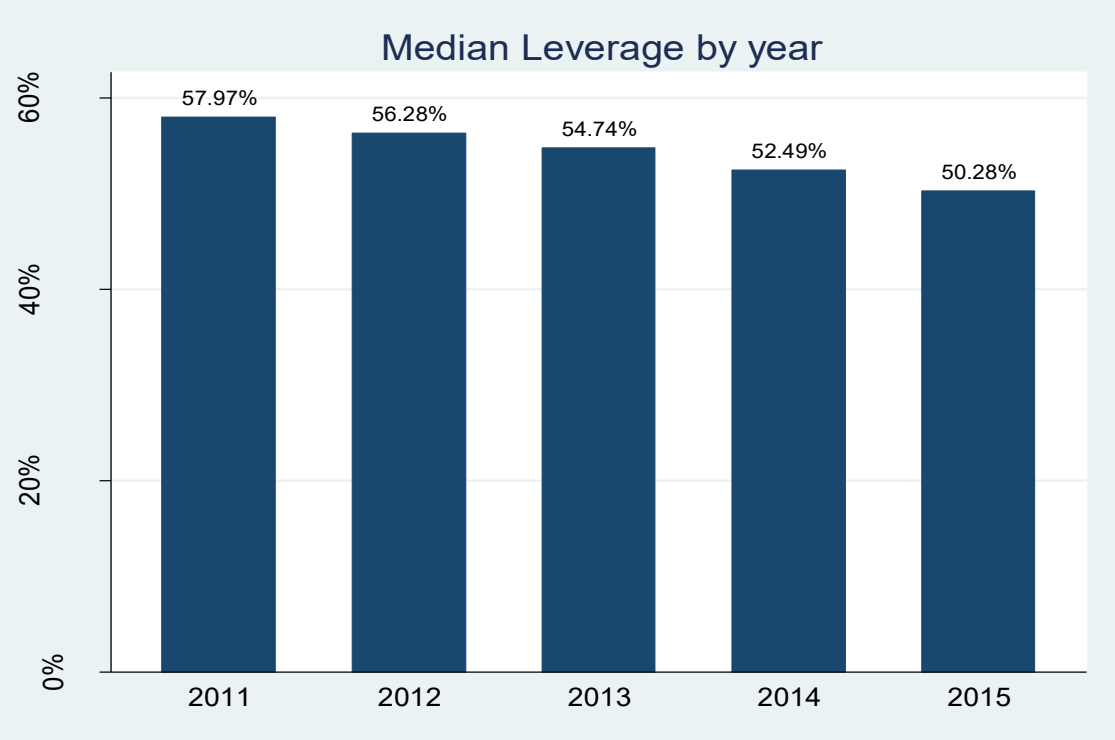

Figure 2 – Median leverage by year. Output: Stata Software[91].

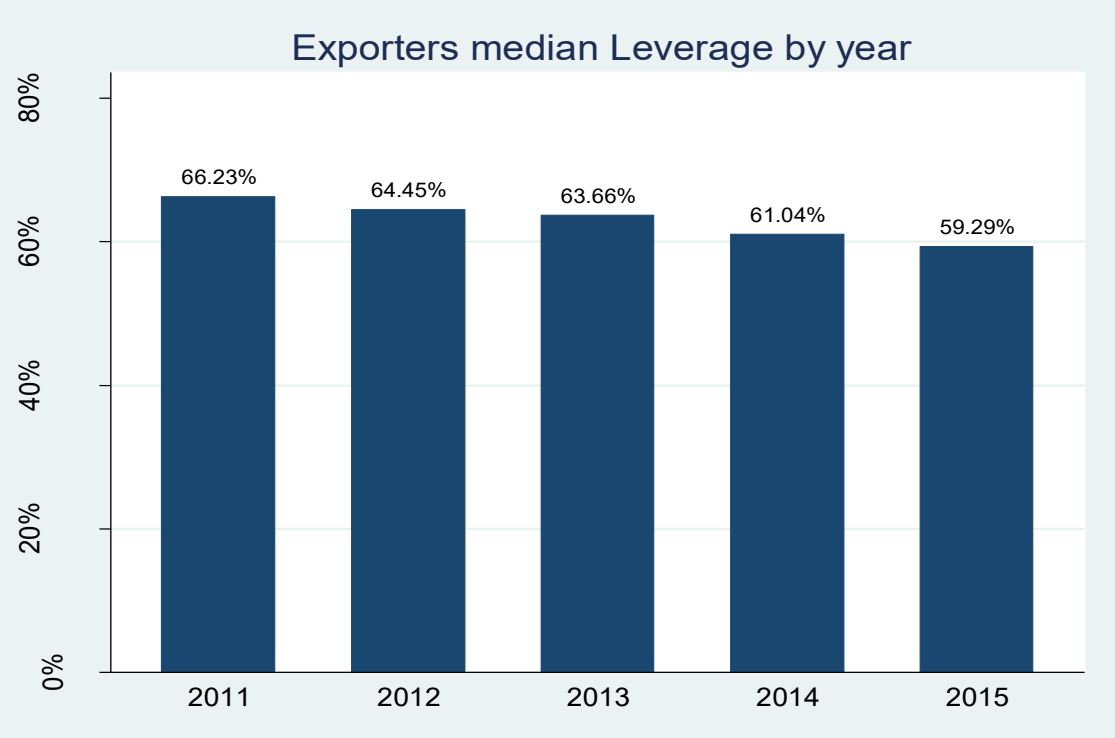

Figure 3 – Exporter firms' median leverage by year. Output: Stata Software.

[91] The Stata Software was the software used to do the data analysis.

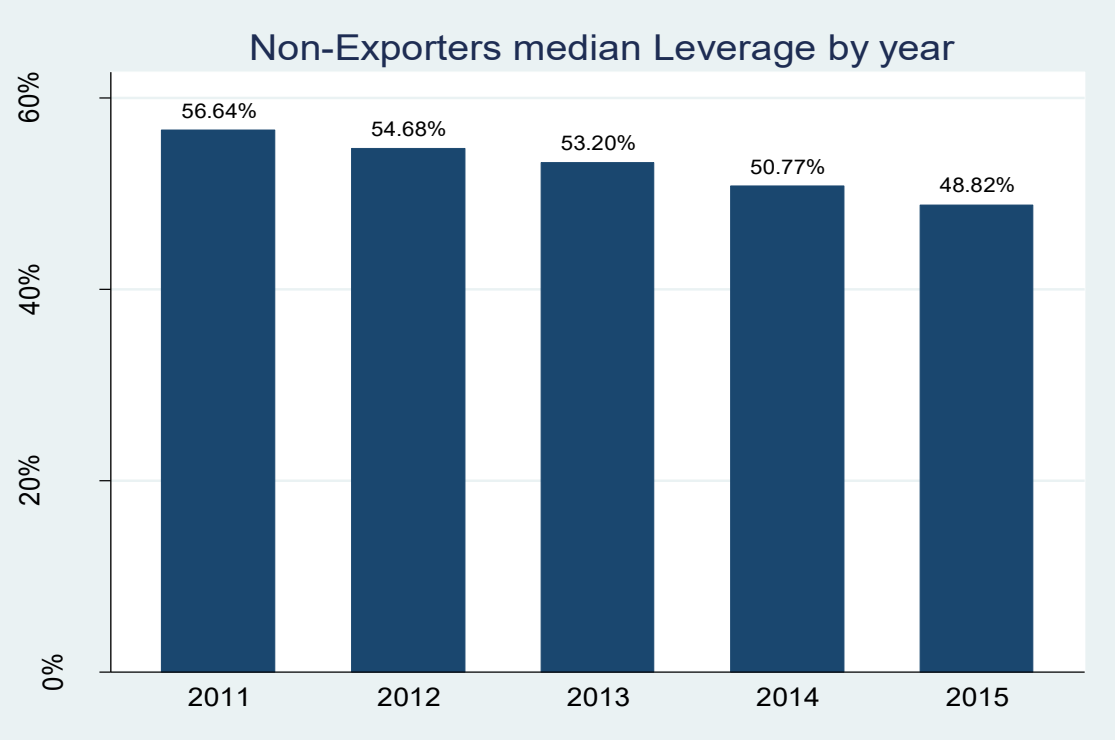

Figure 4 – Non-Exporter firms' median leverage by year. Output: Stata Software.

4.3.2 Independent/control variables

According to Table 10 and Appendix E (that presents graphs with the evolutions of the variables in study during the 2011-2015 period), it is possible to conclude that only export firms exhibit export sales. According to this statement, the median exporter firm, in the median year, sold 40% of the total sales as exportations. From 2011 to 2014, the median firm had an increase in export sales to 43% of the total sales. From 2014 to 2015, the export sales slightly decreased.

Considering variables Taxes and Tangibility, it is possible to conclude that, in the median year, the median exporter firm presents a higher marginal tax rate than the median non-export firm (Taxes variable) and the median exporter firm presents more fixed tangible assets than the non-exporter firm (Tangibility variable). During the period in analysis, the median taxes paid

increased from 2011 to 2012 and decreased in all the subsequent years (from 2012 to 2015). In relation to the Tangibility variable, the fixed tangible assets of the median firm decreased from 2011 to 2014 and slightly increased in 2015.

At the same time, the median non-exporter firm, in the median year, has a higher level of profitability than the exporter firm (the profitability difference between the median non-export and export firms is equal to 1%). The median firm profitability decreases from 2011 to 2012 and increase in all the following years (from 2012 to 2015).

The median exporter firm, in the median year, is larger than the non-exporter firm. Analyzing this variable by year, it is observable that the median firm size remains stable during the period in analysis.

According to the Industry variable, the median leverage level is lower for non-exporter sectors than for exporter sectors. During the period 2011-2015, the median Industry variable decreased, which means that firms do not follow the industry median leverage as a benchmark.

Analyzing the Business Risk variable, the median exporter firm, in the median year, reveals much less volatility of its earnings than the median non-exporter firm. During 2011-2015, the median of BR variable was very unstable, as it is presented in Graph "Median Business Risk by year" (see Appendix E). From 2011 to 2012 and from 2014 to 2015, it is observable a significant decrease in the median of BR variable while the opposite was found for the 2012-2014 period.

At the same time, the mean exporter firm presents 4% of the value of its assets as D&A and the non-exporter firm presents 5% of the value of its total assets as D&A (NDTS variable analysis). From 2011 to 2015, the median NDTS variable for all firms decreases successively.

According to the Inflation Rate variable, the Portuguese inflation rate, during 2011-2015, presented a huge decrease between 2011 and 2014 and a slight increase from 2014 to 2015.

4.5 Preliminary Analysis

Table 11 presents the correlations between the independent/control variables and the dependent variable (for more detail see Appendix F).

Variables	Leverage variable			
	All sectors	Export sectors	Non-export sectors	Expected correlation
Export Intensity	0.0807	0.0338		-
Taxes	-0.0252	0.0051	-0.0278	-
Tangibility	0.1685	0.0967	0.1756	+
Profitability	-0.2148	-0.1955	-0.2120	-
Size	0.0829	-0.0544	0.0633	+
Industry	0.0598	0.0452	0.0531	+
Business Risk	0.0180	-0.0206	0.0214	-
NDTS	0.0362	0.0286	0.0413	+
Inflation Rate	0.0583	0.0776	0.0580	+

Table 11 – Correlations between independent/control variables and the dependent variable.

There are some cases where the results are not consistent with the expected correlation. One of those cases is the correlation between EI variable and Leverage: we expected a negative correlation, based on the existing literature, and found a positive correlation. Possible justifications to this fact can be: (*i*) the Portuguese Government gives financial support to exporter firms (through credit lines) and, as consequence, exporter firms tend to have higher debt levels and; (*ii*) as exporter firms have more tangible assets (to use as collateral) and less volatile earnings than non-exporter firms, exporter firms face lower debt costs when they are asking for debt financing and, consequently, exporter firms tend to rely in more debt because it is cheaper.

Taking into account the correlations between variables, the preliminary analysis reveals that the export intensity positively affects the firm's leverage level. Additionally, from Table 11 we can conclude that (*i*) firms belonging to export sectors tend to rely in more debt due to the positive impact of EI, Taxes, Tangibility, Industry, NDTS and IR variables in leverage, while the non-export sectors tend to rely in more debt due to the positive impact of Tangibility, Size, Industry, BR, NDTS and IR variables in leverage; (*ii*) export sectors tend to rely in more equity (less in debt) due to the negative impact of Profitability, Size and BR variables in the Leverage variable, while the non-export sectors tend to rely in more equity (less in debt) due to the negative impact of Taxes and Profitability variables in the Leverage variable.

It is important to notice that the preliminary analysis do not offer a definitive answer to our research questions because it only provides a right answer whenever all the other variables that explain the dependent variable are not correlated with the independent variables. For this reason, in section 5 we use a regression analysis where the impact of each variable on leverage will be examined while controlling for other variables.

4.6 Methodology

The sample selected for this study is composed with a set of firms observed during 5 years (the period 2011-2015). For this reason, the analysis of the financing decisions taken by a firm (Leverage variable) will be performed in a panel data format. The panel data methodology was selected because, with panel data, it is possible to model dynamic effects and the heterogeneity across observations (Greene, 2012). At the same time, the panel data methodology allows the researcher to have "more informative data, more variability, less

collinearity among variables, more degrees of freedom and more efficiency" (Gujarati and Porter, 2008).

In order to study the impact of the variables in the financing decisions, using the Stata statistical software, it will be used a fix-effect model (FE). This model assumes the existence of correlation between the explanatory variables and the omitted variables of the model and tries to control this correlation (Greene, 2012). Several authors, like Flannery and Ragan (2006) and Frank and Goyal (2009), state that firm fixed effects are important (Frank and Goyal, 2009) and should be a part in a model that study capital structure choices (Flannery and Ragan, 2006). Similarly, Huang and Ritter (2009) used firm fix-effect model in their study. Chen and Yu (2011) use as explanatory variable the Export Intensity variable and all the other variables as controls. In line with the referred authors, Export Intensity variable will be the only explanatory variable and all the other variables will be used as control variables.

In this way, the model to be used to analyze the financing decisions of export and non-export sectors in Portugal, under a firm fix-effect model, is given by the following model:

$$Lev_{i,t} = \beta_0 + \beta_1 EI_{i,t} + \beta_2 Taxes_{i,t} + \beta_3 Tangibility_{i,t} + \beta_4 Profitability_{i,t} + \beta_5 Size_{i,t} + \beta_6 Industry_{i,t} + \beta_7 BR_{i,t} + \beta_8 NDTS_{i,t} + \beta_9 IR_t + \sum_{i=1}^{n} \alpha_{9+i} DF_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where:

- i: represents a firm observation (i=1, 2, …, 32 912);
- t: represents a year observation (t=2011, 2012, 2013, 2014, 2015);
- i, t: represents a firm-year observation (i, t=127 151)
- Lev: represent Leverage variable;
- EI: represents the Export Intensity variable;
- Taxes: represent Taxes variable;

- Tangibility: represents the Tangibility variable;
- Profitability: represents the Profitability variable;
- Size: represents the logarithm of total assets variable;
- Industry: represents the Industry variable;
- BR: represents the Business Risk variable;
- NDTS: represents the Non-Debt Tax Shields variable;
- IR: represents the Inflation Rate variable;
- DF: represents a dummy variable that take a value of 1 in the case that observation *it* is related to firm *i* in the year *t*.
- ε: represents the error term.

This model will be useful to analyze the impact of the independent variable and the controls in the dependent variable in all sectors together and in both the export sectors and non-export sectors. At the same time, it will be produced significance tests in order to determine the model quality and to analyze the significance of each independent variable.

In order to conduct the individual significance tests, it will be considered the following two hypothesis: the null hypothesis, where H0: $\beta_k=0$ and the non-null hypothesis, where H1: $\beta_k\neq0$. If the null hypothesis is rejected (not rejected), this suggests that the independent variable influences (not influences) the dependent variable and, as consequence, the independent variable is significant (not significant) in the model. The null hypothesis will be rejected or accepted using a significance level of 10% (α). If the value given by the p-value test is below (above) the significance level, the null hypothesis will be rejected (accepted). Thus, if the p-value > 0.1, the null hypothesis is accepted and the independent variable is not significant in our model.

In the global significance test, F test, all the variables are studied and tested at the same time. From this, two hypotheses should be considered: the

null hypothesis, where H0: $\beta_1=\beta_2=\beta_3=\ldots=\beta_k=0$ and the non-null hypothesis, where H1: $\beta_1\neq\beta_2\neq\beta_3\neq\ldots\neq\beta_k\neq0$. If the null hypothesis is rejected (not rejected), this suggests that the model is significant (not significant). As in the previous test, the null hypothesis will be rejected or accepted from a significance level of 10% (α). If the value obtained from the F test (Prob > F) exceeds the significance level (10%), the null hypotheses will be accepted.

Chapter 5

5. Regression results, tests and possible deviations from the literature

5.1 Regression results and tests

Before starting the analysis of the results obtained by the estimation of model (1) presented in section 4.6, it is important to check if the statistical assumptions are verified in order to guarantee that our analysis through a fix-effect regression produce the best linear estimator[92]. According to Greene (2012), the statistical assumptions to verify are the endogeneity assumption[93], the multicollinearity assumption and the heteroskedasticity assumption.

The endogeneity assumption is not a pertinent assumption in a fix-effect regression because the scope is to control the omitted variables left in the error term that are correlated with the independent variable. Additionally, according to Greene (2012), the fix-effect estimators are appropriate to cases of endogeneity. The multicollinearity happens when the independent variables are "perfectly collinear" between them, while the heteroskedasticity assumption assumes that the variance of the error term is not the same across observations (Greene, 2012).

In order to verify the absence of multicollinearity, it will be analyzed the correlations[94] between the variables present in the model. As the correlation

[92] The best linear estimator is the one that has the lowest difference between the true values of the dependent variable and the estimated values of the dependent variable (Greene, 2012).
[93] Endogeneity occurs when the independent variables or controls are correlated with unobserved characteristics that are included in the error term.
[94] Gujarati and Porter (2008) consider that exist high correlation between two variables when their correlations are superior to 0.80 (and, as consequence, serious problems of multicollinearity).

tables suggest (Appendix F), it is possible to conclude that the correlations between all the variables are never superior to 0.80 and, for that reason, there are no multicollinearity problems.

In order to verify the heteroskedasticity assumption, all the estimators will be conducted under the robust estimation because this will allow us to use the fix-effect regression without heteroskedasticity problems (Greene, 2012). As Greene (2012) states, it is suitable to compute the robust standard errors for the fix-effect estimator.

With all the assumptions verified, it will be analyzed the impact of the independent/control variables in the dependent variable. The following table presents the results of estimating our model (see section 4.6). It is important to notice that the EI, Taxes, Tangibility, Profitability, Industry, BR and NDTS are ratios, the Size variable is a log variable and IR variable is an annual rate (see Table 14 for an in-depth explanation of the variables and the expected impact on leverage).

Variables	**Firm Fix-Effect Regressions**		
	All sectors [1]	**Export sectors [2]**	**Non-export sectors [3]**
Export Intensity	-0.00 (0.797)	0.01 (0.390)	
Taxes	-0.00*** (0.000)	0.00 (0.914)	-0.00*** (0.000)
Tangibility	0.15*** (0.000)	0.08*** (0.000)	0.16*** (0.000)
Profitability	-0.24*** (0.000)	-0.31*** (0.000)	-0.23*** (0.000)
Size	0.17*** (0.000)	0.10*** (0.000)	0.18*** (0.000)
Industry	0.01*** (0.001)	-0.01** (0.033)	0.01*** (0.001)
Business Risk	<-0.00 (0.865)	0.00 (0.096)	-0.00 (0.651)
NDTS	0.29*** (0.000)	0.15** (0.009)	0.30*** (0.000)

Inflation Rate	1.21*** (0.000)	1.21*** (0.000)	1.19*** (0.000)
Firm fixed effects	yes	yes	Yes
Adjusted R-squared	0.88	0.88	0.88
Overall F-Test	862.52***	120.71***	863.12***
Number of Observations	127 151	13 685	113 493
Firm observations	32 912	3 026	29 885

***, ** and * indicate that the reported coefficients are significantly different from zero at the 1%, 5% and 10% levels, respectively. Coefficients were estimated based on heteroskedasticity-consistent standard errors. Model [1] presents the results of estimating our model for a sample including both exporter and non-exporter firms. In Models [2] and [3] we run our model for two sub-samples, considering only exporter or non-exporter firms, respectively.

Table 12 - Regression Results (obtained from the Stata software).

The estimation results obtained from the firm fix-effect regressions suggests that, in the case of firms belonging to both export and non-export sectors (Model [1]): (*i*) Export Intensity has an insignificant impact on leverage, which means that the type of firm – exporter or non-exporter – does not affect the firm's level of debt; (*ii*) Taxes and Profitability variables have a negative impact in Leverage; (*iii*) Tangibility, Size, Industry, NDTS and Inflation Rate variables have a significant positive impact in firm's leverage level; and (*iv*) Business Risk variable has an insignificant impact on Leverage. It is important to notice that Tangibility, Profitability, Size, NDTS and IR variables are those with a higher impact on Leverage.

However, when splitting the sample between firms classified as belonging to the export sector *vis-à-vis* the non-export sector, we find different impacts of the explanatory variables on Leverage. Concerning Model [2], we find that: (*i*) Export Intensity has an insignificant impact on leverage; (*ii*) Profitability and Industry variables have a negative impact in Leverage; (*iii*) Tangibility, Size, NDTS and Inflation Rate variables have a significant positive impact in firm's leverage level; and (*iv*) Business Risk variable has an insignificant impact on Leverage. As in Model [1], it is important to note that Tangibility, Profitability, Size, NDTS and IR variables are those with a higher impact on Leverage.

In the case of non-export sectors (Model [3]), the estimation results suggest that: (*i*) Taxes and Profitability variables have a negative impact in Leverage; (*ii*) Tangibility, Size, Industry, NDTS and Inflation Rate variables have a significant positive impact in firm's leverage level; and (*iii*) Business Risk variable has an insignificant impact on Leverage. In Model [3], Tangibility, Profitability, Size, NDTS and IR variables are those with a higher impact on Leverage.

In order to evaluate the fit of the three regressions, it is important to analyze the adjusted coefficient of determination (adjusted R^2) and the overall F-test. The R^2 measure determines the percentage of the total variation that is explained by the model. In other words, the R^2 (and adjusted the R^2) evaluate the model quality with a scale of values between 0 and 1 (Greene, 2012). Nevertheless, Greene (2012) states that R^2 measure has some problems when is analyzing the goodness of fit[95]. In order to deal with this problem, the adjusted R^2 penalizes the results that increase the R^2 to its limit and, consequently, the adjusted R^2 is a better measure of fit than the R^2[96]. The overall F-test determines if a regression model has explanatory power and, as consequence, if it is possible to rely on.

The regression results obtained from the firm fix-effect regressions suggests that, for all the cases studied (firms belonging to all sectors, to export sectors only and to non-export sectors only), the three regression models are good (R^2=88%) and have explanatory power (the F-test is significant for a significance level of 1%).

From the presented results, it is possible to conclude that, in Models [1] and [2], the Export Intensity variable is not statistically important in explain the

[95] One of that problems is the R^2 will never decrease when an additional variable is added to the regression and will continue to achieve its limit of 1 (Greene, 2012).

[96] The adjusted R^2 could decline when a variable is added to the model as an independent variable and this never happens to the R^2 (Greene, 2012).

Leverage variable; i.e., is not the fact of a firm being an exporter and even the firm's export intensity that influences the firm's capital structure.

Once presented the estimation results for the three regressions, it is important to analyze if the obtained results are in line with the expected results from the literature. Table 12 presents the expected signals for all the variables (as suggested by the literature), our findings (obtained by the estimation results), and if the variables impact is significantly at 5%.

Model	Determinant	Variable	Expected signal	Findings	T-test
All sectors Model [1]	Exportation effect	EI	-	-	Insignificant
	Taxes	Taxes	+	-	Significant
	Assets	Tangibility	+	+	Significant
	Profitability	Profitability	-	-	Significant
	Firm Size	Size	+	+	Significant
	Industry conditions	Industry	+	+	Significant
	Business Risk	BR	-	-	Insignificant
	Non-debt tax shields	NDTS	-	+	Significant
	Macroeconomic effect	IR	-	+	Significant
Export sectors Model [2]	Exportation effect	EI	-	+	Insignificant
	Taxes	Taxes	+	+	Insignificant
	Assets	Tangibility	+	+	Significant
	Profitability	Profitability	-	-	Significant
	Firm Size	Size	+	+	Significant
	Industry conditions	Industry	+	-	Significant
	Business Risk	BR	-	+	Insignificant
	Non-debt tax shields	NDTS	-	+	Significant
	Macroeconomic effect	IR	-	+	Significant
Non-export sectors Model [3]	Taxes	Taxes	+	-	Significant
	Assets	Tangibility	+	+	Significant
	Profitability	Profitability	-	-	Significant
	Firm Size	Size	+	+	Significant
	Industry conditions	Industry	+	+	Significant
	Business Risk	BR	-	-	Insignificant
	Non-debt tax shields	NDTS	-	+	Significant

	Macroeconomic effect	IR	-	+	Significant

Table 13 - Expected signals, findings and individual significance tests.

As it is possible to examine in the above table, some of the obtained results do not follow the expected results suggested by the existing literature.

The hypothesis that exist a negative relationship between Export Intensity and Leverage, as defended by Chen and Yu (2011), were not confirmed by Model [1] and Model [2]. In both models, the EI variable is insignificant (that is, the impact of EI in Leverage is not statistically important to study).

We hypothesize that there is a positive relationship between Taxes and Leverage, as presented by Graham (1996) and Graham, Lemmon and Schallheim (1998). Our results do not confirm our hypothesis for all the three models. Model [1] and Model [3] reveals a significant negative relationship between the effective tax rate and the debt levels, and Taxes variable is insignificant in Model [2].

The hypothesis that exist a positive relationship between tangible assets and Leverage, as pointed out by Frank and Goyal (2009), was confirmed in all the three models. We confirm our fourth hypothesis that there is a negative relationship between Profitability and Leverage, as argued by Frank and Goyal (2009) and Fama and French (2002). Similarly, the hypothesis that there is a positive relationship between firm size and Leverage, as supported by Harris and Raviv (1991) and Rajan and Zingales (1995), was verified in all the three models.

We only corroborate the hypothesis of a positive relationship between the median sector leverage (the industry conditions) and firm leverage, as defended by Hovakimian *et al.* (2001) and Flannery and Ragan (2006), for non-exporter firms - Model [2]. Contrary to what we expected, there is a negative relationship between Industry and Leverage for exporter firms.

We find an insignificant impact of BR on Leverage. Thus, we do not corroborate the results of Frank and Goyal (2009), which points out a negative relationship between volatile firms (business risk) and leverage.

Regarding the hypothesis that there is a negative relationship between NDTS and debt levels, as argued by DeAngelo and Masulis (1980), none of the three models support this relationship. We find a positive relationship between NDTS and Leverage. Nevertheless, the three models suggest that the NDTS variable is statistically important to study.

Finally, contrary to presented by Gungoraydinoglu and Öztekin (2011), we find a significant positive relationship between inflation rate and debt levels.

5.2 Robustness checks

The Table 14 will present the estimation results for the model in study with the UP and Growth variables. Those variables were not included in the three models studied above because the variables UP and Growth dramatically reduce our number of observations.

Variables	Model in study plus UP variable [a]			Model in study plus Growth variable [b]			All variables included in the model [c]		
	All sectors	**Export sectors**	**Non-export sectors**	**All sectors**	**Export sectors**	**Non-export sectors**	**All sectors**	**Export sectors**	**Non-export sectors**
Export Intensity	-0.00 (0.598)	0.01 (0.203)		0.02 (0.221)	0.01 (0.179)		0.01 (0.349)	0.02 (0.124)	
Taxes	-0.00*** (0.000)	-0.00 (0.773)	-0.00*** (0.000)	-0.00 (0.795)	-0.00 (0.345)	-0.00 (0.904)	-0.00 (0.703)	-0.00 (0.317)	0.00 (0.833)
Tangibility	0.11*** (0.000)	0.08*** (0.000)	0.12*** (0.000)	0.07*** (0.000)	-0.03 (0.402)	0.09*** (0.000)	0.07*** (0.000)	-0.04 (0.253)	0.10*** (0.000)
Unique Product	0.10* (0.090)	11.36*** (0.000)	0.08 (0.163)				1.97** (0.037)	11.03*** (0.001)	1.38* (0.065)
Profitability	-0.30*** (0.000)	-0.33*** (0.000)	-0.29*** (0.000)	-0.34*** (0.000)	-0.30*** (0.000)	-0.35*** (0.000)	-0.36*** (0.000)	-0.37*** (0.000)	-0.36*** (0.000)
Growth				0.03*** (0.005)	0.09*** (0.001)	0.02* (0.078)	0.03** (0.025)	0.09*** (0.001)	0.01 (0.321)
Size	0.21*** (0.000)	0.10*** (0.000)	0.23*** (0.000)	0.19*** (0.000)	0.12*** (0.000)	0.23*** (0.000)	0.20*** (0.000)	0.10*** (0.000)	0.26*** (0.000)
Industry	0.01*** (0.000)	-0.00 (0.179)	0.02*** (0.000)	0.01 (0.122)	-0.00 (0.969)	0.03** (0.025)	0.02* (0.056)	0.00 (0.799)	0.05*** (0.000)
Business Risk	<-0.00 (0.753)	0.00 (0.114)	-0.00 (0.517)	-0.00** (0.039)	0.00 (0.881)	-0.00 (0.100)	-0.00** (0.021)	0.00 (0.854)	-0.00* (0.092)
NDTS	0.27*** (0.000)	0.20*** (0.002)	0.28*** (0.000)	0.22*** (0.000)	0.08 (0.453)	0.26*** (0.000)	0.22*** (0.000)	0.16 (0.184)	0.25*** (0.000)

Inflation Rate	1.06*** (0.000)	1.13*** (0.000)	1.02*** (0.000)	0.97*** (0.000)	1.01*** (0.000)	0.91*** (0.000)	0.94*** (0.000)	0.91*** (0.000)	0.91*** (0.000)
Firm fixed effects	yes	yes	Yes	Yes	yes	Yes	Yes	yes	Yes
Adjusted R-squared	0.88	0.88	0.88	0.90	0.88	0.90	0.89	0.89	0.90
Overall F-Test	588.92***	113.17***	559.63***	104.77***	23.94***	89.98***	92.68***	24.51***	77.84***
Number of Observations	102 538	12 484	90 080	21 661	5 280	16 392	19 527	4 904	14 624
Firm observations	27 783	2 794	24 997	7 896	1 578	6 322	7 124	1 468	5 658

***, ** and * indicate that the reported coefficients are significantly different from zero at the 1%, 5% and 10% levels, respectively. Coefficients were estimated based on heteroskedasticity-consistent standard errors. Model [a] presents the results of estimating our model including the UP variable while Model [b] presents the results of estimating our model including the Growth variable. Model [c] presents the results for all the variables included in the model.

Table 14- Regression results for the variables not included in our sturdy (obtained from the Stata software).

From Table 14, it is possible to conclude that the inclusion of UP and Growth variables do not drastically change our results obtained from Model [1], Model [2] and Model [3]. Therefore, it is possible to state that our obtained results in section 5.1 are robust and good to rely on.

As it is possible to conclude from the three models in study, the obtained results are not always in line with the hypothesis defended by the literature. There are several explanations that can explain these deviations, which will be presented in the next section.

5.3 Possible deviations from the literature

One of the possible deviations of our results from the literature is the fact that our study is based on non-public/ unlisted companies. Several authors based their studies in public/listed companies and, consequently, as we based on unlisted companies, our findings could be different due to this simple fact. Thus, our measures to test each hypothesis might not be the most appropriate, since we are using book data exclusively.

Another possible deviation of our results from the literature is the macroeconomic environment, which has been unstable due to the 2007-2008 financial crisis and the subsequent European sovereign debt crisis. Consequently, firms included in our sample were significantly affected by the sovereign debt crisis during the period in analysis (2011-2015). The sovereign debt crisis affected significantly the macroeconomic variables, namely interest rates, inflation rates, tax rates (and, as consequence, the firms' effective tax rates and NDTS) and the sectors' stability (which affects the industries conditions and the firms' business risk).

Simultaneously, the financial crisis and the subsequent European sovereign debt crisis impacted significantly the global economy, namely the importations and exportations between countries and firms. This fact might explain the statistical insignificance of the Export Intensity variable in both all sectors and export sectors regressions.

Chapter 6

6. Limitations and contributes

During the execution of the present work, several limitations were found and, consequently, made the execution of this work more complex and result as new contributes to the financial literature.

One of those limitations that culminate as a contribution was the fact that few authors and studies analyzed export firms and, as consequence, there are few studies about the capital structure and the capital structure determinants of export firms. As our goal was to determine the differences in the financing decisions between export and non-export firms, it was more difficult for us to achieve that goal. For this reason, our study appears with new knowledge to the literature and pass through a big limitation to a new contribution to the literature.

Another limitation was the fact that we used book values (accounting values) to construct our explanatory variables. Several authors and studies used both book and market values to create their proxies. However, as we are studying private firms, we only have access to book values and thus we felt some difficulties in finding good measures for our variables.

Another significant limitation is related to the change observed between 2009 and 2010 in the Portuguese accounting system. Until 2009 (including), the accounting system used in Portugal was the POC[97] system, while after 2010 (including) the accounting system used in Portugal is the SNC system. When we were collecting the data, we observed that the change in the accounting system significantly affected the way of presenting the accounting data and, for

[97] Plano Oficial de Contas (Official Accounting Plan).

that reason, we decided to study only the 2011-2015 period[98] in order to have consistent data.

An additional limitation of our study was the fact that we did not include in our study all the country-level characteristics that could affect the firms' debt levels. As presented by Gungoraydinoglu and Öztekin (2011), there are some country level characteristics that could affect the firms' debt levels, namely law and culture characteristics. However, as we did not study these variables, we consider this as an important avenue for future research.

Finally, the fact that our sample period corresponds to a period of financial crisis appears as a possible limitation in our work. The financial crisis affected the global economy and particularly Portugal that asked for funding assistance to the European Commission, the IMF and to the ECB in 2011. This fact compromised the current behavior of the Portuguese firms and, as consequence, influences our sample. Analyzing the impact of our independent and control variables on leverage, considering a subsequent period without the impact of a financial crisis, is also an important avenue for future research.

[98] To calculate CAPEX we needed the 2010 accounting data.

Conclusion

The main goal of this study is to give an answer to the following research questions: (*i*) What are the differences in the financing decisions between export and non-export sectors in Portugal?; and (*ii*) Does the export intensity affects Portuguese firm's leverage level?.

To answer our questions, we collected accounting and financial data for a sample of Portuguese firms belonging to export and non-export sectors in the 2011-2015 period. We use the panel data methodology because, as stated by Gujarati and Porter (2008), the panel data methodology gives more informative and more efficient data.

Therefore, having in mind the existing literature on capital structure, we tested several variables that affect firms' debt levels, like the Export Intensity, Taxes, Tangibility (of assets), Profitability, (firm) Size, Industry (conditions), Business Risk, Non-Debt Tax Shields and Inflation Rate. Then, we performed robustness checks by including Unique Product and Growth variables in our baseline model, because the inclusion of these variables dramatically reduces our number of observations (from 127 151 in Model [1] to 19 527 in Model [c] – all sectors).

From the obtained results, it is possible to conclude that the factors that influences export sectors to use debt are not the same factors that influence non-export sectors and, for that reason, the financing decisions of export and non-export sectors in Portugal are different. The obtained results suggest that (asset) Tangibility, (firms) Profitability and (firm) Size influence significantly (and in line with the literature) the using of debt in all the three models – all firms (Model [1]), exporter firms only (Model [2]) and non-exporter firms only (Model [3]). In a different way, the obtained results for the Export Intensity and

the Business Risk variables suggest that these variables are insignificant in the selection of debt as a financing source. While the relationship between Taxes and Leverage is significant and negative for firms belonging to non-export sectors, it is insignificant for firms belonging to the export sectors. There is a negative relationship between Industry and Leverage in Model [2], which is not in line with the existing literature. However, as we expected, the influence of Industry in Leverage is significant and positive in Model [1]. Finally, the obtained results for the Non-Debt Tax Shields and Inflation Rate variables suggest that there is a significantly positively relationship between these variables and the debt level, which is not in line with the expected impact suggested by the literature. Therefore, it is possible to conclude that Tangibility, Profitability, Size, NDTS and IR variables are significant and have the same impact in the selection of debt in both the export and non-export sectors and that the differences in the financing decisions between export and non-export sectors are related to the significant impact of the Industry variable (negative impact in the export sectors model and positive impact in the non-export sectors models).

In trying to answer our first research question, "what are the differences in the financing decisions between export and non-export sectors in Portugal?", we can say that (*i*) the export sectors tend to use lower debt levels in comparison to non-export sectors due to the significant negative impact of the industry conditions while (*ii*) the export sectors tend to use higher debt levels in comparison to non-export sectors due to the positive impact of the effective tax rates, the business risk and the export intensity (however, this impacts seems to be insignificant in the export sectors model but not in the non-export sectors model). Concerning our second research question, "does the export intensity affects Portuguese firms' leverage levels?", we find that the export intensity has an insignificant impact on firms' debt levels. Thus, in our models, the capital

structure is not influenced by firms' export intensity. A possible explanation for this discovery is the fact that Portuguese firms tend to rely in more debt than in equity (as it is possible to see in the descriptive analysis section), which leads to the conclusion that debt tends to be the main financing source for both export and non-export firms in Portugal and, consequently, being an exporter firm (firm with a positive export intensity) does not influence their capital structure.

Several factors have significant influence on the results obtained, namely the financial crisis and the fact of the sample being constituted of Portuguese non-public/unlisted firms. These factors might be a possible answer to explain why several results are contrary to what is expected from the literature. At the same time, as we did not study all the country-level characteristics, namely law and culture characteristics as suggested by Gungoraydinoglu and Öztekin (2011), and, consequently, this appears as one possible opportunity to future investigation about export and non-export firms' sample.

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Appendices

Appendix A - Exportations in 2006-2015 period.

The following data were collected on SABI database[99] and not in Statistics Portugal (INE) because the criteria used by INE for the division of the sectors is not the same division used by SABI (SABI uses CAE Rev.3), so a correspondence conflict would appear between the different sources of information when it was necessary to collect information for the construction of the econometric model. The table below presents rounded data.

Year	Total Exportations (in Euros)	Exportation – Sales (in Euros)	Exportations - Supply Services (in Euros)
2006	55 432 147 630,51	43 334 541 563,63	12 097 606 066,87
2007	58 386 365 586,91	43 695 914 196,12	14 690 451 390,80
2008	59 660 394 209,40	42 880 256 242,94	16 780 137 966,46
2009	51 644 632 173,00	36 398 693 298,94	15 245 938 874,06
2010	60 681 606 024,60	43 983 208 486,71	16 698 397 537,89
2011	68 059 032 629,88	49 972 400 936,00	18 086 631 693,87
2012	66 225 806 622,75	47 446 848 270,67	18 778 958 352,07
2013	69 338 430 889,49	48 816 662 469,71	20 521 768 419,78
2014	69 108 695 315,29	48 663 232 510,11	20 445 462 805,18
2015 (predicted)	63 082 097 956,54	45 910 133 061,62	17 171 964 894,91

[99] SABI database contains financial information of companies in Spain and Portugal. The data was collected on 20th September 2016.

Appendix B - Total exports by sector and weight of the sector in exports in 2010-2015 period.

The following data was collected on SABI database[100] by the creation of the variable "total exportations" in the database. The sectors in which CAE is 46 had a great impact both in exports and internal market and was not selected to study because it had a big impact in both markets. The sectors in which CAE is 10 had more impact in the internal market than in the exports and, for that reason, were categorized as non-export sectors. The table presents rounded data.

CAE Code	Total exportations (in EUR) 2015 (predicted)	Total exportations (in EUR) 2014	Total exportations (in EUR) 2013	Total exportations (in EUR) 2012	Total exportations (in EUR) 2011	Total exportations (in EUR) 2010	Weight of the sector in total exports in the period 2010-2015[101]
CAE 01	317 923 887,21	282 544 307,23	268 694 551,73	238 446 970,16	200 208 723,09	186 448 254,59	0,38%
CAE 02	17 938 452,98	22 597 914,36	19 111 365,51	18 734 714,84	29 491 626,90	24 990 565,18	0,03%
CAE 03	121 438 271,26	118 304 145,92	97 722 972,03	108 647 987,29	102 360 923,78	88 047 462,88	0,16%
CAE 07	400 266 112,48	411 148 370,44	429 034 003,24	471 719 923,94	458 431 122,13	426 544 329,79	0,66%
CAE 08	98 867 411,52	119 129 075,03	112 894 921,51	120 612 064,97	110 594 730,02	102 739 853,80	0,17%
CAE 09	5 754 585,93	34 572 005,89	100 047 750,82	99 884 832,39	115 386 648,93	89 284 810,71	0,11%
CAE 10	2 002 166 757,65	2 183 753 402,58	2 113 168 469,81	1 952 172 551,00	1 738 183 532,70	1 492 882 004,98	2,89%
CAE 11	783 025 344,08	920 792 250,97	815 124 268,95	860 717 467,10	790 178 342,13	642 240 539,83	1,21%
CAE 12	90 599 558,13	74 253 698,17	64 811 469,61	68 363 336,99	71 555 849,71	77 866 076,94	0,11%
CAE 13	1 704 498 682,36	1 665 938 286,11	1 592 925 930,19	1 470 469 758,36	1 495 089 781,59	1 374 737 636,75	2,35%

[100] The data was collected on the 20th September 2016.

[101] The weight of the sector was calculated using the average of the sector's weight in the total exports in each year during the period 2010-2015.

CAE 14	2 221 027 704,33	2 229 250 539,16	2 027 301 053,52	1 906 517 186,59	1 870 669 225,39	1 735 434 073,71	3,03%
CAE 15	1 533 258 555,40	1 623 586 507,09	1 521 018 884,43	1 421 735 748,22	1 372 880 472,32	1 202 277 092,37	2,19%
CAE 16	1 375 962 508,50	1 400 949 182,65	1 382 551 877,69	1 327 890 579,14	882 704 501,31	1 026 297 360,80	1,87%
CAE 17	987 175 062,57	862 564 153,84	871 214 179,85	922 816 091,58	1 157 501 648,69	1 926 844 513,44	1,72%
CAE 18	70 483 956,46	82 393 513,75	95 728 879,30	97 656 047,52	129 431 689,48	70 966 382,46	0,14%
CAE 19	3 220 235 004,45	3 255 197 831,59	4 186 383 172,05	3 260 677 444,82	2 393 168 987,22	1 797 592 092,85	4,54%
CAE 20	1 801 612 231,71	1 920 230 959,99	1 929 361 734,32	1 908 726 575,34	1 836 529 224,07	922 077 671,84	2,59%
CAE 21	421 776 676,20	453 557 356,83	490 773 979,78	450 355 214,49	364 817 841,56	314 566 209,19	0,63%
CAE 22	2 381 930 613,02	2 260 504 789,73	2 154 633 892,30	2 049 526 590,69	1 935 683 199,56	1 636 511 139,80	3,13%
CAE 23	1 522 086 198,46	1 584 206 635,91	1 441 079 427,12	1 379 268 236,41	1 366 765 666,31	1 321 364 541,72	2,18%
CAE 24	1 258 431 992,16	1 396 016 685,18	1 191 231 108,44	1 459 119 626,75	1 357 943 789,74	1 019 580 023,30	1,94%
CAE 25	2 597 855 191,25	2 550 596 727,54	2 364 086 951,66	2 228 826 993,49	2 051 844 040,52	1 869 417 036,36	3,45%
CAE 26	461 152 267,48	604 466 298,17	529 982 397,25	533 862 973,39	749 869 920,13	582 560 554,71	0,87%
CAE 27	1 432 652 005,10	1 633 040 330,24	1 701 458 665,67	1 758 263 725,17	1 671 683 128,29	1 625 806 205,56	2,48%
CAE 28	1 376 272 144,57	1 378 892 719,46	1 279 931 994,76	1 208 580 873,38	1 049 492 934,47	978 683 698,56	1,83%
CAE 29	5 019 126 182,03	4 863 382 082,71	4 701 190 605,89	4 685 143 622,21	5 121 521 544,41	4 396 393 662,52	7,27%
CAE 30	237 222 550,74	181 175 833,27	144 000 321,34	147 707 821,75	141 643 129,72	141 875 054,48	0,25%
CAE 31	740 859 257,42	708 072 576,06	632 704 555,25	557 519 228,83	472 292 411,07	408 843 357,00	0,89%
CAE 32	498 098 899,31	542 053 841,78	519 292 867,63	642 164 304,10	617 560 249,34	390 450 864,84	0,81%
CAE 33	521 434 592,70	470 260 222,80	417 126 413,70	405 803 043,67	319 418 463,70	318 915 579,45	0,62%
CAE 35	680 744 043,44	973 805 312,03	593 931 991,83	679 701 972,68	445 958 351,96	1 600 540 300,35	1,28%
CAE 36	1 971 373,40	3 672 050,83	4 065 266,95	3 878 729,19	2 651 868,19	1 262 742,57	0,00%
CAE 37	1 844 906,75	2 168 707,12	2 833 996,68	9 009 268,01	4 503 682,21	2 596 646,12	0,01%
CAE 38	16 011 5791,32	159 612 797,50	168 130 204,93	178 683 998,68	179 208 361,69	186 639 418,47	0,26%
CAE 39	37 569,46	48 065,02	45 905,48	21 368,27	19 452,96	19 452,96	0,00%
CAE 41	1 075 927 432,81	1 374 405 028,94	1 316 185 572,45	1 228 455 299,62	1 083 095 699,99	1 050 006 910,15	1,79%
CAE 42	125 936 1500,90	1 923 400 998,88	2 322 484 783,75	2 107 835 624,09	1 839 433 016,61	2 198 239 028,53	2,94%

CAE 43	636 798 056,24	1 017 299 582,90	909 843 207,26	622 150 749,93	657 708 584,74	664 007 112,57	1,13%
CAE 45	469 942 247,99	590 259 911,68	645 972 957,10	688 948 819,51	452 663 812,30	381 977 674,35	0,81%
CAE 46	9 619 953 466,82	11 221 631 650,27	12 429 805 978,23	11 833 609 380,56	16 698 955 591,84	13 623 286 307,19	19,04%
CAE 47	930 185 049,16	937 868 636,73	826 547 267,37	803 168 275,00	685 101 499,55	673 852 789,84	1,23%
CAE 49	148 919 1371,63	1 497 709 442,42	1 378 673 975,81	1 288 487 160,50	1 301 484 418,97	1 160 372 849,84	2,05%
CAE 50	943 745 265,73	981 223 599,06	1 018 054 682,24	1 140 813 984,19	1 083 748 682,94	1 262 676 459,65	1,63%
CAE 51	2 768 941 871,23	3 142 533 064,68	3 109 629 649,95	3 097 427 376,82	2 887 117 937,87	2 679 688 443,68	4,46%
CAE 52	692 187 285,43	1 423 624 618,69	1 386 583 530,92	1 394 050 626,33	1 357 153 582,09	1 291 609 795,11	1,90%
CAE 53	146 762 072,27	138 635 076,05	127 702 823,09	114 934 350,24	110 296 707,07	98 254 642,30	0,19%
CAE 55	153 780 708,69	174 483 185,65	150 291 671,49	122 203 105,16	124 159 571,54	126 979 249,92	0,21%
CAE 56	34 367 819,12	31 260 891,98	25 102 180,32	30 500 613,00	47 297 129,29	31 788 695,49	0,05%
CAE 58	137 256 218,82	155 118 072,02	134 249 161,70	134 256 765,79	106 560 870,95	104 787 307,20	0,19%
CAE 59	122 963 943,85	105 799 332,56	98 887 883,85	108 784 438,76	98 654 994,31	72 799 942,74	0,15%
CAE 60	53 029 877,31	46 642 110,58	41 154 721,99	40 186 927,26	26 466 623,93	23 041 206,89	0,06%
CAE 61	540 227 037,05	528 737 356,99	1 449 814 774,07	1 300 922 609,66	968262591,69	790 597 179,31	1,40%
CAE 62	781 321 290,00	790 767 621,91	698 282 187,43	654 347 262,50	522 118 002,80	461 319 698,90	0,98%
CAE 63	110 475 763,97	108 877 513,69	119 774 768,58	100 113 693,16	72 534 810,30	62 764 275,57	0,14%
CAE 64	14 770 198,05	18 207 776,30	15 926 021,25	41 799 182,47	74 518 541,45	74 129 486,62	0,06%
CAE 66	39 603 886,15	47 269 291,65	42 772 486,39	55 097 123,01	55 430 577,77	46 677 340,38	0,07%
CAE 68	80 340 887,11	85 168 862,93	108 776 464,21	87 593 414,13	115 827 746,41	144 995 673,05	0,16%
CAE 69	126 619 660,03	124 498 632,43	116 580 014,08	113 112 519,58	120 505 731,55	121 482 246,55	0,18%
CAE 70	531 913 964,97	598 651 597,05	640 427 965,49	886 996 851,57	1 523 253 550,90	1 471 717 727,67	1,44%
CAE 71	2 504 505 923,98	3 130 182 651,59	2 432 599 265,19	2 084 351 842,23	1 988 111 763,88	675 204 551,05	3,20%
CAE 72	25 916 985,13	25 154 463,86	20 584 082,51	18 420 552,78	21 148 273,61	21 112 566,60	0,03%
CAE 73	116 759 989,23	126 403 830,59	110 602 751,78	120 083 198,27	127 815 126,66	127 887 368,12	0,18%
CAE 74	169 092 882,43	164 910 448,46	146 784 697,57	137 691 313,08	143 681 394,38	134 263 931,86	0,23%
CAE 75	587 211,25	460 051,14	512 141,25	407 184,86	1 195 759,79	297 016,88	0,00%

CAE 77	382 480 202,22	495 291 340,10	481 210 536,57	277 816 773,64	323 639 280,08	230 207 833,51	0,55%
CAE 78	146 757 934,28	150 516 303,30	150 518 384,30	104 250 838,26	97 559 808,64	72 601 814,15	0,18%
CAE 79	416 356 554,51	450 579 482,79	421 907 363,26	348 221 316,05	305 635 613,74	352 626 621,86	0,58%
CAE 80	8 194 680,74	8 371 958,05	7 439 829,56	5 420 029,92	5 143 896,63	3 839 446,94	0,01%
CAE 81	7 025 376,61	8 857 920,71	8 555 724,55	53 808 982,12	61 486 531,85	81 247 307,62	0,06%
CAE 82	320 149 377,02	336 419 688,82	323 432 000,32	298 389 118,57	237 055 078,55	249 982 641,22	0,45%
CAE 84	0,00	0,00	160 448,71	187 936,18	211 613,03	271 882,58	0,00%
CAE 85	19 890 457,21	24 144 609,47	19 506 713,95	16 057 244,94	13 760 133,98	17 973 862,15	0,03%
CAE 86	31 912 188,38	42 586 688,41	20 859 258,06	33 509 960,74	36 326 070,08	19 658 328,34	0,05%
CAE 87	209 369,33	236 111,76	23 546,75	27 000,00	238 353,00	1 470 634,49	0,00%
CAE 88	329 493,11	288 482,63	4 097,35	357 815,31	107 969,69	79 632,24	0,00%
CAE 90	20 916 986,80	15 451 138,88	15 145 423,36	14 074 948,52	10 138 838,00	13 975 650,04	0,02%
CAE 91	635 135,15	571 713,42	341 084,48	23 806,90	241 636,60	204 799,33	0,00%
CAE 92	395 88,98	30 772,67	462 436,53	0,00	274 616,75	137 831,80	0,00%
CAE 93	58 145 673,43	55 615 090,82	74 143 737,33	59 926 894,35	43 611 548,84	57 647 741,49	0,09%
CAE 94	118 791,00	90 724,87	84 229,24	0,00	21 130,09	56 456,72	0,00%
CAE 95	19 832 253,36	19 738 161,05	15 316 806,14	13 481 841,51	12 518 272,12	11 652 715,92	0,02%
CAE 96	6 727 684,29	15 980 648,99	11 115 570,56	10 274 999,38	9 505 518,77	8 856 135,37	0,02%
Total	63 082 097 956,54	69108695315,29	69338430889,49	66225806622,75	68059032629,88	60681606024,60	100%

Appendix C - Total internal market (sales plus supply services) by sector and weight of the sector in the total market in 2010-2015 period.

The following data was collected on SABI database[102] by the creation of the variable "total sales and supply services in internal market". The sectors in which CAE is 46 had a great impact both in exports and internal market and was not selected to study because it had big impact in both markets. The sectors in which CAE's are 19 and 42 had much more impact in exports than in the internal market and, for that reason, were categorized as export sectors. The sectors in which CAE is 49 had more impact in exports than in the internal market but not as much impact as the 10 most relevant CAE sectors in exports and, for that reason, were not categorized as export or non-export sectors .The table below presents rounded data.

CAE Code	**Total internal market (in EUR) 2015 (predicted)**	**Total internal market (in EUR) 2014**	**Total internal market (in EUR) 2013**	**Total internal market (in EUR) 2012**	**Total internal market (in EUR) 2011**	**Total internal market (in EUR) 2010**	**Weight of the sector in internal market in 2010-2015 period** [103]
CAE 01	2 667 676 270,26	2 569 431 305,33	2 403 416 350,73	2 294 895 308,91	2 055 119 658,97	1 944 867 213,48	0,97%
CAE 02	543 466 645,18	581 711 482,77	537 267 066,68	468 678 260,24	440 918 258,10	441 490 833,72	0,21%
CAE 03	167 917 912,30	167 526 657,73	184 899 789,55	195 543 862,87	197 632 306,70	175 441 529,24	0,08%
CAE 07	1 953 311,86	5 409 779,39	2 923 111,30	754 217,50	1 184 043,14	1 399 978,60	0,00%
CAE 08	350 334 216,66	336 357 900,47	368 642 187,34	394 038 032,11	500 177 018,80	570 391 967,10	0,17%
CAE 09	49 334 717,20	42 968 660,76	48 858 763,35	47 372 888,44	34 712 800,07	21 923 136,47	0,02%

[102] The data was collected on the 20th September 2016.

[103] The weight of the sector was calculated using the average of the sector's weight in the total internal market in each year during the period 2010-2015.

CAE 10	8 850 216 757,91	9 218 822 288,79	9 294 847 399,79	9 149 515 356,46	8 942 366 208,10	8 642 466 492,70	3,74%
CAE 11	1 822 797 409,95	1 814 882 025,93	1 830 334 294,08	1 789 398 131,84	1 881 903 659,51	1 960 973 187,52	0,77%
CAE 12	98 627 156,74	91 997 882,19	89 109 082,08	87 395 064,16	89 094 431,11	93 465 720,91	0,04%
CAE 13	1 477 428 132,18	1 492 581 850,63	1 491 602 250,05	1 360 742 930,27	1 407 219 611,51	1 415 307 767,88	0,60%
CAE 14	1 042 063 934,97	1 045 857 441,14	981 057 857,77	898 560 013,02	955 777 882,89	1 026 454 110,55	0,41%
CAE 15	1 015 005 200,43	1 047 464 910,15	976 473 572,12	863 475 861,61	862 009 836,80	806 476 171,79	0,39%
CAE 16	1 356 789 613,32	1 361 121 761,41	1 277 702 359,47	1 313 605 597,51	1 309 748 493,19	1 402 256 146,89	0,55%
CAE 17	2 818 407 515,66	2 727 789 337,80	2 710 972 528,93	2 641 530 346,68	2 424 354 465,63	1 358 529 149,94	1,02%
CAE 18	794 433 750,78	857 777 143,67	833 972 700,98	805 094 932,08	914 303 307,83	1 027 931 516,53	0,36%
CAE 19	5 347 975 534,81	6 525 742 470,44	6 703 576 492,80	7 170 891 492,49	6 995 012 753,94	6 468 191 494,44	2,70%
CAE 20	2 139 568 162,82	2 326 343 841,71	2 404 818 866,06	2 471 121 607,59	2 519 622 008,18	2 978 908 472,71	1,02%
CAE 21	578 229 832,02	596 131 975,80	590 844 344,65	570 427 192,91	701 978 810,59	749 439 463,97	0,26%
CAE 22	1 444 973 639,51	1 459 244 604,57	1 392 602 803,11	1 361 730 709,07	1 419 884 417,87	1 391 244 695,84	0,59%
CAE 23	2 039 712 851,64	1 991 392 285,47	2 018 828 427,53	2 181 073 087,33	2 778 592 170,88	3 139 685 613,90	0,97%
CAE 24	1 007 331 833,38	1 027 499 935,17	1 075 166 052,00	1 086 730 894,07	1 259 992 696,64	1 157 265 515,51	0,45%
CAE 25	2 915 659 375,91	2 928 827 901,42	2 885 144 500,29	2 949 643 165,23	3 463 435 366,60	3 743 881 747,18	1,30%
CAE 26	345 470 926,03	735 103 715,63	909 917 551,16	932 450 208,74	844 920 414,83	745 955 750,79	0,31%
CAE 27	945 788 444,39	1 030 290 635,51	1 033 910 364,76	1 096 445 112,54	1 467 104 929,09	1 122 847 385,34	0,46%
CAE 28	1 066 391 552,33	1 055 476 251,74	983 298 887,32	1 249 883 765,94	1 241 716 237,10	1 348 760 848,11	0,48%
CAE 29	1 757 979 458,87	1 621 845 659,82	1 360 974 967,31	1 699 365 372,79	1 766 913 573,89	1 479 593 589,64	0,67%
CAE 30	130 733 383,37	129 567 214,81	117 224 344,09	126 984 651,20	106 481 060,84	118 508 208,74	0,05%
CAE 31	674 229 097,52	640 470 992,37	599 652 737,39	591 978 665,92	707 470 977,79	867 011 359,81	0,28%
CAE 32	393 539 268,47	385 282 702,77	388 782 431,37	395 179 148,82	430 881 654,90	451 139 649,17	0,17%
CAE 33	938 649 721,51	909 519 714,86	868 478 620,60	846 814 992,59	945 977 704,66	1 030 124 058,57	0,38%
CAE 35	17 534 174 121,11	17 706 360 117,13	18 219 191 737,31	17 449 966 055,70	17 451 310 756,66	14 668 162 436,54	7,13%
CAE 36	860 340 813,85	1 005 386 758,28	1 015 057 226,44	1 010 621 872,25	1 004 666 875,51	919 622 187,61	0,40%
CAE 37	64 336 452,01	240 184 116,14	234 431 801,47	214 723 493,00	218 847 881,07	192 966 863,22	0,08%

CAE 38	1 164 985 697,95	1 222 148 973,03	1 247 370 530,01	1 338 144 703,44	1 440 783 485,10	1 309 951 266,93	0,53%
CAE 39	1 651 410,89	1 504 051,00	1 788 479,16	1 981 803,32	2 142 477,22	2 635 923,71	0,00%
CAE 41	5 196 197 199,27	5 373 596 903,67	5 655 412 225,92	6 076 538 863,76	9 224 081 440,69	12 976 684 183,15	3,01%
CAE 42	2 906 216 713,77	3 240 901 578,49	3 487 738 569,55	4 389 904 000,88	6 358 464 627,07	7 061 600 266,73	1,86%
CAE 43	3 362 150 945,33	3 496 041 157,01	3 470 729 425,94	3 830 152 514,92	4 914 517 105,47	5 550 210 081,89	1,68%
CAE 45	14 159 701 952,17	13 063 184 315,32	11 018 592 133,95	10 276 903 871,26	13 650 134 440,86	17 728 508 332,69	5,48%
CAE 46	46 159 016 986,43	48 563 704 988,65	48 680 825 085,51	51 060 976 536,28	52 932 581 278,27	53 390 810 427,14	20,71%
CAE 47	35 605 251 715,41	37 178 513 865,66	36 422 219 766,69	36 384 360 378,71	37 109 513 027,55	37 510 006 336,76	15,19%
CAE 49	4 393 599 151,86	4 582 052 361,22	4 481 066 628,67	4 586 444 076,41	4 712 350 317,89	4 886 122 689,93	1,90%
CAE 50	403 696 635,67	446 061 649,34	342 109 417,04	307 174 943,05	325 419 552,24	319 418 272,36	0,15%
CAE 51	506 293 964,67	641 009 508,52	629 628 026,76	596 573 125,48	598 806 132,22	676 777 492,11	0,25%
CAE 52	3 974 877 500,36	4 396 567 690,72	4 928 869 981,37	5 195 221 469,19	5 406 072 614,73	4 678 171 328,89	1,97%
CAE 53	780 795 149,35	775 743 112,33	741 121 457,51	745 460 592,24	793 648 516,62	844 166 635,11	0,32%
CAE 55	2 468 347 260,80	2 474 620 772,23	2 170 779 131,84	2 110 554 980,91	2 216 735 956,37	2 122 687 919,38	0,94%
CAE 56	4 708 666 774,11	4 618 719 583,10	4 380 160 502,71	4 364 734 050,32	5 023 055 915,82	4 995 558 236,13	1,94%
CAE 58	838 072 444,76	871 141 072,30	960 580 913,33	1 007 315 064,88	1 153 691 103,89	1 257 409 284,24	0,42%
CAE 59	401 752 112,45	414 885 130,22	396 136 654,20	409 182 018,46	489 996 789,51	539 462 968,54	0,18%
CAE 60	583 175 838,56	775 666 313,20	672 408 194,32	689 036 740,99	773 801 078,78	775 152 133,19	0,29%
CAE 61	3 883 569 659,74	5 003 891 763,34	5 599 955 625,67	5 934 014 427,34	6 252 382 268,56	6 868 278 805,36	2,29%
CAE 62	1 979 673 640,96	2 228 140 658,93	2 184 319 759,93	2 173 242 624,28	2 301 902 437,33	2 332 746 378,35	0,91%
CAE 63	283 588 775,69	290 151 927,70	291 116 424,92	208 014 004,61	355 904 856,42	322 514 835,35	0,12%
CAE 64	264 609 962,91	273 888 567,53	294 832 487,44	302 476 051,79	300 286 307,91	316 880 330,03	0,12%
CAE 65	0,00	16 952,03	9 063,22	0,00	10 052,54	6 091 970,36	0,00%
CAE 66	556 720 421,30	545 865 825,04	540 734 313,83	519 680 801,44	5112 86 390,16	557 419 956,01	0,22%
CAE 68	3 827 470 786,09	3 489 020 709,36	3 468 099 732,10	3 328 389 919,03	4 094 931 736,52	5 276 194 084,56	1,61%
CAE 69	897 964 737,08	895 708 584,59	896 925 727,59	904 290 624,48	942 951 963,85	901 071 522,72	0,38%
CAE 70	2 002 752 919,72	2 292 651 835,65	2 180 279 788,64	2 113 866 942,08	2 124 319 062,81	2 728 626 816,64	0,92%

CAE 71	1 405 612 780,37	1 420 056 505,78	1 452 093 205,70	1 650 164 439,43	2 006 979 481,97	2 446 451 307,79	0,71%
CAE 72	40 760 656,22	45 533 544,28	35 639 329,04	35 305 032,06	43 742 921,57	42 758 156,84	0,02%
CAE 73	911 292 785,87	1 167 842 925,08	1 155 755 176,88	1 159 808 252,40	1 347 157 307,59	1 472 622 947,88	0,49%
CAE 74	466 812 944,23	465 582 443,18	456 650 652,97	417 335 963,37	429 566 693,30	450 719 628,46	0,19%
CAE 75	122 134 972,05	115 396 465,32	103 807 437,88	96 070 196,68	90 702 863,50	87 344 039,81	0,04%
CAE 77	1 122 609 136,58	1 198 307 167,74	1 297 183 651,13	1 403 540 029,09	1 596 908 197,33	1 628 205 913,56	0,56%
CAE 78	1 092 075 533,97	1 169 130 687,22	994 817 220,86	1 023 116 468,70	1 135 330 871,96	1 134 215 075,13	0,45%
CAE 79	1 410 700 882,89	1 424 495 975,92	1 404 164 309,74	1 361 529 315,71	1 534 969 336,55	1 610 948 612,39	0,60%
CAE 80	705 031 199,54	709 464 320,69	716 593 272,41	735 966 902,19	785 599 899,77	784 356 145,51	0,31%
CAE 81	650 881 115,73	716 042 637,93	720 704 919,87	754 512 752,03	791 896 437,02	835 830 796,86	0,31%
CAE 82	1 831 708 910,62	2 128 721 671,77	2 127 161 447,42	2 301 998 469,33	2 410 970 004,17	2 568 404 911,02	0,92%
CAE 84	54 541 354,59	1 147 149 639,91	1 457 621 613,67	1 852 839 236,87	2 198 138 068,21	1 736 322 527,20	0,57%
CAE 85	721 834 873,22	760 338 680,98	762 448 617,36	779 899 468,22	837 213 764,55	873 415 204,03	0,33%
CAE 86	6 184 550 929,41	6 325 261 707,90	8 122 946 720,89	8 370 572 104,18	8 094 470 986,95	8 417 703 741,44	3,13%
CAE 87	235 697 672,76	238 317 364,39	228 293 650,00	219 640 751,52	209 240 522,22	193 062 084,53	0,09%
CAE 88	68 204 598,10	66 940 490,65	67 086 789,66	66 580 362,68	67 099 373,06	67 921 445,55	0,03%
CAE 90	185 914 740,27	209 860 158,96	172 192 215,01	179 434 136,37	180 873 414,60	211 623 300,96	0,08%
CAE 91	75 743 794,18	66 861 327,74	67 686 881,56	52 842 681,84	66 674 876,31	63 683 459,03	0,03%
CAE 92	417 519 224,03	439 873 768,51	439 928 313,88	452 741 966,83	490 765 104,47	494 654 285,10	0,19%
CAE 93	716 259 833,13	686 957 352,68	654 791 395,21	633 068 288,65	699 771 536,65	606 523 354,52	0,28%
CAE 94	2 721 740,18	2 497 748,40	2 210 281,01	2 009 642,05	2 358 600,83	2 441 288,98	0,00%
CAE 95	125 007 354,25	122 603 181,86	124 126 145,97	125 946 588,95	142 039 888,42	169 272 733,59	0,06%
CAE 96	560 464 197,68	559 184 830,69	530 428 234,34	530 526 879,14	555 780 901,58	583 314 725,23	0,22%
Total	223 660 418 602,07	234 018 191 769,50	234 072 123 002,14	238 776 717 349,64	257 069 354 262,32	265 879 638 428,02	100%

Appendix D - All variables' descriptive statistics.

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
Lev	0.68	0.65	0.59	0.00	25.21
Export Intensity	0.12	0.00	0.27	0.00	1.00
Taxes	0.33	0.22	9.57	-161.37	1 365.73
Tangibility	0.29	0.23	0.23	<0.00	1.20
Unique Product	0.00	0.00	0.00	<0.00	0.44
Profitability	0.09	0.08	0.20	-8.52	13.33
Growth	0.04	0.01	0.10	-2.76	1.11
Size	5.89	5.80	0.76	3.61	9.91
Industry	0.56	0.29	0.90	0.00	22.93
Business Risk	4.64	0.54	182.93	-5 439.05	24 539.69
Non-debt tax shields	0.05	0.04	0.06	<0.00	5.15
Inflation Rate	0.01	0.00	0.01	-0.00	0.04

The number of firm-year observations is 21 866.

After defining the variables' intervals, the new descriptive statistics table for all the variables is presented below.

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
Lev	0.58	0.62	0.24	0.00	1.00
Export Intensity	0.12	0.00	0.27	0.00	1.00
Taxes	0.23	0.23	0.43	-13.23	3.56
Tangibility	0.28	0.22	0.23	<0.00	1.00
Unique Product	0.00	0.00	0.00	<0.00	0.44
Profitability	0.10	0.09	0.10	-0.68	0.55
Growth	0.04	0.01	0.09	-0.88	0.95
Size	5.94	5.85	0.74	4.17	9.91
Industry	0.47	0.27	0.57	0.00	4.64
Business Risk	1.53	0.51	16.28	-474.16	145.58
Non-debt tax shields	0.05	0.04	0.04	<0.00	0.85
Inflation Rate	0.01	0.00	0.01	-0.00	0.04

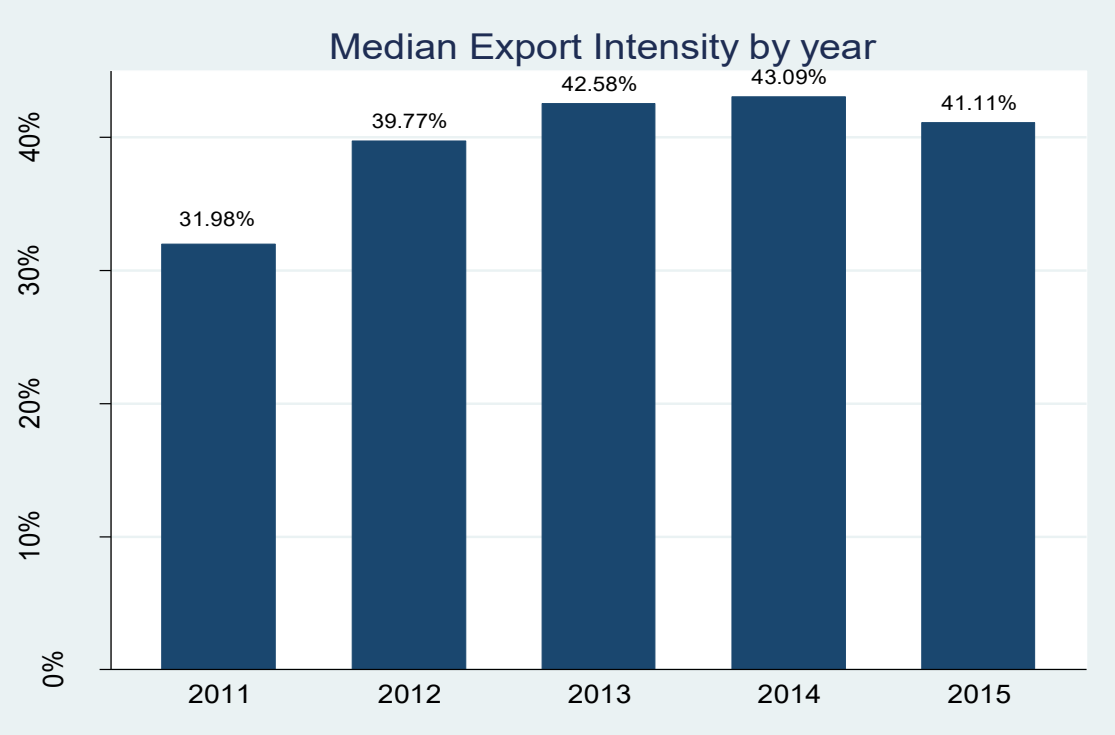
The number of observations is 19 527.

The next table presents the median firm for all the explanatory variables, divided by exporter and non-exporter firms.

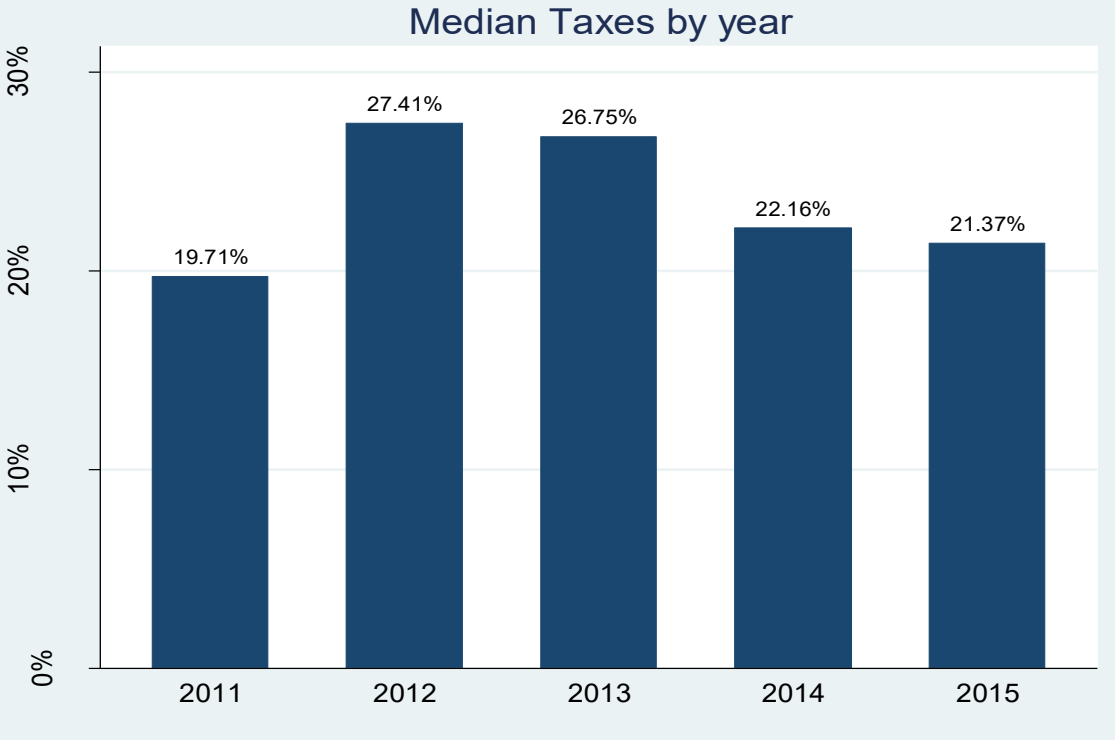
Variable	Exporter firms	Non-Exporter firms
Export Intensity	0.48	0.00
Taxes	0.24	0.23
Tangibility	0.24	0.22
Unique Product	0.00	0.00
Profitability	0.09	0.09
Growth	0.03	0.01
Size	6.52	5.67
Industry	0.23	0.28
Business Risk	0.31	0.60
Non-debt tax shields	0.04	0.03
Inflation Rate	0.00	0.00

The number of observations is 19 527.

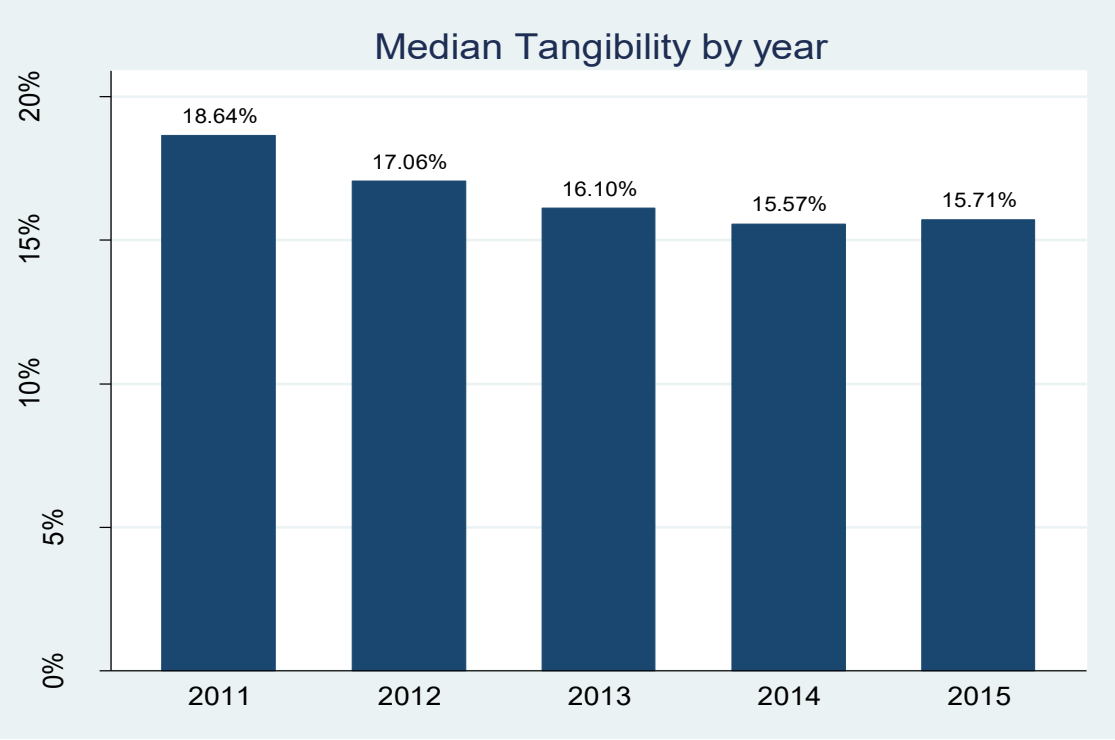
Appendix E - Median evolution of the explanatory variables of all the firms sample between 2011 and 2015.



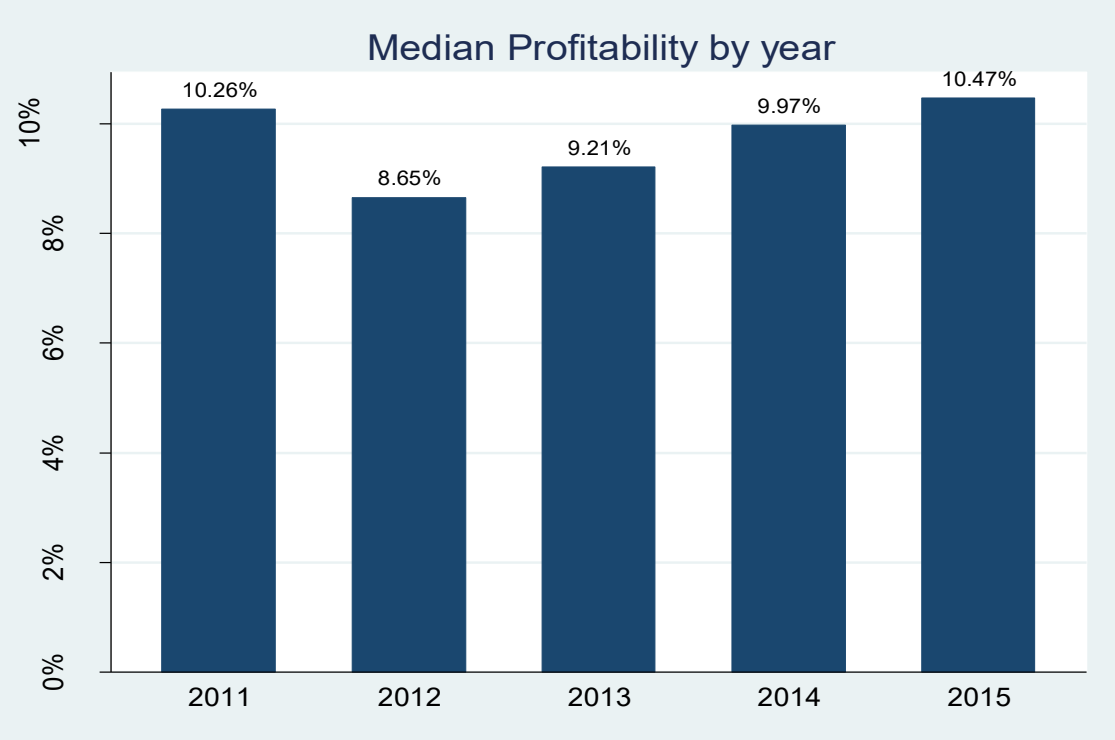
This graph uses only export firms' observations (non-export firms' observations takes value of 0 in this variable). Output: Stata Software.



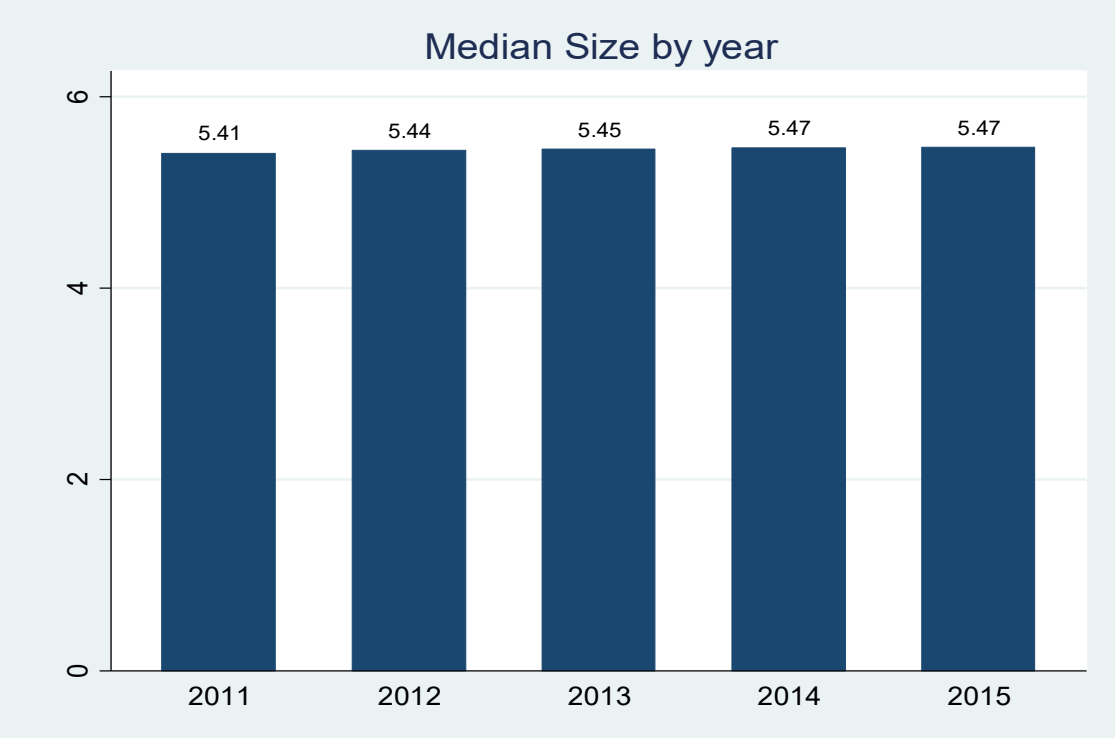
Output: Stata Software.



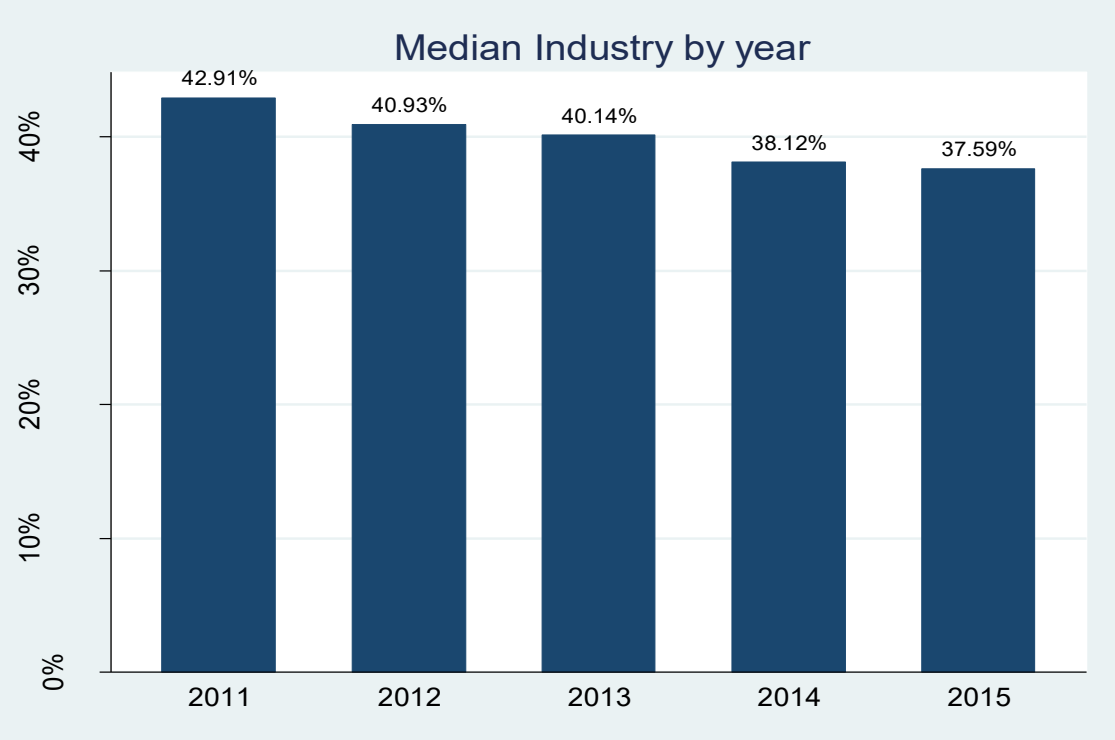
Output: Stata Software.



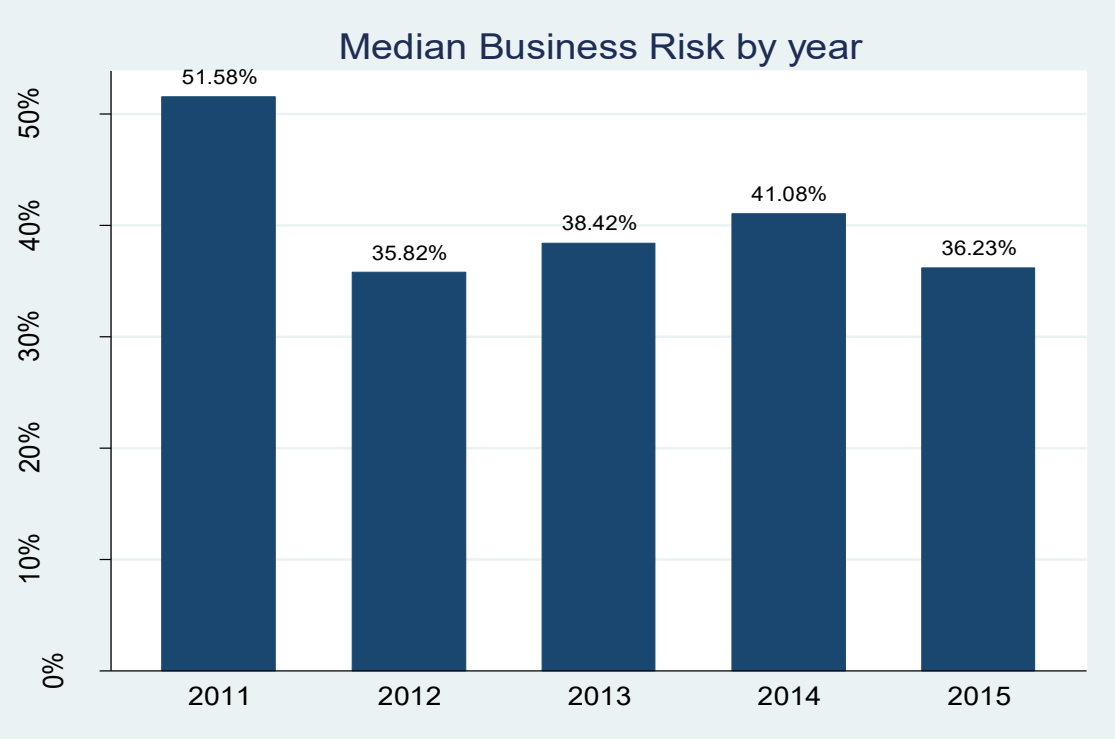
Output: Stata Software.



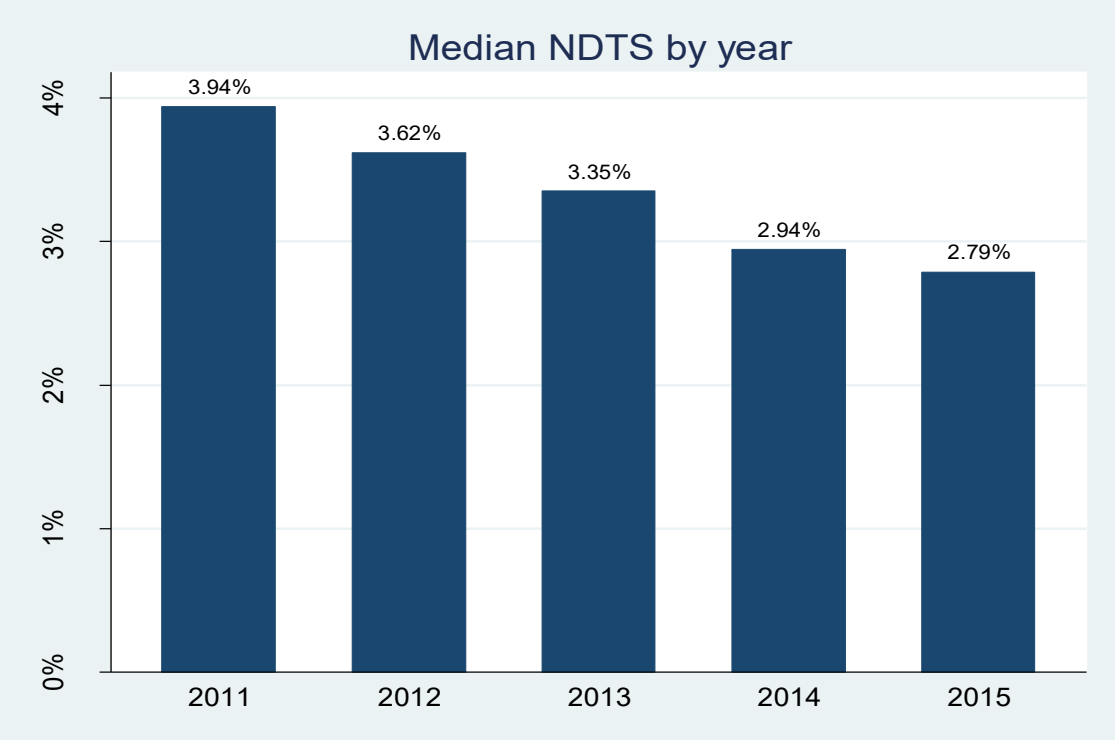
Output: Stata Software.



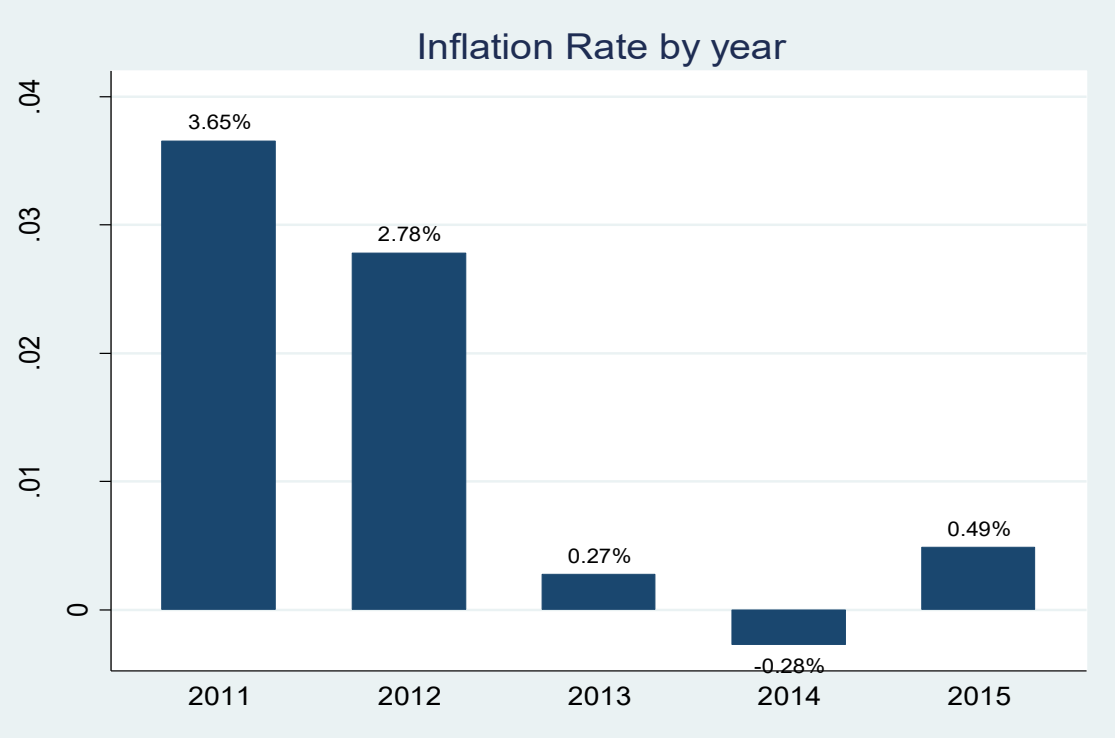
Output: Stata Software.



Output: Stata Software.



Output: Stata Software.



Output: Stata Software.

Appendix F - Correlation tables.

Correlation table for the sectors in study.

Variable	Lev	EI	Taxes	Tangibility	Profitability	Size	Industry	BR	NDTS	IR
Lev	1.0000									
EI	0.0807	1.0000								
Taxes	-0.0252	0.0014	1.0000							
Tangibility	0.1685	-0.0192	-0.0038	1.0000						
Profitability	-0.2148	-0.0360	0.0635	0.1033	1.0000					
Size	0.0829	0.3226	-0.0022	0.0256	-0.2045	1.0000				
Industry	0.0598	0.0348	-0.0263	-0.0852	0.0644	-0.5446	1.0000			
BR	0.0180	0.0012	-0.0185	-0.0198	-0.0107	0.0472	-0.0390	1.0000		
NDTS	0.0362	-0.0415	0.0393	0.4154	0.4431	-0.2714	0.1315	-0.0343	1.0000	
IR	0.0583	-0.0151	0.0074	0.0360	0.0022	-0.0302	0.0276	-0.0312	0.0903	1.0000

Correlation table for the export sectors in study.

Variable	Lev	EI	Taxes	Tangibility	Profitability	Size	Industry	BR	NDTS	IR
Lev	1.0000									
EI	0.0338	1.0000								
Taxes	0.0051	-0.0221	1.0000							

Tangibility	0.0967	-0.0599	-0.0392	1.0000						
Profitability	-0.1955	0.0601	0.0415	0.0576	1.0000					
Size	-0.0544	0.1519	-0.0567	0.1099	-0.0608	1.0000				
Industry	0.0452	-0.0913	-0.0026	-0.0983	0.0662	-0.6403	1.0000			
BR	-0.0206	0.1882	-0.0495	-0.0276	0.0035	0.3927	-0.1900	1.0000		
NDTS	0.0286	-0.0586	0.0032	0.4412	0.3810	-0.1141	0.1219	-0.0526	1.0000	
IR	0.0776	-0.0449	0.0300	0.0178	-0.0458	-0.0332	0.0152	-0.0831	0.0751	1.0000

Correlation table for the non-export sectors in study.

Variable	Lev	Taxes	Tangibility	Profitability	Size	Industry	BR	NDTS	IR
Lev	1.0000								
Taxes	-0.0278	1.0000							
Tangibility	0.1756	0.0001	1.0000						
Profitability	-0.2120	0.0646	0.1050	1.0000					
Size	0.0633	0.0037	0.0249	-0.2136	1.0000				
Industry	0.0531	-0.0348	-0.0892	0.0707	-0.6312	1.0000			
BR	0.0214	-0.0179	-0.0184	-0.0137	0.0467	-0.0344	1.0000		
NDTS	0.0413	0.0441	0.4143	0.4447	-0.2942	0.1444	-0.0339	1.0000	
IR	0.0580	0.0056	0.0378	0.0048	-0.0282	0.0288	-0.0345	0.0914	1.0000