



Capital Structure and Diversification Strategies for Listed Portuguese Companies

by

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Bibliographical Note

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Abstract

Capital structure decision is considered one of most debated topics in corporate finance, being several theories and empirical studies developed since the irrelevance of financing decisions in value creation of the firm with Modigliani and Miller (1958).

Notwithstanding, the puzzle of firm's financial resources is still unsolved (Myers, 2001), and there is not a single theory capable of incorporating all the determinants in this dynamic process (Frank and Goyal, 2009).

For this reason, the present dissertation aims to introduce a corporate strategy approach in the capital structure decision, focusing on Product and Geographic Diversification.

Using a sample of 35 Portuguese listed companies, from 2003 until 2013, static panel data models were developed for three Leverage measures – Total Debt Ratio, Long-term Debt Ratio and Short-term Debt Ratio – as dependent variables, being Product Diversification and Geographic Diversification introduced as explanatory variables.

The results evidence that Product Diversification is not significant in explaining Leverage ratios. Alongside, some findings support that Total Debt and Short-term Debt Ratios exhibit a non-linear inverted U-shape relationship with Geographic Diversification.

Key-words: capital structure, corporate strategy, financing decisions, product diversification, geographic diversification, panel data models.

JEL-Codes: C23, G30, G32.

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1. Introduction

The present study investigates the impact of the degree of Diversification Strategies on financial sources, and whether Product and Geographic Diversification are significant determinants of listed Portuguese companies' capital structure.

Since the 50's, it has been widely discussed what are the determinants of capital structure. These decisions have raised a significant amount of theories and empirical researches in order to investigate this complex process. Modern theory began the puzzle holding the irrelevance of financing decisions in value creation of the firm with Modigliani and Miller (1958). In the following years, some assumptions of this initial perspective were removed, emerging other theories to complement the determinants of the firms' financial resources.

1.1 General Background

Relaxing some Modigliani and Miller (1958) assumptions, the *Trade-off theory* argues that capital structure results from the trade-off between the costs and benefits of debt, being tax deductible interest expenses an advantage, against the fixed debt obligations as a detrimental variable (Kraus and Litzenberger, 1973; Scott, 1976).

Myers and Majluf (1984) developed the *Pecking Order theory* based on asymmetric information, in which managers prefer internal sources, and when external financing is required, debt has priority over equity.

From the *Agency Costs theory* perspective, debt is a disciplinary mechanism, able of controlling the available cash-flows and managers discretionary behaviour; nonetheless, leverage increases the default probability, being also a trade-off to take into account in the debt level decision (Jensen and Meckling, 1976).

Under *Market Timing theory* presented by Baker and Wurgler (2002), the capital structure is a cumulative outcome of attempts to explore the market opportunities, without an optimal solution.

The empirical research developed in the field has found results that can be admitted in the several theories, but not being explained through one single perspective. This fact

was exposed with Frank and Goyal (2009) extensive study over half a century for American companies, being pointed out weaknesses in the main theories of capital structure in explaining the findings achieved.

1.2 Objectives and Motivations

None of the theories appear alone to be more imperative than other. This environment opens an area of research for which it is useful to conduct additional studies to investigate the debt/equity mix. It became relevant to combine some other inputs, provided by management and strategic scholar, incorporating the role of the strategy in this complex process (Barton and Gordon, 1987). This is the main motivation of the current study that focuses on the specific case of Diversification Strategies (Product and Geographic) impact on financial sources.

The effect of such strategies on capital structure is a product of three factors – i) the *Coinsurance Effect*, through the imperfect correlation of cash-flows from the diversified activities, implying a decrease of the operational risks, which increases the debt capacity (Lewellen, 1971; Kim and McConnell, 1977; Bergh, 1997); ii) the *Transaction costs* in case of bankruptcy, having diversified firms also diversified assets, being more easily disposed, increasing the collateral provided to debtholders, which ultimately allows to obtain more debt (Williamson, 1988; Balakrishnan and Fox, 1993; Kochhar and Hitt, 1998); and iii) the *Agency Costs*, proceeding from the fact that more disperse activities increase their monitoring costs and asymmetric information, reducing debt capacity (Jensen and Meckling, 1976; Jensen, 1986; Kochhar, 1996).

A second and also important reason to develop the study is that empirical studies have examined the Diversification Strategies determinants on capital structure (e.g. Barton and Gordon (1988), Kochhar and Hitt (1998), Menendez-Alonso (2003), Singh, *et al.* (2003), Singh and Nejadmalayeri (2004) and Joliet and Muller (2013)) in other countries, but not in Portugal, which is a gap in the literature. Our study is therefore a contribution for the literature in this matter.

We also took advantage of the recent economic downturn to explore those determinants in such an environment.

The methodology adopted was grounded in multiple regressions techniques applied to panel data, as similar studies in the field (Barton and Gordon, 1988; Kochhar and Hitt, 1998; Menendez-Alonso, 2003; Singh, *et al.*, 2003; Singh and Nejadmalayeri, 2004; Frank and Goyal, 2009).

1.3 Structure of the study

The remainder of the study is organized as follows. Section 2 presents the major capital structure theories, being also focused in the relationship of capital structure and diversification strategies. Section 3 introduces the related studies, exposing the empirical evidence available in the literature. Section 4 discusses the research questions and the respective methodology employed in our study. Section 5 gives details of the data used in our study and sampling procedures, along with the sample characterization. Section 6 reports the empirical results. Finally, the study concludes in Section 7 with the main findings, limitations and suggestions for future research.

2. Theoretical Background

To provide the theoretical background on the field of capital structure and also diversification strategies, firstly we present a general overview of the main theories of capital structure in section 2.1, followed by some specific theoretical explanations of the relationship between Capital Structure and Diversification Strategies in section 2.2.

2.1 Major Capital Structure Theories

It has been widely discussed, since many years, the value relevance of financing decisions. Modigliani and Miller (1958) started this long journey, giving the theoretical insights followed by many authors (e.g. Kraus and Litzenberger (1973), Jensen and Meckling (1976), Ross (1977), Myers and Majluf (1984), Brennan and Kraus (1987) and Baker and Wurgler (2002)).

2.1.1 Modigliani and Miller Model

Modigliani and Miller (1958) began the capital structure puzzle holding the irrelevance of financing decisions in value creation of the firm. However, as it is referred by the authors, some drastic simplifications were put in place to face the dilemma – such as, no taxes, no transaction and bankruptcy costs, symmetric information, rationality of investors and homogeneous expectations – creating a perfect, but not real and feasible, market scenario.

Miller (1977) puts a spotlight on taxes with the aim of introducing some real aspects to the theory above, since interests represent a tax deductible expense, creating gains for any company subject to tax-paying. Notwithstanding, even with this improvement, if interest tax shields are effectively firm value creators, it wasn't enough to explain why capital structure were not exclusively composed by debt (Myers, 1984).

Furthermore, Miller (1977) establishes an equilibrium of aggregate supply and demand for corporate debt, along with and an equilibrium debt-equity ratio for the corporate sector as a whole, but with no optimum debt ratio for any individual firm. In this equilibrium state, the value of the firm will be again independent of the debt and equity scheme, since the taxes of the personal income by the managerial investor in corporate

debt, will offset the corporate tax saving. Therefore and considering that different investors have different taxes rates, firms will issue debt as long as the benefit is positive, i.e. until the marginal balance between benefits and costs of debt are positive.

2.1.2 Trade-off Theory

Kraus and Litzenberger (1973) introduced new pieces in the puzzle with *Static Trade-off Theory*, combining two market imperfections – taxation of corporate profits and the existence of bankruptcy penalties. The model developed demonstrates that the levered firm value results from the unlevered firm market value, plus the tax advantage of debt, deducted of corporate tax rate times the present value of bankruptcy costs. In this framework, the tax advantage allows a higher after-tax operating income, however, it is limited with legal obligation of fixed payments to debtholders, that when not met could represent penalties and possibly force into bankruptcy.

Scott (1976) also present an optimal capital structure model, being under the assumptions that bankruptcy is possible and the secondary markets for assets are imperfect. It also refers that debt is valuable, as interest payments are tax deductible, to the extent that level of debt implies higher probability of occurrence of insolvency costs. In addition, the author also argues that an increase in the liquidation value of the firm's assets, collateral for debt obligations, reduces the costs of going bankrupt and consequently, will allow a higher level of debt.

In this way, *Trade-off Theory* sustains moderate debt ratios, putting out of scope established, profitable companies with superior credit ratings, operating historically at low debt ratios (Myers, 2001). Despite this weakness, the theory is consistent with the fact that companies holding higher slices of safe and tangible assets will borrow more than riskier companies with higher proportions of intangible assets, which offer an unsteady collateral to debtholders (Myers, 2001).

In order to innovate the static method of *Trade-off Theory*, Hennessy and Whited (2005) formulate a theory where capital structure decisions are defined simultaneous with investment decisions, enriching the previous approach with more dynamism in the process. They found evidence to support the inexistence of a target debt ratio, presenting variation in tax parameters as powerful explanatory variable of some

anomalies in the expected capital structure decision behaviour from the traditional *Trade-off Theory* point of view.

2.1.3 Pecking Order Theory

Moving forward with this unsolved puzzle, another milestone to consider is the *Pecking Order Theory* (Myers and Majluf, 1984), introducing a model based on previous studies concerning financing practices developed by Donaldson (1961) and asymmetric information. Contrasting with *Trade-off Theory*, Myers and Majluf (1984) have presented a model to explain some aspects of the corporate behaviour, such as the preference for internal sources and the prioritization of debt over equity, when external financing is required. The two key points of the theory are i) the costs of relying on external financing, since it would represent a separation of ownership and control, implying a subordination of managers to the capital markets and ii) the advantage of debt over equity caused by the asymmetric information effect, since raising equity to finance investments could be perceived by the market as a sign of stocks overvaluation, as managers have more information, expecting an higher rate of return and consequently, increasing the cost of equity.

Therefore, the *Pecking Order Theory* overcomes the *Trade-off Theory* explaining why profitable firms borrow less, considering that those firms will have more internal funds available, than less profitable ones. It also gives theoretical insights that help explain why debt is the preferred source of external financing, on the grounds that managers will avoid underpricing consequences of issuing new equity to finance projects, being debt more appealing. Nonetheless, the theory does not address the possibility of using financial tactics in order to balance the managers' superior information, and the optimal capital structure goal is overshadowed by the costs of external financing.

Other authors (e.g. Harris and Raviv (1991) and Heinkel and Zechner (1990)) also explain capital structure decisions driven by new investments cash-flows and the effect of asymmetric information on the process.

To outside investors, the only investment information obtained regarding investment decisions of the firms is if certain project is taken. Under this information asymmetry, it is not possible to outside investors disaggregate a firm on its net present value projects

(Harris and Raviv, 1991). So, there is a window opportunity to overinvestment, since securities of the firm are valued by outside investors through the average project quality (Narayanan, 1988) and consequently, overpriced equity could be used to finance negative NPV projects. Knowing this, Heinkel and Zechner (1990) introduced a model to formulate an initial capital structure with an optimal level of debt that leads to the best subsequent investment policies - reduces the overinvestment financed through overvalued equity and at the same time, does not limit the available cash flows in such order that could lead to underinvestment policies. Their results suggest an optimal capital structure in the initial moment, with a debt/equity mix that generates the first best firm value-maximizing result of investment policy in the next time period, when managerial decisions have to be taken.

2.1.4 Signalling Models

The underinvestment problem present by Myers and Majluf (1984) is addressed by other authors, but resolved through a richer set of financing options than straight debt over equity, invalidating in some cases the results of *Pecking Order Theory* (Brennan and Kraus, 1987; Noe, 1988; Constantinides and Grundy, 1989).

Brennan and Kraus (1987) establish a value-revealing signalling equilibrium of the financing choice characterized by a theorem based on the *lemon property*, which sets that each financing strategy is chosen by the worst possible type of firm from the investor's point of view and consequently, the net claim will be the lowest true and full-information value. Firms will try to maximize the lag between the price of its financing choice and its true value. Although, if investors will price financing choice at its worst case value, firms will be induced to choose the worst-case financing strategies, since other alternative choice will imply a negative difference the true value of financing choice and its price. Along these lines, the financing strategy is a signal of the characteristics of the firm (Brennan and Kraus, 1987), being equity issue a negative signal, but on the other hand, issuing equity to repurchase debt a positive signal.

In the scope of asymmetric information, other models with fixed investment give to capital structure the role of signalling private information (Ross, 1977; Heinkel, 1982; Poitevin, 1989; Hillier, *et al.*, 2011).

Ross (1977) develops a model in which profitability and debt-equity ratio are positively related, being debt a signalling mechanism used by managers of high-quality firms to provide inside information not available to the market. The author explains that debt is an efficient and believable instrument of firm value, since engaging in new debt contracts signs the firms' capability of future coupon debt payments and, on the other hand, firms with poor performance could not be able of issuing the same levels of debt, since have higher marginal expected bankruptcy costs than higher quality firms.

2.1.5 Agency Costs Theories

Other contributions to the puzzle defined a firm as nexus of contracts, since everyone who has an interest in the firms' activities are part of the whole design web which the firm is made, (Jensen and Meckling, 1976). In that web, every role has a different influence – managers have direct control over the business activity, aside the fact that shareholders or suppliers of risk capital have indirect control. The foundation of this definition categorizes debt as less interventionist, because bondholders can only control the firm in the case of default or covenants breach, and equity as being similar to hierarchical control, through board of directors and monitoring activities. Considering this, debt and equity frame can be viewed as a governance structure, as it is suggested by Williamson (1988). Debt could reduce the agency costs between shareholders and managers, creating discipline in the use of the available cash-flows. Although an increase on leverage intensifies the bankruptcy costs. Taking into account this trade-off, Jensen (1986) defends an optimal debt ratio capable of equalizing the marginal benefits and costs of debt.

Harris and Raviv (1990) and Stulz (1990) study the agency costs as determinant of capital structure, being focused on the conflicts of interest between equityholders and managers.

The optimal capital structure of Stulz (1990) generate a solution with a debt level capable of limiting the free cash available, in order to resolve the overinvestment conflict, as it is presented by Jensen (1986). Additionally, this optimal solution also incorporates the costs of debt which arise from having the free cash allocated to debt payments, precluding the execution of profitable investments, thus conducting to underinvestment. Managers could be reluctant in execute the optimal level of debt on

account of being a manager's flexibility restrain mechanism. Therefore, Stulz (1990) argues that potential takeover targets firms will have more debt, than firms with anti-takeover measures; he also expects that firms with higher positive net present value investment opportunities will have less debt in their capital structure, predicting that value-increasing investments are able of offsetting the value-decreasing ones.

Harris and Raviv (1990) argue that the conflict of interest between managers and shareholders is regarding liquidation decisions, since it is assumed that managers will always continue operations even if liquidation is a better scenario for investors. Under this assumption, debtholders could force liquidation when cash-flows are reduced; however, default decision study implies investigation costs in order to ultimate the decision, increasing the resources lost in the liquidation process. As a result, firms with higher liquidation value, i.e. with more tangible assets and/or lower investigation costs related to the default process will have higher levels of debt.

In pursuance of the conflicts between debtholders and equityholders, Diamond (1989) and Hirshleifer and Thakor (1992) incorporate reputational considerations of firms in the capital structure decision. The reputation of a firm is dependent on its history of debt repayment, so firms with a long history have a higher record and therefore will have more incentives to endorse safer projects. Notwithstanding, young firms do not have their reputation on stake, having lower costs when balancing riskier projects acceptance.

2.1.6 Market Timing Theory

In more recent years, *Market Timing Theory* (Baker and Wurgler, 2002) upgrades the traditional approaches, being based on the trend of companies issue equity when market-to-book ratios are high and repurchase when market value is below the book value. The authors considered this review as having a substantial explanatory power, using the market-to-book ratios to capture the market timing opportunities perceived by managers. As a result, the capital structure is a cumulative outcome of attempts to explore the market opportunities, without having an optimal solution.

Welch (2004) following the approach of Baker and Wurgler (2002) demonstrate that the debt ratio dynamics is largely explained by stock returns and also stock return-adjusted historical capital structure. However, it is not due to attempts of exploring market

timing opportunities, since it has not been found evidence that issuing equity is a used mechanism of counteract for stock returns variability by corporations. Despite this fact, the author puts stock return as a first order determinant of debt ratios, being the correlation between them near one. It also argues that other variables used in the study of capital structure play a significant role, because are correlated with omitted dynamics of stock returns.

Elliott, *et al.* (2008) decomposed the market-to-book ratio into two components – mispricing and growth options – avoiding the multiple interpretations of this variable. In a framework with growth options controlled, the author found strong evidence supporting market timing theory, founding that when equity is overvalued it is probable that firms issue equity.

2.1.7 Other contributions

Heaton (2002) introduces through the field of behavioural finance the impact of managers optimism into the problem, without invoking the conflicts of interests stated above and their agency costs. First, the author supports that optimistic managers could prefer internal funds, on behalf of external sources, due to the overvaluation made on the company. Second, since they also overvalue their capabilities, they could pursue negative net present value projects. These findings implicitly suggest that a certain amount of free cash-flow, enough to finance the positive net present value projects, could avoid under-investment. In the optimistic manager scenario, limited available cash-flows could not work as effective mechanism in order to maximize value creation, as suggested by Jensen (1986).

Frank and Goyal (2009) developed a research with American companies over 54 years, from 1950 until 2003, with the goal of identifying reliable patterns of capital structure explanatory theories, incorporating inputs to capture the main contribution presented in the literature. The main findings indicate that leverage is positive related with size, tangible assets and industry leverage; it is also pointed out that it is negatively related with profits and market-to-book ratios.

Summary

Despite all findings, the extensive research pointed out weakness in the main theories of capital structure. *Market Timing* approach has low explanatory power in the trends identified in the leverage ratios; the *Pecking Order Theory* intuitively relates profitability with low leverage, however, assets tangibility, industry leverage and firm size stay out of scope from this theoretical framework; from *Trade-off Theory* arises the empirical weakness of profitable firms with lower leverage ratios, although, sustain size, industry leverage, tangibility and market-to-book as important determinants.

A long journey has been accomplished in direction of the optimal capital structure, but the puzzle is still unsolved and probably will remain so (Myers, 2001). Granting all this, new perspectives and determinants are explored, sharpening the main building blocks off this all dynamic process.

In section 2.2, bearing in mind the capital structure theories above mentioned, we shed further light and discuss the relationship between capital structure and diversification, introducing a corporate strategy approach to the financial paradigm.

2.2 Capital Structure and Diversification

The limitations of finance paradigm in explaining capital structure decisions at the firm level suggest that managerial choice is relevant, and the strategy decision framework is an important complement in capturing the factors that have an impact on this decision (Barton and Gordon, 1987). In fact this new perspective, complemented with corporate strategy, is a development from a deterministic product of external market forces as implied by the finance field, into a more functional managerial decision approach.

In particular, the effect of diversification on capital structure is likely to be a product of the *coinsurance effect* (Lewellen, 1971; Kim and McConnell, 1977; Bergh, 1997); the *transaction cost* (Williamson, 1988; Balakrishnan and Fox, 1993; Kochhar and Hitt, 1998) and the *agency cost* (Jensen and Meckling, 1976; Jensen, 1986; Kochhar, 1996).

We discussed on the following paragraphs for each of these theories the impact of Diversification Strategies on Capital Structure.

2.2.1 Coinsurance Effect

Lewellen (1971) questioned if it was possible to produce gains to the stockholders in a merger without sufficient operating efficiencies, referring this possibility as a *pure financial* combination of enterprises. Following this approach, the author concludes that mergers provide more debt capacity, because the likelihood of default of the consolidated firm is smaller than the sum of firm's individual probability of failure on debt commitments. The merger partners are now accountable for all the jointed debt obligations, setting a borrower diversification context, which results in more debt capacity. Therefore, the *coinsurance effect* arises from the possibility of imperfect correlation of cash-flows, which reduces the operational risks, creating additional borrowing capacity.

In search of *coinsurance effect*, Kim and McConnell (1977) also conclude that merger firms employ more debt, than the individual ones. Additionally, it was found that this increase on leverage didn't cause abnormal negative returns on bondholders, suggesting as explanation, that this growth was provided by the occurrence of higher coverage of the cash-flows.

2.2.2 Transaction Costs

In this framework, *firm specific assets*¹ have lower reutilization in other business and structures, representing a restricted liquidation value in case of default (Balakrishnan and Fox, 1993). Subsequently, debt will be preeminent in supporting non-specific assets acquisitions and, on the other hand, equity will prevail on more focused and specialized businesses (Williamson, 1988).

Since the diversification type is dependent on the characteristics of the resources available, as exposed by Chatterjee and Wernerfelt (1991), unrelated business will point to more non-specific assets, than related businesses organizations. Therefore, the nature of assets, measure of their collateral capacity, will dictate the preferred financial tool – debt or equity.

¹ As exposed by Balakrishnan and Fox (1993), this characteristic implies that the utility and output produce by the asset in a determined firm are higher than an alternative best use in other structure.

2.2.3 Agency Costs

Jensen (1986) sets the debt as discipline mechanism of managers and controlling device of free cash-flow available for spending at the discretion of managers. The author also highlights the role of debt in motivating the organizational efficiency, since the firm will conduct more efficient procedures and activities, with the threat of fail to comply with the debt service.

Nonetheless, there are some agency costs along with debt, since managers are agents acting on the behalf of equity holders and bondholders. Therefore, the debt use disadvantages comprises the monitoring expenditures, the increase in bankruptcy costs and also the opportunity wealth loss, to the extent that it influences the investments decisions (Jensen and Meckling, 1976).

Shareholders will endorse the use of debt, constraining the opportunistic behaviours and probably destroying value of diversification strategies held by managers. Therefore, firms with more leverage will conduct lower unrelated diversification strategies.

In the case of companies with foreign operations, the agency costs of debt intensify, because geographic dispersion demands more efforts in the information processing, increasing the costs of monitoring activities. Therefore, bondholders require higher interest rate to meet with the information asymmetries and higher monitoring costs.

After having discussed the theoretical background regarding Capital Structure and specifically its relationship with Diversification Strategies, in section 3, we present some of the empirical studies developed in the field.

3. Related Research – Capital Structure and Diversification

We complemented the theoretical background presented in the previous section with the description of some empirical studies developed in the field of Capital Structure and Diversification Strategies.

Taking into account the aim of the study, the impact of diversification strategies on leverage, previous empirical evidence is presented and discussed accordingly with the type of Diversification strategy.

3.1 Leverage and Product Diversification

Barton and Gordon (1987) first empirical study developed over this matter was an attempt to achieve an integrated view – filling the gap of the financial literature to explain and understand the capital structure and introduce more functional inputs to the strategy ground. In the following year, Barton and Gordon (1988) continued the research, introducing the values and goals of management, based on Andrews (1971) research, which settle the dimensions of corporate strategy as an organizing framework.

Using a sample of American industrial companies still in existence in 1982, which maintain the diversification strategy between 1970-74, the study concludes that the level of debt is different among different strategies of diversification – being unrelated strategies the ones that achieve a higher volume of debt financing, contrarian to single or related diversification.

Other important finding was the link between debt and the level of profits – across all diversification strategies, profit was shown to have a significant negative relationship with debt. This result is consistent with fact that managers want to have flexibility. So, with an increase in profit, firms could be financed by internal generated funds, reducing the level of debt, as it is predicted by *Pecking Order Theory* discussed in paragraph 2.1.3 (Myers and Majluf, 1984).

Kochhar and Hitt (1998) examine the relationship between corporate strategies and financing types and sources, dividing the diversification strategies into two types – related and unrelated diversification. A company is pursuing a related diversification

when acquires a company which segment is in the same industry or invests in specific assets related to the company's industry. Unrelated diversification implies acquisition of businesses in different industry groups.

Using a sample of 187 large manufacturing firms traded on the American or New York stock exchange that adopted a diversification strategy during the period of 1982-1986, the study confirmed that financial decisions are influenced by firm diversification strategies. The results supported that related diversification implies more specific assets and businesses, since this is pointed out as more risky from the point of view of fund suppliers, which may lose their investment if the firm bankrupts. This also, linked with constraints to managerial actions faced by the debtholders, introduces higher risk into related diversification strategies. In short, it was found out that equity is preferred for related diversification and debt for unrelated diversification.

Regarding the source of financing (public or private), the results indicate that it is influenced by the form of entry in new business – acquiring an existing firm or through direct entries (internal development). In the case of internal development, since it involves more uncertainty than acquiring an existing business, because of greater information asymmetry, firms tend to rely more on private sources. On the other hand, firms using acquisitions of existing business will use more public sources.

Menendez-Alonso (2003) developed an article to study the effect of diversification on capital structure in a Spanish panel data composed by 480 manufacturing firms, from 1991 until 1994. The results conclude that diversification does not have influence in the leverage ratios for Spanish data during the period in study.

3.2 Leverage and Geographic Diversification

Pursuing the relationship of internationalization strategy and capital structure, Singh and Nejadmalayeri (2004) centred their study in French corporations with best performance from 1996 until 1999. The authors address some research questions in order to understand the differences between domestic and multinational firms in respect to the maturity of debt, the degree of leverage in relation with international diversification and the impact of international strategies over the cost of capital.

The models were constructed assuming a non-linear relationship between financial leverage and internationalization. The rationale behind this assumption is that in the initial stages of internationalization, firms will need to expand their financial resources, but will only have available short-term debt, due higher information asymmetries perceived by investors; then, in a more mature phase of the internationalization strategy, long-term debt will be available, implying a positive relationship between long-term debt and the degree of international diversification. The results support the hypothesis exposed, suggesting a U-shape relationship between the degree of internationalization and short-term debt; it also was reported that international diversification is positively related with total and long-term debt.

In respect of cost of capital, the models suggest that more international firms have higher level of debts, resulting in a reduction of the overall cost of capital. This outcome is sustained by the effect of debt as hedging instrument of the foreign exchange risk, particularly higher in international organizations.

3.3 Leverage and Dual Diversification Strategy

Singh, *et al.* (2003) explore the relationship of two types of diversification – geographic and product – and their impact on corporate leverage.

According with other authors and respective studies, the two types of diversification produce different effects on the capital structure. Li and Li (1996) support the fact that diversified firms need greater leverage, in order to maximize their value. Although, a considerable number of studies produce evidence showing that domestic firms have more debt emplaced than multinational companies (Senbet, 1979; Michel and Shaked, 1986; Fatemi, 1988; Lee and Kwok, 1988; Burgman, 1996; Chen, *et al.*, 1997).

Using a sample from 1994 to 1996 of non-financial firms with business segments and international operations data available, Singh, *et al.* (2003) achieved a sample of 1,127 American companies.

It was found that product diversity is on average, unconnected with debt, but could be negatively related in some circumstances. Finally the study also concludes that a dual strategy diversification – product and also geographic – seems to conduct to higher leverage, suggesting that coinsurance effect is present.

3.4 Leverage and New Geographic Area of Operation

In recent years, Joliet and Muller (2013) also study the impacts on capital structure of international strategies, although assessing the degree of internationalization through the type of new geographic area of operation reported by the companies. The sample was categorized by the initial geographic area(s) of operation (domestic firms, firms in developed countries and well-diversified firms) and the new foreign target area (developed, emerging and diversified). This cross-sectional analysis improves previous approaches, since international diversification categorization captures the inherent risks and opportunities among regions, not being only measured through the foreign to total sales ratio.

The main stock indexes were used (American S&P 500 and S&P 400, Canadian TSX, Australian ASX 200, British FTSE 100 and FTSE 250, French SBF 120 and German DAX 30 and MDAX 50), selecting firms that disclose a new geographic area of operation between 1994 and 2004 and achieving 246 firms.

The results lead to three main conclusions: i) independently of the initial geographic diversification of the firm, a new entry in developed countries has no significant impact in the capital structure; ii) companies well-diversified don't change their capital structure significantly after a new foreign area entry and iii) both domestic firms and firms only active in developed markets significantly increase their debt to equity ratio, when expanding into a region or country where they had no operation before.

3.5 Summary

Most of the studies found strong evidence regarding the impact of diversification strategies in capital structure. Those findings are in general supported by the theoretical field through the *Coinsurance Effect* (Lewellen, 1971; Kim and McConnell, 1977) and *Agency Costs Theories* (Jensen and Meckling, 1976; Jensen, 1986; Kochhar, 1996).

Table 1 summarizes the samples, variables and main findings of the empirical studies previously exposed and reviewed.

Table 1: Summary of empirical studies about Capital Structure and Diversification Strategies reviewed and main findings.

Author(s) of the study	Sample (Country and Period)	Diversification and Control Variables	Main Finding
Barton and Gordon (1988)	Firms selected from 1974 <i>Fortune</i> list of industrial companies in existence in 1982; 1970 – 1974	Four categories of diversification –single, dominant, related and unrelated. Control variables – profitability, size, growth rate, capital intensity and earning risk.	Unrelated firms’ strategies are the ones that achieve a higher volume of debt financing, contrarian to single or related diversification.
Kochhar and Hitt (1998)	Large manufacturing firms traded on the American or New York stock exchange that adopted a diversification strategy during the period of 1982-86	Entropy measure of total product diversification see Appendix 1; control variables – size, bankruptcy risk, firm risk and proportion of new debt financing.	Equity financing is linked with related diversification and unrelated diversification with debt. Diversification through acquisitions seems to be supported by debt and internal development of new business by equity.
Menendez-Alonso (2003)	Spanish manufacturing firms; 1991 – 1994	Diversification index of sales segments; Control variables - business risk, growth, size, R&D investment and profitability	Diversification appears with not significant explanatory power of leverage ratios.
Singh, <i>et al.</i> (2003)	Non-financial firms listed U.S. firms with annual sales higher than US\$ 10 million and business segments and international operations data available; 1994 – 1996	Entropy measure of total product diversification, see Appendix 1 and ratio of foreign sales to domestic sales as geographic diversification proxy. Control variables – profitability, growth opportunities, size and managerial efficiency.	A dual diversification strategy – product as well international – show more debt usage, suggesting that coinsurance effect of diversification occurs. However, product diversification may be negatively related to firm leverage.
Singh and Nejadmalayeri (2004)	French firms in the best performing list for four consecutive years; 1996 – 1999	Ratio of foreign to total assets; ratio of foreign to total sales and ratio of foreign to total income; Control variables – size, growth, profitability and market performance.	Non-linear inverted U-shape relationship between the degree of international diversification and short-term debt financing; international diversified firms support higher level of debt financing.
Joliet and Muller (2013)	Non- financial firms included in American, Canadian, Australian, British, French and German main stock indexes; 1991 – 2007	Companies classified according their international diversification strategies – developed, emerging and diversified; Control variables – marginal tax rate, bankruptcy costs, profitability, assets collateral value, growth and corporate investments.	Both domestic firms and firms only active in developed markets significantly increase their debt to equity ratio when expanding into a region or country where they had no operation before.

The previous studies have focused on samples from America and some European countries, namely French and Spain. However, the impact of Diversification Strategies on Leverage has not, so far, being studied for Portugal. Our study aims to contribute to fill the gap in the literature with an empirical research to study the effect of Diversification Strategies on Capital Structure of listed Portuguese companies.

4. Hypotheses Development and Research Design

This section presents the research questions and the methodology adopted in our study, being firstly developed the hypotheses and then the empirical models along with variables construction.

4.1 Research Hypotheses

As discussed in the previous section, the literature highlights the fact there is not a unique and single perspective capable of incorporate all the important determinants in the capital structure dynamic process. In fact, several elements have to be considered to construct a useful and effective explanatory model – the tax benefits and the financial distress costs of debt; the agency costs of debt and equity and the signalling effect of debt. Those elements capture the essence of the main building blocks of capital structure theory – the traditional *Trade-off* and *Pecking Order* theories, the agency cost and imperfect information approach and the signalling models.

Bearing in mind the aim of this study, the usefulness of diversification in explaining the capital structure for listed Portuguese companies, we introduce this managerial input as a strategic viewpoint in the study of capital structure.

Leverage and Product Diversification

In light of *Coinsurance Effect*, firms with uncorrelated cash-flows from different businesses and segments will have more debt capacity (Lewellen, 1971). Singh, *et al.* (2003) also found evidence of the *Coinsurance Effect* of diversification in the debt usage. Other studies report higher Leverage for unrelated diversification (Barton and Gordon, 1988; Kochhar and Hitt, 1998). Therefore, it is expected a positive relationship between Leverage and the degree of the Product Diversification. Based on these arguments, we formulated the following hypothesis:

H₁: Leverage is positively related with Product Diversification

Leverage and Geographic Diversification

Taking into account agency costs theory perspective of Jensen and Meckling (1976), firms with more disperse activities increase the agency costs of debt, such as

information asymmetries between bondholders and shareholders and costs of monitoring their performance. Accordingly, geographic diversification implies higher agency costs of debt, reducing the debt usage, as it was found out by Singh, *et al.* (2003). Other authors also found evidence that domestic firms have more debt than multinational ones (Senbet, 1979; Michel and Shaked, 1986; Fatemi, 1988; Lee and Kwok, 1988; Burgman, 1996; Chen, *et al.*, 1997). As a result, Leverage is related with Geographic Diversification.

Furthermore, Singh and Nejadmalayeri (2004) argue that, in the initial stages of international diversification, firms will demand debt to face their financial needs, since other sources will only be available in a more mature phase of the international strategy, when the information asymmetries perceived by investors reduce. So, it is expected a non-linear, specifically inverted U-shape, relationship between Leverage and the degree of Geographic Diversification. Based on these arguments, we formulated the following hypothesis:

H₂: Leverage has an inverted U-shape relationship with Geographic Diversification

4.2 Empirical Models

Likewise other studies that adopted a similar approach (Barton and Gordon, 1988; Kochhar and Hitt, 1998; Menendez-Alonso, 2003; Singh, *et al.*, 2003; Singh and Nejadmalayeri, 2004; Frank and Goyal, 2009) this study of the capital structure determinants will apply a regression analysis.

To test the hypotheses developed in the previous section, we use a multiple linear regression model which settles relationship between Leverage, the dependent variable, and the explanatory or independent variables.

4.2.1 Panel Data Models

Regression analyses might be based on time series, sectional or panel data. The first ones are related with observations of a variable in different time periods; sectional data, it deals with data obtained in the same point of the time period; as respects to panel data, it is composed by multi-dimensional observations obtained over several time periods (Wooldridge, 2008).

The panel data assembles several advantages over sectional or time-series data, such as the possibility of gathering more information, larger samples and more accurate statistical inference in hypotheses testing, because it generally contains more degrees of freedom and sample variability (Hsiao, 2006). Based on the above, we used a panel data model in the current study as exposed in the section 4.2.2.

In furtherance of panel data estimations, the most common approaches are the Pooled Regression (OLS - Ordinary Least Squares) or static panel data model admitting the existence of unobservable individual effects random or fixed. The OLS method is suggested as the most simple, although each observation is considered as an independent unit, in spite of the transversal and temporal dimension of panel data.

As regards to the Fixed Effect Model, it admits that the unobservable individual effects are constant and correlated with the independent variables. Similarly, the model assumes that the differences in the company's specificities and overtime can be captured through a constant term (Johnston, 2001).

By contrast, the Random Effect Model the unobservable individual effect is not correlated with the independent variables. Therefore, in this specification the differences in the company's specificities and overtime are unknown, unobservable and not measured (Marques, 2000).

The main challenge in panel data estimations is to adopt the appropriate methodology, able of controlling the impact of the unobserved heterogeneity (Hsiao, 2006).

In order to choose between fixed or random effects, Mátyás and Sevestre (2008) identified two main questions – i) the study purpose and ii) the context and sample selection and its environment. Marques (2000) exposes that if the study is designed to statistically infer about a particular individual unit (e.g. a specific group of countries) the fixed effects estimator will be more consistent and efficient.

On that account, we applied the *Hausman Test*¹ to select which is the appropriate estimator for the sample in study, i.e. select the fixed effect which admits the existence of correlation between the unobservable individual effects and the explanatory variables or adopt a random effect estimator which recognizes no correlation between them.

¹ *Hausman Test* details are exposed in Appendix 2.

4.2.2 The Model

To test our hypotheses H_1 and H_2 we estimate the following regression model, presented in equation (4.1), representative of the basic panel data model, as previously discussed.

In order to isolate other influences on the firms' capital structure, control variables will be used, following the inputs provided by *Pecking Order theory* and *Trade-off theory* and the similar studies reviewed in the previous section (Barton and Gordon, 1988; Kochhar and Hitt, 1998; Menendez-Alonso, 2003; Singh, *et al.*, 2003; Singh and Nejadmalayeri, 2004; Frank and Goyal, 2009).

The model to be estimated is:

$$LEV_{it} = \beta_0 + \beta_1 * PRODDIV_{it} + \beta_2 * GEODIV_{it} + \beta_3 * SRGEODIV_{it} + \beta_4 * PROF_{it} + \beta_5 * TANG_{it} + \beta_6 * SIZE_{it} + \beta_7 * GROWTH_{it} + \beta_8 * EFFICIENCY_{it} + \varepsilon_{it} \quad (4.1)$$

Wherein:

- LEV_{it} denotes Leverage for the company i in the year t . The choice of the Leverage indicator is crucial for the research design, since different measures of Leverage could lead to different results. As argued by Rajan and Zingales (1995) study of Leverage for international panels, the ranking of most leveraged countries changes across measures. So, empirical studies have not unequivocally concluded that one of the measures is more useful. Those authors also argue that when the purpose is to study the effect of financing decisions, the ratio of total debt to capital (debt plus equity) will be the most adequate variable. On the other hand, those authors also pointed out that ratios using total assets as deflator could fail, because some assets are used to offset non-debt liabilities, such as trade receivables. Considering that, debt ratios calculated using total assets are influenced by industrial specifications which affect the level of trade receivables, as well as accounts payable. Therefore, ratios unaffected by the gross level of trade credit or other changes in assets not related to financing decisions are a preferred measure. Consequently, we measure the firm's leverage through three debt ratios – total debt, long-term debt and short-term debt ratios – computed using each level of debt deflated by the sum of book value of

debt² and the market value of equity, expressed by the market capitalization at year end. As a result, we have three variants of the regression (4.1) for each measure of Leverage.

- ***PRODDIV_{it}*** is the Product Diversification for the company *i* in the year *t*, measured through the segment report of sales disclosed in the annual financial statements of the companies, applying the *Entropy Measure of Diversification*, as showed in Appendix 1 (Jacquemin and Berry, 1979). This measure was also used by Kochhar and Hitt (1998) and Singh, *et al.* (2003). Firms focused in a single segment will have diversification indexes with zero value; as long as the diversification increases, i.e., the dispersion of sales among relevant segments is higher, the entropy measure will raise. As exposed in H₁, it is expected a positive relationship between Leverage and Product Diversification, and as such its coefficient to be positive.
- ***GEODIV_{it}*** is the Geographic Diversification for the company *i* in the year *t*; being measured also applying *Entropy Measure of Diversification*, as per variable *PRODDIV_{it}* and with the same behaviour, but using Geographic segment report of sales. We do not predict any signal for this coefficient as it has been incorporated to study non-linearities between Leverage and Geographic Diversification. Consequentially, this variable should be analysed together with the variable *SRGEODIV_{it}*, presented below.
- ***SRGEODIV_{it}*** is the square ratio of *GEODIV_{it}*, measured by the square ratio of geographic entropy measure, adopting a similar approach to the one used in Singh and Nejadmalayeri (2004). This variable is introduced to study possible non-linear relationships between Leverage and Geographic Diversification. As such, recalling H₂, an inverted U-shape relationship between Leverage and Geographic Diversification, it is expected its coefficient to be negative.

Control Variables

- ***PROF_{it}*** is the Profitability for the company *i* in the year *t*. In this study, we used the proxy Return on Assets (Earnings before interest and taxes/ Total Assets), since it is

² The market value of debt would be a more accurate measure. However, to achieve it, maturity dates and interest rates will be needed, implying a smaller sample to have that information available. Additionally, Bowman (1980) and Titman and Wessels (1988) found evidence of a large cross-sectional correlation between market value of debt and its book value.

considered an efficient variable, on account of being correlated with additional return measures (Bettis, 1981). Myers and Majluf (1984) defend that firms prefer internal funds, rather than external financing, leaving the choice of the Leverage level dependent on the investment opportunities and the cash flow available. In this way, more profitable firms will have more retained earnings (*ceteris paribus*) to finance their growth, having lower Leverage. Adversely, analysing the trade-off between tax advantage of debt and the Leverage related costs, other authors, Kraus and Litzenberger (1973), Bradley, *et al.* (1984) and Hillier, *et al.* (2011), proposed a contrary expected relationship between profitability and debt. According to *Trade-off theory*, discussed in the section 2.1.2, firms with better performance will attempt to reduce the taxes from its positive earnings, using deductible interest expenses. Finally, the signalling effect of debt, previously exposed in the section 2.1.4, also contributes to a positive expected relationship between Profitability and Leverage, because issuance of debt signs the capability of the firm comply with future debt payments, being an efficient way to adjust the information asymmetries between stakeholders over firm's performance. Despite the contradiction in the literature, we expected a negative relationship between Profitability and Leverage, following the findings present in the previous studies - Barton and Gordon (1988), Singh, *et al.* (2003), Singh and Nejadmalayeri (2004), Joliet and Muller (2013) and Frank and Goyal (2009).

- **TANG_{it}** is the Asset Tangibility for the company *i* in the year *t*, incorporating the value of assets in place that might be used as debt collateral, measured through the ratio of Property, Plant and Equipment to Total Assets, also used, among others, in Frank and Goyal (2009). The Asset Tangibility captures the possible debt collaterals and consequently the value liquidation of firm in case of bankruptcy. As a result, it is expected that the possession of relative high tangible assets will improve debt capacity, since debtholders will perceived a lower risk, reducing the agency costs of debt. Therefore, we incorporated Assets Tangibility to analyse this positive expected relationship, as in similar studies (Myers, 1984; Barton and Gordon, 1988; Singh, *et al.*, 2003; Frank and Goyal, 2009) and expect its coefficient to be positive.
- **SIZE_{it}** is the Firm Size for the company *i* in the year *t*. Following similar studies (Singh, *et al.*, 2003; Singh and Nejadmalayeri, 2004; Frank and Goyal, 2009) we use

for the size variable the logarithm of assets. Also in which concerns this variable, *Pecking Order theory* and *Trade-off theory* have opposite perspectives in respect to Firm Size. Based on *Pecking Order theory* (Myers and Majluf, 1984), exposed in section 2.1.3, as well as Titman and Wessels (1988) is expected a negative relationship, since smaller firms have higher costs in equity issues than larger ones and are consequently predisposed to use more debt. Contrarily, from *Trade-off theory*, it is expected a positive relationship, because firms with more robust structure will be able to reduce the transaction and agency costs, being able to trade larger blocks of debt. We expect a positive relationship between Leverage and Firm Size, as reported by Singh, *et al.* (2003), Singh and Nejadmalayeri (2004) and Frank and Goyal (2009).

- ***GROWTH_{it}*** represents the Growth Opportunities for the company *i* in the year *t*. As Rajan and Zingales (1995), Singh, *et al.* (2003), Singh and Nejadmalayeri (2004) and Joliet and Muller (2013), we use Market-to-book Ratio as a proxy for growth opportunities, being determined through the ratio of the Enterprise Value³ to Total Assets. As it was pointed out by Myers (1977), growth opportunities could be postponed or eventually wasted, when firms have their cash-flows restricted to ensure debt commitments. Based on that, we expect a negative signal for the coefficient of Growth Opportunities.
- ***EFFICIENCY_{it}*** is the Managerial Efficiency for the company *i* in the year *t*. We use the amount of revenues generated for each euro of assets as a proxy of the Managerial Efficiency, that is Asset Turnover ratio (Sales to total Assets), consistent with Singh, *et al.* (2003). Firms less efficient than others will require more management restraint devices. Knowing that debt is as disciplinary mechanism of managers and controlling device of free cash-flow, it is expected a negative relationship between Leverage and Managerial Efficiency, as it was reported by Singh, *et al.* (2003).
- **$\beta_0, \beta_1, \beta_2, \dots, \beta_k$** are the Regression Coefficients;

³ Enterprise Value is computed through the Fiscal Period End Market Capitalisation, plus Preferred Stock, plus Minority Interest, plus Total Debt, minus Cash.

- ε_{it} is the estimation error which complies with the classical assumptions of models estimated by OLS technique.

Table 2 summarizes the dependent variables, explanatory and control variables, hypotheses, variable proxies used in this study and its expected signal on leverage.

Table 2: Summary of the dependent and independent variables and expected relationship with Leverage.

Hypotheses/ Variables		Proxy Variable	Short Representation	Expected Signal
Dependent Variables (LEV)				
Total Debt Ratio		Total Debt / (Total Debt + Market Capitalization)	TDR	
Long-term Debt Ratio		Long-term Debt Ratio / (Total Debt + Market Capitalization)	LTDR	
Short-term Debt Ratio		Short-term Debt Ratio / (Total Debt + Market Capitalization)	STDR	
Hypotheses and Explanatory Variables				
H ₁	Product Diversification	Entropy measure using operational sales segments	PRODDIV	+
H ₂	Geographic Diversification	Entropy measure using geographic sales segments	GEODIV	?
		Square Ratio of GEODIV	SRGEODIV	-
Control Variables				
Profitability		Earnings before interest and taxes/ Total Assets	PROF	-
Asset Tangibility		Net Property, Plant and Equipment / Total Assets	TANG	+
Firm Size		Logarithm of Total Assets	SIZE	+
Growth opportunities		Enterprise Value / Total Assets	GROWTH	-
Managerial Efficiency		Sales / Total Assets	EFFICIENCY	-

Note: As referred in the definition of LEV_{it} variable, firms Leverage was measured through the three debt ratios summarized in this table.

We present in this section the research hypotheses and the models for testing them. In next section, we present the sample and data collection, as well as its descriptive statistics.

5. Sample Selection and Descriptive Statistics

Our research analyses the impact of Diversification on Leverage. We have focused the selection of our sample on Portuguese companies listed on *Euronext Lisbon*. The reason for this choice comes from the fact that, as far we know, no previous research in the field of Leverage and Diversification has been carried out using Portuguese data.

Section 5.1 presents the sample selection and data collection. Descriptive statistics of the sample used in this study are displayed and discussed in section 5.2.

5.1 Sample Selection and Data

The data of the annual reports and disclosures of segment information were collected from *DataStream* database of *Thomson Reuters* for listed Portuguese companies on *Euronext Lisbon* in 2015.

Financial companies were excluded, since they have specific regulations applied to their capital structure as well as companies with year-end different from 31st of December, constructing a panel data with annual frequency from January until December of each year.

Our sample period extends from 2003 to 2013, since we considered relevant to include the most recent data available, thus, the sample is composed by observations until 2013; on the other hand, as a result of the current financial crisis, beginning in 2008 (Grouhy, *et al.*, 2008), the time period window was expanded incorporating five years before, in order to capture a pre-crisis period.

The final sample was computed eliminating observations with no data available for the variables in study, achieving a final sample of 35 companies⁴, representing 203 company-year combinations.

⁴ The companies are presented in Annex 1.

5.2 Descriptive Statistics

5.2.1 Global Characterization of the sample

Table 3 reports the number of firms in sample by industry in accordance with two-digits SIC Code⁵.

Table 3: Sample distribution across industries.

Industry	Companies	Obs.	% Obs.
Business Services	3	23	11%
Communications	4	22	11%
Food Stores	2	20	10%
Heavy Construction, Except Building Construction - Contractors	4	19	9%
Lumber and Wood Products, Except Furniture	2	18	9%
Paper and Allied Products	3	17	8%
Electric, Gas and Sanitary Services	2	16	8%
Stone, Clay, Glass, and Concrete Products	2	14	7%
Eating and Drinking Places	1	9	4%
Wholesale Trade - Durable Goods	1	9	4%
Amusement and Recreation Services	1	6	3%
Petroleum Refining and Related Industries	1	6	3%
Printing, Publishing and Allied Industries	2	6	3%
Transportation Equipment	1	6	3%
Food and Kindred Products	2	5	2%
Wholesale Trade - Nondurable Goods	1	4	2%
Hotels, Rooming Houses, Camps, and Other Lodging Places	1	1	0%
Primary Metal Industries	1	1	0%
Real Estate	1	1	0%
Total	35	203	100%

Note: Industries correspond to the Two-digit SIC Code.

Table 3 shows that the observations are distributed along several sectors, being the ones with more percentage Business Services and Communications with 11% of the total panel each one. Consequently, no influence is expected from the industry.

The sample was broadly divided into two groups as presented in Table 4, taking into account the two types of diversification strategy – product and geographic – using the segment report of sales and computing the *Entropy Measure of Diversification* for each type, applying the formula on the Appendix 1.

Table 4 reveals that most of the current listed Portuguese companies are in average focused in a single segment for both Product and Geographic strategies. Regarding

⁵ Standard Industrial Classification code is a four-digit numerical code assigned by the United States Government to identify the primary business of a company. The first two digits identify the major Industry Group.

Geographic Diversification, the number of companies highly diversified is higher than within Product Diversification group.

Table 4: Breakdown of the sample within each type of diversification, using *Entropy Measure of Diversification* Index.

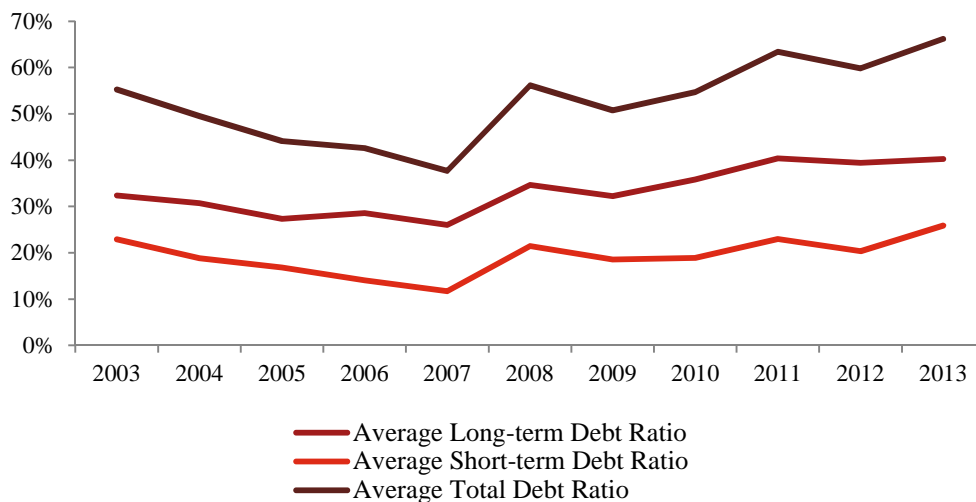
Year	Product Diversification			Total	Geographic Diversification			Total
	Focused	Medium	High		Focused	Medium	High	
2003	12	5	1	18	13	2	3	18
2004	15	4		19	13	2	4	19
2005	15	3		18	14	1	3	18
2006	14	2		16	13	1	2	16
2007	17	1	1	19	16	2	1	19
2008	16	3	1	20	19	1		20
2009	12	6	1	19	14	3	2	19
2010	12	6	2	20	15	4	1	20
2011	16	6	2	24	16	6	2	24
2012	10	4		14	8	5	1	14
2013	13	3		16	10	4	2	16
Total	152	43	8	203	151	31	21	203

Notes:

If the *Entropy Measure of Diversification* index is 0, the company is focused in a single segment, having no diversification, referred to as “focused”; indexes between 1 and 1.5 represent firms with medium diversification (“medium” column); being high diversification showed by ratios higher than 1.5 (“high” column).

Graph 1 presents the evolution of the debt ratios, different proxies for our dependent research variables, for the sample in the study.

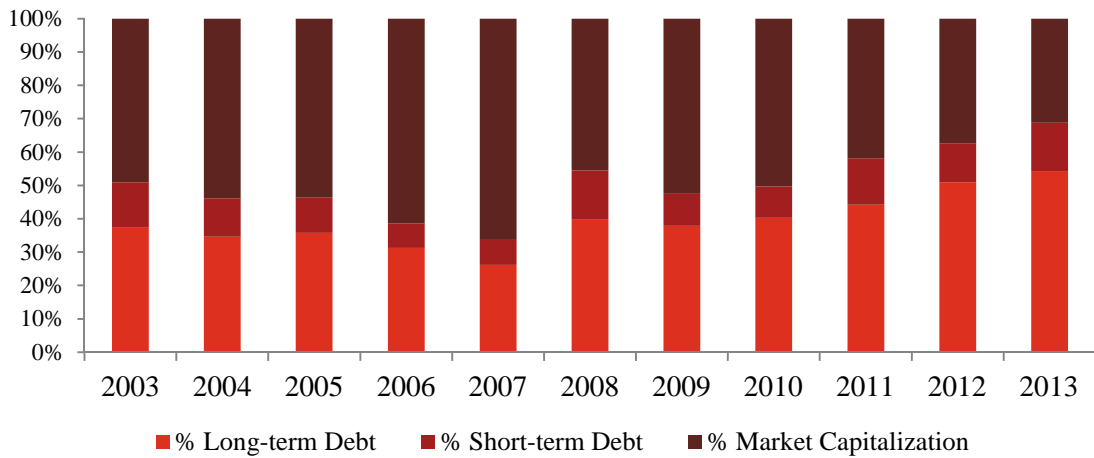
Graph 1: Sample Average Leverage evolution between 2003 and 2013.



On average, companies have more than 50% of the capital structure composed by debt, except in the years from 2004 until 2007.

Graph 2 displays the average composition of the capital structure of the sample.

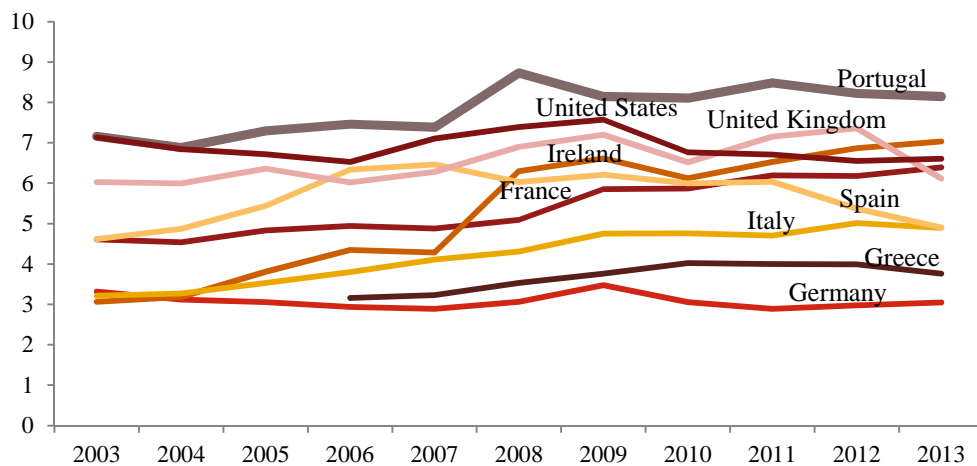
Graph 2: Average composition of Sample Capital Structure between 2003 and 2013.



From 2003 until 2007, on average the equity slice of the capital structure increased. In the period of the 2008 financial crisis, from 2008 until the present, the equity financing was replaced by long-term debt. As respect of short-term debt, 2003, 2004, 2008, 2011 and 2013 were the years with higher significance; although, it remains more or less constant over the period under review.

Graph 3 presents the evolution of the Debt to Gross Operating Surplus Ratio for the period under review for Non-Financial companies in several European countries and United States of America.

Graph 3: Non-financial corporations' debt to gross operating surplus ratio, between 2003 and 2013.



Source: Organisation for Economic Co-operation and Development (OECD).

Debt is the sum of securities other than shares, except financial derivatives, loans and other accounts payables. Gross operating surplus is the measure of Earnings before interest and depreciation and amortizations and taxes. A ratio of 2.5 means that debt outstanding is 2.5 times larger than the gross operating surplus (OECD, 2015).

Graph 3 reveals that the evolution of leverage in the sample is consistent with the evolution of Debt to Gross Operating Surplus Ratio, for Portuguese non-financial companies during the period in analysis.

Comparing to countries from the empirical studies developed in the field (Barton and Gordon, 1988; Kochhar and Hitt, 1998; Menendez-Alonso, 2003; Singh, *et al.*, 2003; Singh and Nejadmalayeri, 2004; Joliet and Muller, 2013) Portuguese companies are consistently more levered than the ones from United Kingdom, France, Spain, Germany and United States of America.

In matter of leverage of listed Portuguese companies, the International Monetary Fund reports its excess in the Global Financial Stability Report of 2013 (IMF, 2013). The document also contains vulnerability indicators for listed companies to measure Profitability and Interest Coverage Ratio. It was reported that 32% of the Portuguese listed companies in 2011 had their Interest Coverage Ratios below 1; regarding profitability, the results were similar to listed companies of Spain and Italy, but below the average of German, France and Ireland (IMF, 2013).

Based on the above referred, we inferred that leverage in our sample is consistent with statistics from Portugal and also with IMF (2013) conclusions for listed Portuguese companies. As such, we considered our sample representative of the listed Portuguese companies' scenario.

5.2.2 Other Descriptive Statistics

Table 5 exhibits some of descriptive statistics – mean, median, maximum, minimum and standard deviation of the research variables.

The sample was divided into two panels for each type of diversification (product and geographic), according to the breakdown based on the *Entropy Measure of Diversification*: low for diversification focused in a single segment (Panel B and D) and high is a cumulative representation of the parameters medium and high referred in Table 4 (Panel A and C).

Regarding Panel A and B, firms with high Product Diversification feature 0.55 average Leverage, against 0.52 for low Product diversified firms. Singh, *et al.* (2003) reported

similar results, being product diversified firms the ones with higher means for the Leverage indicators.

Table 5: Descriptive Statistics of the Sample.

	LEV	PROD DIV	GEO DIV	PROF	TANG	SIZE	GROWTH	EFFICIENCY
Panel A – High Product Diversification								
Mean	0.55	1.23	0.73	0.03	0.33	5.94	0.81	0.76
Median	0.60	1.12	0.70	0.04	0.36	5.57	0.73	0.68
Maximum	0.94	1.87	1.88	0.22	0.61	7.63	1.39	2.24
Minimum	0.02	1.00	0.00	-0.20	0.01	4.25	0.33	0.31
Std. Dev.	0.26	0.23	0.52	0.07	0.17	0.96	0.24	0.41
N	51	51	51	51	51	51	51	51
Panel B - Low Product Diversification								
Mean	0.52	0.44	0.71	0.05	0.37	6.01	0.90	0.81
Median	0.52	0.50	0.59	0.06	0.37	6.06	0.81	0.65
Maximum	0.98	0.99	2.19	0.19	0.81	7.49	3.42	2.40
Minimum	0.05	0.00	0.00	-0.27	0.00	3.80	0.23	0.01
Std. Dev.	0.23	0.32	0.60	0.06	0.20	0.68	0.45	0.51
N	152	152	152	152	152	152	152	152
Panel C - High Geographic Diversification								
Mean	0.59	0.67	1.53	0.04	0.43	6.30	0.77	0.61
Median	0.58	0.61	1.41	0.05	0.43	6.34	0.70	0.50
Maximum	0.98	1.87	2.19	0.11	0.73	7.63	1.39	1.02
Minimum	0.29	0.00	1.00	-0.20	0.14	4.97	0.38	0.31
Std. Dev.	0.18	0.60	0.36	0.05	0.16	0.67	0.25	0.21
N	52	52	52	52	52	52	52	52
Panel D- Low Geographic Diversification								
Mean	0.51	0.63	0.43	0.04	0.34	5.89	0.91	0.87
Median	0.54	0.65	0.45	0.05	0.36	5.88	0.82	0.73
Maximum	0.97	1.66	0.97	0.22	0.81	7.55	3.42	2.40
Minimum	0.02	0.00	0.00	-0.27	0.00	3.80	0.23	0.01
Std. Dev.	0.25	0.39	0.31	0.07	0.20	0.76	0.44	0.53
N	151	151	151	151	151	151	151	151

Notes:

Panel A represents product diversified firms with Product Diversification Index above 1;

Panel B is composed by the companies with Product Diversification Index below 1, being focused in one segment;

Panel C belong to high geographic diversification companies, with Geographic Diversification Index above 1;

Panel D corresponds to firms' sales focused only in one country, having Geographic Diversification Indexes below 1.

LEV represents the dependent variable Leverage, measured through the ratio of total debt to the sum of total debt plus market capitalization.

Independent Variables – PRODDIV: Product Diversification; GEODIV: Geographic Diversification; PROF:

Profitability; TANG: Tangibility; GROWTH: Growth opportunities; EFFICIENCY: Managerial Efficiency.

N – Observations.

Firms with higher Geographic Diversification have, on average, higher Leverage, being opposite results found in Singh, *et al.* (2003) and Singh and Nejadmalayeri (2004). Those authors reported that on average domestic firms have more Leverage.

As noted in Table 5, the maximum level of Leverage is displayed in Panel B and C, corresponding to Firms with low Product Diversification or with high Geographic Diversification.

Profitability displays similar results for each panel – on average firms have positive levels of Profitability, although, the lag between the minimum and maximum and also the standard deviation value (above the mean) indicate a great level of dispersion. Considering the potential existence of outliers, this will be treated in robustness tests of the model.

On average, the four panels, A, B, C and D reveal similar Asset Tangibility values, being also accentuated the lag between the maximum and minimum for this variable, since some firms present no Asset Tangibility at all (zero value), meaning residual values of Property, Plant and Equipment in its Assets, against firms with Property Plant and Equipment representing 81% of the total Assets.

Regarding Firm Size, considering that all the firms in the sample are listed companies, the values of standard deviation are small comparing with the means, showing low dispersion of values.

Growth Opportunities, measured through Market-to-book Ratio, are on average superior for focused firms, whereas the high values belong to Panel B and D, belonging to firms with low diversification.

On the subject of Managerial Efficiency, more diversified firms are on average the ones with higher values of Asset Turnover ratios.

In short, at this stage, it appears that firms with more international activities have more Leverage, on average. Regarding Product Diversification, firms more focused have, on average, lower levels of Leverage.

Having presented the procedures of the sample for testing the hypotheses formulated in section 4 and data collection, we discussed in section 6 the empirical results.

6. Empirical Results

The first section will start with a univariate analysis of the relationship between Leverage, as dependent variable, and the explanatory variables presented in the section 4.

Finally, the empirical results obtained from the regression analysis to test the formulated hypotheses will be presented and discussed in section 6.2. Throughout the analysis, the models have been regressed by OLS (Ordinary Least Squares).

6.1 Univariate Results

The purpose of the univariate analysis is to investigate separately the relationship between the dependent variable and each independent variable. This exercise is also useful to select which variables should be incorporated in the regression models. However, we built the model and the explanatory variables to test the hypotheses formulated in the section 4 and several control variables based on the literature review.

Table 6 presents the Pearson correlation coefficients among our research variables, including only the Total Debt Ratio as dependent variable. The correlation matrixes using instead of Total Debt, Long-term Debt and Short-term Debt Ratios which evidence similar results, are tabulated in Appendix 3 and Appendix 4 of this study.

Table 6: Pearson Correlation Matrix, using Total Debt Ratio as Leverage measure.

	LEV	PROD DIV	GEO DIV	PROF	TANG	SIZE	GROWTH	EFFICIENCY
DEBT RATIO	1.00							
PRODDIV	0.02	1.00						
GEODIV	0.10	-0.07	1.00					
PROF	-0.41***	-0.10	0.03	1.00				
TANG	0.04	-0.23***	0.31***	0.23***	1.00			
SIZE	0.10	0.12*	0.23***	0.32***	0.35***	1.00		
GROWTH	-0.57***	-0.07	-0.12*	0.10	0.10	-0.05	1.00	
EFFICIENCY	-0.48***	-0.22***	-0.10	0.30***	0.04	-0.13*	0.38***	1.00

Notes:

***, **, * Significant at the 1, 5, and 10 percent levels, respectively. LEV represents the dependent variable Leverage, measured through the ratio of total debt to the sum of total debt plus market capitalization. Independent Variables – PRODDIV: Product Diversification; GEODIV: Geographic Diversification; PROF: Profitability; TANG: Asset Tangibility; GROWTH: Growth opportunities; EFFICIENCY: Managerial Efficiency.

Regarding the correlation with Leverage, only Profitability, Growth Opportunities and Managerial Efficiency have a statistical significance relationship with Leverage, being negative as expected.

Using the Long-term Debt Ratio as dependent variable, the results are similar to the ones previous exposed, being Firm Size, additionally, as expected, positive correlated.

Short-term Debt Ratio appears negatively correlated with Profitability, Firm Size and Growth Opportunities, also as expected.

The magnitude of the correlation among the independent variables is relatively low, being all the coefficients below 0.5, suggesting no significant multicollinearity between these variables, which should be taken into account in the regressions analysis.

It should however be noted that Asset Tangibility exhibits coefficients statistically significant with Product Diversification, Geographic Diversification, Profitability and Firm Size in the Total Debt Ratio, Long-term Debt Ratio and Short-term Debt Ratio correlation matrixes. This result highlights the link between resources and the type of firm's diversification (Chatterjee and Wernerfelt, 1991), since the company's strategy dictates the type of assets.

The results in Table 6 also show a statistical significant relationship between Firm Size and Geographic Diversification, Profitability, Asset Tangibility, Product Diversification and Managerial Efficiency for the three correlation matrixes. In fact, Firm Size captures several companies' characteristics. It is usually the correlation of Firm Size with the remaining independent variables, as it was reported for example in Singh, *et al.* (2003).

6.2 Multivariate Results

Following the details of the sample characterization described in section 5, we incorporated in the equation (4.1) a *dummy* variable to control the period of the 2008 Financial Crisis. Recalling, the leverage of the sample changes its descending evolution in the beginning of the 2008, becoming relevant incorporate this qualitative variable.

Firstly, we will discuss our findings from the regression of the model (4.1) in section 6.2.1. Then, in section 6.2.2, we will analyse in more detail the impact of 2008 Financial Crisis on Leverage.

6.2.1 General Empirical Results

During the year of 2005, within our sample time period, a mandatory transition from local account rules (Local GAAP) to International Accounting Standards/International Financial Reporting Standards (IAS/IFRS) occurred for public European companies, which may have impact on our findings. This transition, with the aim to increase the quality and consistency of reporting standards, has led to major changes in several reported disclosures and financial indicators (Vazakides, *et al.*, 2013). In particular, the reported total assets had significant changes, due to revisions on goodwill, intangible assets, property, plant and equipment, investment property and deferred tax assets (Costa and Lopes, 2010; Vazakides, *et al.*, 2013). Regarding liabilities, the major changes impacted the reported provisions and deferred tax liabilities (Costa and Lopes, 2010; Vazakides, *et al.*, 2013). It was also reported significant changes in ratios, like Return on Assets (Earnings before Interest and Taxes to Total Assets) and Return on Equity (Net Income to Total Equity) (Costa and Lopes, 2010; Vazakides, *et al.*, 2013).

Considering the significant changes with IAS/IFRS transition, most of the control variables of our study could be affected, because Total Assets is a deflator used in Profitability, Asset Tangibility, Growth opportunities and Managerial Efficiency, and it is the measure of Firm Size. Additionally, Property, Plant and Equipment and Return on Assets were also influenced with changes in the accounting standards, affecting Asset Tangibility and Profitability, respectively.

Regarding our explanatory variables (Product and Geographic Diversification), the segment report of sales was also required in the Portuguese GAAP, so those variables were not affected with the IAS/IFRS transition.

Wherefore, we control any the effect of the IAS/IFRS transition, by regression our sample for the period 2005 – 2013, where all listed firms applied the international standard and concluded about the differences between the whole period 2003 – 2013 and 2005 – 2013.

Table 7 shows the results of the regression models (4.1), using sample pooled over years and firms, for each dependent variable, Total Debt Ratio, Long-term Debt Ratio and Short-term Debt Ratio. The Appendix 5 reports the results of the regressions models (4.1) for the sample from 2005 until 2013.

Table 7: Regression Results of the Model (4.1) for the total sample, for the period 2003 - 2013.

The table reports results of regressions regarding the three debt ratios – total debt to the sum of total debt and market capitalization ratio; long-term debt to the sum of total debt and market capitalization ratio and short-term debt to the sum of total debt and market capitalization ratio - using the explanatory variables presented in the section 4.

Independent Variables	Expected Signal	Leverage (Dependent Variables)		
		TDR	LTDR	STDR
Explanatory Variables				
PRODDIV	+	0.00 (0)	-0.05* (-1.87)	0.03 (1.45)
GEODIV	?	0.14* (1.95)	0.03 (0.44)	0.10 (1.15)
SRGEODIV	-	-0.09** (-2.59)	0.00 (-0.11)	-0.08* (-1.92)
Control Variables				
PROF	-	-0.91*** (-5.55)	-0.21 (-1.31)	-0.76*** (-5.12)
TANG	+	0.05 (0)	-0.17** (-2.35)	0.23*** (5.26)
SIZE	+	0.03 (1)	0.08*** (3.12)	-0.06*** (-3.1)
GROWTH	-	-0.24*** (-9.21)	-0.09*** (-3.59)	-0.15*** (-3.51)
EFFICIENCY	-	-0.13*** (-3.13)	-0.15*** (-4.18)	0.02 (0.91)
DFC2008	?	0.05** (2.78)	0.04*** (2.27)	0.01 (0.65)
R ²		57%	36%	32%
Adjusted R ²		55%	33%	29%
F-statistic		2.80	11.97	10.02
Prob(F-statistic)		0.000	0.000	0.000
Observations		203		
Periods		2003 - 2013		
Method		Random Effect		

Notes:

T-statistics are given below the coefficients estimates in parenthesis. ***, **, * Significant at the 1, 5, and 10 percent levels, respectively.

The *Hausman Test*, reported in Appendix 2, was performed, being the null hypothesis not rejected for all three models, i.e., the random effect estimator is more adequate than the fixed effect.

Dependent Variables - TDR: Total Debt Ratio; LTDR: Long-term Debt Ratio; STDR: Short-term Debt Ratio.

Independent Variables – PRODDIV: Product Diversification; GEODIV: Geographic Diversification; SRGEODIV: Square Ratio of Geographic Diversification; PROF: Profitability; TANG: Asset Tangibility; GROWTH: Growth opportunities; EFFICIENCY: Managerial Efficiency; DFC2008: *dummy* variable which assumes 1 if 2008 financial crisis is present, i.e. if the years are from 2008 until 2013 and 0 otherwise.

Our aim is to test the relationship between Leverage and Product and Geographic Diversification, being the main parameters of interest to test the hypotheses the coefficients of PRODDIV and SRGEODIV.

In a first stage, it will be assessed if the fitted model to the data is statistical significant, performing the following overall test of significance:

$$H_0: \beta_1 = \beta_2 = \dots \beta_k = 0$$

$$H_1: \text{at least one } \beta_j \neq 0.$$

Thereafter, the hypotheses test will be performed to report the empirical evidence obtain, complementing with a balance between the results accomplished and the hypotheses designed.

From an overall test of significance perspective, as disclosed in Table 7, *p-value* is equal to 0.000 for the three regressions; so, the null hypothesis is rejected. Accordingly, the model as a whole explains the Leverage variables.

Analysing the R^2 , a comparative measure of the explanatory power of the regressions models, all the three models have this indicator above 30%, being similar levels obtained in previous studies (Singh, *et al.*, 2003; Singh and Nejadmalayeri, 2004; Frank and Goyal, 2009).

Empirical Results

The positive expected relationship between Leverage and Product Diversification, defined in H_1 , was not confirmed for the three Leverage regressions. In fact, Product Diversification presents a negative relationship with Long-term debt ratio in the whole period. Nonetheless, in the regression for the sample under IAS/IFRS, after 2005, Product Diversification is not statistical significant in the three Leverage measures, being the IAS/IFRS transition a possible explanation for the unexpected result achieved in the Long-term debt ratio regression.

Regarding Geographic Diversification, its non-linearity was confirmed for Total Debt and Short-term Debt Ratio regressions, being reported an inverted U-shape relationship with Geographic Diversification for Total Debt and Short-term Debt Ratios. As predicted, the empirical evidence tends to corroborate the formulated research

hypothesis, H₂, for Total Debt and Short-term Debt Ratio regressions, having the SRGEODIV a negative signal.

Our findings contrast with the results reported by Barton and Gordon (1988), Singh, *et al.* (2003) and Singh and Nejadmalayeri (2004), who found significant relationships between Leverage and diversification variables. Nonetheless, Product Diversification appears with no explanatory power of listed Portuguese companies' capital structure, similarly to the result obtain in Menendez-Alonso (2003) for Spanish companies.

Despite this, a non-linear inverted U-shape relationship between Short-term Debt Ratio and Geographic Diversification is consistent with Singh and Nejadmalayeri (2004).

Regarding the control variables included in the study, for the three Debt Ratios, the findings included in Table 7 diverge among dependent variables, being presented as follows.

Total Debt Ratio Regression and Control Variables

The Total Debt Ratio appears negatively correlated, as predicted, with Profitability, Growth Opportunities and Managerial Efficiency. Comparing with the results for the period 2005 – 2013 (Appendix 5), this last variable appears not statistically significant. The *dummy* variable to control the impact of 2008 Financial Crisis in Leverage, presents a significant level, expressing a positive relationship between Total Debt Ratio and the 2008 Financial Crisis.

Long-term Debt Ratio Regression and Control Variables

Analysing Long-term Debt Ratio, this dependent variable is negatively correlated, as expected, with Growth Opportunities and Managerial Efficiency, being identical results reported for the sample in the period of 2005 – 2013, as tabulated in Appendix 5.

On the other hand, Asset Tangibility coefficient shows a different sign compared to the expected, being Long-term Debt Ratio negatively correlated with the independent variable. This finding is contrarian to our prediction and might be the result of the significant changes that occurred with the IAS/IFRS transition, specifically regarding Property, Plant and Equipment, since this coefficient is not statistical significant in the regression presented in Appendix 5 for the sample after 2005.

Profitability, measured by Return on Assets, a ratio largely affected by the IAS/IFRS transition (Costa and Lopes, 2010), presents only for the sample after 2005 a negative statistical significant relationship, as predicted, with Long-term Debt Ratio.

Firm Size is statistical significant, presenting a positive relationship with Long-term Debt. As previously discussed, Total Assets were also reported as a financial statement line significantly impacted by the IAS/IFRS transition, although, this finding prevails in the regression for 2005 – 2013.

Another important finding is the significant statistical relationship with Long-term Debt Ratio and the 2008 Financial Crisis, being the *dummy* variable positive correlated.

Short-term Debt Ratio Regression and Control Variables

Regardless of the periods analysed, 2003 – 2013 or isolating 2005 – 2013, Short-term Debt Ratio is negatively correlated with Profitability and Growth Opportunities. Asset Tangibility presents a positive coefficient signal. These findings follow our predictions expressed in section 4.

Regarding Firm Size, it is negatively correlated, for the whole sample. However, our predictions expressed in section 4 are that Leverage is positively correlated with Firm Size, because larger companies may reduce the transaction and agency costs of Debt than small ones. Nonetheless, the results presented indicate that Firm Size might allow access to debt with larger maturities, reducing the Short-term Debt usage.

The evidence collected does not corroborate our prediction on Managerial Efficiency, for the period after 2005. The positive coefficient might be justified by the fact that Short-term Debt represents a smaller slice of the capital structure and its obligations end or are renewed within one year, being a non effective managerial constraint device, as could be Long-term Debt. On these grounds, Long-term Debt Ratio regression confirmed our expectations, being Long-term Debt Ratios smaller for more efficient firms. However, this decrease on Leverage could not be completely offset with equity financing, generating and increase in Short-term Debt Ratios.

Summary

In summary, Table 8 shows the predicted and observed signal for each of the variable for the three variant models reported in Table 7.

Table 8: Expected and observed signal by variable.

Hypotheses / Variables		Short Representation	Expected Signal	TDR	LTDR	STDR
Explanatory Variables						
H ₁	Product Diversification	PRODDIV	+	NS	-	NS
H ₂	Geographic Diversification	GEODIV and SRGEODIV	-	-	NS	-
Control Variables						
	Profitability	PROF	-	-	NS	-
	Asset Tangibility	TANG	+	NS	-	+
	Firm Size	SIZE	+	NS	+	-
	Growth opportunities	GROWTH	-	-	-	-
	Managerial Efficiency	EFFICIENCY	-	-	-	NS

Notes:

NS – not supported. Hypotheses definition is presented in section 4.

Dependent Variables - TDR: Total Debt Ratio; LTDR: Long-term Debt Ratio; STDR: Short-term Debt Ratio.

The empirical evidence collected in terms of Profitability for Total Debt Ratio and Short-term Debt Ratio is similar to the findings of Barton and Gordon (1988), Kochhar and Hitt (1998), Singh, *et al.* (2003), Singh and Nejadmalayeri (2004) and Frank and Goyal (2009).

Asset Tangibility in Barton and Gordon (1988) study also was reported as being not statistical significant. Despite this, the positive relationship in the Short-term Debt Ratio regression was also found in Singh and Nejadmalayeri (2004) and Frank and Goyal (2009).

The positive relationship between Long-term Debt Ratio and Firm Size is coincident with the findings in Kochhar and Hitt (1998), Singh, *et al.* (2003) and Frank and Goyal (2009).

Regarding Growth opportunities, measured by Market-to-book ratio, the negative coefficient for all the three regressions complies with the relationships reported between Leverage and this indicator in Frank and Goyal (2009).

The negative signal of Managerial Efficiency for the regressions with Total Debt Ratio and Long-term Debt as dependent variable is also stated in Singh, *et al.* (2003).

6.2.2 Additional Analysis - Impact of 2008 Financial Crisis

Following the significant level found in the *dummy* variable evaluating the impact of 2008 Financial Crisis in Total Debt Ratio and Long-term Debt Ratio regressions, we

further explored whether the 2008 Financial Crisis period had an incremental effect on our global findings.

For that purpose, the equation (4.1) was regressed splitting the sample in two periods, before and after the financial crisis. We assumed the crisis began in 2008 (Grouhy, *et al.*, 2008). This allowed us to test the differentiating effects of the current financial crisis. Table 9 presents the results for the variable Long-term Debt Ratio, being Total Debt Ratio regression not tabulated for the sake of parsimony, but with similar results.

As noted in Table 9, prior and post financial crisis, Product Diversification has no explanatory power in determining Long-term Debt Ratio. On the other hand, in the period of financial crisis, Long-term Debt presents a negative non-linear relationship with Geographic Diversification.

Profitability in the period after financial crisis exhibits a negative sign, as expected; although, Profitability does not present a significant coefficient in the regression prior financial crisis.

Asset Tangibility in the model with the total sample has an unexpected relationship with Leverage, presenting a negative significant coefficient; although, in the models reported in Table 9, it appears with no level of significance for both regressions after and prior 2008.

Long-term Debt Ratio exhibits a positive correlation with Firm Size for the period after 2008, having no significant statistical relationship before the 2008.

Regarding Growth Opportunities and Managerial Efficiency, it appears that Leverage is negative correlated in both periods.

In summary, before the financial crisis, only Growth Opportunities and Managerial Efficiency expressed a significant relationship with Long-term Debt; after 2008, Profitability and Firm Size have additional explanatory power, being also presented an inverted U-shape relationship with Geographic Diversification. Considering the whole sample, the major difference is the significance of Asset Tangibility, not confirmed in the periods before and after crisis (coefficients not statistically significant).

Table 9: Regression Results of the Model (4.1) splitting the sample before and after 2008 financial crisis for the dependent variable Long-term Debt Ratio.

The table reports results of regressions regarding the long-term debt ratio - long-term debt to the sum of total debt and market capitalization ratio - using the explanatory variables presented in the third section and splitting the sample into two periods – before and after 2008.

Independent Variables	Expected Signal	Long-term Debt Ratio		
		2003 - 2007	2008 - 2013	2003 - 2013
Explanatory Variables				
PRODDIV	+	-0.01 (-0.36)	-0.02 (-0.44)	-0.05* (-1.87)
GEODIV	?	0.03 (0.31)	0.15* (1.66)	0.03 (0.44)
SRGEODIV	-	-0.01 (-0.22)	-0.09* (-1.91)	0.00 (-0.11)
Control Variables				
PROF	-	-0.01 (-0.05)	-0.53** (-2.7)	-0.21 (-1.31)
TANG	+	0.09 (0.7)	-0.09 (-1.16)	-0.17** (-2.35)
SIZE	+	0.03 (0.78)	0.09*** (3.29)	0.08*** (3.12)
GROWTH	-	-0.08** (-2.76)	-0.09* (-1.77)	-0.09*** (-3.59)
EFFICIENCY	-	-0.11** (-2.2)	-0.15*** (-3.46)	-0.15*** (-4.18)
DFC2008	?			0.04** (2.27)
R ²		18%	34%	36%
Adjusted R ²		10%	29%	33%
F-statistic		2.27	6.84	11.97
Prob(F-statistic)		0.030	0.000	0.000
Observations		90	113	203
Method		Random Effect	Random Effect	Random Effect
Notes:				
T-statistics are given below the coefficients estimates in parenthesis. ***, **, * Significant at the 1, 5, and 10 percent levels, respectively.				
The <i>Hausman Test</i> , reported in Appendix 2, was performed, being the null hypothesis not rejected for all three models, i.e., the random effect estimator is more adequate than the fixed effect.				
Dependent Variables - LTDR: Long-term Debt Ratio.				
Independent Variables – PRODDIV: Product Diversification; GEODIV: Geographic Diversification; PROF: Profitability; TANG: Asset Tangibility; GROWTH: Growth opportunities; EFFICIENCY: Managerial Efficiency; DFC2008: <i>dummy</i> variable which assumes 1 if 2008 financial crisis is present, i.e. if the years are from 2008 until 2013 and 0 otherwise.				
Results for 2003 – 2013 have been previously presented in Table 7.				

The results suggest that for Portuguese listed companies, Diversification Strategies have low explanatory power. Our findings contradict our expectations formulated in H₁, which concerns Product Diversification.

Regarding non-linearities of Leverage and Geographic Diversification, we supported and inverted U-shape relationship in the Total Debt Ratio and Short-term Debt Ratio regressions, as formulated in H₂. This last finding was also corroborated in the regression of Long-term Debt Ratio, only for the period of 2008 Financial Crisis.

6.3 Robustness Tests

To test the results obtain in the previous section and complementing the empirical analysis, we performed a few sensitivity analyses. For the sake of parsimony, some of the results were not tabulated.

Firstly, we re-estimate the model (4.1), using an alternative deflator for the dependent variables. Secondly, likewise Singh, *et al.* (2003), we controlled the effect of Dual Diversification strategies. Finally, the model was regressed with elimination of outliers.

6.3.1 Alternative Measure of Leverage

Aligned with previous studies, (Singh, *et al.*, 2003; Singh and Nejadmalayeri, 2004; Frank and Goyal, 2009) we used the Total Assets as an alternative deflator for the Leverage ratios, instead of the sum of Debt and Market Capitalization, comparing with the original results in section 6.2.

The Appendix 6 includes the regressions for the equation (4.1), using as dependent variables ratios computed with Total Assets deflator.

In the Total Debt Ratio regression, the most meaningful difference is regarding Geographic Diversification, since the non-linearity previously exposed is not supported.

Regarding Long-term Debt Ratio regression, it appears negatively correlated with Firm Size, contrarian to previous results and also our expectations. However, we re-estimate the regression restricting the sample with observations after 2005, due to IAS/IFRS transition, being Firm Size coefficient not significant.

Considering Short-term Debt Ratio, Firm Size is not statistical significant, contrarian to the previous results.

6.3.2 *Effect of Dual Diversification Strategy*

Product and Geographic Diversification may interact, since one firm could employ a Dual Diversification strategy. As such, we further explored whether that strategy has an impact on our results constructing the model (6.1), introducing the variable PRODDIV*GEODIV, to capture the effect of a Dual Diversification strategy, as detailed:

$$LEV_{it} = \beta_0 + \beta_1 * PRODDIV_{it} + \beta_2 * GEODIV_{it} + \beta_3 * (PRODDIV * GEODIV)_{it} + \beta_4 * PROF_{it} + \beta_5 * TANG_{it} + \beta_6 * SIZE_{it} + \beta_7 * GROWTH_{it} + \beta_8 * EFFICIENCY_{it} + \varepsilon_{it} \quad (6.1)$$

The new variable presents a significant statistical relationship for Long-term Debt and Short-term Debt Ratio regressions. Regarding Long-term Debt Ratio, the coefficient of the new variable is positive, although, GEODIV and PRODDIV have a negative coefficient, both with statistical significance. Singh, *et al.* (2003) also reported a positive impact of Dual Diversification strategies on Leverage.

Analysing the Short-term Debt Ratio regression, the coefficient of the new variable is negative, being GEODIV and PRODDIV positive and also with statistical significance.

Taking into account Agency Costs theories (Jensen and Meckling, 1976), the results for Short-term Debt Ratio seem to confirm that firms with more disperse activities increase their monitoring costs and also information asymmetries, implying higher costs of debt, and consequently, reducing its use. Wherefore, accordant with our findings, a Dual Diversification strategy impacts negatively the Short-term Debt Ratio.

6.3.3 *Sensitivity Test to Outliers*

Recalling the results of the univariate analysis, the variable that exhibits more extreme observations is Profitability, since the lag between the minimum and maximum was high and the standard deviation is equal or above the mean for each Panel exposed in the section 5. Considering this, the extreme observations of Profitability were eliminated, excluding 45 observations. The outliers were identified using the frequency

distribution of the sample, eliminating observation with Profitability above 0.1 and below 0.

The equation (4.1) was estimated for the restricted sample, being most of the results consistent with the previous ones exposed in the multivariate analysis. Notwithstanding, the inverted U-shape relationship with Geographic Diversification in Total Debt Ratio regression is not supported.

7. Conclusion

In this section we will start by presenting the main results achieved in this empirical investigation. Then, we will discuss some study limitations, being the last section dedicated to possible paths of further investigation in this field.

7.1 Discussion of results

The issue of measuring the determinants of capital structure has been discussed for decades.

The main purpose of this study was to discuss the impact of Diversification Strategies in the Capital Structure of Portuguese companies listed on *Euronext Lisbon*.

The capital structure choice is the result of several determinants, and there is not a single theoretical perspective capable of capture all the important aspects in this complex process. In order to update the financial paradigm and incorporate a new perspective in the capital structure decision, we suggest that corporate strategies, particular the diversification ones, are some of the potential explanations for the firms' financial resources.

Based on a sample of 35 Portuguese companies listed on *Euronext Lisbon* for the time period 2003 to 2013, we investigated the impact on Leverage of Product and Geographic Diversification, and several control variables, such as Profitability, Asset Tangibility, Firm Size, Growth Opportunities and Managerial Efficiency.

Our findings suggest that Product Diversification strategies have no impact on the Leverage ratios of the Portuguese companies, contrarian as expected. Regarding Geographic Diversification, Total Debt Ratio and Short-term Debt Ratio feature an inverted U-shape relationship with Geographic Diversification, being positively correlated in the first stages of diversification and negatively correlated in a more mature phase of the geographic expansion. However, in some of the robustness test performed, Geographic Diversification is not statistically significant in the Total Debt Ratio regressions, being the previous findings held for Short-term Debt Ratio.

The findings suggesting a non-linear relationship of Leverage with Geographic Diversification are consistent with the fact that firms in initial stages of expansion have restrains to equity issues, but in a more mature phase, other sources of financing will be available, replacing Leverage (Singh and Nejadmalayeri, 2004).

After controlling the effect of the 2008 Financial Crisis in the models, most of the results previously achieved remained. In the period under the effect of 2008 Financial Crisis, Long-term Debt also exhibits an inverted U-shape relationship with Geographic Diversification.

Considering a Dual Diversification Strategy, Short-term Debt Ratio is negatively affected when a company has simultaneous Product and Geographic Strategies, enhancing the effect of Agency costs of disperse activities on the debt level (Jensen and Meckling, 1976). However, Long-term Debt Ratio is positively affected by a Dual Diversification strategy, as it was found by Singh, *et al.* (2003).

Our study makes some contributions to the existing literature that addresses the capital structure study of Portuguese listed companies.

Firstly, it brings the issue of the determinants of capital structure for the Portuguese listed companies. Secondly, highlights the impact of Diversification strategies in capital structure, enriching the current literature with some diverging findings from the previous empirical studies.

Our findings are relevant to suggest that contrarian to previous studies for American companies (Barton and Gordon, 1988; Kochhar and Hitt, 1998; Singh, *et al.*, 2003) Product Diversification strategies have low explanatory power of Leverage for listed Portuguese companies. However, the results are similar to the ones achieves by Menendez-Alonso (2003) for a sample of Spanish companies.

We also found evidence to support an inverted U-shape relationship between Leverage and Geographic Diversification, as reported by Singh and Nejadmalayeri (2004).

7.2 Limitations

This study presents some limitations. The first one is regarding the small sample size, due to small number of listed Portuguese companies and available data, which could affect the statistical inference and consequentially the results.

A second limitation is related with the quality of sales segment report for the companies in analysis. The accuracy of those divulgations, disclosures and the definition of segments, independently of the accounting standard, is a managerial choice, impacting the quality of the report (Aleksanyan and Danbolt, 2015) and consequentially, the Diversification Indexes measure.

Another limitation is the possible Reverse Causality between Leverage and Diversification. The presence of Endogeneity could generate bias in estimates, i.e. reject a hypothesis that is in fact true and do not reject a hypothesis that is in fact false.

7.3 Future Research

A possible development is applying the research to a more extent sample and other geographic areas. Most of the studies developed are for samples before the financial crisis and for companies from United States and some European countries.

Other further investigation, as suggested by Menendez-Alonso (2003) and also developed Joliet and Muller (2013) involves studying the impact of the change in the diversification strategy scope in the capital structure of the firm, implying a more extensive data collection.

Another potential line of research might be to study the impact of focalization process on Leverage, comparing with the results of the opposite diversification approach.

Appendixes

Appendix 1 Entropy Measure of Diversification

The Entropy Measure of Diversification suggested by Jacquemin and Berry (1979) is calculated as follows: P_i is the share of the i th business segment's sales as a percent of total firm sales and n is the number of the firm's business segments:

$$\text{Total Diversification} = \sum_{i=1}^n P_i \ln \frac{1}{P_i}$$

Appendix 2 Hausman Test

This test is a generally accepted method to choose between fixed and random effect model (Hausman, 1978).

$$H = (\hat{b}_{FE} - \hat{b}_{RE})' (\hat{V}_{FE} - \hat{V}_{RE})^{-1} (\hat{b}_{FE} - \hat{b}_{RE}) \sim \chi_k^2$$

\hat{b}_{FE} is the vector of estimators of the model with fixed effects;

\hat{b}_{RE} is the vector of estimators of the model with random effects;

\hat{V}_{FE} is the matrix of variances-covariance of the estimator \hat{b}_{FE} ;

\hat{V}_{RE} is the matrix of variances-covariance of the estimator \hat{b}_{RE} ;

k is the number of regression coefficients.

The *Hausman test* tests the null-hypothesis that the coefficients estimated by the random effects estimator are adequate, against the alternative hypothesis of correlation between the individual unobservable effects and independent variables, being fixed effect estimator more adequate.

If $H > \chi_k^2$ or $p\text{-value} < 0.05$, the null hypothesis is rejected, implying that fixed effect model is more adequate.

Appendix 3 Correlation matrix with Dependent variable Long-term Debt Ratio

	LONG-TERM DEBT RATIO	PROD DIV	GEO DIV	PROF	TANG	SIZE	GROWTH	EFFICIENCY
LONG-TERM DEBT RATIO	1.00							
PROD_DIV	0.07	1.00						
GEO_DIV	0.19***	-0.07	1.00					
PROF	-0.16	-0.10	0.03	1.00				
TANG	0.10	-0.23***	0.31***	0.23***	1.00			
SIZE	0.40***	0.12*	0.23***	0.32***	0.35***	1.00		
GROWTH	-0.40***	-0.07	-0.12*	0.10	0.10	-0.05	1.00	
EFFICIENCY	-0.53***	-0.22***	-0.10	0.30***	0.04	-0.13*	0.38***	1.00

Notes:

***, **, * Significant at the 1, 5, and 10 percent levels, respectively. LEV represents the dependent variable Leverage, measured through the ratio of long-term debt to the sum of total debt plus market capitalization. Independent Variables – PRODDIV: Product Diversification; GEODIV: Geographic Diversification; PROF: Profitability; TANG: Asset Tangibility; GROWTH: Growth Opportunities; EFFICIENCY: Managerial Efficiency.

Appendix 4 Correlation matrix with Dependent variable Short-term Debt Ratio

	SHORT-TERM DEBT RATIO	PROD DIV	GEO DIV	PROF	TANG	SIZE	GROWTH	EFFICIENCY
SHORT-TERM DEBT RATIO	1.00							
PROD_DIV	-0.04	1.00						
GEO_DIV	-0.08	-0.07	1.00					
PROF	-0.40***	-0.10	0.03	1.00				
TANG	-0.05	-0.23***	0.31***	0.23***	1.00			
SIZE	-0.31***	0.12*	0.23***	0.32***	0.35***	1.00		
GROWTH	-0.35***	-0.07	-0.12*	0.10	0.10	-0.05	1.00	
EFFICIENCY	-0.09	-0.22***	-0.10	0.30***	0.04	-0.13*	0.38***	1.00

Notes:

***, **, * Significant at the 1, 5, and 10 percent levels, respectively. LEV represents the dependent variable Leverage, measured through the ratio of short-term debt to the sum of total debt plus market capitalization. Independent Variables – PRODDIV: Product Diversification; GEODIV: Geographic Diversification; PROF: Profitability; TANG: Asset Tangibility; GROWTH: Growth Opportunities; EFFICIENCY: Managerial Efficiency.

Appendix 5 Regression Results of Models (4.1), for the period 2005 – 2013

The table reports results of regressions regarding the three debt ratios – total debt to the sum of total debt and market capitalization ratio; long-term debt to the sum of total debt and market capitalization ratio and short-term debt to the sum of total debt and market capitalization ratio - using the explanatory variables presented in the section 4. The sample period is from 2005 until 2013.

Independent Variables	Expected Signal	Leverage (Dependent Variables)		
		TDR	LTDR	STDR
Explanatory Variables				
PRODDIV	+	0.02 (0.49)	-0.03 (-1)	0.03 (1.08)
GEODIV	?	0.27** (2.42)	0.10 (1.32)	0.14 (1.12)
SRGEODIV	-	-0.14*** (-3.09)	-0.04 (-1.03)	-0.09* (-1.85)
Control Variables				
PROF	-	-0.87*** (-4.23)	-0.36* (-1.93)	-0.62*** (-4.32)
TANG	+	0.03 (0.27)	-0.08 (-1.12)	0.16** (2.49)
SIZE	+	0.11 (1.04)	0.08*** (3)	0.18 (1.06)
GROWTH	-	-0.21*** (-6.44)	-0.08** (-2.73)	-0.12*** (-3.05)
EFFICIENCY	-	0.01 (0.07)	-0.13*** (-3.46)	0.16*** (3.66)
DFC2008	?	0.05** (2.25)	0.05** (2.36)	-0.01 (-0.24)
R ²		88%	37%	76%
Adjusted R ²		83%	33%	68%
F-statistic		20.37	10.18	9.13
Prob(F-statistic)		0.000	0.000	0.000
Observations		166		
Periods		2005 - 2013		
Method		Fixed Effect	Random Effect	Fixed Effect

Notes:

T-statistics are given below the coefficients estimates in parenthesis. ***, **, * Significant at the 1, 5, and 10 percent levels, respectively.

The *Hausman Test*, reported in Appendix 2, was performed, being the null hypothesis rejected for Total Debt and Short-term Debt regressions, i.e., the fixed effect estimator is more adequate than the random effect. Regarding Long-term Debt Ratio regression, the null hypothesis was not rejected, being the random effect estimator more adequate.

Dependent Variables - TDR: Total Debt Ratio; LTDR: Long-term Debt Ratio; STDR: Short-term Debt Ratio.

Independent Variables – PRODDIV: Product Diversification; GEODIV: Geographic Diversification; SRGEODIV: Square Ratio of Geographic Diversification; PROF: Profitability; TANG: Asset Tangibility; GROWTH: Growth opportunities; EFFICIENCY: Managerial Efficiency; DFC2008: *dummy* variable which assumes 1 if 2008 financial crisis is present, i.e. if the years are from 2008 until 2013 and 0 otherwise.

**Appendix 6 Regression Results of Model (4.1) for the total sample, for the period
2003 – 2013, using different Dependent Variables**

The table reports results of regressions regarding the three debt ratios – total debt to total assets ratio; long-term debt to total assets ratio and short-term debt to total assets ratio - using the explanatory variables presented in the section 4.

Independent Variables	Expected Signal	Leverage (Dependent Variables)		
		TDR	LTDR	STDR
Explanatory Variables				
PRODDIV	+	0.02 (1.11)	0.00 (-0.04)	0.03 (1.38)
GEODIV	?	0.04 (0.64)	0.03 (0.42)	0.05 (1.04)
SRGEODIV	-	-0.04 (-1.33)	0.01 (0.21)	-0.06** (-2.26)
Control Variables				
PROF	-	-1.01*** (-7.56)	-0.02 (-0.15)	-0.92*** (-7.05)
TANG	+	0.07 (1.12)	-0.16** (-2.18)	0.20*** (3.53)
SIZE	+	0.01 (0.34)	-0.22*** (-3.52)	-0.03 (-1.38)
GROWTH	-	-0.01 (-0.53)	0.03 (1.06)	-0.04*** (-2.08)
EFFICIENCY	-	-0.13*** (-3.56)	-0.34*** (-6.04)	0.04 (1.43)
DFC2008	?	0.00 (-0.19)	0.04** (2.12)	-0.01 (-0.84)
R ²		31%	76%	31%
Adjusted R ²		28%	70%	27%
F-statistic		9.63	12.02	9.43
Prob(F-statistic)		0.000	0.000	0.000
Observations	203			
Periods	2003 - 2013			
Method		Random Effect	Fixed Effect	Random Effect

Notes:

T-statistics are given below the coefficients estimates in parenthesis. ***, **, * Significant at the 1, 5, and 10 percent levels, respectively.

The *Hausman Test*, reported in Appendix 2, was performed, being the null hypothesis not rejected for Total Debt and Short-term Debt regressions, i.e., the random effect estimator is more adequate than the fixed effect. Regarding Long-term Debt Ratio regression, the null hypothesis was rejected, being the fixed effect estimator more adequate.

Dependent Variables - TDR: Total Debt Ratio; LTDR: Long-term Debt Ratio; STDR: Short-term Debt Ratio.

Independent Variables – PRODDIV: Product Diversification; GEODIV: Geographic Diversification; SRGEODIV: Square Ratio of Geographic Diversification; PROF: Profitability; TANG: Asset Tangibility; GROWTH: Growth opportunities; EFFICIENCY: Managerial Efficiency; DFC2008: *dummy* variable which assumes 1 if 2008 financial crisis is present, i.e. if the years are from 2008 until 2013 and 0 otherwise.

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Annexes

Annex 1 Companies included in the study

#	Company	SIC Code	Industry
1	Altri SGPS S.A.	2611	Pulp Mills
2	Cimpor-Cimentos de Portugal, SGPS, S.A.	3241	Cement, Hydraulic
3	Cofina SGPS, S.A.	2711	Newspapers
4	Copam-Companhia Portuguesa de Amidos S.A.	2046	Wet Corn Milling
5	Corticeira Amorim SGPS S.A.	2499	Wood Products
6	Edp - Energias de Portugal, S.A.	4911	Electric Services
7	Estoril Sol, SGPS., S.A.	7999	Amusement And Recreation
8	F. Ramada - Investimentos, SGPS, S.A.	3316	Cold Finishing Of Steel Shapes
9	Galp Energia, SGPS., S.A.	2911	Petroleum Refining
10	Glintt - Global Intelligent Technologies, S.A.	7373	Computer Integrated Systems Design
11	Ibersol, sgps, S.A.	5812	Eating Places
12	Imobiliaria Construtora Grao Para, S.A.	7011	Hotels And Motels
13	Impresa - sociedade gestora de participacoes sociais, S.A.	4833	Television Broadcasting Stations
14	Inapa - investimentos, participações e gestao, S.A.	5111	Printing And Writing Paper
15	Jeronimo Martins S.A.	5411	Grocery Stores
16	Litho Formas Portuguesa - Impressos Continuos e Multiplos, S.A.	2752	Commercial Printing, Lithographic
17	Martifer sgps, S.A.	1629	Heavy Construction
18	Mota-engil SGPS S.A.	1611	Highway And Street Construction
19	Nos SGPS S.A.	4841	Cable And Other Pay Television Services
20	Novabase SGPS S.A.	7371	Custom Computer Programming Services
21	Pharol SGPS S.A.	4812	Radiotelephone Communication
22	Portucel S.A.	2621	Paper Mills
23	Reditus - SGPS S.A.	7373	Computer Integrated Systems Design
24	Ren - Redes Energéticas Nacionais, SGPS, S.A.	4911	Electric Services
25	Sag Gest Soluções Automóvel Globais SGPS S.A.	5012	Automobiles And Other Motor Vehicles
26	Sdc – Investimentos SGPS S.A.	1611	Highway And Street Construction
27	Semapa Sociedade de Investimento e Gestão, SGPS, S.A.	2621	Paper Mills
28	Sonae Industria - SGPS, S.A.	2493	Reconstituted Wood Products
29	Sonae - SGPS, S.A.	5411	Grocery Stores
30	Sonae.com, SGPS, S.A.	4812	Radiotelephone Communication
31	Sonagi - Sociedade Nacional de Gestao e Investimento, S.A.	6512	Nonresidential Building Operators
32	Sumol+compal, S.A.	2033	Canned Fruits And Specialties
33	Teixeira Duarte, S.A.	1611	Highway And Street Construction
34	Toyota Caetano Portugal, S.A.	3711	Motor Vehicles And Car Bodies
35	VAA-Vista Alegre Atlantis SGPS S.A.	3269	Pottery Products