



ASSOCIAÇÃO DE POLITÉCNICOS DO NORTE (APNOR)
INSTITUTO POLITÉCNICO DE BRAGANÇA

“The Capital structure of medium- and big-sized Portuguese wine producers.”

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Bragança, July, 2019.



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Abstract

Portugal's economy is strongly built upon wine industry with a per capita production and quality above average world indicators. Its sustainability and competitiveness depend on being able to grow alongside its competitors while looking attentively to emerging markets.

The aim of this paper is to analyze if capital structure decisions of medium- and big-sized Portuguese wine producers are in accordance with the predictions of trade off theory and pecking order theory and their determinants. On the basis of the empirical literature review about the capital structure decisions in Portuguese MBEs (medium and big sized enterprises), this study analyses the relationships between the determinants – profitability, size, age, asset structure and growth, identified as reliable determinants in the empirical literature, and debt for MBEs located in different regions of Portugal.

This study seeks to analyze if the capital structure decisions of small and medium-sized enterprises (SMEs) are different from those of other large companies. To do so, we consider two research samples: (i) 110 SMEs; (ii) 22 large firms, from SABI database. We use panel data analyses methodology. In order to identify the determinants of the capital structure, we use pooled OLS, fixed and random effects models. All the specification tests witness in the favour of the fixed effects model that is why we consider its results as the most reliable for our research.

Based on previous empirical research, six firm-specific determinants of capital structure were analyzed through the proposed methodology: profitability, size, growth, tangibility, liquidity and non-debt tax shield. While the first four factors can be linked to both the pecking order and the trade-off theory, liquidity is significant for the pecking order theory, while the non-debt tax shield is given special attention in the trade off theory. SMEs' capital structure decisions are closer to the assumptions of pecking order theory and further removed from those of trade-off theory compared with the case of other large firms.

Keywords: Trade-off theory, Pecking order theory, Medium and big-sized producers, panel data analysis, determinants of capital structure.

Resumo

A economia de Portugal é fortemente construída sobre a indústria do vinho com uma produção *per capita* e indicadores mundiais de qualidade acima da média. Sua sustentabilidade e competitividade dependem de poder crescer junto com seus concorrentes, enquanto observa atentamente os mercados emergentes.

O objetivo deste trabalho é analisar se as decisões de estrutura de capital dos produtores de vinho portugueses de médio e grande porte estão de acordo com as previsões da teoria do *trade off* e da teoria *pecking order* e dos seus determinantes. Com base na revisão de literatura empírica sobre as decisões de estrutura de capital em médias e grandes empresas portuguesas (MGE), este estudo analisa as relações entre os determinantes - rentabilidade, tamanho, idade, estrutura de ativos e crescimento, identificados como determinantes fiáveis na literatura empírica, e a dívida das MGE localizadas em diferentes regiões de Portugal.

Este estudo procura analisar se as decisões de estrutura de capital de pequenas e médias empresas (PME) são diferentes das de outras grandes empresas. Para tanto, consideramos duas amostras de pesquisa: (i) 110 PME; (ii) 22 grandes empresas do banco de dados SABI. Utilizamos análises de dados em painel para avaliar várias observações, a saber: método de análise em painel, OLS agrupado, efeitos fixos versus aleatórios, testes de efeitos fixos e aleatórios, teste F para efeitos fixos, teste Breusch-Pagan LM, teste de Hausman.

As decisões de estrutura de capital das PME estão mais próximas das premissas da teoria de *pecking order* e mais distante daquelas da teoria do *trade-off* em comparação com as de grandes empresas.

Palavras-chave: Teoria *trade-off*, Teoria *pecking order*, Produtores médios e grandes, análise de dados em painel, determinantes da estrutura de capital.

Abstrakt (O'zbek tili)

Portugaliyaning iqtisodiyoti jon boshiga ishlab chiqarilgan va o'rtacha ko'rsatkichlardan yuqori sifatli vino ishlab chiqarishga asoslangan. Vino ishlab chiqarish barqarorligi va raqobatbardoshligi rivojlanayotgan bozorlardagi raqobatchilar bilan birga o'sishga qaratilgan.

Ushbu maqolaning maqsadi o'rta va katta hajmdagi Portugaliya vino ishlab chiqaruvchilarining sarmoyaviy tuzilish qarorlarini savdo-sotiq nazariyasi va peking tartib nazariyasi va ularning determinantlari haqida taxminlarga muvofiqligini tahlil qilishdir. KO'HK (kichik va o'rta hajmli korxonalar)ning kapital strukturasi qarorlari bo'yicha tahliliy adabiyotlarni ko'rib chiqish asosida bu tadqiqot determinantlari - daromadi, hajmi, yili, aktivlar tuzilishi va o'sishi o'rtasidagi munosabatlarni tahlil qiladi, tahliliy adabiyotlar va KO'HK lar uchun qarzar Portugaliyaning turli hududlarida mavjuddir. Kapital strukturaning determinantlarini aniqlash uchun biz Pooled OLS, fixed va random ta'sir modellarini qo'llaymiz. Barcha spetsifikatsiya testlari fixed ta'sir modelining foydasiga guvohdir, shuning uchun biz uning natijalarini tadqiqot uchun eng ishonchli deb hisoblaymiz.

Ushbu tadqiqot kichik va o'rta korxonalar kapitalining tuzilishi qarorlaridan boshqa yirik kompaniyalardan farq qiladimi-yo'qmi tahlil qilish uchun mo'ljallangan. Buning uchun ikkita tadqiqot misolini ko'rib chiqamiz: (i) 110 KO'HK; (ii) 22 yirik firmalar SABI ma'lumotlar bazasidan. KO'HK ning sarmoya tuzilmasi qarorlar Pecking Order Teoriyasining taxminlariga yaqinroq bo'lib, boshqa yirik firmalarning ishlariga nisbatan savdo-sotiq nazariyasidan ham olib tashlandi. Biz panel ma'lumotlarini tahlil qilish metodologiyasidan foydalanamiz. Ilgari empirik tadqiqotlarga asoslanib, taklif etilayotgan metodologiyadan sarmoya tarkibining oltita firma omili: rentabellik, hajmi, o'sishi, moddiy boyliki, likvidligi va soliq qarzdorsizligi tahlil qilingan. Dastlabki to'rt omil ham pecking tartibiga, hamda savdo-sotiq nazariyasiga bog'liq bo'lishi mumkin bo'lsa-da, likvidlik pecking tartib nazariyasi uchun ahamiyatga ega, garchi soliq qarzdorsizligi savdo nazariyasiga alohida e'tibor qaratgan bo'lsada.

Kalit so'zlar: Savdo nazariyasi, Pecking tartib nazariyasi, o'rta va yirik ishlab chiqaruvchilar, pooled OLS, fixed ta'sir modeli, random ta'sir modeli.

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Acronyms

DF-Degrees of freedom;

EBIT- Earnings before interest and taxes;

EGLS-Estimated generalized least squares;

FGLS-Feasible generalized least squares;

GLS-Generalized least squares;

LEV-Leverage;

LIQ-Liquidity;

LM-Lagrange multiplier;

NDTS-Non debt tax shields;

n-Number of observations;

OLS-Ordinary least squares;

POT-Pecking order theory;

ROA-Return on assets;

SABI-Analysis System of Iberian Balance Sheets;

SME-Small and medium-sized enterprises;

SSE-Sum of Squares error;

TANG-Tangibility;

TOT-Trade-off theory;

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Introduction

The foregoing financial crisis has put great pressure on domestic and international firms, especially developing firms. The supply of credit has dropped dramatically, while increased risk and an increased cost of capital pressure firms in finding the right balance between debt and equity. Capital structure has been the subject of many existing studies, in which researchers aim to document the link between capital structure and firm performance. From a firm's perspective, finding and operating at the optimum capital structure could be beneficial. Capital structure significantly affects the cost and availability of capital, which in turn will also affect a firm's performance.

The capital structure of companies refers to the way in which the company is financed through a mix of debt and equity capital. It is the proportion of resources attributed to the firm through different sources, which may include internal and external financiers. Capital structure, capitalization, financial structure, leverage ratio and invested capital, all have the same meaning, how much money and what type of sources the company has used to build itself up and purchase its assets. The ratio of total debt to total capital employed is referred to as the firm's financial leverage.

Consequently, financial conditions in the corporate sector not only affect firm performance, but they also have a powerful effect on macroeconomic outcomes. As mentioned previously, the capital structure of an organization is of utmost importance to both the managers of firms and lenders, since a wrong mix of leverage may seriously affect the performance and survival of any business. Subsequently an appropriate capital structure is a critical decision for any company. This decision is not only important because of the need to maximize returns to numerous organizational constituencies, but also because of the impact such decision has on a company's ability to deal with its competitive environment.

Furthermore, the main objective of this dissertation is to explain and identify the determinants and theories under the capital structure of Portuguese companies in the wine industry. Empirical studies do not lead to a consensus with regard to the significant determinants of the capital structure of the companies.

In the corporate finance literature, there are two theories of capital structure that are relevant: the trade-off theory and the pecking order theory. The trade-off theory argues that firms choose the optimal level of debt by trading off the benefits of debt against its costs. The benefits of debt include tax deductibility of interest expenses and a reduction in agency costs of equity derived from excess free cash flows. The costs of debt are mainly bankruptcy costs, either direct or indirect, and these may occur in a situation of excessive debt (Fama & French, 2002). According to this theory, there is an optimal level of debt, which occurs when the marginal benefit equals the marginal cost of an additional unit of debt. The pecking order theory is an alternative and more recent theory of capital structure. This theory argues

that a pecking order in financing exists if there are information asymmetries between the insiders (either large shareholders or managers), and outsiders (mainly small shareholders or other investors of the company). In such case, the cost of issuing new securities is the most important issue and it goes beyond a discussion of benefits and costs of debt. The main prediction of this theory is that there is a hierarchy of financing sources. Hence, firms prefer to use retained earnings as their first financing source, followed by debt and, lastly, by equity. Equity is less interesting to firms, given that it entails larger information asymmetry costs, making its issuance more expensive relative to other funding sources (Baker & Wurgler, 2002).

The aim of this work is to look at decisions affecting capital structure in the Portuguese winery. In other words, we discuss whether the leverage of firms follows more closely the predictions of the trade-off model and/or the pecking order model. The data used comes from SABI database and covers the period from 2010 to 2017. This database collates accounting information on non-financial firms as well as other data such as the age of the firm and the number of employees. Previous research found that a significant negative relation between profitability and leverage, which supports the pecking order theory. However, they also observed that firms converge rapidly to their target leverage ratios, thus providing evidence in favor of the trade-off theory. We think these results may not be conflicting as they could refer to decisions made with different time-horizons in mind (DeAngelo & Masulis, 1980).

The current study has the following structure: Chapter 1 presents a brief review of the capital structure theories. Chapter 2 presents the methodology followed throughout the empirical study. Chapter 3 presents the results. Chapter 4 analyses the results obtained in the empirical part. The last chapter presents the main conclusions of the study and some suggestions for future research.

1. Literature Review

This part of the dissertation describes some more essential approaches in the literature review to determine the capital structure of medium and big-sized Portuguese winery, namely; Modigliani and Miller, Trade-off theory, Pecking order theory as well as the determinants of capital structure.

1.1. Modigliani and Miller

The creative Modigliani-Miller statement (1958) is a foundation of corporate finance theory. It provides conditions under which changes in a firm's capital structure do not affect its fundamental value (Aboura & Lepinette, 2017). Furthermore, Stiglitz (1969) and Rubinstein (1973) incorporated risky debt in their model and proved that capital structure does not affect the firm's value.

In mainstream finance, the extant capital structure literature has recognized that Modigliani and Miller's (1958) proof of the irrelevancy of capital structure has been based on the following set of assumptions (Ardalan, 2017):

1. Capital markets are frictionless.
2. Individuals can borrow and lend at the risk-free rate.
3. There are no costs to bankruptcy or business disruption.
4. Firms issue only two types of claims: risk-free debt and equity.
5. All firms are assumed to be in the same risk class.
6. Corporate taxes are the only form of government payment.
7. All cash flow streams are everlasting.
8. There are no signaling opportunities.

9. There are no agency costs.

10. Operating cash flows are completely unaffected by changes in capital structure.

Modigliani and Miller (1958) have found out two criteria of rational decision-making:

a) the maximization of profits.

b) the maximization of market value.

In accordance with the first criterion, a physical asset is worth gaining if it will increase the net profit of the owners of the firm. However, net profit will increase only if the expected rate of return, or yield, of the asset exceeds the rate of interest. According to the second criterion, an asset is worth acquiring if it increases the value of the owners' equity, i.e., if it adds more to the market value of the firm than the costs of acquisition (Modigliani & Miller, 1958). They incorporated corporate taxes in their analysis and proved that the levered firm's value is greater than the unlevered firm's value by the amount of debt tax shield, i.e., gain in the firm's value from leverage as well.

Miller (1977) considered both personal taxes and corporate taxes and showed that the gain from leverage in the value of the firm could be much smaller than when considering only corporate taxes.

Furthermore, DeAngelo and Masulis (1980) investigated the impact on debt of tax shields generated by factors other than interest payments. That is, tax shield generated by non-cash charges such as depreciation, oil depletion allowances, and investment tax credits. They showed that there is a non - zero corporate debt utilization that maximizes the value of the firm without assuming the costs of bankruptcy or agency.

Leland (1994) and Leland and Toft (1996) examined the value of the firm on the assumption that the present value of the cost of business disruption and the present value of lost interest tax shields are affected by the choice of capital structure of the company. They concluded that there is an optimal capital structure – defined as a capital structure to maximize the value of the firm – so that the value created by the present value of interest tax shield trades off with both the value lost from the present value of business disruption costs and the present value of the loss of interest tax shields.

Jensen and Meckling (1976) based their model on the cost of the agency and demonstrated an optimal capital structure that maximizes the value of the company. They noted that the probability distribution of the cash flows of the firm depends on its ownership structure. This is because there are agency costs of debt as well as agency costs of external equity. The agency costs of debt increase with the increased use of debt. The agency costs of external equity increase with the increased use of external equity. Therefore, there is an optimum combination of debt and equity that minimizes agency costs and maximizes firm's value, i.e., firm's optimal capital structure. In this way, they showed the existence of the firm's optimal capital structure without assuming taxes and bankruptcy costs.

1.2. Trade-off theory

Having no taxes is the one of the main assumptions of the Modigliani and Miller (1958). The trade-off theory is not only a development of the M&M statement but also takes into account the effects of taxes and bankruptcy costs. This theory is considered as the first step for the development of lots of other theories, which have studied how firms choose their capital structure. The theory of Modigliani and Miller (1958) can be used to describe how companies use taxation to manipulate profitability and select an optimum level of debt. Debt level on the other hand increases the risk of bankruptcy or, as we call it, the cost of bankruptcy because, "as the debt-to-equity ratio increases, debt holders will require higher interest rates, but shareholders will also claim higher profits for their investment" (Brealey & Myers, 2003, p. 508-509). Financial managers often think of the debt - equity decision of the firm as a trade-off between interest tax shields and the costs of financial distress, according to Brealey and Myers (2003). "Companies with safe, tangible assets and plenty of taxable income to shield ought to have high target ratios. Unprofitable firms with risky, intangible assets should rely primarily on equity funding. If no adjustment of capital structure costs existed, then each company should always be at its target debt ratio" (Brealey & Myers, 2003, p. 509).

Furthermore, trade-off theory includes monetary issues, financial distress and conflicts of interest. It assumes that firms have a target debt level, according to Taggart (1977), Jalilvand and Harris (1984). Various authors, namely; López-Gracia and Sánchez-Andújar (2007), López-Gracia and Sogorb-Mira (2008) consider that the target debt ratio depends on a firm's characteristics. According to the trade-off theory, capital structure decisions of companies point to a target debt ratio in which debt tax shields are maximized and debt - related bankruptcy costs are minimized. Debt offers firm a tax shield, according to Myers (2001), Shyam-Sunder and Myers (1999), Fama and French (2002), Frank and Goyal (2007). Debt allows firms to benefit from debt tax-shields (Modigliani & Miller, 1963; DeAngelo & Masulis, 1980) and reduce the free cash flow problem between managers and shareholders in accordance with Jensen and Meckling (1976), Jensen (1986), Stulz (1990). However, there are disadvantages associated with debt: agency costs, which arise mainly from the potential conflicts between managers and creditors (Jensen & Meckling, 1976; Myers, 1977) and financial distress costs (Robichek & Myers, 1966; Kraus & Litzenberger, 1973; Kim, 1978).

In addition, the manager should choose the debt ratio that maximizes firm value according to the trade-off theory (Brealey & Myers, 2003, p. 498). The advantage is because the interest of debt is deductible before paying taxes (Modigliani & Miller, 1963). "This means, among other things, that the tax advantages of debt financing are somewhat greater than we originally suggested" (Modigliani & Miller, 1963, p. 434). Therefore, firms increase the level of debt in order to gain the maximum tax benefit but at the other side they increase the risk of a possible bankruptcy.

1.2.1. Static Trade-off theory

The static trade off theory of optimal capital structure assumes that companies balance the marginal present values of interest tax shields against the financial distress costs (Shyam, Sunder & Myers, 1999). The optimum level is when the marginal value of the debt - related benefits exactly offsets the increase in the present value of the costs associated with issuing more debt (Myers, 2001). The debt benefits are the tax deductibility of interest payments that favours debt use, but the positive effect can be complicated by personal taxes (Miller, 1977) and non - debt tax shields (De Angelo & Masulis, 1980). In addition, they studied proposed a theoretical optimum debt level for a company where the present value of tax savings due to further borrowing is only offset by increases in the present value of distress costs. Dudley (2007) also assumes that the issue or repurchase of securities does not involve transaction costs. Moreover, the following theory suggests that higher profitable firms have higher target debt ratio, because they would ensure higher tax savings from debt (Niu, 2008, p. 134), lower probability of bankruptcy and higher over-investment and these require a higher target debt ratio.

1.2.2. Dynamic Trade-off theory

According to the static trade off theory, the companies balance the tax benefits of debt with the risks of bankruptcy. But it is expensive to issue and repurchase debt in order to achieve the target debt ratio that would achieve the maximization of firm value, according to dynamic trade off theory. Thus, companies whose leverage ratios are not exactly the same as their target, will adjust their capital structure if the benefits of doing so outweigh the adjustment costs. In addition, dynamic trade off theory suggests that firms let their leverage ratios vary within an optimal range (Dudley, 2007). Hovakimian, Opler, and Titman (2001) found that more profitable firms are more likely to issue debt over equity. Empirical evidence of Dudley (2007) study supports the predictions of dynamic trade off theory, concluding that volatility increases the optimal leverage range and profitability and interest rates reduce the leverage range. According to his study, profitable firms find it advantageous to readjust their debt ratios more often in order to capture the tax benefits of debt as predicted by the dynamic trade off theory.

1.3. Pecking order theory

The theory of pecking order comes from Donaldson's works (1961) and has been revived by Myers and Majluf (1984), who argue based on information asymmetries. They argue that when companies face the prospect of financing their projects with external capital, they will issue the security with the least cost of information. This suggests that if internally generated funds are exhausted, firms will issue debt, followed by hybrid debt securities, including convertible debt, and then equity as a last resort. Managers possess private information in the context of information asymmetry, and any action signals private information to investors about the company's future prospects. Faced with the debt equity

decision, firms are more likely to issue debt securities when underpriced. Myers (1984) argues that firms do not have a targeted capital structure; instead, firms would prefer to rely on internal financing rather than issuing new securities. According to Barclay and Smith (2005), a debt issue indicates the confidence of managers that future earnings will be sufficient to cover interest payments. By contrast, if it is overpriced, managers are more likely to issue equity. This is because the existing shareholders will find an undervalued equity issue expensive. In addition, there is limited consensus on what is the true value of the issued equity. Due to these reasons, investors discount equity issues more than debt issues. There is no well - defined debt equity ratio according to this theory. Each firm's capital structure is a result of the cumulative need for external financing.

Pecking order theory (POT) of capital structure shows how the ineffectiveness of information asymmetry in the source of finance could be reduced by managers (Dada & Ukaegbu, 2015). A company may attempt to finance its current and viable growth through internal financing, then equity, and consider debt as a final resort (Eldomiaty, Azzam, El Din, Mostafa, & Mohamed, 2017).

The empirical validity of the pecking order model is being examined extensively in the following capital structure studies. Studies that regress leverage on a set of firm-specific variables usually report a negative correlation between profitability and leverage (Strebulaev, 2007; Kayo & Kimura, 2011; Chipeta, Wolmarans & Vermaak, 2012; Cole, 2013). It has been interpreted as a proof of pecking order financing behaviour mainly because profitable firms are more likely to use internally generated funds and have less need for external financing.

Furthermore, Shyam-Sunder and Myers (1999) consider examining the theoretical model's empirical predictions in which firms rely on internal funding sources whenever possible. Just in the case of a financial deficit will the firm consider a hierarchy of external financing choices, in which secured debt is favoured, followed by risky debt and then equity. Their findings claim that for the sample of their firms, POT is an excellent descriptor of corporate financing behaviour.

Finally, it has been noted that the original POT model exhibits some limitations. Namely, Chirinko and Singha (2000) argue that POT empirical model has a little power to distinguish between plausible patterns of external funding, which could lead to incorrect inference. Myers (2001) also argues that POT together with other capital structure theories, works better under some conditions than others. Researchers may report results consistent with one theory even when other determines the actual financing decisions. This implies that POT needs additional support to be fully supported in order to distinguish it from other theories.

1.4. Comparison between Trade-off Theory and Pecking Order Theory

In most of the empirical studies on capital structure, pecking order and trade-off theories are actually presented as mutually exclusive to each other and have been tested separately using different

methodologies and for different samples in several countries. Shyam Sunder and Myers (1999) find out more supportive evidence for the pecking order as opposed to trade-off theory. The findings of Hovakimian et al. (2001) are consistent with the pecking order model in short-run and reversion to the target leverage in the long-run. Fama and French (2002) find proof both in favor and against both the theories.

Long and Malitz (1985), Mackie-Mason (1990) and Graham (1996) found that certain implications of the trade-off theory have received empirical support. On the other hand, Baskin (1989), Shyam-Sunder and Myers (1999), Fama and French (1999) found the evidence in a one-on-one comparison between the two theories, the pecking order model seems to be more favorably viewed than the trade-off theory. We identify one big contradiction of the trade-off model and one less serious contradiction of the pecking order model (Fama and French, 1999, p. 3). The 'big contradiction' is the earnings-leverage relationship. Titman and Wessels (1988), Baskin (1989), Rajan and Zingales (1995), Fama and French (1999) have found the disadvantage of the actual relationship between leverage and earnings (or profitability). However, Brealey and Myers (1996), Shyam-Sunder and Myers (1999) etc indicated that the trade-off theory predicts a positive intercommunication between leverage and earnings in accordance with the received wisdom. To quote Myers (1989, p. 83), 'the most telling evidence against the static trade-off theory is the strong inverse correlation between profitability and financial leverage.' On the other hand, Helwege and Liang (1996), Fama and French (1999), Chirinko and Singha (2000), Frank and Goyal (2000) stated the hypothesis of pecking order predicts a negative earnings-leverage relationship consistent with the empirical evidence, although some other implications of the theory of pecking order have been found to be inconsistent with empirical evidence.

1.5. Determinants of capital structure

Capital structure determination is considered as one of the key corporate financing decisions and managers often face difficulties in finding the optimal one. There are some different theories regarding this phenomenon in the finance literature and this issue has been already discussed. No theory can be regarded as the conclusive one as varying evidence found regarding this complex issue. Presently, the need to determine an optimal capital structure has become more troublesome as well as important due to the emergence of a need of the best corporate governance practices.

Theory of capital structure has been a study of interest to the researchers of finance. Thus, over the past 4 decades, the capability to explain capital structure has progressed enormously. Furthermore, Modigliani and Miller (1958), De Angelo and Masulis (1980), Booth, Aivazian, Demirguc-Kunt and Maksimovic (2001) discussed theoretical models to explain the determinants of capital structures across firms and countries. Based on the literature surveys observed, few theories of capital structure appeared, namely; trade-off theory, pecking order theory, agency problem theory, and the most recent market

Baker and Wurgler (2002) introduced market timing theory. However, the most well-known theory which is widely discussed is trade-off theory and pecking order theory which will be discussed further.

The correlation between capital structure and firm's performance has been the subject of debate of recent and current studies (Memon, Bhutto & Abbas, 2012). This debate consists on whether there is an optimal capital structure for a firm or whether the use of debt is irrelevant to the firm's performance or value (Modigliani-Miller, 1958). The literature on the relationship between firm performance and capital structure has produced different results, based on the researches of Modigliani and Miller (1958), Myers (1984), Titman and Wessels (1988), Harris and Raviv (1990), Rajan and Zingales (1995), Ghosh C, Nag R, Sirmans C, (2000), Frank and Goyal (2003). Also, the studies on capital structure, have been developed different theories including trade-off theory and pecking order theory.

Empirical research on medium and big-sized firms' capital structure decisions is relatively recent, and the first studies about this topic have focused on the differences between small firms and large firms according to Bhaired C and Lucey B (2010). He argues that given results of the various studies, it is possible to sum up that financial theories explain those decisions, however adopting a different rationality that one used for analysing large firms' capital structure decisions. The literature on capital structure describes various variables related to the firm capital structure decisions (Frank & Goyal, 2007). However, they find a small number of factors that are empirically booming and financially significant: profitability, size, asset tangibility, growth and so on, in explaining firms' capital structure decisions.

A number of factors are suggested by the empirical literature that may influence the financial structure of firms. For instance, Harris and Raviv (1991) suggest that the leverage of firms is likely to be affected by fixed assets, investment opportunities, advertising expenditures, the possibility of bankruptcy, and profitability and uniqueness of the product. According to Rajan and Zingales (1995), Banerages, Heshmati and Wihlborg (2000) and Bevan and Danbolt (2001), we have taken company size, profitability, tangibility, growth opportunities and non-debt tax shields as the possible determinants of capital structure. We discuss the relevant literature for each of these variables below.

1.5.1. Determinants of capital structure under trade-off theory perspective.

In this section, some empirical findings from existing studies would be included in order to examine how powerful trade-off theory (TOT) is to explain capital structure decision by applying various types of variables such as Business risk, firm liquidity, firm size, growth opportunity, income taxes, profitability and tangibility.

Business Risk

Kjellman and Hansen (1995) considered one of the most influential factors on financing choices is the risk factor. According to TOT, the higher risks might be more likely to cause a higher possibility of bankruptcy. The investment with a higher level of business risks is probably to choose equity finance or

internal finance, instead of debt finance in order to avoid higher distressed cost. In contrast, a negative intercommunication is expected between business risk and leverage in TOT. The following studies display that there is a consistent result with this prediction. Qiu and La (2010) suggested that an inverse relationship is shown between debt ratio and business risk for those indebted firms, which also showed that the leveraged firms are concerned more about cost of issuing new securities as opposed to the tax advantage of debt finance. However, Suto (2003) and Huang and Song (2006) have displayed a positive intercommunication between business risk and debt ratio. Suto (2003) also found out that there is a positive sign between risk and leverage of market value only when the stock market is prospering. Huang and Ritter (2009) also suggested that a huge proportion of firms' financing deficit with net external equity is funded by the firms when the expected risk premium is low. Financial prudence suggests that firms having high business risk in the form of variability in the operating profit should not go for high financial risk in the form of high debt equity ratio. TOT suggests a negative relation between business risk and debt equity ratio. For this study business risk is measured as the coefficient of variation in operating profits. (Business Risk = coefficient of variation in operating profits) (Kaur & Rao, 2009).

Firm liquidity

Harris and Raviv (1991) investigated that according to the agency view of TOT, higher liquidity diminishes agency costs of debt, while it raises agency costs of equity. To be more precise, the firms with more liquidity are alleged to be used or sold without important loss of firm value as monetary deposits for a higher debt level. Therefore, the firms with higher levels of liquidity are regarded to have more liquid assets in accordance with trade-off models of capital structure, which are likely to have a higher leverage ratio due to their ability to meet contractual obligations on time. Furthermore, firms would be able to choose to have a high level of debt in order to benefit advantage of tax saving from issuing debt. TOT predicts a positive relationship between liquidity and leverage. Bankruptcy costs tend to be higher for firms with low levels of liquidity, and so they will face more obstacles in obtaining debt (Degryse, Goeij, & Kappert, 2012).

Firm size

Based on TOT, we can expect a positive correlation between firm size and debt ratio, because the larger firms usually have relatively lower risks and costs of bankruptcy. The larger firms are also easier to enlarge, have relatively smaller observing costs, less volatile cash flows and easier access to credit market in accordance with the research of Wiwattanakantang (1999). In other words, firm size also can be regarded as a reverse proxy of bankruptcy costs. Wiwattanakantang (1999) has pointed out that large and well-known firms are easier to obtain loans without provided collateral (guarantee). Therefore, it needs more debt to fully benefit from the tax shield. On the other hand, researchers namely; Crnigoj and Mramor (2009), Baharuddin et al. (2011) as well as Noulas and Genimakis (2011) have found out that this positive relationship is also able to explain how the problem of information asymmetry probably does not decrease as an increase of firm size. Serrasqueiro and Nunes (2010) also found out that the

influence of firm size on financing decision is important in a particular industry such as service industry. It has pointed out that the larger firms prefer to resort to more debts because of a lower possibility of bankruptcy. Al-Najjar (2011) also has presented a positive correlation between size and capital structure. Marsh (1982) also has showed that large firms are likely to choose long-term debt, whereas small firms choose short-term debt. Qiu and La (2010) suggested that indebted firms are five times larger than firms that do not use debt financing in Australia. However, Cassar and Holmes (2003), Chittenden et al. (1996) investigated that both listed and unlisted firms are less dependent on long-term debt due to limited access to capital markets and high transaction costs of issuing debt securities. Moreover, many studies provide supportive results namely; Suto (2003), Deesomask et al. (2004), Voulgaris et al. (2004), Akhtar (2005), De Jong A, Kabir R and Nguyen T.T (2008), Daskalakis and Psillaki (2008), Bessler et al. (2011), Sheikh and Wang (2011). They also found that the informational asymmetry problem is greater for small firms as there is a lack of financial disclosure and theory owner-manager nature, which is reverse to the findings of Crnigoj and Mramor (2009).

Growth Opportunity

Based on TOT, it has been predicted that growth opportunity ought to have a negative correlation in TOT, since it is encouraged to invest in a riskier project for a company with better growth opportunity. Huang and Song (2006) and Antonious *et al.* (2008) have found a negative relationship between leverage and growth opportunity. One possible reason is that growth opportunity could be regarded as a type of intangible asset, and it could be influenced or damaged by the financial distress or other uncertain factors. Moreover, Wiwattanakantang (1999) also figured out those firms whose growth level is low are subject to a lower degree of asset-substitution problem, and thus have a higher capacity of using debt. Myers (1977) argues that firms with high levels of investment opportunities confront with difficulties in obtaining debt because the expected costs of financial distress are higher for firms in this situation. Firms with higher growth opportunities have a lower level of debt, given that these firms encounter higher agency problems between owners and creditors, because the former have great incentives to under-invest (Myers, 1977; Smith & Warner, 1979). Moreover, according to TOT, growth opportunities have no value in the case of firm bankruptcy, and so bankruptcy costs associated with recourse to debt are greater in firms with high growth opportunities.

Income taxes

According to TOT, the firms have higher income tax; a company issues more debts due to a benefit of tax deduction of interest from debt finance, accordingly, when a positive relation is expected. Below, some empirical studies have shown that a positive relationship between income tax and leverage ratio exists. Huang and Song (2006) show that tax rate has a positive correlation with long-term debt ratio and total debt ratio. Wiwattanakantang (1999) pointed that firms with high taxable income are more probably to have high non-debt tax shields, which stimulate the use of a high debt-equity ratio. However, firms that confront with tax exhaustion, namely; pay little or no tax, are bound to issue less debt because

the associated interest deduction is cancelled out by non-debt tax shields. Constantly, Osteryoung and Nast (1991) and Michaelas, Chittenden and Poutziouris (1999) found no significant effects of corporate tax on level of leverage. Degryse *et al.* (2012) conclude that the tax rate has a significant negative effect on total and long-term debt, but a slightly positive effect on short-term debt.

Profitability

Based on the prediction of the model of TOT, it should have a positive relationship between profitability and leverage. To be more precise, the more profitable firms are likely to make more use of debt finance since the risks of bankruptcy are lower; as a result, the firms can benefit from more tax advantages from deduction of interest. Qiu and La (2010) indicated that profitable firms follow pecking order of finance to diminish costs of issuing securities, whereas unprofitable firms are concerned more about financial distress costs. Mazur (2007) also found a positive relationship between profitability and leverage ratio for those highly profitable firms. This result also confirmed that the highly profitable firms would like to accept financial risk connected with debt financing when the bankruptcy risk is lower, according to the researches of Lucas, Dijk & Kloek (1997). In recent years, a new idea has been raised in the latest research studies. In the traditional trade-off model, leverage is determined by trade-off between present value of expected costs of financial distress and present value of expected debt tax shields, both depend on expected future profitability, instead of realised past profitability. Xu (2012) has indicated that higher expected profitability corresponds to higher benefits of debt and lower costs of financial distress. The research of Jensen (1986) has provided direct evidence on prediction of traditional trade-off theories by using US manufacturing firm data. Furthermore, his result found that expected profitability declines with increase of competition import, and the problem of import competition also reduces the free cash flow problem.

Tangibility

The TOT predicts a positive correlation between leverage and fixed asset. The firms with more fixed assets as collateral security are easier to finance from external capital, since they usually have sufficient financial slack or debt capacity. Nivorozhkin (2002) shows a positive relationship between tangibility and long-term debt ratio, which means that tangible assets play a role as collateral for long-term debts to mitigate the lenders' risk. Huang and Song (2006) also found out that tangibility has positive relationships to market total leverage, long-term debt and total debt ratios respectively. Besides, many empirical studies have provided supportive results. Timan and Wessels (1988); Rajan and Zingales (1998); Wald (1999); Wiwattanakantang (1999); Suto (2003); Deesomask *et al.* (2004); Akhtar (2005); Jong *et al.* (2008); Antonious *et al.* 2008; Baharuddin *et al.* (2011); Bessler *et al.* (2011); Noulas and Genimakis (2011) that have provided positive evidence between tangibility and leverage. Additionally, Antoniou *et al.* (2008) have figured out that the effect of asset tangibility on corporate debt is more prominent in bank-oriented (i.e. France, Germany and Japan) than in capital market-oriented (i.e. the US and the UK) economies.

1.5.2. Determinants of capital structure under pecking order theory perspective.

In this section, some empirical findings from existing studies would be included in order to examine how powerful pecking order theory (POT) is to explain capital structure decision by applying various types of variables such as asset liquidity, firm size, growth opportunity, profitability and tangibility.

Asset liquidity

The firms with more current assets are expected to have more internal capital that can be used. As the prediction of POT, the firms with a high level of liquidity are likely to borrow less due to the preference of internal capital. Thus, it is supposed to have a negative relationship between liquidity and leverage ratio. Rajan and Zingales (1995); Bevan and Danbolt (2002); Suto (2003); Deesomsak, Paudyal and Pescetto (2004); Viviani (2008); Sheikh and Wang (2011) have demonstrated that the firms with more ample liquidity are less dependent on debt finance. Mazur (2004) also showed that this relationship is especially important among those firms with dividends paying.

Firm size

The POT has pointed out that the issue of information asymmetry is much less in larger companies than those smaller companies, so the larger firms are supposed to have more equity issuance. In other words, the larger firms tend to provide more information to lenders than those smaller ones. As a result, we can expect a negative relationship between firm size and debt ratio. Chen and Strange (2005) have showed that firm size has a negative effect on book value of the debt ratio in China due to a more reliable credit from government support for those state-owned banks. Rajan and Zingales (1995); Timan and Wessels (1988) and Mazur (2004) also found proof to support a negative hypothesis between size and leverage. Chen (2004) has demonstrated there is a negative correlation between long-term debt and firm size, which presents that the larger firms would like to have better reputation and attraction of capital gains in bond market due to the lower bankruptcy cost.

Growth opportunity

The firms with greater growth opportunity are supposed to have higher requirements of funds, thus, it can be expected to borrow more. Bevan and Danbolt (2002); Crnigoj and Mramor (2009); Daskalakis and Psillaki (2008); Noulas and Genimakis (2011) found that growth expectation has a positive correlation to total debt. Voularis *et al.* (2010) found that growth opportunity significantly affects capital structure decisions through higher use of short-term debt. Furthermore, it definitely confirmed that the difficult access to capital market and long-term borrowing results in higher use of short-term debt. Additionally, Crnigoj and Mramor (2009) also suggested that the effect of growth rate on leverage is smaller in small firms.

Profitability

There are quite a lot of studies that have provided evidence to support POT in many empirical studies, based on the researches of Titman and Wessels (1988), Wiwattanakantang (1999), Nivorozhkin (2002), Chen (2004), Crnigoj and Mramor (2009), Deesomask *et al.* (2004), Akhtar (2005), Chen and Strange (2005), Huang and Song (2006), Antonious *et al.* 2008, Daskalakis and Psillaki (2008), Al-Najjar (2011), Nunes and Serrasqueiro (2011), Sheikh and Wang (2011). A negative relationship between profitability and leverage not only shows that a more profitable firm prefers to make more use of internal capital, as opposed to external capital, but also this finding shows a fact of higher cost of external finance since the existence of information asymmetric issue and costs of bankruptcy for external finance.

Tangibility

According to the prediction of POT, the firms with more fixed assets are supposed to issue less debt since internal capital is preferred. Furthermore, firms holding more tangible assets will be less prone to asymmetric information problems, thus are less likely to have debts. Therefore, tangibility is inversely related to capital structure decision. Besides, many existing findings are consistent with our prediction in accordance with the researches of Chung (1993), Walsh and Ryan (1997), Booth *et al.* (2001), Bauer (2004), Mazur (2004), Daskalakis and Psillaki (2008), Crnigoj and Mramor (2009), Kaadeniz *et al.* (2009), Sheikh and Wang (2011). Moreover, the findings in Crnigoj and Mramor (2009)'s study also present that the effect of tangibility of assets proved to be less negative in small firms, suggesting that collateral assets probably play a more significant role for firms than those medium-sized and large firms.

2. Methodology

This part of the dissertation describes some more essential approaches in the Research Methodology to determine several hypotheses, objective of the research, definition of the variables, model descriptions, and description of data analysis related to the capital structure of medium and big-sized Portuguese winery.

2.1. Objective of the study and Research Hypotheses

We attempt to answer the following research question, “Which theories are eligible to explain the decision of capital structure of wineries, trade-off theory or pecking order theory? What are the determinants of wineries’ capital structure?” It is only logical to assume that the answer is not as straightforward as one might suggest. Therefore, we aim to analyse different aspects of capital structure and firm performance by addressing the following hypotheses:

The pecking order theory suggests that profitable firms will use less debt as they have more retained earnings to finance their projects. Contrary to the pecking order theory, the static trade-off theory implies that higher profitability will lead to higher debt due to lower bankruptcy probability and higher debt ratings. Furthermore, regarding to unfavorable and difficult macroeconomic conditions, which imply illiquidity of the economy, reducing economic activity and a slowdown in the companies’ growth, the following hypotheses will be tested in this paper:

H1: There is a positive relationship between companies’ tangible assets and leverage. Companies need collateral when borrowing loans from the banks. Collateral position in the balance sheet is represented with tangible assets. Companies with higher tangible assets have better chances for borrowing from financial institutions.

H1a: There is a positive relationship between SMEs’ tangible assets and leverage.

H1b: There is a positive relationship between big companies' tangible assets and leverage.

Empirical research on small firms' capital structure tends to find a positive relationship between tangible assets and total leverage (Sogorb-Mira 2005; Serrasqueiro, Armada & Nunes, 2011; Degryse et al., 2012). Several authors, namely; Chittenden et al (1996), Hall, Hutchinson, and Michaelas, (2004), Sogorb-Mira, (2005) identify a negative effect of tangible assets on short-term debt but a positive effect on long-term debt.

H2: There is a negative relationship between companies' profitability and leverage. Companies which are more profitable, less tend to borrow money because it will be funded from its own resources, therefore the expected impact on the capital structure is negative.

H2a: There is a negative relationship between SMEs' profitability and leverage.

H2b: There is a positive relationship between big companies' profitability and leverage.

The most profitable firms, according to TOT, have greater debt capacity and are able to take advantage of debt tax shields (MacKie-Mason, 1990; Fama & French, 2002). Probably the most profitable firms are more capable of fulfilling their responsibilities in debt and interest repayment, which contributes to less likelihood of bankruptcy. POT predicts, on the contrary, an inverse relationship between profitability and debt level. Profitable firms will finance their investments with internal funds, according to POT. They only move to external finance if there is insufficient internal funding.

H3: Non-debt tax shields are negatively related to leverage.

H3a: There is a negative relationship between SMEs' non-debt tax shields and leverage.

H3b: There is a negative relationship between big companies' non-debt tax shields and leverage.

In accordance with DeAngelo and Masulis (1980), non-debt tax shields, such as deductions allowed by depreciation and amortization together with investment tax credit could substitute the role of tax savings permitted by debt. This means that a firm with a high level of non-debt tax shields will probably have a lower level of debt than a firm with low non-debt tax shields.

H4: There is a negative relationship between companies' size and leverage. By increasing sales revenue, companies are more financed by internally generated funds and are less leveraged.

H4a: There is a negative relationship between SMEs' size and leverage.

H4b: There is a positive relationship between big companies' size and leverage.

It should be noted that bigger companies are more diverse than smaller companies. Large firms have higher capacity to meet up with interest payments (Cazorla-Papis, 2001). It is also found that such companies enjoy a higher degree of disclosure of information (Rajan and Zingales, 1995), and have higher collateral values and lower risk of bankruptcy. This creates more opportunities for large firms to qualify for financial leverage as opposed to smaller firms.

H5: Liquidity are negatively related to leverage.

H5a: There is a negative relationship between SMEs' liquidity and leverage.

H5b: There is a negative relationship between big companies' liquidity and leverage.

The liquidity of companies is predicted to be negatively related to the leverage. The empirical evidence supports this negative relation, like Deesomsak *et al.* (2004); Prowse (1990) and De Jong *et al.* (2008). However, liquidities' positive effect on leverage supported by the researches of Sbeiti (2010) and Ozkan (2001).

H6: There is a negative relationship between companies' growth and leverage. If the growth of companies is measured as the percentage change in total assets over the previous year, the companies that invest in their properties do not need to borrow, or can be financed from internally generated funds.

H6a: There is a negative relationship between SMEs' growth and leverage.

H6b: There is a positive relationship between big companies' growth and leverage.

TOT predicts a negative relationship between growth and leverage opportunities. As Myers (1977) shows, in firms with high growth opportunities, the underinvestment problem becomes more acute. Higher growth opportunities companies have higher funding needs. According to POT, when internal finance remains less, firms prefer debt to external equity to fund opportunities for growth associated with greater risk than investment in existing assets (Baskin 1989; Shyam-Sunder & Myers, 1999; Ramalho & Silva, 2009). These authors state that if internal funds are insufficient, firms with good growth opportunities will increase debt. POT therefore predicts a positive relationship between the growth and leverage.

2.2. Definition of the Variables and Model description

To achieve the objectives of this research and test the hypothesis stated in previous section, it will be used a function that relates the capital structure of the firm as measure by leverage and the determinants identified by the literature as presented previously. Therefore, in this section it is described the variables used to test the model and its formulas of calculus.

Leverage

Abor (2005) demonstrated that short-term debt has a positive relation to profitability while it is the reverse relation for long-term debt that has a negative association. Therefore, according to Abor (2005) and Shubita and Alsawalhah (2012), leverage is measured as long-term and short-term debt when examining the impact on profitability, both divided by the book value of total assets.

$$LEV = \text{Total debt} / \text{Total assets}. \quad (2.1)$$

Tangibility

According to Frank and Goyal (2003), tangibility is measured as the property, plant and equipment, which are assets that can be set as collateral, divided by the book value of total assets.

$$TANG = \text{Property, plant and equipment} / \text{Total assets.} \quad (2.2)$$

Profitability

Maheshwari (2001) defined profitability as the final measure of economic success achieved by a company in relation to the capital invested. Firm which has high profitability will not depend excessively on external funding for its development, because profitability has a negative effect on leverage. Fosu (2013) highlights return on assets (ROA) as a suitable measure for firms' performance and the measure is widely used in capital structure literature, according to Derayat (2012) and Singh (2013). Return on asset is chosen as a measure of profitability and calculated as the net income divided by the book value of total assets.

$$ROA = \text{Net income} / \text{Total assets.} \quad (2.3)$$

Growth opportunity

Firms that have more growth opportunities are also the ones that have higher rate of return since they can generate more profit from their investments. Therefore, previous researches namely; Zeitun and Tian (2007), Nunes et al. (2009), Margaritis and Psillaki (2010) show that growth is positively related to firm's performance. Growth is defined by assets and measured as:

$$Growth = (\text{Assets}_t - \text{Assets}_{t-1}) / \text{Assets}_{t-1} \quad (2.4)$$

Non-debt tax shield

Non-debt tax shield like tax deduction for depreciation and investment tax credits are substitutes for the tax benefit of debt financing (DeAngelo and Masulis, 1980). Therefore, the tax advantage of leverage decreases when other tax deduction increases.

$$NDTS = \text{Depreciations and Amortizations} / \text{Total assets.} \quad (2.5)$$

Liquidity

Lipson and Mortal (2009) argue that firms that have a high level of liquidity have less need to use leverage. Moreover, according to Beaver (1966), we use operating cash flow as a measure of liquidity and divide it by the book value of total assets.

$$LIQ = (\text{Total Current Assets} - \text{Total Current Liabilities}) / \text{Total assets}. \quad (2.6)$$

Firm size

Authors found out some more important hypotheses and a measurement of firm size in their researches (Serrasqueiro, Matias, & Salsa, 2016).

$$SIZE = \text{Natural logarithm of Total Assets} \quad (2.7)$$

As can be seen from several panel data we should use fixed effects/random effects in order to get meaningful and significant coefficients that take into account the various relationships in between the variables. However, we should not forget that all of the quantitative variables are presented as ratios according to total to the exception of Size, taken as the natural logarithm of total assets. In equation 2.8 is the general representation of model with the relation between leverage ($Leverage_{it}$) that represents the capital structure of the firm (the level of debt in the capital structure), and the determinants that may explain it (the explanatory or independent variables).

$$\begin{aligned} Leverage_{it} = & \beta_0 + \beta_1 Tangibility_{it} + \beta_2 Profitability_{it} + \beta_3 Size_{it} \\ & + \beta_4 liquidity_{it} + \beta_5 Non\ debt\ tax\ shields_{it} + \beta_6 Growth_{it} + u_{it} \end{aligned} \quad (2.8)$$

2.3. Data Analysis methods

This passage of the dissertation describes some more essential approaches in the Panel data analyses to evaluate several observations, namely; population and sample, method of panel analyses, pooled OLS, fixed versus random effects, testing fixed and random effects, F-test for fixed effects, Breusch-Pagan LM test for random effects, Hausman test for comparing fixed and random effects.

2.3.1. Population vs. Sample

Data come from the widely used SABI database, collected from 700,000 Portuguese companies. We assume that biases remain roughly constant overtime; hence, the database enables to make relevant comparisons with other comparable Portuguese studies in order to highlight some concrete facts. The

selection of the sample complies with the definition of the capital structure of Portuguese winery. In order to get some more precise information from SABI database, we found from the codes mentioned below: Firstly, we accessed to the code C in which represents Manufacturing, secondly 11 which is manufacturing of beverages, then, we chose 1102 and 11021 which mean manufacturing of wines and manufacturing of ordinary and liquor wine respectively. All financial data are updated and available for the observation period of eight consecutive years [2010, 2017]. From the sample of companies in consideration, each company should have at least 10 employees to be eligible for this research. Our balanced panel of 138 medium and big-sized companies comprises quite a lot of observations in the mentioned period. Firms were also classified according to their industry sector of activity, which allowed us to obtain their various structural characteristics, especially those related to their branch of activity (Jorge & Armada, 2001).

2.3.2. Panel data Analysis method

In economics, data sets combining time series and cross sections are common. Recently, longitudinal data sets have been constructed containing observations of thousands of individuals or families, each observed at several times. Furthermore, some empirical studies simultaneously analysed time-series data on multiple firms, states, or industries. These data sets provide a rich source of information about Panel data model.

A set of data panels includes n entities or subjects, each of which includes T observations measured at 1 through t periods. Therefore, in the panel data, the total number of observations is nT . Ideally, panel data are measured at regular time intervals (e.g., year, quarter, and month). Otherwise, the panel data should be carefully analysed. A panel can be long or short, balanced or unbalanced, and fixed or rotating. The panel of our research considered short and balanced data. A short panel has many entities (large n) but few periods (small T) (Cameron and Trivedi, 2009: 230). Accordingly, a short panel data set is wide in width (cross-sectional) and short in length (time-series). With more than three periods, things are similar. If we have the same T periods for each of N cross-sectional units, we say that the data set is a balanced panel: we have the same periods for all individuals, firms, cities, and so on (Wooldridge, 1980). Unlikely, missing data are very common in panel data sets. For this reason, or probably just because of the way the data were recorded, panels in which the group sizes differ across groups are not unusual. These panels are called unbalanced panels. Unbalanced panel data involves some computation and estimation problems, although most software packages can handle balanced and unbalanced data (Greene, 2000).

When saying panel data, you are implicitly arguing that the data are well arranged by both cross-sectional and time-series variables and that you get a strong impression of presence of fixed and/or random effects. Otherwise, the data are simply arranged in the panel data format but in an econometric sense it is no longer panel data.

The most important issue is consistency in the analysis unit (or measurement), which says that each observation in a data set deserves equal treatment and weight. Although this requirement seems self-evident, careless researchers often overlook it. In many ways, any analysis based on such data may not be reliable if each observation is not equivalent. Here are some checkpoints that researchers should examine carefully. First of all, data should be longitudinal and some fixed and/or random effects should be available in it. Secondly, see if individuals (e.g., entities and subjects) are not consistent but changing. Likewise, check if periods are not consistent but changing. A period under some circumstances may not be fixed but almost random. Moreover, examine if an entity has more than one observation in a particular period. Moreover, check if measurement methods employed are not consistent. In addition, watch out when you “darn” your data set by combining data sets measured and built by different institutions who employed different methods. This circumstance is quite understandable because a perfect data set is rarely ready for you; in many cases, you are to combine some sources of information to build a new data set for your research (Park, 2011).

Finally, the quality of panel data is likely to be lowered by many missing values. So-called listwise deletion (an entire record is excluded from analysis if any single value of a variable is missing) tends to reduce the number of observations used in a model and thus weaken statistical power of a test. This issue is also related to discussion on balanced panel data.

Once a well-organized panel data is prepared, we are moving forward to discuss panel data models that are used to analyse fixed and/or random effects embedded in the longitudinal data. While a panel data set has both a cross-sectional and a time series dimension, it differs from an independently pooled cross-section in some important respects. We follow (or try to follow) the same individuals, families, firms, cities, states, or whatever, over time to collect panel data — sometimes called longitudinal data. For example, by randomly selecting individuals from a population at a given point in time, a panel data set on individual wages, hours, education, and other factors is collected. Then, at several subsequent points in time, these same people are re-interviewed. This gives us data for the same group of people in different years about wages, hours, education, and so on (Wooldridge, 1980).

2.3.2.1. Pooled OLS

If individual effect u_i (cross-sectional or time specific effect) does not exist ($u_i = 0$), ordinary least squares (OLS) produces efficient and consistent parameter estimates.

$$y_{it} = \alpha + X_{it}\beta + \varepsilon_{it} (u_i = 0) \quad (2.9)$$

OLS consists of five core assumptions (Greene, 2008: 11-19; Kennedy, 2008: 41-42) as follows:

1. Linearity says that the dependent variable is formulated as a linear function of a set of independent variables and the error (disturbance) term.

2. Exogeneity says that the expected value of disturbances is zero or disturbances are not correlated with any regressors.
3. Disturbances have the same variance (3.a homoskedasticity) and are not related with one another (3.b non-autocorrelation)
4. The observations on the independent variable are not stochastic but fixed in repeated samples without measurement errors.
5. Full rank assumption says that there is no exact linear relationship among independent variables (no multicollinearity).

If individual effect u_i is not zero in longitudinal data, heterogeneity (individual specific characteristics like intelligence and personality that are not captured in regressors) may influence assumption 2 and 3. In particular, disturbances may not have same variance but vary across individual (heteroskedasticity, violation of assumption 3.a) and/or are related with each other (autocorrelation, violation of assumption 3.b). This is an issue of non-spherical variance-covariance matrix of disturbances. The violation of assumption 2 renders random effect estimators biased. Hence, the OLS estimator is no longer best unbiased linear estimator. Then panel data models provide a way to deal with these problems.

2.3.2.2. Fixed versus Random Effects

Panel data models examine individual or time's fixed and/or random effects. The core difference between fixed and random effect models lies in the role of dummy variables (Table 1). A parameter estimate of a dummy variable is a part of the intercept in a fixed effect model and an error component in a random effect model. Slopes remain the same across group or time period in either fixed or random effect model.

A random effect model assumes that individual effect (heterogeneity) is not correlated with any regressor and then estimates error variance specific to groups (or times). As a consequence, u_i is an individual specific random heterogeneity or a component of the composite error term. This is why a random effect model is also called an error component model. The intercept and slopes of regressors are the same across individual. The difference among individuals (or time periods) lies in their individual specific errors, not in their intercepts.

A random effect model is estimated by generalized least squares (GLS) when a covariance structure of an individual i , Σ (sigma), is known. The feasible generalized least squares (FGLS) or estimated generalized least squares (EGLS) method is used to estimate the entire variance-covariance matrix V (Σ in all diagonal elements and 0 in all off-diagonal elements) when Σ is not known. There are

various estimation methods for FGLS including the maximum likelihood method and simulation (Baltagi & Cheng, 1994).

Table 1 Fixed Effect and Random Effect Models

	Fixed Effect Model	Random Effect Model
Functional form	$y_{it} = (\alpha + u_i) + X_{it}\beta + v_{it}$	$y_{it} = \alpha + X_{it}\beta + (v_{it} + u_i)$
Assumption	-	Individual effects are not correlated with regressors
Intercepts	Varying across group and/or time	Constant
Error variances	Constant	Randomly distributed across group and/or time
Slopes	Constant	Constant
Estimation	LSDV, within effect estimation	GLS, FGLS (EGLS)
Hypothesis test	F test	Breusch-Pagan LM test

Source: (Park, 2011)

A random effect model reduces the number of parameters to be estimated but will produce inconsistent estimates when individual specific random effect is correlated with regressors (Greene, 2008: 200-201).

Fixed effects are tested by the F test, whereas random effects are examined by the Lagrange multiplier (LM) test (Breusch and Pagan, 1980). If the null hypothesis is not rejected in either test, the pooled OLS regression is favoured. The Hausman specification test (Hausman, 1978) compares a random effect model to its fixed counterpart. If the null hypothesis that the individual effects are uncorrelated with the other regressors is not rejected, a random effect model is favoured over its fixed counterpart.

If one cross-sectional or time-series variable is considered (e.g., country, firm, and race), this is called a one-way fixed or random effect model. Two-way effect models have two sets of dummy variables for individual and/or time variables (e.g., state and year) and thus entail some issues in estimation and interpretation.

2.3.2.3. Testing Fixed and Random Effects

How can we know if fixed and/or random effects exist in panel data in hand? A fixed effect is tested by F-test, while a random effect is examined by Breusch and Pagan's (1980) Lagrange multiplier (LM) test. The former compares a fixed effect model and OLS to see how much the fixed effect model

can improve the goodness-of-fit, whereas the latter contrast a random effect model with OLS. The similarity between random and fixed effect estimators is tested by a Hausman test.

2.3.2.4. F-test for Fixed Effects

In a regression of $y_{it} = \alpha + u_i + X_{it}\beta + \varepsilon_{it}$, the null hypothesis is that all dummy parameters except for one for the dropped are all zero, $H_0 / \mu_1 = \dots = \mu_{n-1} = 0$. The alternative hypothesis is that at least one dummy parameter is not zero. This hypothesis is tested by an F test, which is based on loss of goodness-of-fit. This test contrasts LSDV (robust model) with the pooled OLS (efficient model) and examines the extent that the goodness-of-fit measures (SSE or R^2) changed.

$$F(n-1, nT-n-k) = \frac{(e'e_{pooled} - e'e_{LSDV}) / (n-1)}{(e'e_{LSDV}) / (nT-n-k)} = \frac{(R^2_{LSDV} - R^2_{pooled}) / (n-1)}{(1-R^2_{LSDV}) / (nT-n-k)} \quad (2.10)$$

If the null hypothesis is rejected (at least one group/time specific intercept u_i is not zero), you may conclude that there is a significant fixed effect or significant increase in goodness-of-fit in the fixed effect model; therefore, the fixed effect model is better than the pooled OLS.

2.3.2.5. Breusch-Pagan LM Test for Random Effects

Breusch and Pagan's (1980) Lagrange multiplier (LM) test examines if individual (or time) specific variance components are zero, $H_0 / \sigma_u^2 = 0$. The LM statistic follows the chi-squared distribution with one degree of freedom.

$$LM_u = \frac{nT}{2(T-1)} \left[\frac{T\bar{e}\bar{e}}{e'e} - 1 \right]^2 \sim \chi^2 \quad (2.11)$$

where \bar{e} is the $n \times 1$ vector of the group means of pooled regression residuals, and $e'e$ is the SSE of the pooled OLS;

Baltagi (2001) presents the same LM test in a different way.

$$LM_u = \frac{nT}{2(T-1)} \left[\frac{\sum(\sum e_{it})^2}{\sum \sum e_{it}^2} - 1 \right]^2 = \frac{nT}{2(T-1)} \left[\frac{\sum(T\bar{e}_i)^2}{\sum \sum e_{it}^2} - 1 \right]^2 \sim \chi^2 \quad (2.12)$$

If the null hypothesis is rejected, you can conclude that there is a significant random effect in the panel data, and that the random effect model is able to deal with heterogeneity better than does the pooled OLS.

2.3.2.6. Hausman Test for Comparing Fixed and Random Effects

How do we know which effect (fixed effect or random effect) is more relevant and significant in the panel data? The Hausman specification test compares fixed and random effect models under the null hypothesis that individual effects are uncorrelated with any regressor in the model (Hausman, 1978).

It is argued that we should always treat the individual effects as random. The fixed effects model is simply analysed conditionally on the effects present in the observed sample (Mundlak, 1978). If the null hypothesis of no correlation is not violated, LSDV and GLS are consistent, but LSDV is inefficient; otherwise, LSDV is consistent but GLS is inconsistent and biased (Greene, 2008: 208). The estimates of LSDV and GLS should not differ systematically under the null hypothesis. The Hausman test uses that “the covariance of an efficient estimator with its difference from an inefficient estimator is zero” (Greene, 2008: 208).

$$LM = (b_{LSDV} - b_{random})' \widehat{W}^{-1} (b_{LSDV} - b_{random}) \sim \chi^2(k) \quad (2.13)$$

where $\widehat{W} = Var[b_{LSDV} - b_{random}] = Var(b_{LSDV}) - Var(b_{random})$ is the difference in the estimated covariance matrices of LSDV (robust model) and GLS (efficient model). Keep in mind that an intercept and dummy variables should be excluded in computation. This test statistic follows the chi-squared distribution with k degrees of freedom. The formula says that a Hausman test examines if “the random effects estimate is insignificantly different from the unbiased fixed effect estimate” (Kennedy, 2008: 286). If the null hypothesis of no correlation is rejected, you may conclude that individual effects u_i are significantly correlated with at least one regressor in the model and thus the random effect model is problematic. Therefore, you need to go for a fixed effect model rather than the random effect counterpart. A drawback of this Hausman test is, however, that the difference of covariance matrices W may not be positive definite; Then, we may conclude that the null is not rejected assuming similarity of the covariance matrices renders such a problem (Greene, 2008: 209).

3. Empirical Results Analysis

This chapter will begin with removing missing data and a descriptive analysis of the data, then a correlation analysis will be conducted, followed by the choice of estimation model. It will continue presenting the empirical results obtained from analysing the effect different firm-specific determinants may have on capital structure in listed medium and big-sized Portuguese winery. The analysis is based on the specifications discussed in the previous chapter.

3.1. Sample Characterisation/Profile

A statistical data analysis project starts, of course, by the data collection task. The quality with which this task is performed is a major determinant of the quality of the overall project. Issues such as reducing the number of missing data, recording the relevant documentation on what the problem is and how the data was collected and displaying the appropriate description of the meaning of the variables involved must be satisfactorily solved.

Missing data such as failure to obtain some data for certain cases, the values of several variables always will diminish the degree of certainty of the statistical conclusions. Many software products provide means to deal with missing data. These can be simply coding missing data by symbolic numbers or letters, such as "n/a" ("not available") which are ignored while performing statistical analysis operations. Yet the only solution is to simply remove objects with missing data. As we have already found 138 companies step by step from SABI database, those data were chosen carefully according to missing data solution. As a result, companies coded by numbers, namely; 19, 86, 114, 154, 187 and 390 were removed from the list because of not having sufficient data. We still have 132 companies, which are enough to analyze statistically.

Descriptive statistics of the variables used in the research is presented in table 2. It can be seen that minimum and maximum leverage (total debt/total assets) of the analysed Portuguese companies ranged from 0.0492 to 5.6415 respectively as well as the mean of the leverage is 0.5883 (Std deviation = 0.3079) indicating the average level of leverage of Portuguese companies.

Table 2: Descriptive statistics of variables used in the study (2011-2017)

	n	Minimum	Maximum	Mean	Std. Dev¹
Leverage	910	0.0492	5.6415	0.5883	0.3079
Tangibility	910	0.0000	0.9460	0.4306	0.2301
Return on assets	910	-0.5466	0.2475	0.0087	0.0669
Non debt tax shields	910	-0.0017	0.2192	0.0317	0.0203
Size	910	3.8452	12.5283	8.7479	1.3406
Liquidity	909	-0.4262	0.3368	0.0571	0.0733
Growth(A)	903	-0.6675	7.2077	0.0781	0.3271

Notes: ¹Std. Dev – Standard deviation

Tangibility shows greater usage of fixed assets and regardless their operational activity, the companies analysed own on average just approximately 43% of tangible assets (Std deviation = 0.23).

Profitability varies between -0.55 and 0.25. The negative value shows failure of management in generating returns out of firm's assets. The highest value of return on asset in our sample is 0.25, which indicate that the company is not making enough income from the use of its assets. In some cases, a low percentage return may be acceptable. For instance, if a firm recently purchased an expensive piece of machinery for one of its manufacturing plants, the return on that asset may be low for the first few years of operation. If the return remains low beyond the first few years, it may indicate an unwise investment on the part of management. The machinery may not be increasing production efficiency or lowering overall production costs enough to positively impact the company's profit margin. On average, profitability of these companies is about 0.009 (Std deviation = 0.067).

Furthermore, the mean of NDTs is 0.0317, the maximum value is 0.2192 and the minimum value is -0.0017. It shows that some enterprises make full use of the tax effect of NDTs. Growth varies between -0.67 and 7.21. Additionally, growth opportunities average about 7.8% (Std deviation = 0.33).

Liquidity of a firm is calculated by using current ratio and it ranges from minimum value of -0.43 and maximum value of 0.34. Usually, a firm with a higher current ratio is considered as better off whereas the firm with a lower current ratio is supposed to be worse. On average, firms have current ratio of 0.057

with a standard deviation of 0.073 which is normal but it also depends on the size of the firm, type of industry, volume of sales and other factors as well.

Finally, by looking at SIZE, we can find that the smallest firm in our sample has a value of 3.85 and the largest firm has a value of 12.53. On average, firms have size of 8.75 (Std deviation = 1.34).

Correlation is a way of numerically quantifying the association between two variables. Moreover, it measures the strength and direction of this relationship (Koop & Korobils, 2013). The correlation coefficient always lies between -1 and +1, where -1 indicates that the variables are perfectly negatively correlated, while +1 implies perfectly positive correlation. A correlation coefficient equal to 0 indicates that there is no linear relationship between the variables. Values between 0.5 and 0.7 is moderately correlated and between 0.7 and 0.9 is highly correlated (Koop & Korobils, 2013). Table 3 shows the results of Pearson correlation coefficient for each variable. Analysing these results help it can be obtained some indications about positive or negative relationships among variables and consequently about the validation of the hypothesis.

Table 3: Correlations between variables (dependent and independent)

		Lev	Tang	ROA	NDTS	Size	Liq.	Growth(A)
Lev	Pearson Correlation	1	.103**	-.531**	.069*	-.241**	-.459**	0.001
	N	1039	1039	1039	1039	1039	1037	903
Tang	Pearson Correlation	.103**	1	-.256**	.177**	.161**	-.222**	-0.021
	N	1039	1039	1039	1039	1039	1037	903
ROA	Pearson Correlation	-.531**	-.256**	1	-.077*	.101**	.946**	.102**
	N	1039	1039	1039	1039	1039	1037	903
NDTS	Pearson Correlation	.069*	.177**	-.077*	1	-.307**	.202**	-.077*
	N	1039	1039	1039	1039	1039	1037	903
Size	Pearson Correlation	-.241**	.161**	.101**	-.307**	1	0.018	-.094**
	N	1039	1039	1039	1039	1039	1037	903
Liq.	Pearson Correlation	-.459**	-.222**	.946**	.202**	0.018	1	0.054
	N	1037	1037	1037	1037	1037	1037	902
Growth (A)	Pearson Correlation	0.001	-0.021	.102**	-.077*	-.094**	0.054	1
	N	903	903	903	903	903	902	903

Notes: **. Correlation is significant at the 0.01 level (2-tailed); *. Correlation is significant at the 0.05 level (2-tailed).

Lev: Leverage; Tang: Tangibility; ROA: Return on Assets (profitability); NDTS: Non-debt tax shields; Liq.: Liquidity.

From table 3, analyzing the first row or first column is observed that there is a positive although not statistically significant correlation between leverage and tangibility, as the Pearson correlation coefficient is 0.103 (Sig =0.001). The Pearson correlation coefficient between leverage and profitability (as measured by the ratio of EBIT to total assets) is -0.531 (correlation is significant at 0.01 level) showing that the relationship between long-term leverage and profitability is statistically significant with the moderate negative sign.

The correlation between leverage and NDTs is positive and statistically significant although very low (Pearson correlation coefficient is -0.069 , lower than 0.3). Size is negative and statistically significant but very low correlated as the Pearson correlation coefficient is 0.103 (p-value =0.001). Lastly, the correlation between leverage and growth is positive but not statistically significant, as Pearson correlation coefficient is 0.001 (p-value =0.969). These results may indicate that the first hypothesis (that relates positively leverage and tangibility) can be validated. The second hypothesis (leverage and profitability are negatively related) can be validated, but the third hypothesis (negative relation between leverage and non-debt tax shield) cannot be validated, although the correlation is statistically significant the sign is the opposite. However, the fourth hypothesis (negative relationship between leverage and size) can be validated as the sign is as expected and the correlation is statistically significant. Furthermore, the fifth hypothesis (leverage and liquidity are negatively related) can be validated, but the sixth hypothesis (negative relation between leverage and growth) cannot be validated, although the correlation is statistically significant the sign is the opposite. However, these analyses have to be confirmed with a more robust method as it is the panel data analysis.

It should also be noted that the correlation among the independent variables is low.

3.2. Determinants of capital structure

This section will identify the determinants of capital structure, beginning with the determination of the estimation model that is the most appropriate to use. Firstly, a robust pooled OLS regression, fixed effect model and random effect analysis is conducted and the data is examined (table 4) to see if they fulfil the assumptions of the discussed estimation models. Then the sample is tested for panel data effects to see if panel data estimation methods are appropriate. All the assumptions will be tested and discussed before the estimation model is chosen.

The values for F and Prob > F indicate whether regression model is or is not the significant. Especially, they test the null hypothesis that all regression coefficients are equal to zero. For both models, Prob > F is lower than 0.001, which means that we can reject H_0 and conclude that the model is significant, as can be seen in table 4. The F-value is the explained variability divided by the unexplained variability. In these models, namely; robust pooled OLS and Fixed effect model, which the F values are

92.29 and 51.82, respectively. The higher the F-value, the more of the total variability is accounted for in the model.

R-squared measures the explanatory power of the model. The overall R-squared tells us how much the variance in capital structure can be explained by firm-specific characteristic. The R-squared values in table 4, demonstrates that the variation in leverage is better explained by the independent variables. The regression gives an R^2 of 0.383 for Robust Pooled OLS, which means that 38.3% of the variation in leverage can be explained by the independent variables. In comparison, fixed effect model reports an R^2 of 0.747, implying that 74.7% of the variation in leverage can be explained by the independent variables. This shows that it is a large difference between the models and the independent variables' ability to explain variation across firms.

Table 4: Panel Data Analysis Results

LEV	Robust Pooled OLS	Fixed Effect Model	Random Effect Model
TANG	0.0571* (-0.0473)	0.3635*** (0.0964)	0.1569** (0.0607)
ROA	-8.6977*** (2.0959)	-5.0952*** (0.7053)	-6.0881*** (0.6673)
NDTS	-6.2379*** (1.2600)	-3.3032*** (0.8686)	-4.1592*** (0.7998)
Size	-0.0454*** (0.0058)	-0.1106*** (0.0235)	-0.0598*** (0.0115)
LIQ	5.9034*** (1.5173)	2.9531*** (0.6651)	3.7358*** (0.6278)
Growth(A)	0.0632** (0.0216)	0.0397* (0.0210)	0.0396* (0.0206)
Intercept (baseline)	0.8930*** (0.0573)	1.3766*** (0.2075)	1.0133*** (0.1057)
F-test (model)	92.29 ($p < 0.001$)	51.82 ($p < 0.001$)	
DF	894	763	
R^2	0.3825	0.7473	
SSE (SRMSE)	53.0612	21.7157	0.1689
Root MSE (SEE)	0.2436	0.1687	0.1687
σ_u (sigma_u)		0.2185	0.1743
Theta			0.6565
Effect test		8.41***	391.28***
N	901	901	901

Note: Statistical significance: * <0.1, **<0.05, ***<0.001

LEV- Leverage; TANG- Tangibility; ROA- Return on assets; NDTs-Non debt tax shields; LIQ-Liquidity; DF-Degrees of freedom; SSE- Sum of Squares error; N-Number of observations. The standard errors values are in brackets.

In order to choose which model is more appropriate than others in our case, it was used the Breush-Pagan Test (a Lagrange multiplier (LM) test) and the Hausman test. The Lagrange multiplier (LM) test helps decide if a simple random effect model can be used for analysis of panel data. The null hypothesis tested is that the cross-sectional variance across all components is zero, i.e. that there is no significant difference across units and thus no panel effects. The obtained result is $\chi^2(1) = 623.54$ (p-value < 0.001). Hence, the null hypothesis is rejected at the 0.1% significance level and there is significant evidence of differences across entities. This indicates that random effect model should be used instead of Pooled OLS model.

In order to decide between the fixed or the random effects model, a Hausman test is conducted. This test (see table 5) examines whether the coefficients from the fixed effects estimation or the random effects estimation are the most statistically significant.

Table 5: Hausman Test

	(b) fixed_group	(B) random_group	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
TANG	0.3635	0.1569	0.2066	0.0748
ROA	-5.0952	-6.0881	0.9929	0.2285
NDTS	-3.3032	-4.1592	0.8561	0.3388
Size	-0.1106	-0.0598	-0.0508	0.0204
LIQ	2.9531	3.7358	-0.7827	0.2195
Growth A	0.0397	0.0396	0.0002	0.0044

$\chi^2(6) = 28.32$ (*Prob* > $\chi^2 = 0.0001$)

Notes: TANG- Tangibility; ROA- Return on assets; NDTs-Non-debt tax shields; LIQ-Liquidity;

As *Prob* > χ^2 is < 0.05 (i.e. significant) use fixed effects. We may conclude that the fixed effect model is better than its random counterpart. The test is conclusive.

Then we tested if we should use a time-fixed effect model. The results are presented in the Annex 1, table A1. The F-test results are $F(6;757) = 1.97$ (*Prob* > $F = 0.0672$). As *Prob* > F is > 0.05, so we failed to reject the null that the coefficients for all years are jointly equal to zero, therefore no time fixed-effects are needed in this case.

The table 4 shows that there are some differences in the magnitude of the coefficients among models. When interpreting the coefficients, all other variables are kept constant (*ceteris paribus*). Tangibility coefficients are significantly different from zero at the 10%, 0.1% and 5% level of significance, respectively, and they have a positive relationship with firm leverage. The results demonstrate that when

the fixed assets/total assets ratio decreases by 1 percent, leverage increases by 0.057 percent in model 1 (Pooled OLS Model). Nevertheless, the magnitude of this variable is greatly decreased if we consider model 2 (fixed effects model), where we observe an increase of 0.364 percent in Leverage. According to random effect model the effect is an increase of 0.157 basis points. Notice that the sign of the relationship remains whichever model is considered (pooled OLS, fixed effect model or random effect model).

The profitability-variable is negative and statically significant at the 0.1% significance level whichever the model. Therefore, the relationship between profitability and leverage is negative which means that if the profitability of the firm (measured by return on assets) increases, the leverage decreases. For all models, there is an indication that firms with higher returns tend to have lower levels of leverage. The results suggest that with a level of confidence of 99%, an increase of one basis point in profitability will lead to 8.7 basis points decrease in leverage (approximately), *ceteris paribus*, for robust pooled OLS. For fixed effect model, the effect is a decrease of 5.1 basis points in leverage, for fixed effect model. According to random effect model the effect is a decrease of 6.1 basis points.

The results show that there is a negative and statistically significant relationship between non-debt tax shield and leverage for all models. However, the magnitude of variable (its coefficient) decrease a lot when is the fixed or random effect model are considered. An increase of 1 basis point in the non-debt tax shield ratio implies a 6.2 basis points decrease in leverage for Pooled OLS model and 3.30 (4.16) basis point decrease in leverage for fixed effect (random effect) model.

The results show that there is a negative and statistically significant relationship between size and leverage for all models. However, the magnitude of variable (its coefficient) decrease a lot when is the fixed or random effect model are considered. An increase of 1 basis point in the size implies a 0.045 basis points decrease in leverage for Pooled OLS model and 0.111 (0.06) basis point decrease in leverage for fixed effect (random effect) model.

The liquidity-variable is positive and statically significant at the 0.1% significance level whichever the model. Therefore, the relationship between liquidity and leverage is positive. The results suggest that with a level of confidence of 99%, a decrease of one basis point in liquidity will lead to 5.9 basis points increase in leverage (approximately), *ceteris paribus*, for robust pooled OLS. For fixed effect model, the effect is an increase of 2.95 basis points in leverage, for fixed effect model. According to random effect model the effect is an increase of 3.7 basis points.

Growth coefficients are significantly different from zero at the 5%, 10% and 10% level of significance for pooled OLS, fixed effect model and random effect model, respectively, and they have a positive relationship with firm leverage. The results demonstrate that a decrease of one basis point in growth will lead to 0.063 basis points increase in leverage in model 1 (Pooled OLS Model). However, the magnitude of these variables is greatly decreased if we consider model 2 (fixed effects model) and

model 3 (random effects model), where we observe increases of 0.04 percent in leverage for both models.

The next section is presented the analysis for the subgroup of small and medium sized (SME) companies and big companies in our sample, in order to check if there are differences in these two groups.

3.2.1. Determinants of capital structure for SME

As done in previous section, it was conduct a (robust) pooled OLS regression, a fixed effect and random effect model, using only data for SMEs in the sample. Table 6 presents the results of these models.

The table 6 shows that there are some differences in the magnitude of the coefficients among models. When interpreting the coefficients, all other variables are kept constant (*ceteris paribus*).

The values for F and Prob > F indicate whether regression model is or is not the significant. Especially, they test the null hypothesis that all regression coefficients are equal to zero. For both models, Prob > F is lower than 0.001, which means that we can reject H_0 and conclude that the model is significant. The F-value is the explained variability divided by the unexplained variability. In these models, namely; robust pooled OLS and Fixed effect model, which the F values are 18.81 and 47.27, respectively. The higher the F-value, the more of the total variability is accounted for in the model.

R-squared measures the explanatory power of the model. The overall R-squared tells us how much the variance in capital structure can be explained by firm-specific characteristic. The R-squared values demonstrate that the variation in leverage is better explained by the independent variables. The regression gives an R^2 of 0.403 for Robust Pooled OLS, which means that 40.3% of the variation in leverage can be explained by the independent variables.

In order to choose which model is more appropriate than others in our case, it was used the Breush-Pagan Test The obtained results is $\chi^2(1) = 459.59$ (p-value < 0.001). Hence, the null hypothesis is rejected at the 0.1% significance level and there is significant evidence of differences across entities. This indicates that random effect model should be used instead of Pooled OLS model.

In order to decide between the fixed or the random effects model, a Hausman test is conducted.

$$\chi^2(6) = 19.26 \text{ (Prob } > \chi^2 = 0.0037)$$

As Prob $> \chi^2$ is < 0.05 (i.e. significant) use fixed effects. We may conclude that the fixed effect model is better than its random counterpart. The test is conclusive.

Table 6: Panel Data Analysis Results For SME

LEV	Robust Pooled OLS	Fixed Effect Model	Random Effect Model
TANG	0.0929* (0.0514)	0.4209*** (0.1096)	0.2060** (0.0692)
ROA	-9.2244*** (2.3327)	-5.8839*** (0.8323)	-6.9008*** (0.7788)
NDTS	-7.0482*** (1.4377)	-4.0554*** (0.9859)	-5.0569*** (0.9026)
Size	-0.0738*** (0.0109)	-0.1268*** (0.0263)	-0.0914*** (0.0160)
LIQ	6.3516*** (1.7220)	3.6566*** (0.7859)	4.4615*** (0.7336)
Growth(A)	0.0538** (0.0221)	0.0397* (0.0228)	0.0380* (0.0222)
Intercept (baseline)	1.1097*** (0.0860)	1.4420*** (0.2227)	1.2343*** (0.1355)
F-test (model)	18.81 (p<0.001)	47.27 (p<0.001)	
DF	745	636	
R ²	0.4027		
SSE (SRMSE)			
Root MSE (SEE)	0.2536	0.1814	0.1814
σ_u (sigma_u)		0.2129	0.1777
Theta			0.6401
Effect test		7.53***	361.75***
N	752	752	752

Note: Statistical significance: * <0.1, **<0.05, ***<0.001

LEV- Leverage; TANG- Tangibility; ROA- Return on assets; NDTS-Non debt tax shields; LIQ-Liquidity; DF-Degrees of freedom; SSE- Sum of Squares error; N-Number of observations; The standard errors values are in brackets.

The table 6 shows that there are some differences in the magnitude of the coefficients among models. When interpreting the coefficients, all other variables are kept constant (*ceteris paribus*).

Tangibility coefficients are significantly different from zero at the 10%, 0.1% and 5% level of significance, respectively, and they have a positive relationship with firm leverage. The results demonstrate that when the fixed assets/total assets ratio decreases by 1 percent, leverage increases by 0.093 percent in model 1 (Pooled OLS Model). Nevertheless, the magnitude of this variable is greatly decreased if we consider model 2 (fixed effects model), where we observe an increase of 0.421 percent

in leverage. According to random effect model the effect is an increase of 0.206 basis points. Notice that the sign of the relationship remains whichever model is considered (pooled OLS, fixed effect model or random effect model).

The profitability-variable is negative and statically significant at the 0.1% significance level whichever the model. Therefore, the relationship between profitability and leverage is negative which means that if the profitability of the firm (measured by return on assets) increases, the leverage decreases. For all models, there is an indication that firms with higher returns tend to have lower levels of leverage. The results suggest that with a level of confidence of 99%, an increase of one basis point in profitability will lead to 9.224 basis points decrease in leverage (approximately), *ceteris paribus*, for robust pooled OLS. For fixed effect model, the effect is a decrease of 5.884 basis points in leverage, for fixed effect model. According to random effect model the effect is a decrease of 6.9 basis points.

The results show that there is a negative and statistically significant relationship between non-debt tax shield and leverage for all models. However, the magnitude of variable (its coefficient) decrease a lot when is the fixed or random effect model are considered. An increase of 1 basis point in the non-debt tax shield ratio implies a 7.048 basis points decrease in leverage for Pooled OLS model and 4.055 (5.057) basis point decrease in leverage for fixed effect (random effect) model.

The results show that there is a negative and statistically significant relationship between size and leverage for all models. However, the magnitude of variable (its coefficient) decrease a lot when is the fixed or random effect model are considered. An increase of 1 basis point in the size implies a 0.074 basis points decrease in leverage for Pooled OLS model and 0.127 (0.091) basis point decrease in leverage for fixed effect (random effect) model.

The liquidity-variable is positive and statically significant at the 0.1% significance level whichever the model. Therefore, the relationship between liquidity and leverage is positive. The results suggest that with a level of confidence of 99%, a decrease of one basis point in liquidity will lead to 6.352 basis points increase in leverage (approximately), *ceteris paribus*, for robust pooled OLS. For fixed effect model, the effect is an increase of 3.657 basis points in leverage, for fixed effect model. According to random effect model the effect is an increase of 4.462 basis points.

Growth coefficients are significantly different from zero at the 5%, 10% and 10% level of significance for pooled OLS, fixed effect model and random effect model, respectively, and they have a positive relationship with firm leverage. The results demonstrate that a decrease of one basis point in growth will lead to 0.054 basis points increase in leverage in model 1 (Pooled OLS Model). However, the magnitude of these variables is greatly decreased if we consider model 2 (fixed effects model) and model 3 (random effects model), where we observe increases of 0.04 and 0.038 percent in leverage for both models, respectively.

3.2.2. Determinants of capital structure for big companies

Using a subsample with only big sized companies, a robust pooled OLS regression, fixed effect and random effect model was conducted, which results are exhibited in table 7. The procedures to identify the adequate model of analysis was similar as in the previous sections. All the assumptions will be tested and discussed before the estimation model is chosen. The values for F and Prob > F indicate, as p-value is lower than 0.001, that H_0 can be rejected and conclude that the model is significant.

R-squared measures the explanatory power of the model. The overall R-squared tells us how much the variance in capital structure can be explained by firm-specific characteristic. The R-squared values demonstrate that the variation in leverage is better explained by the independent variables. The regression gives an R^2 of 0.327 for Robust Pooled OLS, which means that 32.7% of the variation in leverage can be explained by the independent variables.

In order to choose which model is more appropriate than others in our case, it was used the Breush-Pagan Test The obtained results is $\chi^2(1) = 268.82$ (p-value < 0.001). Hence, the null hypothesis is rejected at the 0.1% significance level and there is significant evidence of differences across entities. This indicates that random effect model should be used instead of Pooled OLS model.

In order to decide between the fixed or the random effects model, a Hausman test is conducted.

$$\chi^2(6) = 2.61 \text{ (Prob } > \chi^2 = 0.8562)$$

As Prob $> \chi^2$ is > 0.05 (i.e. not significant) use random effects. We may conclude that the random effect model is better than its fixed counterpart. The test is conclusive.

The table 7 shows that there are some differences in the magnitude of the coefficients among models. When interpreting the coefficients, all other variables are kept constant (*ceteris paribus*).

Tangibility coefficients are significantly different from zero at the 10% level of significance and they have a negative relationship with firm leverage. The results demonstrate that when the fixed assets/total assets ratio increases by 10 percent, leverage decreases by 0.029 percent in model 1 (Pooled OLS Model). Nevertheless, the magnitude of this variable is greatly increased if we consider model 2 (fixed effects model), where we observe a decrease of 0.055 percent in Leverage. According to random effect model the effect is a decrease of 0.071 basis points. Notice that the sign of the relationship remains whichever model is considered (pooled OLS, fixed effect model or random effect model).

Profitability coefficients are significantly different from zero at the 0.1%, 10% and 10% level of significance for pooled OLS, fixed effect model and random effect model, respectively, and they have a negative relationship with firm leverage. For all models, there is an indication that firms with higher returns tend to have lower levels of leverage. The result suggests that with a level of confidence of 99%, an increase of one basis point in profitability will lead to 5.636 basis points decrease in leverage (approximately), *ceteris paribus*, for robust pooled OLS. For fixed effect model, the effect is a decrease

of 0.494 basis points in leverage, for fixed effect model. According to random effect model the effect is a decrease of 0.475 basis points.

Table 7: Panel Data Analysis Results for Big Companies

LEV	Robust Pooled OLS	Fixed Effect Model	Random Effect Model
TANG	-0.0288* (0.0612)	-0.0553* (0.0897)	-0.0713* (0.0797)
ROA	-5.6362*** (1.4491)	-0.4936* (0.5080)	-0.4754* (0.5122)
NDTS	0.6882* (1.5446)	0.9452* (1.3677)	1.8569* (1.2781)
Size	-0.0040* (0.0186)	0.0252* (0.0256)	-0.0010* (0.0208)
LIQ	3.6437** (1.1957)	-0.3967* (0.4651)	-0.3542* (0.4705)
Growth A	0.2947** (0.1450)	0.0458* (0.0474)	0.0734* (0.0467)
Intercept (baseline)	0.4414* (0.2334)	0.2869* (0.2743)	0.5505** (0.2265)
F-test (model)	15.81 (p<0.001)	3.55 (p<0.001)	
DF	142	121	
R ²	0.3269		
SSE (SRMSE)			
Root MSE (SEE)	0.1510	0.0462	0.0462
σ_u (sigma_u)		0.1767	0.1443
Theta			0.8798
Effect test		66.38***	23.44***
N	149	149	149

Note: Statistical significance: * <0.1, **<0.05, ***<0.001

LEV- Leverage; TANG- Tangibility; ROA- Return on assets; NDTS-Non debt tax shields; LIQ-Liquidity; DF-Degrees of freedom; SSE- Sum of Squares error; N-Number of observations; The standard errors values are in brackets.

The results show that there is a positive and statistically significant relationship between non-debt tax shield and leverage for all models. However, the magnitude of variable (its coefficient) increase a lot when is the fixed or random effect model are considered. A decrease of 1 basis point in the non-debt tax shield ratio implies a 0.688 basis points decrease in leverage for Pooled OLS model and 0.945 (1.857) basis point increase in leverage for fixed effect (random effect) model.

The size variable is significant at the 10% significance level for leverage of all mentioned models. The results show that there is a negative and statistically significant relationship between size and leverage for pooled OLS and random effect model. However, there is a positive impact between leverage and size in fixed effect model. An increase of 1 basis point in the size implies a 0.004 basis points decrease in leverage for Pooled OLS model and 0.001 basis point decrease in leverage for random effect model. A decrease of 1 basis point in the size implies a 0.004 basis points increase in leverage for fixed effect model.

Liquidity coefficients are significantly different from zero at the 5%, 10% and 10% level of significance for pooled OLS, fixed effect model and random effect model, respectively. Thus, the relationship between liquidity and leverage is positive in pooled OLS and for the rest of two models, they have a negative effect. The results demonstrate that a decrease of one basis point in liquidity will lead to 3.644 basis points increase in leverage in model 1 (Pooled OLS Model). However, the magnitude of these variables is greatly increased if we consider model 2 (fixed effects model) and model 3 (random effects model), where we observe decreases of 0.397 and 0.354 percent in leverage for both models, respectively.

Growth coefficients are significantly different from zero at the 5%, 10% and 10% level of significance for pooled OLS, fixed effect model and random effect model, respectively, and they have a positive relationship with firm leverage. The results demonstrate that a decrease of one basis point in growth will lead to 0.295 basis points increase in leverage in model 1 (Pooled OLS Model). However, the magnitude of these variables is greatly decreased if we consider model 2 (fixed effects model) and model 3 (random effects model), where we observe increases of 0.046 and 0.073 percent in leverage for both models, respectively.

3.2.3. Discussion of the results

The last research objective was to determine if the capital structure of the firms included in this study can be explained by established theories of capital structure. In order to decide which theory (pecking order theory – POT or trade off theory – TOT) provides the most accurate predictions, the nature of the relationship between the dependent and independent variables were examined. Furthermore, pecking order and trade-off theories identify some positive and negative relationships between leverage and variables, i.e. tangibility, asset return, non-debt tax shield, liquidity, size, and growth in table 4 (for all sample) and tables 6 and 7 for subsamples (SMEs and big companies), respectively.

From the analysis of table 4, using the fixed effect model, as it is the most adequate model in accordance to Hausman test, we can conclude for the validation of the hypothesis stated in the chapter 2 (methodology). The results indicated above validate the hypothesis 1 (H1) as tangibility is significant

and positively related to leverage (as already mentioned in previous sections). Therefore, this result is supported by both theories, which expects a positive relationship between tangibility and leverage. The POT explains that information asymmetry will be lower for firms with more tangible assets, resulting in more debt. However, Harris and Raviv (1991) argue that the POT points out a negative relationship between tangibility and debt. They told that firms with few tangible assets will have greater asymmetry problems, and consequently, the coefficient should not be significantly different from zero. The TOT expects a positive relationship between tangibility and debt because a higher degree of asset tangibility leads to lower bankruptcy costs. The hypothesis H1a (for SMEs) is validated as we can observe from the fixed effect model exhibited in table 6. However, the hypothesis H1b, for big companies cannot be validated because the sign is opposite to what would be expected. Moreover, Mackie- Mason (1990) argues that firms with high fraction of tangible assets in the asset base, makes debt choice more likely, which will ultimately influence firm performance. Moreover, Akintoye (2008) argues that firms, with high investments levels in tangible assets, will have lower costs relating to financial distress, compared to firms relying mostly on intangible assets.

Furthermore, the two theories provide different views on the effect profitability have on leverage. The POT assumes a reverse relationship between profitability and leverage. Consequently, more profitable firms will use less leverage because they will use retained earnings as funding instead of external debt. In contrast, the TOT shows that profitable companies will shield their profits from tax, and thus borrow more than less profitable firms. The fact that both theories suggest a negative effect between leverage and profitability is consistent with the results from Titman and Wessels (1988), Rajan and Zingales (1995) Song (2005), Frank and Goyal (2004) among others. A positive relationship is rarely supported by recent empirical studies. The hypothesis H2 is validated both for all sample and for SMEs (see fixed effect model on table 4 and table 6), so, H2a is also validated. However, the coefficient of profitability for big companies is only marginally significant, (this variable is only significant at 10% level), the sign is not as expected (see table 7, random effect model). So, H2b is not validated. Profitability is negatively related to leverage, providing evidence of POT, given that more profitable firms tend to use less debt to finance their needs. Based on these results, we cannot reject *hypothesis 2* except sub-hypothesis 2b. A negative relationship between profitability and leverage is also reported by various studies (Constand *et al.*, 1991; Chittenden *et al.*, 1996; Degryse *et al.*, 2012; Michaelas *et al.*, 1999; Sogorb-Mira, 2005; Serrasqueiro *et al.*, 2011).

Portuguese companies' non-debt tax shields have a negative and statistically significant relationship towards leverage, based on the results of table 4. Thus, we accept *hypothesis 3*. According to SME and big companies, we will examine deeply in order to get a precise answer. The results demonstrate there is a negative and statistically significant impact between non-debt tax shields and leverage for SME (table 6). It also accepts *sub-hypothesis 3a*. The results of the current study corroborate those of Shenory and Koch (1992), Huang and Song (2002) and Titman and Wessels (1988), who identify a negative relationship between non-debt tax shields and leverage. However, in the final

step, we tested relationship between leverage and non-debt tax shields in terms of big companies (table 7). We found out that they have a positive effect and statistically significant at the 10% level. We reject *sub-hypothesis 3b*. These results are consistent with Gardner and Trzcinka (1992), Bradley, Jarrell, and Kim (1984) and Chaplinsky and Niehaus (1993). The TOT suggests a negative relationship between non-debt tax shield and leverage. Despite that, the variable is not a determining factor for Portuguese companies in defining their capital structure, the negative relationship is consistent with the trade-off theory. Mazur (2007) got the same results for Polish companies, while Heshmati (2001) and Ozkan (2001) found non-debt tax shield to be significant and inversely related to debt.

The result of size differs from previous empirical research from Frank and Goyal (2004) who provide results suggesting that size is significant, indicating that larger firms tend to have higher debt levels. The insignificance of this factor stands in contrast to the trade-off theory that claims that size matters, as larger firms tend to add more debt because of a lower probability of default. The POT justifies the expectation of a positive relationship between size and leverage with a lower degree of information asymmetry, as this will give companies better opportunities and conditions to gain access to credit. The relationship between size and long-term leverage is positive, as the TOT predicts. Several authors like Buferna, Bangassa, and Hodgkinsin (2005), Psillaki and Daskalakis (2008) have shown that larger enterprises exhibit higher leverage. The value of tangible assets of the company is reflected in its role of collateral. We identify negative and statistically significant relationships between leverage and size. Therefore, we do not reject *hypothesis 4*. Additionally, a negative relationship is found between size and leverage in SMEs. These results prove *sub-hypothesis 4a*. On the other hand, the results show a positive relationship between big companies' size and leverage, suggesting that larger firms have greater debt. This rejects *sub-hypothesis 4b*. The results of this research support the pecking order theory, confirming that SMEs in Portugal are primarily financed from internally generated funds that affect profitability, growth, tangible assets and enterprise size. In accordance with the theory, more profitable SMEs are less long term leveraged and more financed by internally generated funds. However, the findings of Shepherd (1989) suggest that larger firms are better able to leverage their market power, which in turn will affect profitability, while Penrose (1959) argue that larger firms benefit from economies of scale, which can also have a positive impact on performance.

The empirical results show that the impact of liquidity on leverage is positive and statistically significant at the 0.1% level (Table 4). It rejects *hypothesis 5*. These results are in accordance with the predictions of POT, i.e., firms with higher levels of liquidity have more internal funds, namely free cash flow, which they are able to use to finance their needs. Thus, firms with greater liquidity borrow less. Furthermore, there is a positive and statistically significant relationship between liquidity and leverage for SME. This result is consistent with the predictions of TOT, according to which firms with higher liquidity have higher debt capacity. On the basis of these results, we can reject *sub-hypothesis 5a*. Michaelas et al. (1999) got positive relationships between liquidity and total debt. However, for big companies, liquidity has a negative impact on leverage, which accepts *sub-hypothesis 5b*. In the POT,

firms prefer internal to external financing, as a result they would create liquid reserves from retained earnings. If the liquid assets were sufficient in financing a firm's investments, the firm would have no incentive to increase funds externally. Ozkan (2001) made the same discovery and suggested that the opposite relationship could be a result of potential conflicts between shareholders and debt holders of the company. Sbeiti (2010) also found the liquidity coefficient to be negative, whereas Olayinka (2011)'s results offer a positive relation between leverage and liquidity.

If a company has a lot of growth opportunities, the cost of bankruptcy and financial distress will be considerably higher (Titman & Wessels, 1988). The TOT suggests a negative correlation between growth and leverage. This is mainly because firms with prospects of growth are likely to have lower earnings before tax, and they are therefore not able to take advantage of the interest tax shield associated with a high debt ratio. In addition, growing firms are likely to appreciate financial flexibility, and thus preferably a lower debt ratio. Ozkan (2001) achieved a negative effect of growth on leverage. He concludes that growing firms often have a large proportion of intangible assets, and may therefore not be able to support a high leverage ratio. Additionally, firms with growth opportunities tend to have lower debt levels because debt holders are afraid about the firm might pass up on investment opportunities. The results are also consistent with other empirical studies including Frank and Goyal (2007), Rajan and Zingales (1995), Shah and Khan (2007) and Nunkoo and Boateng (2011). In comparison, Noulas and Genimakis (2011) find a positive relationship with growth and leverage explaining that firms choose to issue equity when their market performance is high. Song (2005) discovers that growth is not related to total debt ratio. From table 4 above, we reject H6. The sign of this growth variable is positive and statistically significant, which is consistent to POT. For SMEs companies, the H6a is also not validated as the sign is not as expected (also consistent to POT). For big companies, H6b is validated (the sign is positive and statistically significant). Positive impact of growth to leverage is also confirmed by the results of Degryse, Goeij, and Kappert (2010).

Conclusions, Limitations and Future Research Lines

The aim of this research was to analyse the capital structure determinants of winery companies in Portugal (small, medium and big companies). Previous studies, depending on the country where the research was conducted, have shown a positive or a negative relationship between growth, size, profitability, tangible assets and capital structure (as measured by the ratio total debt to total assets, also referred as leverage ratio).

The obtained results confirm once again that there is no optimal capital structure because financial market conditions constantly change and differ from country to country. However, there are researches in which results are trying to bring the capital structure to the entrepreneurs who can identify deficiencies and advantages of certain ways of financing their enterprises.

To define the determinants of the corporate capital structure we employ pooled OLS, fixed and random effects models. All the specification tests witness in the favour of the fixed effects model that is why we consider its results as the most reliable.

From our research, it can be concluded that some wine companies in Portugal use profit to reduce debt while the others just use external debt, use tangible assets as collateral in long term financing, and increase debt by increasing size and growth potential. In order to provide more financing opportunities for companies in Portugal, it is advisable for Portugal to provide the development of financial markets focusing on companies' financial needs.

Based on our empirical research, six firm-specific determinants of capital structure were identified; profitability, size, growth, tangibility, liquidity and non-debt tax shield. While the first four factors can be linked to both the pecking order and the trade-off theory, liquidity is significant for the pecking order theory, while the non-debt tax shield is given special attention in the trade off theory.

Small firms face greater information asymmetry and agency problems with creditors, but the results regarding the relationships between determinant factors and those firms' capital structure seem to be similar to those identified by studies focusing on SMEs. In fact, the main conclusion of the current study is that POT and TOT predictions are followed in their capital structure by small firms, which is consistent with the results of previous studies focused on SMEs.

The current study's empirical results provide different implications and suggestions for owners and policy makers. To the owners of small firms, we suggest establishing long-lasting and trusting relationships with creditors/investors in order to lessen asymmetric information and problems with agencies in order to obtain more favourable credit terms. Concerning the importance of small firms for

the Portuguese economy, we suggest that policymakers create special lines of credit and tax incentives to encourage the growth of those firms that find it difficult to access external finance sources.

As guidelines for further research, we suggest extensions of data series, including macroeconomic factors as new variables. To form a deeper understanding of capital structure decisions, we suggest future research should analyse SMEs and big companies' capital structure decisions adopting a dynamic perspective, using dynamic estimators.

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Appendix

Table A1: Testing for time-fixed effects (Annex 1)

LEV	Coef.
TANG	0.3901*** (0.0965)
ROA	5.2591*** (0.7073)
NDTS	3.5144*** (0.8700)
Size	0.1369*** (0.0253)
LIQ	3.0511*** (0.6659)
Growth A	0.0461** (0.0211)
Year	
3	0.0123* (0.0210)
4	0.0054* (0.0213)
5	0.0004* (0.0215)
6	0.0259* (0.0215)
7	0.0504** (0.0218)
8	0.0334* (0.0229)
Intercept (baseline)	1.5834*** (0.2197)
F-test (model)	27.1
DF	757
R²	
SSE (SRMSE)	
Root MSE (SEE)	0.1681
σ_u (sigma_u)	0.2335
Theta	
Effect test	8.49
N	901

Note: Statistical significance: * <0.1, **<0.05, ***<0.0001; TANG- Tangibility; ROA- Return on assets; NDTS-Non-debt tax shields; LIQ-Liquidity; DF-Degrees of freedom; SSE- Sum of Squares error; N-Number of observations.