Radboud University

Master Thesis

Capital Structure Determinants of European Union firms :

Comparison analysis between euro area members and non-members

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August, 2020
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Abstract

This paper describes an examination of the capital structure determinants of 12,180 non-financial firms that operated in the European Union (EU) between 2011 and 2019. A total of 109,620 firm-year observations was employed to generate insights into the fundamental aspects of capital structure of the organizations included in the study with the overall goal of better understanding the extent to which prominent capital structure theories hold true within the context of corporate finance. The sample was also divided into two groups according to euro and non-euro membership with the objective of assessing the ways in which membership of the euro area influenced financial leverage decisions. Finally, we compared the financial leverage of euro and non-euro members to assess whether variations in capital structure decisions could be observed across the two groups. The results indicate that the existing theories on capital structure determinants appear to hold true for EU organizations and membership of the euro area can be a significant predictor of the financing decisions made by an organization. The observations of capital structure determinants were interpreted through the lens of static trade-off theory (Modigliani & Miller, 1963) and pecking order theory (Myers & Majluf, 1984). At a high level, the outputs of this study provide solid evidence to support the hypothesis that the static trade-off theory provides reliable insights into the financing choices of EU organizations. Pecking-order theory can also be a useful predictor of the financing decisions of firms located in the euro area, especially in situations in which the economics are integrated and share a single monetary policy.

Acknowledgment

“Above every man of knowledge, there is one who knows better”

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1.0 Introduction

One of the fundamental questions that arise in corporate finance is: Which factors determine the capital structure of firms? The question offers the first piece in the "capital structure puzzle", a term forwarded in S. C. Myers, S.575, AFA presidential address. However, interest in identifying the main factors that contribute to capital structure can be traced back much further in time to the pioneering studies of Modigliani and Miller, who presented what is widely held as the first modern theory related to the typical determinants of corporate financial structure: The trade-off theory. According to this theory, a rational equation should be applied that seeks to calculate the costs versus benefits of a given capital structure (Modigliani & Miller, 1963). Following on from this work, many researchers have attempted to determine a suitable leverage target for organizations that operate in different industries.

A further theory that is of relevance is that of pecking order theory. described how organizations should rely on internal rather than external funding sources. In addition, in situations in which all things remain neutral, the costs associated with issuing equity should be higher than the cos t of issuing debt (Gertler & Hubbard, 1988) The rationale that underpins capital structure composition concerns the fact that different agents within an economy access different information. Along these lines, the theory of asymmetric information, which is also referred to as Moral Hazard and Adverse Selection process, has a direct impact on the funding sources that are available to organizations (Fazzari et al., 1987). If a firm operates in a context in which there is information asymmetry between the executives of a firm and external investors, the executives will typically perceive the stock of the firm to be under-priced on the external market. As such, funding that is secured by issuing equity will exhibit a right-skewed information distribution and, as such, is primarily viewed as the least preferable source of funding. Observing the firm's leverage level will generally provide an insight into the organization's profitability and scope for investment opportunities.

The two theories described above has been studied in-depth and are supported by a significant amount of empirical evidence. However, scholars have yet to agree on a universal theory that can adequately explain the capital structure preferences across a sample of heterogeneous organizations (Frank & Goyal, 2009). Some studies, such as that of (Fama & French, 2002), have generated results that support the Pecking order theory. In addition, some researchers, such as (La Rocca et al., 2011), have concluded that empirical evidence exists that supports the existence of both theories. Although the existing studies have yet to generate indisputable evidence that adequately explains the financing behavior of firms, the existing studies have reliably identified some of the factors that impact financing decisions.

The primary motivation that underpins this study is the need for a more in-depth understanding of how companies in Europe union make financing decisions in relation to multiple factors, including tax, bankruptcy costs, agency conflicts, and adverse selection. The main goal of this research is to examine the most critical elements of capital structure with the underlying objective of developing insights into the factors that influence the capital structure of European union firms. This objective will be achieved by performing an empirical analysis of the firm's financial leverage that can be observed in specific European firms. Next, we analyze the impact of the euro area membership on firm's financial leverage. Finally, we evaluate whether there is a significant change in the behaviour of the determinants of capital structure between firms in context of euro area membership. Past research has generally used a variety of company samples: in Europe, some research has only addressed a single nation, e.g. the UK (Ozkan, 2001) or Spain (De Miguel & Pindado, 2001); other research has looked at a specific group of European nations (Antoniou et al., 2002; G. C. Hall et al., 2004). However, there has been little research making comparisons between groups of countries. Acedo-Ramírez & Ruiz-Cabestre (2014) made a distinction between market-oriented economies and bank-oriented ones, and Bancel & Mittoo (2004) found differences in the determinants of capital structure between Scandinavian and non-Scandinavian countries. It is thought that the findings of this research will fill this gap and contribute to the knowledge enlargement about the influence of euro area membership on the capital structure of firms. Additionally, our data sample enables us to observe the capital structure determinants in the period post financial crisis of 2008/2009. Thus, we incorporate the impact of the previous global financial crises that might have altered the corporate capital structure behaviour in Europe. Finally, we interpret the findings in light of trade-off and pecking order theory – two most important corporate finance theories dealing with financing behavior of the firms.

Specifically, this paper investigates into the impact of firm-specific, tax-related, industry-specific, and macroeconomic determinants of capital structure in order to attempt to provide answers to the following research question:

What are the determinants of capital structure of European Union firms and does the determinants of capital structure differ in terms of euro area membership?

The structure of the paper is organized as follows: Section 2 examines the existing literature on how different theories of capital structure can explain financing behavior of firms. Additionally, empirical hypotheses based on the theoretical background are structured and presented. Section 3 provides the description of data sample,dependent variable, and all explanatory variables. In Section 4, we outline econometric model used in the empirical analysis and the optimal research method. Section 5 presents

empirical results of the study and examines their theoretical implications. In the final section, we include conclusion, limitations, and recommendation. Finally, we will give the study an opportunity to recommend further studies based on the gaps identified.

2.0 Literature Review

Contemporary corporate finance literature typically commences with an overview of the theory presented by Modigliani and Miller (1958); i.e., by exploring the notion that the value of a firm that operates in a capital market that is free of friction will not be dependent on how it is financed. Later studies deviated significantly from the ideas presented by Modigliani and Miller. Specifically, later research considered how various factors, including taxes, the opportunities that are available on the financial markets, taxes, agency and transaction costs, and adverse selection, can directly impact the amount of debt or equity involved in corporate financing. Agency conflicts relate to the tensions that may be observed between the various stakeholders that form an organization. At a high level, agency theory is concerned with the presence of a conflict of interest between the people who hold stock and the debtholders on the one hand, and the managers and other stakeholders on the other. According to agency theory, which first emerged in the 1980s, organizations should seek to secure specific and optimal capital structures. This involves acknowledging that there is a trade-off between securing higher leverage and related increasing bankruptcy and agency costs, on the one hand, and potential tax benefits, on the other hand.

This understanding informed the evolution of a variety of capital structure theories, the two most significant of which are typically regarded as the static trade-off theory and the pecking order theory. According to the conventional theory of capital structure, organizations vary their level of leverage by balancing the anticipated benefits with the potential costs resulting from debt use (Bradley et al., 1984). This notion led to the development of trade-off theory, which takes into consideration the fiscal elements and financial distress costs associated with debt. Following the emergence of this line of thinking, Modigliani & Miller, (1963) modified their original theory by asserting that organizations typically opt to pursue debt as opposed to equity financing because the deductibility of the interest is beneficial in the former in comparison to the latter. Consequently, the attractiveness of tax shields would result in all organizations being fully indebted. However, behavior of this nature is not typically observed, and several scholars, including Modigliani and Miller, have hypothesized that the risk of bankruptcy and other debt-related costs may explain why firms do not opt for debt-only financing. A range of risks can motivate firms to reduce leverage; for example, bankruptcy costs, the tax-related benefits of interest payment deductions, and the agency costs that may be associated with excessive free cash flow. In light of the combination of these exposures, the organization may pursue a financing structure by which it can access a leverage structure that will maximize its value. While the benefits of debt financing include the ability to access tax-deductible interest payments and mitigate the agency conflicts associated with excessive cash flows (Jensen, 1986), debt financing is related to a range of costs, including interest rate expenses and risk of financial distress. Along this line of thinking,

Bradley et al. (1984) proposed that the optimal debt level was reached when the marginal benefits of debt finance are equal to the marginal costs.

The pecking order hypothesis of corporate capital structure emerged as a result of asymmetric information considerations (Myers & Majluf, 1984). Per this theory, where there are information asymmetries between insiders, be they managers or stockholders, and outsiders, such as investors and debtholders and investors, financial decisions will be made according to a pecking order; i.e., a hierarchy. Where this is the case, the factors that are taken into consideration extend beyond the relative costs and benefits of debt. In this scenario, organizations will opt to use retained earnings as opposed to debt and will use equity as the financing source of last resort. Retained earnings are not associated with any type of adverse selection problem. However, debt is linked with information asymmetry between organization executives and shareholders and debtholders. From the organization's insider perspective, retained earnings represent a more attractive source of financing than debt, but debt is preferable to equity due to its lower cost. The reason equity represents the least attractive form of finance is due to the presence of significant asymmetric information costs, which means that it is relatively expensive to issue in comparison to debt (Baskin, 1989). The patterns that can be observed in financing, including organizations' tendency not to issue equity and to ensure strong cash reserves, can be explained by the pecking order model. It is for this reason that the trade-off model and pecking order theory are commonly regarded as the most significant capital structure theories within corporate finance. The next part of this section describes the theoretical foundations and previous empirical findings with regard to specific capital structure determinants selected for the purpose of this study.

2.1 Firm specific determinants of capital structure

In accordance with the work of Rajan & Zingales (1995) and Köksal & Orman (2015), in which a quartet of four firm-specific variables are used in explaining the capital structures of these companies, all of these will be incorporated, offering a theoretical foundation for the way the variables are employed in the following subsection.

2.1.1 Firm Size

One essential driver of leverage is company size. Much research has suggested that company size is a significant reason for cross-sectional differences in terms of debt-equity ratio (e.g., Michaelas et al., 1999). Size functions as an inverse proxy for the likelihood of a company defaulting (Rajan & Zingales, 1995). In

terms of companies getting into financial difficulty, Pettit & Singer (1985) contend that bigger companies have greater diversity and so carry less risk, so size may operate as a proxy for the likelihood of financial difficulty. Additionally, it is more costly for smaller companies to declare themselves bankrupt (Ang et al., 1982).

Using this form of reasoning, bigger companies usually demonstrate greater debt capacity and will generally have a greater cost of borrowing to exploit the taxation benefits of debt to their maximum. Fama (1985) contends that the monitoring cost of debt is higher in relative terms for small companies in comparison to larger ones, which means that large companies can pay less for their borrowing. As previously mentioned, company size is inversely related to the likelihood of financial difficulties and so when attempting to acquire debt capital the associated costs may not be so important for larger companies. Nevertheless, Rajan & Zingales (1995) suggest that when the expense of financially defaulting is not particularly great, the positive correlation between company size and levels of debt should not be so significant. In short, small companies will have lower levels of leverage in comparison to larger companies for a number of reasons, e.g., more expensive bankruptcy, lower marginal corporate tax rates, the greater expense associated with information asymmetry, and higher agency costs.

However, pecking order theory offers a prediction of a negative correlation between company size and leverage, because larger companies have to deal with lower adverse selection and so it is easier for them to issue equity in comparison to smaller companies. Generally, smaller companies are more negatively affected by asymmetric information as they do not have as many mandatory obligations to disclose financial information (Pettit & Singer, 1985). On the basis of past research and trade-off theory, it is generally recognized that leverage and company size have a positive correlation. Thus, we form our first hypothesis: *Company size ought to have a positive correlation with its debt levels (H1).*

2.1.2 Firm Profitability

The existence of informational asymmetries between investors and managers takes us to the pecking order theory. In this context Myers, (1984), and Myers & Majluf (1984) argue that there exists a hierarchy in the financing of firms. Myers, (1984) suggests that companies will gain financing in line with their place in the hierarchy, firstly employing their internal funds, then debt, and lastly external equity. The relative costs of asymmetric information related to different sources of finance are mirrored in the hierarchy. Thus, companies are predicted to attempt to avoid using external finances and to place greater reliance on internal funding. Pecking order theory proposes that levels of internal funding (i.e., retained profits) indicate how

profitable a company has been over the short-term past. So, the pecking order theory predicts a negative correlation between profitability and leverage. Empirical confirmation of an inverse correlation between leverage and profitability has appeared in several empirical studies (e.g., Rajan & Zingales, 1995).

Trade-off theory, as a rule, offers predictions of a positive correlation between company leverage and profitability because profitable companies are less likely to default and are more interested in the tax advantages of debt interest in comparison to companies with a low-profit level. If financing is obtained by borrowing from outside then managers are incentivized to commit to efficient investment strategies rather than following their own self-interest that has the potential to make it more likely that the company will default (Harris & Raviv, 1990). In addition, a higher debt ratio linked with company profitability could indicate that financial management is sound when there is high information asymmetry (i.e. during an economic downturn). So this theory implies that there is a positive correlation between profitability and leverage. On the basis of the evidence found in past research, both empirical and theoretical, we formulate the following hypothesis on the basis of pecking order theory predictions: *A negative correlation will exist between leverage and profitability (H2).*

2.1.3 Assets Tangibility

Tangibility stands for asset structure tangible asset may be a fixed asset, e.g. plant or buildings, or a current asset, for example company inventory. These are easier to use as collateral and so they will experience lower depreciation in times of financial difficulty (Rajan & Zingales, 1995). Stiglitz & Weiss (1981) suggest that the bondholder response to either adverse selection or moral hazard is to look for assets that can be used as collateral in the hope that securitized debt could lower the cost of information asymmetry. Furthermore, this leads to reductions in agency costs because that can be secured against a tangible asset of definite value that could be employed in the event of bankruptcy. Thus, trade-off theory proposes that companies with a significant value of fixed assets will find it easier to obtain external financing and so ultimately their capital structure will have a greater reliance on debt in comparison to companies that have fewer assets that can be used as collateral. This means that leverage will have a positive correlation with numbers of tangible assets (Frank & Goyal, 2009). The pecking order theory, on the other hand, is generally interpreted as predicting a negative relation between leverage and tangibility, since the low information asymmetry associated with tangible assets makes the issuance of equity less costly (Harris & Raviv, 1991). This accords with most historical empirical investigations (Shah & Khan, 2007; Chen, 2004; Nunkoo & Boateng, 2009) that have shown that companies with higher levels of tangible assets enjoy higher ratios of

leverage. Thus, the following hypothesis is based on the trade-off theory: *Asset tangibility will be positively related with leverage (H4).*

2.1.4 Growth opportunities

Intangible assets are not readily collateralizable. Growth opportunities represent a form of an intangible asset. Firms that benefit from growth opportunities may find it difficult to attract financing based on these assets alone. Organizations that have high growth opportunities are associated with high agency and bankruptcy costs. They may be reluctant to increase debt levels on the basis that doing so will increase their risk of bankruptcy (Myers, 1984). According to the trade-off theory, there is a negative correlation between leverage and growth due to the fact that it is not possible to collateralize intangible assets, such as growth opportunities (Jensen & Meckling, 1976). This theory hypothesizes that organizations that have more significant growth opportunities will have less debt because higher investment chances enhance the risk of agency issues between creditors and shareholders on the basis that the shareholders will not be incentivized to invest (Myers, 1977). However, according to the pecking order theory, there is a positive correlation between growth opportunities and an organization's debt ratio (Myers, 1984) because it is likely that internal funds will not be sufficient for firms to engage in investment opportunities and, as such, there will be a need to secure external debt. According to this perspective, there is a positive link between growth opportunities and the level of debt (DeAngelo & Masulis, 1980; Jensen, 1986; Myers, 1984; Myers & Majluf, 1984). The following hypothesis is formulated in relation to growth on the basis of the trade-off theory: *Company growth opportunities will have a negative correlation with company leverage (H3).*

2.2 Tax-related determinants of capital structure

Taxes are a crucial element influencing capital structure decisions. In line with the work of Köksal & Orman (2015), our analysis has included two determinants related to tax. These are the rate of corporate income tax a company pays and what non-debt tax shield are available. Using such capital structure determinants has a natural justification in the trade-off theory logic. From one perspective, corporate income tax could be influential in a company's decisions on their financing because as it rises, interest tax shields created by using leverage become more attractive. From another perspective, non-debt tax shields created by specific expenses being deductible may work in the same way as an interest tax shield.

2.2.1 Non-debt Tax Shield

A non-debt tax shield may be seen as a replacement for the benefits available from deductions on income tax. Non-debt tax shields may be, amongst others, various tax credits, allowances, and depreciation. Companies that have more non-debt tax shields will be able to lower financial leverage due to a fall in the level of incentives for interest tax shields. Because of this, more profitable companies with low levels of non-debt tax shields will attempt to create capital structures reliant on debt so they can reap the advantages of debt tax benefits in comparison to less profitable companies (DeAngelo & Masulis, 1980). Trade-off theory proposes that a negative correlation will exist between leverage and levels of non-debt tax shields, and thus we can formulate the following hypothesis: *The amount of firm's non-debt tax shields will be negatively related to its leverage (H5).*

2.2.2 Corporate Income Tax

In accordance with the trade-off theory detailed above, companies will assume debt in preference to equity finance so that they can reap the advantages of tax shields, increasing debt ratios to the level where financial difficulties become highly probable. On the basis of this theory, we would expect to find a positive correlation between leverage and corporate income tax rates (Haugen & Senber, 1986). On the other hand, when tax rates are higher than companies could have less internal funding and thus capital would be more expensive. As a result of this, both capital expenditure and the requirement for external financing from debt would fall which would give us a negative correlation between leverage and tax rates (Kremp et al, 1999). It is interesting to note that Titman & Wesseles (1988) , Ray and Hutchinson (1993), among others, did not find any significant correlations between corporate income tax and financial behavior. According to Modigliani & Miller (1963) debt financing may give rise to tax advantages compared to alternative forms of financing. In line with trade-off theory, we formulate the following hypothesis: *A positive correlation exists between a company's leveraged and levels of corporate income tax rate (H6).*

2.3 Industry-specific determinants of capital structure

The type of industry can have a significant effect on the way a company finances its behavior (Harris & Raviv, 1991). MacKay & Phillips (2005) and Frank & Goyal (2009), demonstrated that influences within and between industries have an important effect on leverage ratio and that the influence of company characteristics on their capital structure can be very different in different industries. Frank & Goyal (2009) found that the type of industry can be responsible for a number of omitted factors amongst companies working in the same sector. Since firms that operate within the same industry may benefit from the same opportunities while also being exposed to comparable threats and frequently exhibiting equivalent earnings

variability. According to Leary and Roberts (2014), it is useful to compare firms that operate in the same industry when considering financial performance. As such, we examine industry profitability and growth as a means of generating insights into the extent to which there is a correlation between the leverage of firms and their respective industry profitability and growth.

2.3.2 Industry Profitability

Industry profitability is worth consideration because organizations that operate within a given industry typically exhibit consistent patterns from the perspective of strategies and policies. In addition, they are usually exposed to the same threats and opportunities, compete in similar markets, and sell similar services and products. In many cases, they may have comparable technology, growth, collateral, and asset structures, all of which will have a direct impact on their capital structures (Allen & Meyer, 1991). According to the trade-off theory, high profitability is negatively correlated with debt on the basis that firms that have high levels of profitability benefit from consistent cash flow and have lower financial distress costs (Frank & Goyal, 2009). This view is aligned with the findings of Welch, (2004) and (MacKay & Phillips, 2005). However, the pecking order theory does not directly predict the importance of industry (Frank & Goyal, 2009). In line with trade-off theory, we formulate the following hypothesis: *There is a negative relationship between leverage and industry profitability (H7).*

2.3.2 Industry Growth

La Rocca et al. (2011) state that the choice of capital structure is additionally dependent on a company's business lifecycle and, following on from that, the growth patterns in the industry. They demonstrated a positive correlation between leveraged ratio and industry growth rates. Additionally, Baskin (1989) reveals that firms operating in the higher growth industries tend to be more financially leveraged than those operating in lower growth industries. In order to account for demand shifts specific to an industry, we have also measured how industry develops using mean growth rates for groups of companies that share identical two-digit industry classification codes. La Rocca et al. (2011) found a positive correlation with leverage ratios. On the basis of past empirical evidence, we formulate the following hypothesis: *There will be a positive correlation between levels of growth rate in an industry and a company's leverage (H8).*

2.4 Macroeconomic determinants of capital structure

De Jong et al. (2008) proposed that stability and performance levels in macroeconomic environments have a substantial influence on company finance choices. We have incorporated essential macroeconomic variables into our analysis to reveal how changes in macroeconomic conditions can influence a company's capital structure. Specifically, we have incorporated inflation and GDP growth as variables as a proxy for developments in the overall economic atmosphere in the countries under investigation.

2.4.2 Inflation

In finance discussions, inflation is frequently cited as an influential factor in terms of companies' financial decisions. This concept arises from the ways in which the predicted level of inflation and tax considerations interact. If it is predicted that the level of inflation will be high in the immediate future, there is an increase in real value accruing from tax deductions for debt interest (Taggart, 1985). Thus, trade-off theory proposes that there will be a positive correlation between leverage and inflation. By contrast, it is hard to see why inflation would matter for firms' leverage decisions in a model of pecking order (Frank & Goyal, 2009). Accordingly, we have centered our hypothesis in trade-off theory, thus: *A positive correlation exists between companies' capital structure measured as leverage and predicted inflation levels (H9).*

2.4.1 GDP Growth

Growth in real gross domestic product (GDP) may be regarded as a proxy for company growth opportunities available within the economy. In a high-growth economic environment, intangible levels of assets in correlation with the investment opportunities to hand will cause companies to lose more value if financial difficulties arise. On the basis of trade-off theory this means that there will be a negative correlation between company leverage and GDP growth. However, pecking order theory suggests a positive correlation between leverage and macroeconomic growth, because easily attainable growth opportunities in comparison to internal financing would suggest that more leverage is required. Past empirical studies have usually found a negative correlation between economic growth and leverage (e.g., Demirgüç-Kunt & Maksimovic, 1996). Thus, we have formulated a hypothesis centered on trade-off theory and past empirical studies: *There will be a negative correlation between GDP growth and leverage (H10).*

2.5 Euro area membership

Every nation that is a member of the European Union is also a member of the Economic and Monetary Union. Certain nations in the European Union have adopted a single currency – the euro – as their only

currency. The member states who have done this together constituted the euro area. Because their currencies are aligned, euro-area members' economies have greater integration. Such economic integration must have proper management if the greatest benefit of sharing a currency is to be realized. Thus, the euro area differs from other nations in the EU due to its shared economic management, specifically its monetary and economic policies (ECB).

The euro area represents a collection of bank-oriented economies. Banks are central in this area to financing for non-financial companies, and so it is more usual for financial guarantees to be acquired using debt. The ECB states that, regarding the part played by various financial markets, the financial structure of the euro area is marked by the overwhelming use of non-marketable financing instruments, e.g., unlisted shares and loans (ECB, 2020). The fact the company tend to rely on bank loans means that firms in the euro area have high levels of debt, which causes greater financial prudence within these economies. In the face of an economic slowdown and significant tightening of regulations, the ECB has made huge interventions to make it easier to supply credit through reducing essential rates to their lowest ever level and then implementing non-standard monetary policy interventions. Variations in economic and monetary policy have been suggested to have a greater influence on companies operating within the euro area than on those outside. Because of this, numerous economists have noted that corporate debt within the euro area nations holds back economic recovery and investment spending if debt reaches excessive levels (e.g., Cecchetti et al., 2011; Kalemli-Ozcan et al., 2015a; ECB, 2013)

Full review of structural matters in the context of company financing and economic activity in the euro area suggests that company decisions on capital structure can have implications for economic performance/financial stability of the entirety of an economy (ECB, 2013). Camacho et al., (2006) have created indicators for the variations between business cycles in a nation. They found that bilateral distances match for the countries in the euro area are generally quite close, implying that business cycles in these countries have greater commonality between themselves than they do with other nations. Other studies especially on European countries have concluded that the output effects in the eurozone are very similar (see, for example, G. Peersman, 2004). Baele et al., (2004) contend that the euro has already significantly impact a number of areas in European financial markets. A change in the monetary policy stance impacts on the overall financing environment and thus also on firms' financing costs. This makes it vital to have an understanding of the influence of monetary unification/economic integration on companies' capital structure in euro area. In light of this, it will be a matter of interest to analyze if the level of indebtedness varies in term of euro area membership. Additionally, we analyze if the differences in the determinants of

capital structure between the groups of countries considered are statistically significant. On the basis of the above, we have formulated two hypotheses:

Euro area members have higher leverage ratio than non-members (H11).

There are differences in the determinants of capital structure between euro area members' firms and those of non-members (H12).

3.0 Data

3.1 Sample construction

This research takes evidence from 27 European nations[1]. Firstly, we examine the whole sample, comprising 12,180 firms from 27 countries in the European Union. We arrived at the sample of 109,620 firm-year observations for the period 2011 to 2019. We then split the sample into two groups, members of the euro area and non-members. In terms of the euro member countries, we limited the data to the firms that adopted the euro prior to 2010 on the basis that our data set was derived from 2011 onwards. This ensured sufficient time had passed between the change in policy and the economic impact. The underlying objective of the Eurosystem's monetary policy is to promote price stability (ECB). Which "is to be maintained over the medium term." This philosophy takes into consideration the fact that there may be an intrinsic delay between the time at which policies come into practice and the impact they have on the economy. As such, the variations that result from a change in monetary policy will be distributed over a certain period of time and there may be significant delay between when the implementation of the policy and the outcome. Bernanke et al. (1999) asserted that a "common estimate" (p. 309-334) between policy changes and their influence on inflation was two years. According to Peersman and Smets (2002), interest rate money, and inflation area-wide data indicates that it can take over 12 months before monetary policy adjustments have the full impact on inflation. This view strongly validates the ECB medium-term policy orientation. Based on the previous literatures, we assume a one-year lag before euro area policy take effect. Thus, we exclude members who have adopted the euro after 2010, these being Estonia, Lithuania and Latvia. The group of countries outside the euro area are members of the EU but have chosen not to adopt the euro, these being Bulgaria, Croatia, the Czech Republic, Denmark, Hungary, Poland, Romania, and Sweden.

Firm-specific data from 2011 to 2019 was obtained from the Orbis Database, managed by Bureau van Dijk. Corporate income tax rates, GDP growth, and inflation data was obtained from the Eurostat Database. A number of filters were applied to the data: we exclude micro firms because they often have missing data as they are not required to furbish an income statement. Hence, these firms are automatically excluded from the analysis. In accordance with the European commission definition of micro enterprises, companies had to either have a turnover or/and total asset in excess of €2 million, and more than 10 employees. Any companies that were not active throughout the entire period of the study were also excluded, i.e., companies

[1] EU countries are Belgium, Czech Republic, Denmark, Germany, Estonia, Romania, Greece, Bulgaria, Croatia, Spain, France, Italy, Latvia, Lithuania, Luxembourg, Hungary, Malta, Netherlands, Cyprus, Austria, Poland, Portugal, Slovenia, Slovakia, Finland and Sweden, along with Iceland.

that suffered bankruptcy or that had any latency in the research timeframe were excluded. The last operation was to remove any companies where values were missing to arrive at an economically and statistically meaningful cohort best suited to empirical analysis. Firms active in 17 industries were included based on their corresponding NAICS 2007 codes (Appendix 0). Firms active within certain industries were excluded[2], these being the public sector, the public administration sector, and the financial and insurance sector. Companies working in these sectors function in a very different way and/or are heavily regulated regarding levels of corporate debt, which made them unsuitable for this research (Brav, 2009; Rajan & Zingales, 1995). *Appendix 1* and *Appendix 2* display an overview of the number of firms per industry and firms per country, respectively.

3.2 Dependent Variable

One of the fundamental classifications of capital structure proxies is debt structure. Studies on how a capital structure is defined and determined aid us in identifying the most appropriate proxies reflecting changes in firms' financing behavior over time. Rajan & Zingales (1995) stated that a firm's level of leverage is determined by financial debt which accurately indicates if the firm can default in the near future. Moreover, many studies are based not only on the total liabilities but divide them into short- and long-term liabilities (Michaelas et al., 1999; Hall et al., 2000; Bhiard & Lucey, 2010; Hanousek & Shamshur, 2011).

In this study, we will discuss three measures of leverage: short-term, long-term, and total leverage Following the previous scholarly works of Jordan et al. (1998) we create a variable to estimate the capital structure of firms by taking into account the leverage ratio, simplified as the ratio of debt to total assets. In the study, debt has been classified as long term if it has a maturity of at least one year and short-term otherwise.

3.3 Explanatory variables

Many firm-specific explanatory variables are considered in order to demonstrate the connection between leverage and firm-specific determinants. The size of the firm is calculated as the natural logarithm of total sales[3] (Titman & Wesseles, 1988; Rajan & Zingales, 1995 and Köksal et al., 2013); profitability is defined

[2] Based on corresponding NAICS 2007 codes, we exclude enterprises active in the following industries: unclassified establishment (NAICS: 99), public administration sector (NACIS: 92), and the financial and insurance sector (NAICS: 52).
[3] To avoid problems of multicollinearity we use the logarithm of total sales to measure firm size since several of the ratios used in our analyses are in terms of assets.

as the ratio between the firm's value of earnings before interest and tax over the book value of total assets[4] (Frank & Goyal, 2009; Lemmon et al., 2010); tangibility defined as the ratio between fixed assets and the book value of total assets (Rajan & Zingales, 1995; De Jong et al., 2008). Finally, variable growth proxies for the firm's growth opportunities and is measured as yearly percentage change in total sales (Wald, 1999; Frank & Goyal, 2009).

We define two variables with respect to the role of taxes in the determinants of capital structure. As proposed by Titman & Wesseles (1988) and Ozkan (2001), non-debt tax shields are measured as quotients of the firm's annual depreciation and amortization to total assets ratio. Furthermore, according to Booth et al.'s (2001) approach, we use the average corporate income tax rate to estimate the effect taxes have on the firm's capital structure

To analyze the determinants of a capital structure in the context of a particular industry, We use industry profitability and growth as a means of evaluating the factors that impact capital structure within a given industry. For the purposes of this paper, industry profitability is measured as the mean industry earnings before interest and tax divided by total assets. It provides insights into whether there is a correlation between organization leverage and industry profitability (Frank & Goyal, 2009; Jõeveer, 2013). According to Leary and Roberts (2014), it can be useful to consider earnings before interest and taxes to total assets when evaluating the performance of organizations in the same industry in comparison to those from alternative industries. To take industry-specific demand shifts into consideration, we also assess the industry growth by considering the mean percentage change in sales per year and industry classification.

In order to examine how macroeconomic conditions vary over time, we create two key variables. The first variable is the annual rate of change in the consumer price index as a measure for expected inflation (Frank & Goyal, 2009) and the second variable is the percentage change of the annual real GDP.

[4] The use of EBIT, instead of other measures of earnings, because it allows to compare companies with different capital structures.

Table 1	Definition	Pecking order	Trade-off
Dependent variable(s)			
Debt ratios			
Debt to Asset total	Total debt/Total assets	N/A	N/A
Debt to Asset short term	Short-term debt/Total assets	N/A	N/A
Debt to Asset long term	Long-term debt/Total assets	N/A	N/A
Independent variable(s)			
Firm-specific determinants			
Size	Natural log of sales	_	+
profitability	EBIT/Total assets	_	+
Tangibility	Fixed assets /Total assets	_	+
Growth	Percentage yearly change in sales	+	_
Tax-related determinants			
Non-debt tax shields	Depreciation & Amortization /Total assets	?	_
Income tax	Corporate income tax	?	+
Industry specific determinants			
Industry profitability	mean industry earning before interest and tax over total assets per year	?	_
Industry Growth	mean percentage change in sales per year and industry	?	?
Macroeconomic determinants			
Inflation	Percentage change in Inflation	?	+
GDP	Percentage change in GDP Percentage	+	_

Table 1 *Capital structure theories and relation between leverage and internal determinants based on literature review (hypotheses 1 – 9). The sign "+" indicates positive relationship with leverage and the sign "-" indicates negative relationship.*

3.4 Descriptive analysis

The following subsections introduces the various statistical tests that are undertaken to demonstrates the validity of the dataset.

3.4.1 Summary statistics

We provide summary statistics for the full sample of firms included in the analysis corresponding to 12,180 firms and 109,620 firm-year observations between years 2011-2019. Additionally, we divide the sample into two groups based on euro area membership. The summary statistics in *Table 2* and *Table 3* shows the mean, standard deviation, minimum and maximum of the dependent and independent variables. The degree of variation that can be observed across different data sets can be assessed using standard deviation. Low standard deviation values indicate that the data points are limited to a small range of variables and are indicative of that there are no major outlier issues in the data. Table 2 allows to conclude that the euro area member's companies have, on average, higher levels of leverage. Table 3 shows the average level of independent variables for the same group of countries and other descriptive statistics for these variables.

Table 2: Descriptive statistics for the dependent variables

Table 2	Full Sample					Euro Area Member Sample					Non-member Sample				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
VARIABLES	N	mean	sd	min	max	N	mean	sd	min	max	N	mean	sd	min	max
Total Leverage	109,620	0.190	0.211	0	8.421	83,799	0.190	0.211	0	8.421	25,092	0.188	0.212	0	5.051
ST_Leverage	109,620	0.0879	0.142	0	8.421	83,799	0.0946	0.151	0	8.421	25,092	0.0657	0.104	0	1.562
LT_Leverage	109,620	0.102	0.151	0	5.027	83,799	0.0958	0.141	0	2.317	25,092	0.122	0.181	0	5.027
Firms	12,180					9,311					2,788				

Table 3: Descriptive statistics for the Independent variables

Table 3	Full Sample					Euro Area Member Sample					Non-member Sample				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
VARIABLES	N	mean	sd	min	max	N	mean	sd	min	max	N	mean	sd	min	max
Profitability	109,620	0.0580	0.100	-0.990	0.980	83,799	0.0541	0.0988	-0.970	0.980	25,092	0.0709	0.104	-0.99	0.90
Size	109,620	3.333	1.711	0.693	12.44	83,799	3.473	1.738	0.693	12.44	25,092	2.879	1.539	0.696	10.73
Tangibility	109,620	0.265	0.239	0	0.999	83,799	0.234	0.222	0	0.999	25,092	0.364	0.264	0	0.999
Growth	109,620	0.0658	0.443	-0.997	49.96	83,799	0.0621	0.447	-0.997	49.96	25,092	0.0779	0.433	-0.948	26.61
ND_Tax	109,620	0.0413	0.0374	0	0.790	83,799	0.0393	0.0358	0	0.790	25,092	0.0477	0.041	0	0.77
GDP	109,620	0.0107	0.0172	-0.0660	0.252	83,799	0.0068	0.0160	-0.066	0.252	25,092	0.0230	0.014	-0.0220	0.071
Inflation	109,620	0.0127	0.0116	-0.0160	0.058	83,799	0.0132	0.0108	-0.015	0.0410	25,092	0.0108	0.013	-0.0160	0.058
Tax_Rate	109,620	0.270	0.0731	0.100	0.444	83,799	0.301	0.0408	0.100	0.444	25,092	0.169	0.063	0.100	0.263
Industry_Prof	109,620	0.0580	0.0115	-0.00190	0.094	83,799	0.0541	0.0126	-0.019	0.0903	25,092	0.244	0.017	-0.0233	0.119
IndusGrowth	109,620	0.0658	0.0386	-0.0162	0.243	83,799	0.0621	0.0380	-0.033	0.266	25,092	0.0708	0.055	-0.0494	0.670

3.4.2 Correlation Analysis

The correlation matrix provides insights into the direction and strength association between two variables. The cross-correlation terms for the independent variables can be observed in the correlation matrix presented in *Appendix 3*. The Pearson correlations were used to assess the correlation coefficients as a means of identifying whether there was a degree of high collinearity amongst variables. The data presented in *Appendix 3* indicates that there was not a high degree of collinearity between the independent variables. The correlation coefficients were all relatively small. The highest correlation was observed between non-debt tax shields and tangibility (0.3927). There was not a significant correlation between the variables. As, collinearity did not undermine the interpretation of the regression coefficients of the independent variables (Studenmund, 2017). In addition, the VIF test was employed to verify whether multicollinearity was present. The results of this test are presented in *Appendix 4*. As can be observed in the data, the mean VIF-value is 1.21. All VIF-values are below 5. As such, it is reasonable to conclude that multi collinearity is not a problem within this samples and, therefore, will not have a negative impact on the reliability of the results of this study (O'Brien, 2007).

3.4.3 Heteroskedasticity

Heteroskedasticity can be an issue in studies of this nature because they include a dataset that spans a vast array of organizations from different industries and countries. Heteroskedasticity emerges when there is a difference in the variance of error terms across the observations. As such, this can mean that the effects that some of the determinants of interest in the current study can differ, resulting in non-constant variance. The Breusch-Pagan test was employed in this study to ascertain the presence of heteroskedasticity. The outcomes of the test are presented in *Appendix 5*. As can be observed in the table, the Prob > chi2 value was 0.000. As such, the null hypothesis can be rejected, and it is evident that there is some degree of heteroskedasticity in the dataset. Robust standard errors were employed to address heteroskedasticity.

4.0 Methodology

4.1 Research method

This study employed a quantitative research approach by which the answers to a given set of research questions were generated. Due to the nature of the data that was available for the companies of interest in this study, a panel data model was employed. Antoniou et al. (2002) recommended combining cross-observations that were performed over a given period as a means of enhancing the accuracy of the results by increasing the number of observations, reducing the risk of multicollinearity among the explanatory variables, and increasing the degree of freedom. A further advantage of, panel data analysis is that it increases the chance of adequately capturing the complexity of behaviour because it allows researchers to control the impact of the variables that are omitted while also providing an opportunity to explore previously unidentified dynamic relationships. Panel data analysis also makes it possible to evaluate the influence of unobserved and missing variables from the explanatory variables (MaCurdy, 1981). As the data set assessed in this study contained more entities than time-periods, it takes the form of a short and wide panel type.

4.2 Empirical strategy

An empirical regression analysis was performed to test the hypothesis. This involved identifying the variables that were of statistical significance in terms of capital structure. Through the use of the panel data approach, it was possible to implement a random or fixed effects regression model. To ascertain which of these models was the most suitable in terms of the research objectives, a Hausman specification test was performed within which the null hypothesis was that the preferred model is random effects as opposed to fixed effects (Greene, 2010). The underlying objective was to verify the extent to which the unique errors were correlated with the regressors. If no such correlation was observed, the null hypothesis was accepted. The outcomes of the Hausman test revealed that the variations in the coefficients revealed a covariance between the error term and the explanatory variables. As such, a fixed-effects model was employed in the current study as a means of estimating Model 1, which is often used in comparable studies (Frank & Goyal, 2009). As fixed-effect models control for unknown variables, the net impact that the independent variables have on the outcome variable can be assessed as a means of achieving the underlying goal of assessing the influences that tax-related, firm-specific, and macroeconomic factors have on the determinants of capital structure. The outcomes of the Hausman test are presented in *Appendix 6*.

The second objective of the current study was to assess the effect that euro area membership has on the determinants of capital structure. As membership of the euro area time-invariant was omitted, the random effect model was employed to generate insights into the extent to which the impact of a time-varying

predictor changes according to time-invariant predictors (or vice versa). Therefore, a random-effects approach was used to test Model 2 and Model 3 and assess the impact of euro area membership on the determinants of capital structure, despite the fact that the Hausman test indicated that a fixed-effects model was more suitable. According to Clark and Linzer (2012) it is "neither necessary nor sufficient" to rely on the outcomes of the Hausman test when making decisions as to which research methodology to follow. Research method decisions are as much philosophical as they are statistical (Jones, 2010). As econometricians, we are interested in comprehending the way in which policy changes may impact the wider economy. Fixed effect models can make this possible by reducing a significant amount of uncertainty, leaving only a theoretically universal effect and making it possible to control for differences at the higher level. However, a random effect approach unequivocally models this variation, leading "to a richer description of the relationship under scrutiny" (Subramanian et al., 2009b, 373). According to Western (1998), a clearly delineated random effect model can offer everything that a researcher can access through the fixed-effect approach, and more. As such, it is frequently perceived to represent a superior model (Shor et al., 2007). In addition, random effects are only biased to a notable extent in extreme situations (Mcculloch & Neuhaus, 2011).

When using a random-effects model, there is a requirement to delineate the factors that may have an impact on the predictor variables. According to Frank and Goyal (2007), there is a significant correlation between leverage and industry classification. As such, as a means of controlling for industry effect, 21 dummy variables were included in the Model 2 and Model 3 random effect models. In addition, dummy variables that controlled for year-fixed effects were also incorporated and the dummy variable "Euro" was added as a means of evaluating the impact euro area membership has on the determinants of capital structure. A value of one was used if the organization was a member of the euro area, while zero was applied in all other cases. In addition, the euro area dummy was introduced as an interaction term with other predictor variables as a means of evaluating if the variations in the respective capital structure determinants are statistically significant across groups.

4.3 Econometric models

Based on the theoretical framework, the model below is designed to investigate the relationship between capital structure and the determinants affecting it. The following fixed effect model estimated:

Model 1

$$Lev_{it} = \alpha_i + \beta_1 Size_{it} + \beta_2 Prof_{it} + \beta_4 Tang_{it} + \beta_3 Growth_{it} + \beta_5 NDTax_{it} + \beta_6 Tax_{it} + \beta_7 IndLeverage_{it} + \beta_8 IndGrowth + \beta_9 Inflation_{it} + \beta_{10} GDP_{it} + \mu_i + \lambda_t + \mathcal{E}_{it}$$

where Lev stands for one of the leverage measures (short-term, long-term or total) of particular firm i in year t; α is the intercept; Size represents firm size; Prof is profitability; Tang is assets tangibility; Growth is growth opportunities of firm; NDTax is non-debt tax shield; Tax is level of corporate income tax rate; GDP is the GDP growth; inflation is the inflation rate; μ_i stands for time-invariant effect specific to the firm; λ_t is the parameters of time dummy variables; $\mathcal{E}_{it}$ is the standard error item.

Additionally, in order to analyze if the level of financial leverage differ in terms of euro area membership, we add the dummy variable Euro to the random effect model. The dummy variable, Euro, takes the value one if the company belongs to the euro area and zero otherwise. For countries which adopt the euro in later years their observations will be allocated accordingly. Thus, observation years after adoption of the euro, the dummy variable Euro, takes the value of one and zero otherwise. Dummy variables that control for year and industry fixed effects are also included. The following random effect model is estimated:

Model 2

$$Lev_{it} = \alpha + \beta_1 Size_{it} + \beta_2 Prof_{it} + \beta_4 Tang_{it} + \beta_3 Growth_{it} + \beta_5 NDTax_{it} + \beta_6 Tax_{it} + \beta_7 IndProf_{it} + \beta_8 IndGrowth + \beta_9 Inflation_{it} + \beta_{10} GDP_{it} + \beta_{11} Euro_i + industry_i + \lambda_t + \mathcal{E}_{it}$$

Finally, to complement the analysis, in addition to the additive dummy variable (Euro), this dummy will be introduced in an interaction term, with the purpose of analyzing if the differences in the determinants of capital structure between the euro area members and non-members are statistically significant. The coefficients of those interactive variables indicate the differences in the respective determinants of capital structure between euro area members with respect to non-members firms. Accordingly, the following random effect model is estimated:

Model 3

$$\begin{aligned} Lev_{it} = \alpha &+ \beta_1 Size_{it} + \beta_2 Prof_{it} + \beta_4 Tang_{it} + \beta_3 Growth_{it} + \beta_5 NDTax_{it} + \beta_6 Tax_{it} \\ &+ \beta_7 IndLeverage_{it} + \beta_8 IndGrowth_{it} + \beta_9 GDP_{it} + \beta_{10} Inflation_{it} + \beta_{11} Euro_i \\ &+ \beta_{12} Euro_i \, x \, Size_{it} + \beta_{13} Euro_i \, x \, Prof_{it} + \beta_{14} Euro_i \, x \, Tang_{it} \\ &+ \beta_{15} Euro_i \, x \, Growth_{it} + \beta_{16} Euro_i \, x \, NDTax_{it} + \beta_{17} Euro_i \, x \, Tax_{it} \\ &+ \beta_{18} Euro_i \, x \, Indprof_{it} + \beta_{19} Euro_i \, x \, IndGrowth_{it} + \beta_{20} Euro_i \, x \, Inflation_{it} \\ &+ \beta_{21} Euro_i \, x \, GDP_{it} + industry_i + \lambda_t + \mathcal{E}_{it} \end{aligned}$$

5.0 Results

The results for capital structure determinants fixed effect regressions are displayed in Table 4. Furthermore, results for random effect regressions including euro area dummy are reported in Table 5. Finally, results for random effect regressions including interaction terms are reported in Table 6. We interpret these findings with respect to theoretical predictions of pecking order and trade-off theory of capital structure.

5.1 Estimation results for the full sample

In terms of the firm-specific capital structure determinants, the profitability, tangibility, and size coefficients were all of statistical significance at the 1% level for all three leverage ratios. There was a positive correlation between size and all three leverage ratios. This entails that, should all other variables remain the same, larger firms are, on average, more likely to be leveraged than smaller firms. They are also likely to take on higher levels of debt because they benefit from greater levels of diversification. On this basis, larger organizations represent a lower risk than smaller organizations, have a higher credit rating, and benefit from lower interest rates. As such, they are likely to have more debt. The findings of this research are aligned with the underlying hypothesis of the trade-off theory; i.e., there is a positive correlation between organization size and leverage. *In general, our results are consistent with the trade-off theory suggesting positive association between the size and leverage and thus provide supportive evidence for our initial hypothesis (H1).*

The results of the analysis reveal that there is a negative association between profitability and all three leverage ratios. This can be attributed to the fact that organizations that benefit from higher levels of profitability can generate more internal funds and, as such, are less reliant on external funding. These findings are aligned with the hypothesis that underpins the pecking order theory, which asserts that organizations that have access to internal sources of finance will opt to use these resources as opposed to seeking external finance sources because doing so is more cost-effective. The high external financing costs are derived from market frictions associated with the information asymmetries and agency problems that occur on the demand side (i.e., shareholders) and supply side (i.e., debtholders) of capital. *In general, the results are consistent with pecking order theory and confirm our initial hypothesis that profitability of the firm is negatively associated with its leverage (H2).*

Our findings are consistent with those of Köksal & Orman (2015) in that we identified a significant positive correlation between tangibility and long-term and total leverage. However, we also found a negative

correlation between asset tangibility and short-term leverage. As such, firms that have higher levels of tangible assets are more likely to have less long-term debt and more short-term debt. (Demirguc-Kunt & Maksimovic, 1999) found comparable outcomes in their research on organizations spanning 19 countries. Trade-off theory specifies that adverse selection and the moral hazard costs associated with debt financing reduce when an organization has higher levels of tangible assets. This is based on the notion that it is possible to use tangible assets as collateral which, in turn, enhances an organization's capacity for debt. *Our findings primarily provide confirmatory evidence for the initial hypothesis consistent with trade-off theory stating that tangibility will be positively associated with leverage (H3).*

Finally, the results of the data analysis indicate that there is not a positive correlation between growth and any form of the organizations' leverage on the basis that its coefficients are not significant for all leverage specifications. This could be attributed to data limitations. Specifically, the proxy we applied for the organization's growth opportunities. Contrary to the previous literature on the determinants of capital structure, we were unable to employ market-to-book ratio as an approximation for organization growth opportunities because these are only on offer from publicly listed enterprises. *Therefore, we do not provide any evidence regarding our initial hypothesis that the growth opportunities of the firm are related to its leverage (H4).*

The estimated coefficients for the tax-related capital structure can be observed in the second section of Table 4. The data provides an estimation of the effect that corporate income tax and non-debt tax shields have on capital structure.The non-debt tax shield variable is of statistical significance at the 1% level for both long-term and total leverage ratios. However, it is only of statistical significance at the 5% level for short-term leverage ratio. There is a clear negative correlation between non-debt tax shield level and an organization's preference for using debt to finance operations. The results indicate that the ability to access a tax advantage as a result of alternative reasons other than debt—that is, depreciation and amortization—play a significant role in an organization's capital structure decisions. Specifically, the more non-debt tax shields the firm has access to, the less value it will place in interest tax shields that are derived from debt financing. These findings are aligned with trade-off theory because organizations are trading the potential benefits of interest expense deductibility for the disadvantage of a higher chance of experiencing financial distress. DeAngelo & Masulis (1980) argue that the existence of a sufficient amount of expenses in the form of non-debt tax shields means that organizations have less incentive to leverage debt because the interest tax shields are, to some degree, switched for instruments related to depreciation and amortization (i.e., non-debt tax shields). *In general, we find supportive evidence for trade-off theory and confirm our initial hypothesis stating that non-debt tax shields are negatively related to leverage (H5).*

The findings of the current study reveal that there is a statistically significant positive correlation between the corporate income tax rate and organizations' long-term and total leverage ratios. These outcomes are aligned with the trade-off theory, which asserts that there is a positive correlation between corporate tax rates and leverage because the tax code features make it possible for organizations to deduct interest payments, but not dividends, from the taxable amount. As such, there is a tax advantage associated with debt. Antoniou et al. (2008) argue that high tax rates raise the interest tax benefit of using debt as a method of financing. Generally, the results of the current study are aligned with the trade-off theory as they demonstrate that corporate income tax changes are positively correlated with leverage. *In general, our results are consistent with the trade-off theory suggesting that changes in corporate income tax have a positive impact on leverage (H6).*

The estimate coefficients for industry-specific growth and profitability determinants are exhibited in Table 4. There is no statistically significant link between organizations' leverage and industry-specific determinants and any of the three leverage ratio specifications. *In general, we are unable to find evidence to support the hypothesis that there is a correlation between the capital structure of an organization and the development of industry-specific determinants in terms of industry profitability and growth (H7,H8).*

The estimated coefficients for the macroeconomic determinants are displayed in the bottom section of Table 2. For all equations, there is a positive correlation between inflation and leverage and coefficients that are of significance at the 1% level with short-term and total leverage ratios and at the 5% level with long-term leverage ratio. As such, as inflation increases, so too does firms' indebtedness. This finding is aligned with the trade-off theory, which asserts that, in light of the tax-deductibility of nominal interest payments, an inflation-induced rise in nominal interest rates will enhance the tax advantage associated with debt financing. According to Taggart (1985), the true value of debt tax deductions increases in situations in which there is an anticipation that inflation will be high. Moreover, Bastos et al. (2009) highlighted how this positive relationship can be explained by the fact that the nominal amounts of debt depreciate as a result of inflation, making them a more attractive proposition for the borrower. Our findings revealed that the inflation coefficient related to the short-term leverage ratio is significantly higher in comparison to that related to the long-term and total leverage ratios. (Myers, 1977) emphasized that, if firms are uncertain about the future inflation rates, they will typically rely on short-term interest rate debt. *In general, we find supportive evidence for trade-off theory and confirm our initial hypothesis stating that inflation levels are positively related to leverage (H9).*

Finally, there does not appear to be a correlation between GDP growth and any form of organization leverage as the coefficients were insignificant for all leverage specifications. *In general, we do not find any solid evidence that there is association between firms' capital structure choice and GDP growth (H10).*

5.2 Estimation results with an additive dummy

Table 5 presents the outcomes of the analysis of the variation in the level of indebtedness between euro area members and non-members (Model 2). As the data highlights, there is a positive correlation between the size of an organization and its long-term and total leverage ratios, but a negative correlation between the size of an organization and its short-term leverage ratio. Furthermore, there was a negative relationship between profitability and all three leverage ratios at the 1% significant level. Tangibility is positively correlated with long-term and total leverage ratios, but negatively correlated with short-term leverage ratio. There is no significant relationship between growth and any of the leverage ratios of interest in this study.

The non-debt tax shield has a negative impact on all three leverage ratios; however, there is a positive correlation between corporate tax rate show and long-term and total leverage. There was no significant association between industry determinants and the leverage ratios. There is a positive relationship between macroeconomic determinants in the form of inflation and GDP growth and all three leverage ratios; however, for the long-term leverage ratio only.

It is also worth noting that that the data related to the random effect model with additive dummy variable presented in Table 5 reveals that there are significant similarities with the fixed-effect model based on the full sample presented in Table 4 with regards to the determinant effects of the capital structure. Finally, there is a statistically significant association between the dummy variable Euro[5] and all three leverage ratios at 1% level. This is indicative of the fact that companies that are located in the euro area are likely to incorporate more dept within their financial structure, even when the main capital structure determinants have been controlled for. This outcome is aligned with the work of Cohen et al. (2019), who concluded that changes to the ECB's balance sheet and interest rates are positively correlated with company leverage. They highlighted how the monetary policies that are devised by the ECB serve to motivate non-financial organizations to increase their debt burden, pursue more investment opportunities, and enhance their shareholder distribution. However, they also found that ECB policies appeared to have a more significant marginal impact on organizational decisions both after the 2008 global recession and in the latter part of 2011, when the Euro debt crisis started to unfold, and Mario Draghi came into office and considerably

[5] Euro takes the value one if the company belongs to the euro area and zero otherwise.

modified the existing ECB policies by introducing more funds into the economy and reducing interest rates as a means of motivating organizations to secure further loans.

As membership of the euro came into fruition, interest rates in areas on the periphery of the euro rapidly converged to European levels, signaling a marked fall in the country and currency risk. This prompted a significant reduction in the cost of debt, while the cost of equity remained constant at elevated levels (see Appendix 7). Geis et al. (2018) described how, by the time the euro was introduced, a broad reduction in rates was observed, prompting many organizations in the area of the euro to engage in higher levels of bank borrowing. Although the enhanced access to credit was initially a significant motivation for the corporate structure, the increase in the level of debt made firms more vulnerable to changes in the interest rates and negative credit risk assessments passed by market participants. It is for this reason that the cost of equity was high for businesses in the euro area. In fact, since the commencement of the global financial crisis, surges in the equity risk premium have served to counterbalance the drop in the yield of risk-free assets. Specifically, the equity risk premium has not fallen in line with the cost of debt (see Appendix 7), which has profited more immediately from the monetary policy measurements that have been established at part of the Euro system. This has entailed that, in comparison to borrowing from banks or issuing bonds, equity financing represents a costly mode of finance (Geis et al., 2018). The leverage ratios in the euro area have expanded substantially since 2000, rising to 132% of the GDP in the euro area in 2017 (see Appendix 8). After peaking at 137% during the first three months of 2015, the corporate debt ratio in the euro area has typically been falling.

As such, the majority of the debt ratios of euro-area firms climaxed during 2009 and subsequently fell until around 2011, when some stabilization appears to have developed. According to ECB (2012) debt-to-asset ratio increase was largely more modest than the rise in debt to economic activity. This highlights how the increase in non-financial organization's level of indebtedness was supported, to some degree, by an uplift in assets, which can be utilized as collateral as a means of making it possible for organizations to secure higher levels of debt.

In general, we find supportive evidence for our initial hypothesis stating that euro area members' firms have higher leverage ratio than non-members (H11).

Table 4

VARIABLES	(1) Short-term Leverage	(2) Long-term Leverage	(3) Total Leverage
Firm specific determinants			
Size	0.00726***	0.0120***	0.0193***
	(0.00222)	(0.00193)	(0.00275)
Profitability	-0.133***	-0.116***	-0.248***
	(0.0116)	(0.00865)	(0.0140)
Tangibility	-0.0312***	0.172***	0.141***
	(0.00660)	(0.00860)	(0.0107)
Growth	-0.000963	-0.000962	-0.00192
	(0.000607)	(0.00117)	(0.00132)
Tax related determinants			
ND_Tax	-0.0648**	-0.102***	-0.167***
	(0.0323)	(0.0268)	(0.0395)
Tax_Rate	0.00826	0.0498**	0.0581*
	(0.0259)	(0.0221)	(0.0316)
Industry determinants			
Industry_Prof	0.0373	-0.150	-0.113
	(0.0614)	(0.108)	(0.122)
Industry_Growth	0.00396	-0.00723	-0.00328
	(0.0107)	(0.0119)	(0.0151)
Macroeconomic determinants			
Inflation	0.430***	0.155**	0.275***
	(0.0434)	(0.0690)	(0.0758)
GDP	0.0194	0.0227	0.0421
	(0.0783)	(0.0472)	(0.0890)
Constant	0.0739***	0.0340***	0.108***
	(0.00921)	(0.0117)	(0.0141)
Observations	109,620	109,620	109,620
R-squared	0.015	0.166	0.096
Number of Firms	12,180	12,180	12,180

Table 4 This table displays the findings for the robustness for the robustness of full sample using Fixed Effects model. Significance levels at 1%, 5%, and 10% are denoted as ***,**,*, respectively. Standard errors are reported in parentheses.

Table 5

VARIABLES	(1) Short-term Leverage	(2) Long-term Leverage	(3) Total Leverage
Firm specific determinants			
Size	-0.000377	0.00986***	0.0103***
	(0.000859)	(0.000736)	(0.00122)
Profitability	-0.143***	-0.124***	-0.262***
	(0.00985)	(0.00844)	(0.0126)
Tangibility	-0.0137***	0.194***	0.174***
	(0.00482)	(0.00649)	(0.00840)
Growth	0.000426	-0.000395	-0.000203
	(0.000558)	(0.00114)	(0.00140)
Tax related determinants			
ND_Tax	-0.0619**	-0.111***	-0.171***
	(0.0296)	(0.0246)	(0.0372)
Tax_Rate	0.00849	0.0930***	0.0927***
	(0.0192)	(0.0183)	(0.0259)
Industry determinants			
Industry_Prof	0.0534	-0.129	-0.0823
	(0.0616)	(0.108)	(0.123)
Industry_Growth	0.00578	-0.00610	-0.000295
	(0.0109)	(0.0120)	(0.0153)
Macroeconomic determinants			
Inflation	0.386***	0.121*	0.268***
	(0.0437)	(0.0695)	(0.0766)
GDP	-0.0385	0.101**	0.0613
	(0.0786)	(0.0450)	(0.0886)
Euro	0.0199***	0.0158***	0.00400***
	(0.00250)	(0.00388)	(0.00464)
Constant	0.0949***	0.0346***	0.133***
	(0.00954)	(0.0114)	(0.0154)
Observations	108,891	108,891	108,891
Number of Firms	12,099	12,099	12,099

Table 5 This table displays the findings for the robustness of the euro members and non-member sample sample using Random Effects model with the additive dummy "Euro". Euro takes the value one if the company belongs to the euro area and zero otherwise. Significance levels at 1%, 5%, and 10% are denoted as ***,**,*, respectively. Standard errors are reported in parentheses.

5.3 Estimation results with an additive dummy and interactive terms

This subsection introduces the euro area dummy into the interaction term with the underlying objective of assessing if there is a statistical significance between the determinants of capital structure between euro and non-euro area members. The coefficients of those interactive variables provide an indication of the variances between the respective regressors in euro area members in comparison to non-members.

First section of Table 6 presents the firm-specific determinants. As can be observed, there is a negative correlation between the size of the firm and short- and long-term leverage ratios when euro area membership is taken into consideration (see interaction between size and euro area dummy). This could potentially be explained by the fact that larger firms who are members of the euro rely on internal financing more than external financing. The effect of euro membership on size is aligned with the pecking order theory, which asserts that there is a negative correlation between company size and leverage because larger companies are required to manage lower adverse selection; as such, they can more readily issue equity than small companies. Furthermore, we observe that, in the context of euro area firms, there is a negative correlation between profitability and the short-term leverage ratio. This, again, is consistent with the pecking order theory, which asserts there is a negative relationship between profitability and leverage. However, the significance of this relationship falls when we consider the long-term and total leverage ratios. Incorporating the tangibility variable with the euro area dummy generates further insights into the relationship. A statistically significant negative correlation with short-term leverage can be observed. This indicates that euro-member firms tend to rely on other sources of finance to a greater extent, even if their asset structure offers them increased debt capability derived from higher levels of tangible assets that have the ability to act as collateral. This finding could be potentially explained by the pecking order theory, which asserts that there is a negative correlation between leverage and tangibility because the issuance of equity is less costly due to the low information asymmetry associated with tangible assets. The results in terms of the growth opportunities are aligned with the trade-off theory, which predicts that there is a negative correlation between an organization's growth opportunities and its leverage. However, the statistical significance of this negative correlation rises among firms that are euro members. This indicates that euro area firms have more opportunity to capture growth prospects by issuing internal financing.

In terms of the tax-related determinates, the non-debt tax shield effect remains of statistical significance at the 10% level for long-term and total leverage; however, the significance and magnitude of the correlation reduces when euro membership is taken into consideration. We can see that the coefficient of the interaction term with non-debt tax shields is only of statistical significance when the short-term leverage ratio is at the

10% significant level. This can be attributed to the fact that the euro area member firms reduce leverage when they encounter a higher level of non-debt tax shields. This data is consistent with the outcomes of prior studies, which have found that organizations that have non-debt tax shields already benefit from tax benefits; as such, they are not incentivized to issue debt (Wald, 1999; Fama & French, 2002). These outcomes are naturally aligned with the trade-off theory. However, we also identified a statistically significant positive correlation between the corporate income tax rate and the leverage ratios of organizations that were consistent with the trade-off theory. That said, the magnitude and direction of this correlation varied when euro area membership was taken into consideration. There was a highly significant negative correlation between the corporate tax rate and all three leverage ratios. On average, the members of the euro area have higher tax rates (see Table 2). This could increase capital. As a result, capital expenditure and the need for debt via an external source would reduce (Kremp et al., 1999).

Examining the industry-specific factors, we can see that industry growth and profitability are both statistically associated with short-term leverage. However, the direction of this correlation changes when euro membership is taken into consideration. We can see that the profitability of the industry has negative implications when the euro area is included. This is aligned with trade-off theory, which asserts that the higher the level of profitability in a given industry, the lower the leverage used by organizations that operate within that sphere (Frank & Goyal, 2009). However, the industry growth interaction reveals that there is a statistically significant rise in the amount of short-term leverage employed by euro area members in comparison to non-members. These outcomes support the previous conclusions drawn by La Rocca et al., (2011) and Baskin, (1989).

Examining the correlation between the capital structure choice and the behavior of the GDP growth and inflation macroeconomic variables, we ascertained that the interaction of both variables is statistically correlated with long-term leverage at the 5% level. The inflation interaction coefficient reveals that there is a positive correlation with the long-term leverage ratio when the euro area is considered. This finding is aligned with trade-off theory. However, the relationship is not significant in terms of the short-term and total leverage ratios. This is aligned with the primary objective of the Eurosystem's monetary policy: To ensure price stability between euro-member countries. As such, it is likely that inflation will be more stable in counties that are members of the euro and this entails that the positive influence inflation has on leverage is not as significant in the case of euro-member organizations. However, the coefficient interaction in terms of GDP growth is both positive and significant in terms of long-term leverage and the total leverage equations are aligned with the pecking order theory, which anticipates a positive correlation between leverage and economic growth on the basis that a high ratio of growth opportunities to internal funds indicates that there is a stronger requirement for funds from an external source. The positive correlation is

likely to be indicative of the fact that firms that operate in the euro area are typically better placed to exploit the opportunities present within economic growth.

There is a statistically positive correlation between the dummy Euro variable and all three leverage ratios. This is indicative of the fact that organizations that are located in the euro area typically exhibit higher leverage ratios. Model (2) confirmed this hypothesis. On the contrary, an analysis of the implications of the interaction terms revealed that euro-member firms have exhibited a broad movement away from raising funds through debt to the use of excess funds via equity capital and/or internal financing. It is possible to explain this contradiction by considering the high degree of heterogeneity that can be seen among the countries that are members of the euro, both in terms of the corporate debt ratio at the outset of the financial crisis and the deleveraging pace. ECB (2012) highlights how the steady reduction in debt ratios is reflective of both the demand and supply variables that influence the amount of credit that organizations in the euro area can access. In terms of the demand side, a combination of a higher tendency to retain earnings and reduced economic activity has entailed that organizations have less need for external sources of funds. On the supply side, the banks have put more stringent credit standards in place that have reduced the availability to bank loans to non-financial organizations. As a result, many companies have deleveraged. Furthermore, the situation has also prompted a change in the overall capital structure of organizations, with many firms exhibiting a lower level of bank financing in comparison to market-derived financing. Simultaneously, the corporate debt ratios evidenced in the euro are conventionally relatively substantial by historical standards, which can explain why the euro area variable is significantly positively correlated with all three leverage ratios.

As a variation in the significant explanatory variables can be observed between the euro and non-euro members, the objective of this study was achieved: To assess is variations in the determinants of capital structure can be observed between the groups of countries that were the subject of the research.

Therefore, we provide evidence regarding our initial hypothesis that there are differences in the determinants of capital structure between euro area member firms and those of non-members (H12).

Table 6

VARIABLES	(1) Short-term Leverage	(2) Long-term Leverage	(3) Total Leverage
Size	0.00395***	0.00607***	0.0115***
	(0.00126)	(0.00174)	(0.00226)
Profitability	-0.108***	-0.147***	-0.250***
	(0.00943)	(0.0234)	(0.0225)
Tangibility	0.00422	0.189***	0.189***
	(0.00690)	(0.0123)	(0.0140)
Growth	0.000613	-0.00397*	-0.00420*
	(0.000901)	(0.00174)	(0.00221)
ND_Tax	-0.00104	-0.109**	-0.114**
	(0.0283)	(0.0455)	(0.0532)
Tax_Rate	0.129***	0.475***	0.308***
	(0.0275)	(0.0443)	(0.0537)
Industry_Prof	0.336***	-0.260	0.0236
	(0.0862)	(0.168)	(0.189)
Industry_Growth	-0.0392**	0.0182	-0.0152
	(0.0193)	(0.0265)	(0.0321)
Inflation	0.242***	0.158*	0.387***
	(0.0516)	(0.0851)	(0.0925)
GDP	-0.0553	-0.00799	-0.0589
	(0.0594)	(0.0682)	(0.0839)
Euro	0.0370***	0.0502***	0.0777***
	(0.0101)	(0.0163)	(0.0190)
Size x Euro	-0.00524***	-0.00398**	-0.00191
	(0.00151)	(0.00190)	(0.00257)
Profitability x Euro	-0.0473***	0.0297	-0.0172
	(0.0156)	(0.0246)	(0.0268)
Tangibility x Euro	-0.0242***	0.00643	-0.0225
	(0.00893)	(0.0140)	(0.0170)
Growth x Euro	-0.000333	-0.00564***	-0.00581**
	(0.00112)	(0.00213)	(0.00270)
ND_Tax x Euro	-0.0840*	-0.00527	-0.0802
	(0.0481)	(0.0534)	(0.0704)
Tax_Rate x Euro	-0.168***	-0.487***	-0.273***
	(0.0314)	(0.0483)	(0.0583)
Industry_Prof x Euro	-0.395***	0.190	-0.144
	(0.102)	(0.170)	(0.195)
Industry_Growth x Euro	0.0623***	-0.0363	0.0186
	(0.0192)	(0.0268)	(0.0317)
Inflation x Euro	-0.0289	0.174**	0.136
	(0.0625)	(0.0857)	(0.0969)
GDP x Euro	0.0133	0.182**	0.183*
	(0.0796)	(0.0763)	(0.105)
Constant	0.0840***	-0.0140	0.0781***
	(0.0116)	(0.0163)	(0.0205)
Observations	108,891	108,891	108,891
Number of Firms	12,099	12,099	12,099

Table 6 This table displays the findings for the robustness of the euro area members and non-member sample sample using Random Effects model with the additive dummy Euro and interactive terms. Euro takes the value one if the company belongs to the euro area and zero otherwise. Significance levels at 1%, 5%, and 10% are denoted as ***,**,*, respectively. Standard errors are reported in parentheses.

5.4 Robustness test

This subsection of the paper presents an overview of the additional robustness tests that were performed for the capital structure determinants. The results of the regression analysis are presented in Table 7, and this data is discussed in the remainder of this chapter.

As a means of testing for any structural breaks within the capital structure determinants, we divided the data into two further samples according to alternative periods. As can be seen in Table 7, similarities can be observed within both periods, and the tax-related, firm-specific, and macroeconomic determinants typically exhibit a comparable pattern. The only exception to this concerns the relationship between the growth of the industry in which the organizations operated and leverage, which became significant in comparison to the baseline regression when the sample data was divided into two.

There were also some variations in terms of the direction of the correlation between industry growth and capital structure leverage and determinants. While there appeared to be a positive correlation between long-term and total leverage for the period spanning 2015-2019 after the sample was divided into two, a negative correlation was observed for the period spanning 2011-2014. In support of this finding, the Eurosystem's quarterly Bank Lending Survey (BLS) reveals that the credit standards that governed loans to commercial entities were made more stringent in both 2009 and 2011-12. Most of the firms that took part in the European Central Bank (ECB) Survey on the Access to Finance of Enterprises (SAFE) revealed that they had found it most difficult to access bank loans during this time.

Table 7

	Period 2011-2014			Period 2015-2019		
VARIABLES	(1) Short-term Leverage	(2) Long-term Leverage	(3) Total Leverage	(4) Short-term Leverage	(5) Long-term Leverage	(6) Total Leverage
Firm specific determinants						
Size	0.00142*	0.00941***	0.0108***	0.0102***	0.00695***	0.0171***
	(0.00345)	(0.00310)	(0.00407)	(0.00248)	(0.00250)	(0.00306)
Profitability	-0.104***	-0.0823***	-0.186***	-0.121***	-0.109***	-0.229***
	(0.0192)	(0.00840)	(0.0205)	(0.00861)	(0.0138)	(0.0145)
Tangibility	-0.0382***	0.147***	0.108***	-0.0197**	0.172***	0.152***
	(0.0103)	(0.0136)	(0.0167)	(0.00903)	(0.0114)	(0.0143)
Growth	1.08e-05	-0.00126	-0.00125	-0.000925	0.000225	-0.000700
	(0.000735)	(0.00142)	(0.00174)	(0.000784)	(0.000768)	(0.00111)
Tax related determinants						
ND_Tax	-0.124*	-0.0812**	-0.205***	-0.0287**	-0.0949***	-0.124***
	(0.0737)	(0.0380)	(0.0736)	(0.0311)	(0.0315)	(0.0394)
Tax_Rate	-0.104***	0.0746*	-0.0293	0.0232*	0.0222*	0.00107**
	(0.0393)	(0.0411)	(0.0491)	(0.0194)	(0.0204)	(0.0215)
Industry determinants						
Industry_Prof	0.0107	-1.66e-06	0.0107	-0.0428	0.0428	-1.22e-05
	(0.0896)	(0.125)	(0.137)	(0.0839)	(0.132)	(0.147)
Industry_Growth	-0.00464	-0.00671*	-0.0114	0.00544	0.0422*	0.0477*
	(0.0116)	(0.0120)	(0.0145)	(0.0144)	(0.0216)	(0.0245)
Macroeconomic determinants						
Inflation	0.0264**	0.126*	0.152	0.176***	0.0167	0.193**
	(0.0786)	(0.0857)	(0.0959)	(0.0611)	(0.108)	(0.114)
GDP	0.229*	-0.00617	0.223	0.121***	0.0631	-0.0580
	(0.127)	(0.0683)	(0.138)	(0.0392)	(0.0545)	(0.0569)
Constant	0.138***	0.0229*	0.161***	0.0653***	0.0432***	0.109***
	(0.0144)	(0.0177)	(0.0200)	(0.0109)	(0.0128)	(0.0150)
Observations	48,720	48,720	48,720	60,900	60,900	60,900
R-squared	0.010	0.023	0.026	0.020	0.166	0.095
Number of Firms	12,180	12,180	12,180	12,180	12,180	12,180

Significance levels at 1%, 5%, and 10% are denoted as ***,**,*, respectively. Standard errors are reported in parentheses

6.0 Conclusion

The aim of this study was to examine the determinants of capital structure within EU organizations. Specifically, we examined the influence that firm-specific, industry-associated, tax-related, and macroeconomic determinants had on the financing decisions made by organizations. The sample consisted of 12,180 privately owned businesses that were in operation between 2011 and 2019. We also divided the data into two groups: euro area members and non-members of the euro. Through the use of panel data, we were able to employ both random- and fixed-effects regression models. This ensured that the results were reliable and efficient and provided us with a holistic view of the capital structure decisions that firms made while also making it possible to consider the structural differences that could be observed between different groups. We identified the variables that have an impact on organizations' financing choices and considered our main findings within the context of two prominent capital structure theories: The trade-off theory and the pecking-order theory.

In terms of the firm-specific determinants of capital structure, we studied the impact of size, profitability, tangibility, and growth opportunities. The size of the organization was found to be positively correlated with its leverage. This can be attributed to the fact that larger enterprises are typically more diverse and less risky propositions than their smaller counterparts; as such, they can secure higher levels of debt through external finance mechanisms. In addition, in a comparable manner to prior empirical studies, we determined that there was a positive correlation between an organization's tangibility and its leverage. These findings highlight how the amount of tangible assets a firm holds serves to increase its debt capacity and, as a result, an organization's asset structure has a fundamental influence on its ability to secure external funding. Our findings also reveal that there is a significant negative relationship between an organization's profitability and leverage. Specifically, the most profitable a firm is, the more likely it is to use internal funding sources as these are more cost-effective than securing funds externally. However, there was no solid evidence to support the hypothesis that an organization's growth opportunities have an influence on the amount of leverage.

In terms of the tax-related determinants of capital structure, we found evidence to support the notion that there is a significant negative relationship between the quantity of non-debt tax shields that an organization has access to and its leverage. This indicates that any non-debt related tax advantages can act in a similar fashion as a tax shield. Specifically, organizations that have a large amount of amortization and depreciation expenses will be less likely to be motivated by the tax advantages that are associated with debt as these are, to some degree, exchanged for non-debt tax shields. However, there was a statistically significant

correlation between the corporate income tax rate and the long-term and total leverage of an organization. These findings are aligned with the trade-off theory, which hypothesizes that there is a positive correlation between corporate tax payments and leverage because some aspects of the tax code make it possible for interest payments to be subtracted from the overall tax bill.

In terms of the industry-related capital structure determinants, in our sample of EU companies, there was no compelling evidence to support the notion that industry-specific determinants, such as growth and industry profitability, have a significant influence on the capital structure of the firm. As can be observed in the estimated coefficients for the macroeconomic determinants detailed in Table 4, there is a positive correlation between inflation and short- and long-term leverage. As such, an organization is likely to have more debt as inflation increases. This finding is aligned with the trade-off theory, which asserts that, in light of the tax-deductibility of nominal interest payments, an inflation-induced rise in nominal interest rates enhances the tax advantages associated with debt financing. However, the outcomes of this study did not find any positive correlation between GDP growth variations and the extent of leverage.

As a result of the comparison analysis between euro area members and non-members presented in this study, we can conclude that euro area membership can act as a significant determinant of an organization's financing options. The data reveals that organizations that are located in the euro area tend to incorporate higher levels of debt in their capital structure than their non-euro counterparts, even after we have controlled for the alternative variables that can influence indebtedness.

We also assessed the extent to which there were variations in the determinants of organizational capital structure between non-euro and euro firms. A broad shift was detected in the financing behavior of firms. Specifically, firms exhibited a move from raising funds via borrowed capital (external funding) to the use of internal funds and equity capital. This shift could be attributed to firm-level reactions to the debt overhangs that were amassed in the lead up to the global financial and European debt crises, which are reflective of the higher amount of leverage secured by organizations in the euro area. The broad shift toward a combined higher share of internal and equity financing entails that the firms involved are less exposed to the financial constraints associated with individual sources of financing, especially debt. The establishment of a European Central Bank in addition to monetary unification further contributed to this process. The European Central Bank plays a role in the establishment and implementation of monetary policy through the transmission channels to continually assess and evaluate modifications in financing practices and the way in which non-financial corporations are financially structured.

Table 8	Pecking order	Trade-off	European Union	Euro Membership
Firm-specific determinants				
Size	–	+	+	–
profitability	–	+	–	–
Tangibility	–	+	+	–
Growth	+	–	–	–
Tax-related determinants				
Non-debt tax shields	?	–	–	–
Income tax	?	+	+	–
Industry specific determinants				
Industry profitability	?	–	?	–
Industry Growth	?	?	?	+
Macroeconomic determinants				
Inflation	?	+	+	+
GDP	+	–	*?*	+

This table displays theoretical predictions derived from trade-off and pecking order theory with respect to capital structure determinants and compares them with the empirical results. The sign "+" indicates positive relationship with leverage and the sign "-" indicates negative relationship.

6.1 Pecking order or static trade-off?

Which of the two most important corporate finance theories of capital structure may provide more reliable explanation for the outcomes of this study? Whereby the hypothesis that underpins the pecking order theory is based on the issues that are associated with asymmetric information, the trade-off theory is concerned with the relative benefits and costs that can be derived from various sources of finance. Table 8 presents a comparison of the two theories with the outcomes of the current study, providing us with insights into the theory more effectively describes the financing choices that can be observed by non-financial firms operating in the EU area. While, the pecking order theory more effectively predicts firm behavior with regards to profitability as it correctly highlights the negative correlation between profit and leverage ratios. The trade-off theory correctly predicts the correlations between firms' leverage and their respective size, tangibility, growth, and tax-related determinants, along with the macroeconomic behavior associated with inflation. The empirical outcomes of this research indicate that, at a high level, trade-off theory is more reliable at anticipating the actions of organizations in the EU with regards to the determinants of capital structure.

We now turn our attention to considering which theory better describes the financing actions of companies that are euro members and share single monetary policy. Here, the results indicate that, with the exception of growth (which is better explained by the trade-off theory) the pecking-order theory more effectively explains business finance decisions in this context than the trade-off theory with regards to firm-specific determinants. In terms of the tax-related determinants that were of interest in this study, trade-off theory correctly anticipates the impact the non-debt tax shield has on the leverage of euro-member firms. In terms of the macroeconomic development that can be observed in the euro area, although the trade-off theory accurately anticipates the greater positive influence of inflation on the leverage of a firm in the euro area, the pecking-order theory more accurately explains euro area organization's ability to better access the benefits associated with economic growth by enhancing leverage.

To summarize, neither of the two notable capital structure theories can accurately explain organizations' financing actions. However, the trade-off theory more effectively explains the financing decisions of EU firms, while the pecking-order theory relevance substantially increase in explaining the impact of euro membership on firms financing decisions. As such, it could be the case that, as economies become more assimilated, especially in terms of their economic and monetary policies, the relevance of the pecking-order theory will increase while the relevance of the trade-off theory will reduce. However, this remains an area that requires further investigation.

6.2 Limitation and future research

This study was hindered by several limitations. First, the data was based on book leverage as opposed to market leverage. This was since the market leverage data available only for publicly listed enterprises. However, according to (Mcclure et al., 1999), “financial theory clearly supports the use of market values for management decisions” (p. 148-149).

In addition, the analysis was limited to the period following the adoption of the euro because the data available in ORBIS is limited to the last ten years, and the majority of organizations signed up to the euro prior to 2010. As such, in this study, it wasn’t possible to assess the impact euro membership had on the determinants of the capital structure before and after the adoption of the euro. Future studies could focus on a dataset that spans both the pre- and post-adoption periods to evaluate any variations that can be observed across the two.

Future studies could take multiple directions. First, the research could take into consideration additional variables that influence capital structure decisions; for example, business age, agency cost, bankruptcy cost, level of innovation, dividend payout, etc.

Finally, this research was primarily limited to the traditional capital structure theories; specifically, trade-off theory and pecking-order theory. It would be of significant benefit to study the more contemporary theories of capital structure as a means of adding further value to the discourse associated with capital structure decisions.

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Appendices

Appendix 0

Code	Industry Title
11	Agriculture, Forestry, Fishing and Hunting
21	Mining
22	Utilities
23	Construction
31-33	Manufacturing
42	Wholesale Trade
44-45	Retail Trade
48-49	Transportation and Warehousing
51	Information
53	Real Estate Rental and Leasing
54	Professional, Scientific, and Technical Services
55	Management of Companies and Enterprises
56	Administrative and Support and Waste Management and Remediation Services
61	Educational Services
62	Health Care and Social Assistance
71	Arts, Entertainment, and Recreation
72	Accommodation and Food Services
This table is retrieved from https://www.naics.com/six-digit-naics/	

Appendix 2

NAICS	Freq.	Percent	Cum.
11	2,304	2.10	2.10
21	972	0.89	2.99
22	2,673	2.44	5.43
23	6,255	5.71	11.13
31.33	44,352	40.46	51.59
42	20,421	18.63	70.22
44.45	4,203	3.83	74.06
48.49	6,165	5.62	79.68
51	2,466	2.25	81.93
53	2,511	2.29	84.22
54	6,624	6.04	90.26
55	2,250	2.05	92.32
56	3,168	2.89	95.21
61	765	0.70	95.90
62	1,674	1.53	97.43
71	1,116	1.02	98.45
72	1,701	1.55	100.00
Total	109,620	100.00	

Variable	Obs	Mean	Std. Dev.	Min	Max
Firms	109,620	6092.958	3516.803	1	12183
Industry	109,620	6.670854	3.185411	1	17
Country	109,620	12.41149	7.035478	1	27

Appendix 3

Country ISO code	Freq.	Percent	Cum.
AT	369	0.34	0.34
BE	13,131	11.98	12.32
BG	11,106	10.13	22.45
CY	9	0.01	22.45
CZ	846	0.77	23.23
DE	4,473	4.08	27.31
DK	576	0.53	27.83
EE	450	0.41	28.24
ES	5,247	4.79	33.03
FI	6,984	6.37	39.40
FR	5,157	4.70	44.11
GR	1,530	1.40	45.50
HR	702	0.64	46.14
HU	27	0.02	46.17
IE	288	0.26	46.43
IT	44,901	40.96	87.39
LT	90	0.08	87.47
LU	126	0.11	87.59
LV	189	0.17	87.76
MT	27	0.02	87.78
NL	468	0.43	88.21
PL	477	0.44	88.65
PT	1,017	0.93	89.57
RO	9	0.01	89.58
SE	11,349	10.35	99.93
SI	54	0.05	99.98
SK	18	0.02	100.00
Total	109,620	100.00	

Belgium	(BE)	Greece	(EL)	Lithuania	(LT)	Portugal	(PT)
Bulgaria	(BG)	Spain	(ES)	Luxembourg	(LU)	Romania	(RO)
Czechia	(CZ)	France	(FR)	Hungary	(HU)	Slovenia	(SI)
Denmark	(DK)	Croatia	(HR)	Malta	(MT)	Slovakia	(SK)
Germany	(DE)	Italy	(IT)	Netherlands	(NL)	Finland	(FI)
Estonia	(EE)	Cyprus	(CY)	Austria	(AT)	Sweden	(SE)
Ireland	(IE)	Latvia	(LV)	Poland	(PL)		

Appendix 4 Correlation Matrix

	Size	Profat~y	Tangib~y	Growth	ND_Tax	Tax_Rate	Indus~f1	Indus~h1	Inflat~n	GDP
Size	1.0000									
Profatibil~y	0.0734	1.0000								
Tangibility	-0.1230	-0.0110	1.0000							
Growth	0.0506	-0.0031	-0.0221	1.0000						
ND_Tax	-0.0206	-0.0418	0.3926	-0.0189	1.0000					
Tax_Rate	0.1291	-0.0247	-0.2318	-0.0104	-0.0751	1.0000				
Industry_P~1	0.0621	0.0362	-0.0945	0.0016	0.0519	0.0373	1.0000			
Industry_G~1	-0.0221	0.0007	-0.0477	0.0872	-0.0310	0.0346	0.0187	1.0000		
Inflation	0.0237	-0.0134	-0.0103	0.0225	0.0192	0.1142	-0.0846	0.3544	1.0000	
GDP	0.0612	0.0268	0.1035	0.0341	0.0435	-0.3994	0.1139	0.2141	-0.2677	1.0000

Appendix 3 Presents the correlation matrix for the explanatory variables.

Appendix 5 Variance Inflation Factor

Variable	VIF	1/VIF
GDP	1.52	0.657053
Inflation	1.35	0.738436
Industry_G~1	1.35	0.740638
Tax_Rate	1.30	0.766615
Tangibility	1.28	0.783006
ND_Tax	1.20	0.833664
Size	1.06	0.939071
Industry_P~1	1.05	0.956171
Growth	1.01	0.988691
Profatibil~y	1.01	0.990065
Mean VIF	1.21	

Appendix 6

```
                        b = consistent under Ho and Ha; obtained from xtreg
         B = inconsistent under Ha, efficient under Ho; obtained from xtreg

  Test:  Ho:  difference in coefficients not systematic

               chi2(18) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                        =      263.06
              Prob>chi2 =      0.0000
              (V_b-V_B is not positive definite)
```

*Dependent variable: Total Leverage

```
                        b = consistent under Ho and Ha; obtained from xtreg
         B = inconsistent under Ha, efficient under Ho; obtained from xtreg

  Test:  Ho:  difference in coefficients not systematic

               chi2(18) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                        =      268.81
              Prob>chi2 =      0.0000
              (V_b-V_B is not positive definite)
```

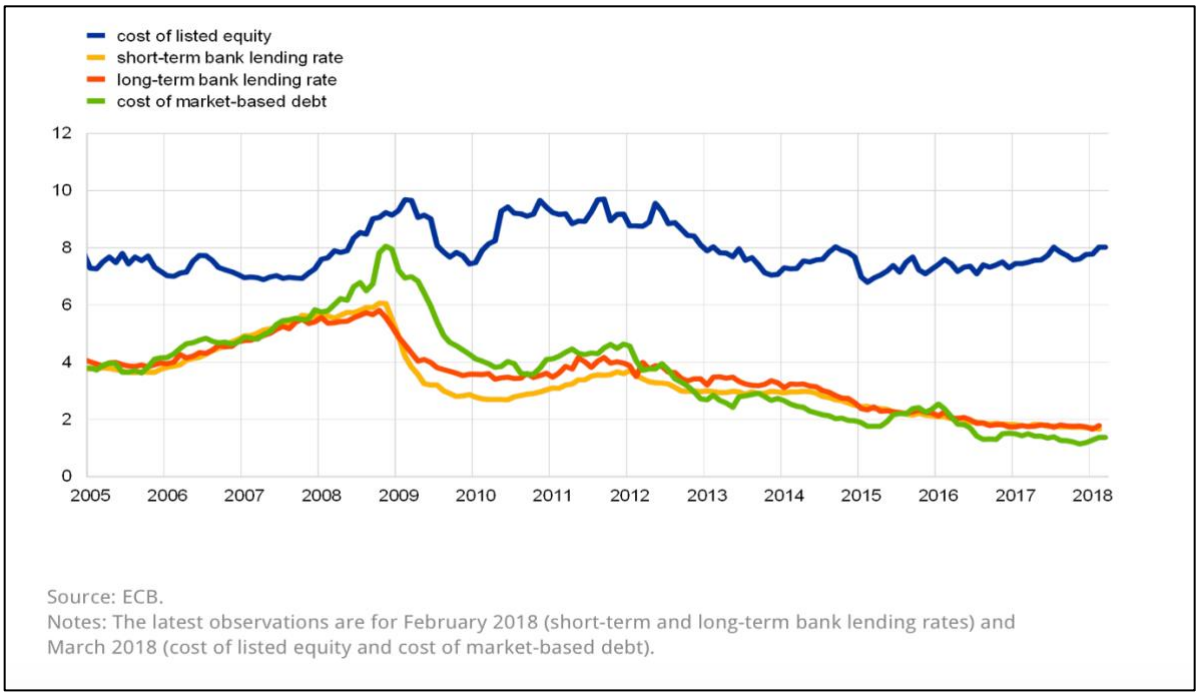
*Dependent variable: Short-term Leverage

```
                        b = consistent under Ho and Ha; obtained from xtreg
         B = inconsistent under Ha, efficient under Ho; obtained from xtreg

  Test:  Ho:  difference in coefficients not systematic

               chi2(18) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                        =      185.54
              Prob>chi2 =      0.0000
              (V_b-V_B is not positive definite)
```

*Dependent variable: Long-term Leverage

Appendix 7

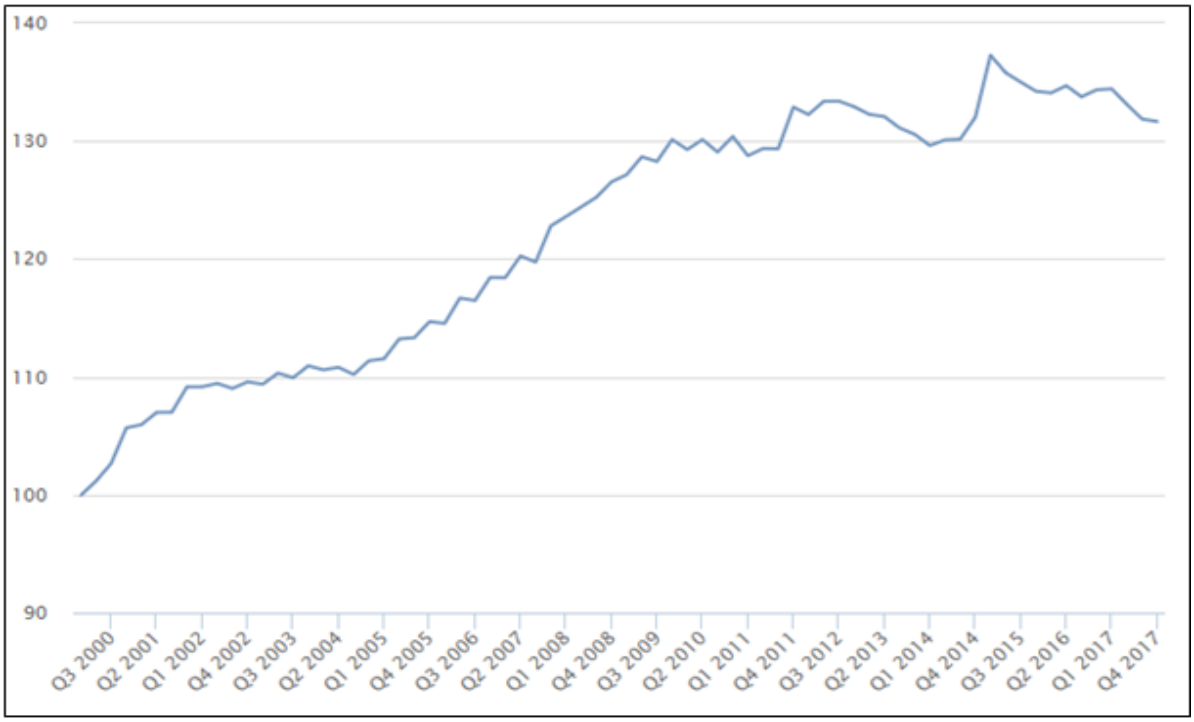
Nominal external financing costs of euro area firms (percentages)



Source: ECB.
Notes: The latest observations are for February 2018 (short-term and long-term bank lending rates) and March 2018 (cost of listed equity and cost of market-based debt).

Appendix 8

Corporate debt ratio, measured as a percentage of GDP



Source: (Euro area statistics, 2018)