CAPITAL STRUCTURE IN EUROPE: DETERMINANTS, MARKET TIMING AND SPEED OF ADJUSTMENT

Thesis submitted for the degree of

Doctor of Philosophy

at the University of Leicester

by

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University of Leicester

2014

Abstract

In broad terms, the aim of this thesis is to investigate the determinants of capital structure in European-listed firms. More specifically, it examines the existence of market timing effects in European firms and the speed of adjustment towards optimal capital structure as well as its determinants. Over the last two decades, Europe has undergone an intriguing experience involving changes in the political geography, financial liberalization, financial integration, a financial crisis and, most recently, financial reform. These exogenous shocks have taken their toll on European capital markets and banking sectors. In particular, the recent financial crisis has unveiled a number of inefficiencies in the incomplete financial integration process in terms of weak governance and ineffective regulations. The crisis period witnessed an increase in the following: the probability of bankruptcy; the number of banks and firms failing; illiquidity; and a significant loss in firms' values. This in turn affected the flow of funds into firms either from bank lending channels or from capital markets. Indeed, such financial turmoil calls for further investigation into the determinants of firms' capital structure in the European markets.

This thesis contributes to the literature in two ways. First, this is the first study that empirically tests the market timing theory in 15 European countries. Second, it adds to the scant literature on comparative studies that examine the target capital speed of adjustment and its determinants. The thesis employs various econometric models to analyse the unbalanced panel data collected from 15 European countries. The generalized method of moments (GMM) estimator (among other panel data techniques) is deemed appropriate to estimate the models. It is designed to accommodate the unbalanced panels, multiple endogeneity and the autoregressive properties in the dependent variable.

The new evidence provided by the findings of this study will be of great interest to the literature and policy-makers. The results confirm the effect of market valuation. However, it is negative in Europe, rather than positive as theory suggests. The results provide evidence that partially supports both pecking order and trade-off theories. For European firms, the annual speed of adjustment towards target capital is, on average, one quarter for book leverage and one half for market leverage. Firms in the Netherlands and Finland are the fastest to adjust their capital while firms in France and Spain are the slowest. The driving forces of the adjustment speed reveal that firms adjust more rapidly in wealthier and healthier environments such as those which involve a stable economy, a concentrated banking system and a promising future.

Key words: Capital structure determinants, market timing, speed of adjustment, Europe

Acknowledgements

I would like to express my deep gratitude to my supervisors Professor Meryem Duygun and Dr Mohamed Shaban for their patient guidance, enthusiastic encouragement and invaluable critiques.

I greatly appreciate Professor Peter Jackson for his inspiring advices. I would also like to thank the external examiner Professor Adyin Ozkan, whose constructive comments have contributed to the improvement of this thesis.

I would like to appreciate the suggestions I received from Professor Ansheng Dong, Professor Emmanuel Haven, Dr Alexandra Dias, Dr Christopher Schinckus, Dr Abbi Kedir and Professor Joachim Grammig. I would also like to express my appreciation to Dr Jesse Matheson and Dr Sandra Nolte for their support.

I am very grateful to Dr Dimitris Papadopoulos and Dr Sarah Robinson for their continuous support and advice. Special thanks to Teresa, Sharon and Michael for their kind and prompt help.

I was very fortunate to have my best friends Naifang, Elmar, Jessica, Robert, Alex, Andreas, Charles, Sarah, Gill, Roberto, Angela, Emili and Adrian for their endurance, encouragement and entertainment.

This thesis is dedicated to my parents, to whom I am indebted for their support and care.

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List of abbreviations

ACE	Allowance for Corporate Equity
ADL	Autoregressive Distributed Lag Model
AIC	Akaike's Information Criterion
ANOVA	Analysis of Variance
AR	Autoregressive (disturbance)
BIC	Bayesian Information Criterion
BPS	Basis Points (TED spread)
CBIT	Comprehensive Business Income Tax
CEE	Central and Eastern European Courtiers
CIR	Crédit d'Impôt Recherche (research tax credit in France)
EBTI	Earnings before Tax and Interest
EBTIDA	Earnings before Tax, Interest, Depreciation and Amortisation
EEC	European Economic Community
EMU	Economic and Monetary Union
ETR	Effective Tax Rate
EU	European Union
FE	Fixed Effects
FGLS	Feasible Generalised Least Square
FSA	Financial Service Act
GAAP	Generally Accepted Accounting Principles
GDP	Gross Domestic Product
GLS	Generalised Least Square
GMM	Generalised Methods of Moment
IID	Identically and Independently Distributed
IPO	Initial Public Offering
ISIN	International Securities Identification Number
IV	Instrumental Variable
KDE	Kernel Density Estimation
LIBOR	London Interbank Offered Rate
MM	Modigliani and Miller (theory)

OLS	Ordinary Least Square
POLS	Pooled Ordinary Least Square
PP&E	Property, Plant and Equipment
R&D	Research and Development
RE	Random Effects
SE	Standard Errors
SEO	Seasoned Equity Offering
SIB	Securities and Investments Board
SIC	Schwarz Information Criterion
SME	Small and Medium Sized Enterprises
SOA	Speed of Adjustment
SUR	Seemingly Unrelated Regression Technique
TSLS	Two Stage Least Square
UK	United Kingdom
US	United States

CHAPTER 1: INTRODUCTION

The decision about capital structure is one of the key judgements that a firm's management has to make. Its importance stems from the effect it has on profitability, liquidity, financial risk and value. Thus, shareholders and potential external investors or lenders are all equally concerned with a firm's capital structure. For a long time, the capital structure decision was thought to be only affected by a firm's internal factors. However, new trends in the academic literature have provided evidence to show that external factors may also have a significant influence on the decision. There is no doubt that studying the determinants of the capital structure decision is of great importance to managers, owners, lenders and policy-makers.

In reality, firms have been practically engaged in capital structure decisions for hundreds of years. Nonetheless, one can argue that the literature on the theory of capital structure is in its infancy compared to other strands of literature in economic theories (Damodaran, 2005). To this day, Modigliani and Miller's (1958) seminal work represents the birth of a long and heated debate on capital structure decisions. Their proposition that the decision is irrelevant to a firm's value in a perfect market with no taxation of corporate income was perceived as being unrealistic by many subsequent studies which claimed that relaxing the underlying assumptions of the theory would deem MM's argument redundant. Therefore, corporate tax and market imperfection are two realities that firms and decision-makers have to bear. Less than a decade later, the very same scholars introduced new and modified propositions from their theory. Modigliani and Miller (1963) introduced a relaxed model in which they took account of the impact of taxation; that is, the capital structure decision is relevant in the presence of corporate tax. In 1966, they suggested that firms could trade-off between the benefits of debt tax shields and the costs of financial distress; a firm can continue borrowing to a certain level when the marginal cost of borrowing is higher than the marginal benefits of tax deduction. This theory is commonly known as the 'trade-off theory' and it emphasizes that excessive leverage limits firms' flexibility in financing and thus increases the probability of bankruptcy.

Jensen and Meckling (1976) proposed the ‘agency theory’ which portrays the relationship between owners (principals) and managers (agents) in an environment where there is a separation between ownership and management. Since managers will have access to information more than owners, they could utilise this information to maximise their own benefits rather than shareholders’ wealth. Jensen and Meckling (1976) clarify that the agency problem also exists between shareholders and bondholders or lenders. The owners may utilise the borrowed funds in riskier projects after they have obtained them from the lenders. By doing so, they will negatively affect the debt value and literally transfer the value from bondholders to shareholders.

The key concept of information asymmetry in Jensen and Meckling’s (1976) research has inspired Ross (1977) to develop the signalling theory. He argues that managerial incentives are the intuitive nature of the signalling theory that affects the process of a firm’s financial decision-making. Ross defines ‘signal’ as the part of the information that insiders deliver to the public from all the other pieces of private information they possess. As managers deliberately provide information in an incomplete form, including positive and negative data, so the receivers (outsider) cannot reap all the same benefits as managers.

Myers and Majluf (1984) and Myers (1984) discuss the effect of asymmetry between owners and managers, resulting in the origination of the ‘pecking order theory’. They elaborate that managers make the capital structure decision based on a ranking of the alternative sources of finance. They will firstly raise funds from the retained earnings, then from debt financing, with the issuance of new equity only chosen as a last resort. This noteworthy hierarchy of financing choices is based on information asymmetry with regard to a firm’s genuine value and growth opportunities. In his proposition, Myers (1984) rejects the idea of the target capital structure proposed by Modigliani and Miller (1966).

Baker and Wurgler (2002) proposed the ‘market timing theory’, inferring that the power of the market could significantly impact firms’ capital structure. The rationale of the market timing theory is fundamentally different and complex compared to the previously mentioned theories. This theory neither assumes an optimal capital structure as in the trade-off theory, nor is it based on the assumption of a semi-efficient market as in the pecking order theory. The market timing theory suggests that firms should issue equity when the market valuation is high and refrain from doing so when a firm's market value is low.

1.1 Motivation

The previous discussion provides a brief review of the evolution of capital structure theories, and highlights the importance of studying capital structure decisions. The aforementioned theories have stimulated the growth of empirical literature on the determinants of capital structure. A significant portion of these studies focused on the developed markets and, in particular, the United States (US). Studies on Europe and other emerging economies are still rare, when compared to the number of US-based studies. The literature also seems to focus on earlier theories of capital structure. Hence, the market timing theory is considered as a relatively new addition to the literature. Thus, only a handful of studies have examined this theory, although with different approaches. The existing significant gap in the literature suggests a need for more studies to be conducted in both developed and emerging markets in order to test the market timing proposition. The need for more empirical evidence is amplified due to the rapid changes in the dynamics of financial markets globally. Moreover, the importance of such studies is indeed augmented in countries experiencing frequent and or significant changes in their economic, political, institutional, legal, financial and business environments. Nonetheless, few studies have provided empirical evidence using cross-country data in Europe; the research is mainly dominated by single country cases (e.g., Noulas and Genimakis, 2011; Miguel and Pindado, 2001) or comparisons between two countries at most (e.g., Panno, 2003; Daskalakis and Psillaki, 2007). There is rare survey evidence (Bancel and Mittoo, 2004; Brounen et al., 2006) and the focus of these studies was limited to the situation before the financial crisis. In searching for the driving forces of speed of capital structure adjustment, only Drobetz and Wanzernried (2006) - who focus on Swiss firms - can be seen as "European evidence". Therefore, theoretically, there is a need in investigating the market timing theory, the determinants of capital structure and the driving forces of speed of its adjustment in Europe.

European countries provide a unique, experimental and fertile ground for more studies to emerge on capital structure decisions. Over the last two decades, Europe has aimed to achieve financial integration among the European Union (EU) states through a bundle of policies that include financial liberalization, currency unification, synchronization of monetary policies and integration of business and financial legislation. Financial integration has long been believed to have a positive impact on the pace of financial development which in turn has a positive impact on economic growth. Financial development is also associated with a more efficient allocation of resources so it can reduce the cost of capital for investment projects. Europe has endeavoured to achieve stable markets by establishing a single financial market, extensive regulatory reform along with a substantial liberalization effort to ensure greater transparency, accountability, fairness and responsibility. However, a full integration of the financial and banking sectors in Europe is yet to be achieved. To this day, the shadow of the recent financial crisis remains a concern for policy-makers, businesses and financiers. The crisis provides up-to-date evidence to policy-makers that there is more to be done to reform the financial sectors, including the banking industry, in order to achieve financial stability. The crisis also raised many questions regarding the integration policies that were in place, as well as their effectiveness. These factors provide an interesting foundation for empirical research to be conducted, especially in the area of capital structure decisions. It is, indeed, important to understand the effect of capital markets on capital structure decisions (i.e., market timing theory). Moreover, understanding the effect of regulations, institutions and economic factors on such decisions is key, as well as how these factors may affect the speed of adjustment by which firms move their capital structure towards the optimal.

Due to the financial liberalization measures taken in the 1980s, the European financial markets transformed from being bank-oriented economies to being more market-oriented economies. European economies introduced market-oriented reforms and shifted away from government intervention through credit allocation. The banking systems were deregulated, interest rates were reduced, the compulsory reserve requirements and associated entry barriers were lowered, and the political support for credit allocation was weakened, while many financial intermediaries were privatized. These policies initiated the shift towards the free trade market in Europe along expansionary financial and capital markets. The development of the equity market facilitates privatization, strengthens a firm's balance sheet, enhances market discipline and provides financing for infrastructure and firms.

1.2 Objectives and research questions

In general, this thesis aims to deliver an understanding of a firm's ability to respond to the changes in the financial markets through its capital structure decisions. The thesis will scrutinize the capital structure decisions of a sample from 15 EU countries during a period of macroeconomic fluctuations in order to reveal the explanatory power of firm-specific and business environment factors on the speed of adjustment of capital structure. The thesis will investigate the determinants of capital structure in Europe from three different perspectives. First, it will examine the presence of the market timing theory in the capital structure decisions in Europe. Second, it will investigate the determinants of the speed of adjustment in these countries given the dynamic changes in their capital markets due to financial integration. Third, it will test whether business environment factors influence the speed of adjustment.

Based on the above discussion, the research questions can be summarised as follows:

1. Has market timing had an impact on the capital structure decisions in Europe? Does the influence of past market valuations persist when various control variables are included?
2. What are the determinants of the capital structure decisions in European firms and which traditional theory explains best?
3. What are the driving forces behind the speed of adjustment in capital structure in light of both macroeconomic conditions (business environment) and firm-specific factors?

1.3 The choice of methodology

This thesis uses data from 15 EU countries between 2000 and 2012. There are various approaches adopted by the literature: ordinary least squares (OLS) for cross-sectional data, and fixed effect (FE) and random effect models (RE) for panel data. The recent literature on the speed of adjustment emphasizes the use of dynamic panel techniques such as generalized method of moments (GMM) for its robust results compared to other approaches. The GMM of Arellano and Bond (1991) provides feasible and efficient estimators for dynamic models where the past decisions of capital structure affect the current one. It also considers the presence of endogeneity and unobserved heterogeneity in the model. This thesis follows the literature and utilises several approaches that are deemed appropriate to answer each research question. OLS is used to investigate the market timing theory following Baker and Wurgler (2002). The dynamic panel data technique, namely GMM, is used to estimate the speed of adjustment models and the determinants of capital structure.

1.4 Contribution

The contribution of this thesis is threefold. First, this thesis addresses the theoretical awareness in Europe in terms of market timing theory. There is no pooled study that investigates market timing theory in Europe. Any such studies seem to focus on the experience in a single country, or two countries at most. This study aims to fill this gap in the literature. Second, this thesis takes value from the novel capital structure theories (i.e., trade-off theory and pecking-order theory) but provides fresh insight into the differences among the 15 European countries. Thus, an up-to-date evaluation associated with the determinants of capital structure is obtained. Finally, this thesis presents the first evidence on the driving forces of capital structure speed of adjustment in Europe. It utilises cross-country data and identifies the impact on the speed of adjustment of both firm- and country-specific factors. The implication of this analysis serves the base, both theoretically and empirically, on how European firms may reduce the cost, thereby maximising their firm value.

1.5 Thesis organisation

This thesis bridges the gap in the empirical literature by analysing the applicability of the market timing theory in 15 EU countries, and it is organised into seven chapters. Chapter two reviews previous studies, and chapter three introduces the methodologies used to obtain the empirical results. The analysis of these results is presented in chapters four, five and six; each of these empirical chapters is independent in the sense that they each have their own data, methodology and results. Finally, chapter seven concludes the empirical findings.

Chapter two presents the most important capital structure theories and lays a basis for the distinctions and overlaps among conventional theories. It begins with the mainstream capital structure theories, and then provides details of the least-developed theory - the market timing approach - from a different perspective. There is divergence from the trade-off and pecking-order theories, leading to an analysis of the current discussions. The subsequent sections provide information with regard to the extent and scope to which the empirical evidence covers these issues.

Chapter three reviews all the methodologies applied in previous work and illustrates the reasons for selecting the models used in this thesis. As there are three standalone research questions, each requires the adoption of appropriate methods to answer. To answer research question 1, Ordinary Least Square (OLS) is applied, as suggested by Baker and Wurlger (2002) for a comparison study. Generalised Methods of Moments (GMM) is applied to answer both questions 2 and 3. This enables me to estimate a dynamic panel data model and to address the issues of endogeneity and unobserved heterogeneity that might arise in my model. This chapter also introduces the data sources and samples, a variable selection through three different dimensions – firm, industry and country levels, respectively.

In search of the market timing effect on European firms, chapter four investigates, drawing heavily from Baker and Wurgler (2002), and conducts three tests. The first test analyses the determinants of the annual change of capital structure regarding a firm's IPO age. The second test captures the cumulative examples of the historical attempts of market valuation. The third test will investigate the same issue but by controlling for alternative explanatory variables drawn from Fama and French (2000). A robustness test was conducted to prove the explanatory power of established weighted average market-to-book variables; these variables endeavour to capture the historical timing effect. The results drawn from these three tests confirm that there is an effect of market valuation; however, it is negative rather than positive, as the theory suggests in Europe.

It is more prone to support the pecking-order theory in terms of the financing policy preferences, and it is not opposed to the trade-off theory for the optimal capital structure assumption.

Since there is no market timing effect found in Europe, chapter five focuses on the determinants of capital structure across European countries. The findings are entirely consistent with the view that growth opportunities form a significant part of stock market values and that they play a major role in rational financial decisions. The results provide strong evidence in support of both the trade-off and pecking-order theories. The speed of adjustment for European firms is on average 26.3 per cent per year. Long-term debt adjusts at 37.9 per cent, while short-term debt adjusts twice as fast as that. This behaviour is likely to result from firms which are over-levered because, according to dynamic trade-off theory, over-levered firms have to adjust faster to reduce these costs. Deviating from the upper side is likely to be more costly than deviating from below the target, because bankruptcy costs and the agency costs of debt intensify more quickly as the firm deviates more above the target. The historical financing activities and market conditions have more persistent effects on their current capital structure. If the timing or adverse selection consideration produces benefits that overcome the costs of deviation, they may dominate firms' behaviour, and thus the timing theory or the pecking-order theory will appear as first-order priorities. All in all, this proves the explanatory powers of the independent variables that are suggested by the trade-off and market timing theories, while the pecking-order theory still takes the lead.

The results show a strong explanation by trade-off theory, which indicates the importance of the driving forces behind the adjustment speed of capital structure. Therefore, chapter six explores and presents the empirical results from both macroeconomic conditions and firm-specific factors. The first dynamic leverage model is estimated by controlling for fixed effects and applying a first-difference transformation. The second set of tests is subject to a two-step GMM estimation which controls the unobserved individual specific heterogeneity and partially retains variations among firms. The result reveals that information asymmetry plays a central role in the speed of adjustment in European firms. Firms tend to adjust faster when there are fewer growth opportunities, lower profitability and fewer tangible assets. This is in consensus with the higher costs of external finance. As expected, macroeconomic conditions are statistically relevant to the speed of adjustment. The results confirm that firms are able to adjust faster under favourable economic conditions, when the market is healthier and when the political and credit risks are lower.

The thesis concludes with final remarks in chapter seven. There is a summary of the empirical findings, followed by policy implications for segmented and incomplete European capital markets. Finally, the chapter summarises the limitations of the thesis and suggests new avenues for future research.

CHAPTER 2: THEORETICAL AND EMPIRICAL LITERATURE

2.1 Introduction

The subject of capital structure has gradually attracted greater interest in the relevant literature after the publication of Modigliani and Miller's (1958) seminal paper on capital structure irrelevance. Their study endured huge criticism because of the unrealistic assumptions. Miller and Modigliani's (1966) proposition provided a relaxed form of capital structure theory that assumes the irrelevance of the capital structure decision to a firm's value in the presence of corporate tax and market imperfection. In MM (1966), the effect of taxes and the costs of financial distress are included in what is now commonly known as the trade-off theory. They predict that firms amend their capital structure by striking a balance between tax deductibility and bankruptcy costs due to high financial leverage.

Jensen and Meckling (1976) propose a model that reflects the misalignment of the interests between shareholders, bondholders and managers of firms. The so-called 'agency theory' exists when there is a separation between two parties' ownership (principle) and management (agent). They suggest that the relationship between managers and owners should reflect the efficient information with regard to the firm and the costs of risk sharing. However, the independence of goals and risk preference between the two parties may result in bias in the financing behaviour and capital structure decisions. Such information asymmetries potentially increase the bankruptcy costs that firms could face and account for the differences in the preferences of stakeholders. Ross (1973) presents the principal problem in economic theory and, in 1977, he suggested the signalling theory. He describes the behaviour when two parties have unequal access to information, in particular if the capital market tends to evaluate firms' performance by examining certain signals. Due to the relatively higher cost of equity, Ross describes the issue of equity as bad signal and the issue of debt as good signal. Myers (1984) and Myers and Majluf (1984) introduce the 'pecking order theory' which suggests that unbalanced access to information may also lead to adverse selection by management. Specifically, instead of choosing the positive net present value projects that maximise the firm's value, they tend to choose projects that provide them with private gains. This hypothesis explains that the allocation of firms' capital structure follows a decision hierarchy in terms of favouring internal financing as a first choice, followed by debt and then external equity as a last resort. The pecking order theory is among the most representative theories of capital structure due to its strong explanatory power in a practical world.

Independent of previous research, Baker and Wurgler (2002) scrutinize the market timing theory by estimating the relationship between the past stock performance and firms' financial structure. This theory identifies a phenomenon where firms issue equity when market valuation is high and prefer debt when market valuation is low, aligned with the cost of equity. Such a proposition intends to explain the firms' capital structure from the influence of psychology on the behaviour of financial practitioners and the subsequent effects on the market.

The aim of this chapter is to review the theoretical and empirical studies in the literature regarding firms' capital structure. Despite the significant amount of studies on capital structure substantial investigation focusing on capital structure, there is not a theory that can summarize the firms' financing patterns alone and the literature fails to pick up the dominant hypothesis. Those research papers cover a wider range and various dimensions and they confirm that there is a list of factors determining a firm's capital structure simultaneously, but not mutually exclusively. Firms from European countries may be similar due to the macroeconomic heterogeneity although they may also differ significantly in the way in which they set their financing policies. This chapter also reviews the empirical literature which finds that some variables systematically affect capital structure. This thesis relates to these previous strands of literature but it principally focuses on the market timing theory as this is the area least examined by previous scholars.

The remainder of this chapter will be set out as follows. Section 2 outlines the theoretical base of the main capital structure theories. In section 3, the market timing theory is segmented for an analysis of its constituent elements. Section 4 reviews the arguments regarding interpretation of the market timing theory. This divergence from mainstream capital structure theories leads to a discussion in section 5 of the important distinction in the current research.

2.2 Capital structure mainstream theories

2.2.1 Modigliani and Miller theorem

Modigliani and Miller's (1958) theorem is considered by the literature to be the classic and seminal work on capital structure, inspiring many other studies. To this day, their academic contribution has triggered a progressive discussion on the relevance of capital structure in corporate finance. Based on the assumption that the capital markets are frictionless, an equal lending rate between investors and a corporation and identical capital structure among firms, Modigliani and Miller (1958) suggest two propositions. The first releases the discussion by claiming the value of a firm is independent of its capital structure. The value of a firm will remain constant regardless of the mixture of debt and equity in their capital structure under perfect and efficient capital market conditions (i.e. irrelevance). In the second proposition, taxes are included in Modigliani and Miller's (1963) justification. Modigliani and Miller (1958) highlight the key factors in the research regarding the determinants of capital structure: taxation, bankruptcy costs, transaction costs, asymmetric information, agency costs, and the equality of access to the market. These factors provide huge potential for developing the propositions, both theoretically and empirically.

2.2.2 Trade-off theory

According to the trade-off theory of Miller and Modigliani (1966), firms amend their capital structure by striking a balance between the tax deductibility and bankruptcy costs of leverage. This is one of the dominant theories in the corporate finance field as there is extensive evidence in favour of target capital structure. Part of the discussion concerns the balance between the marginal benefit of debt from tax and the increased likelihood of incurring costs from financial deficit. The trade-off theory can be explored in depth by dividing the assumption into two parts. The first refers to a static part which assumes that firms trade off the tax savings of debt and the cost of financial distress within a single time period. Respectively, the second part can be considered as a dynamic trade-off theory which assumes the target adjustment behaviour when firms gradually deviate away from the optimal level of leverage over time. The difference depends on whether the balance is between the costs of benefit is static or whether the firms move towards the assumed optimal capital structure.

The static trade-off theory is the original version of the traditional trade-off theory. This version is said to be static as it assumes a balancing point that offsets the positive and negative effects of using debt financing. Schwartz and Aronson (1967) interpret the strong industry effects in leverage ratios as evidence of optimal ratios. Scott (1977) confirms that the desirability of debt finance is from an advantage of tax deduction. MacKie-Mason (1990) clarifies the positive substantial tax effects on capital structure decisions while Warner (1977) reports the negative relation between bankruptcy costs and the optimal debt level. In response to the tax law change, Trezevant (1992) provides evidence of the negative association between tax loss carry forwards and debt financing. Consistent with prior work, De Miguel and Pindado (2001) find that, for Spanish non-financial firms, non-debt tax shields and the costs of financial distress are negatively related to firms' leverage ratios. Bradley *et al*. (1984) also provide both theoretical and empirical support for the static trade-off theory by documenting that debt ratio is negatively influenced by the costs of financial distress, agency costs and the amount of non-debt tax shields.

The dynamic trade-off theory corrects the possible practical problems which could arise in standard static trade-off models. This refers to an ignorance of the transaction costs and retained earnings in the analysis of capital structure. Fischer *et al*. (1989) argue that it is transaction costs that allow firms' financing policies to regularly drift. When the level of leverage increases until it is over the limit, a 'discrete rebalancing' is undertaken and the profitability of the firm will lead to decisions that involve paying down debt. If the level of leverage drops out of the balance, the firm recapitalizes. In the case where earnings become negative and debt levels go up, the increasing trends will continue until the boundary is reached.

Taggart (1977) and Marsh (1982) document the target adjustment model for US and UK firms respectively and discover that firms are inclined to adjust to the optimal target level of the capital structure. This is the dynamic version of the trade-off theory. Empirical evidence obtained from Qian *et al*. (2009) suggests that Chinese firms slowly move towards the equilibrium level of leverage but they tend to speed up when they are further away from the target capital structure. Antoniou *et al*. (2006) group G5 countries on the basis of their economic traditions and find support for trade-off predictions although with slightly different speeds of adjustment for these countries.

Myers (2001) argues that a value-maximising firm would try to attain the optimum to benefit at the margin when the tax-related encouragement of debt financing offsets its cost to bankruptcy. There are two main advantages in the use of debt analysed in the literature. The first advantage involves the tax deductibility of corporate interest payments when debt financing is applied. Miller (1977) proposes that the existence of personal taxes is also important because shareholders have the power to make financing decisions. However, DeAngelo and Masulis (1980) find that managers use equity instead of debt because non-debt tax shields can act as substitutes for the tax advantage of debt financing such as depreciation expenses according to accounting rules, depletion allowances authorised by law and investment tax credits granted by government. Therefore, the tax benefit of debt is not so significant. The second advantage is that the use of debt can mitigate the agency problem between managers and shareholders. Using debt in financing can prevent the corporate manager from wasting free cash flow in unprofitable investments (Jensen and Meckling, 1976). However, firms hesitate to use debt because of its downsides such as the increased risk of the deadweight costs of bankruptcy or the agency costs generated by the conflicts between shareholders and debtors.

2.2.3 Agency theory

To demonstrate the conflicts between outside stockholders, creditors and managerial insiders, Jensen and Meckling (1976) develop the ‘agency theory’ which lies at the heart of corporate governance literature (Rozeff, 1982; Easterbrook, 1984; Shleifer and Vishny, 1986; Crutchley and Hansen, 1989; Berger *et al*., 1997). According to Frank and Goyal (2009), it is concealed by the broad interpretation of the trade-off theory. It derives from the conflict of interest between the ‘principal’ and the ‘agents’. This relationship should reflect the efficient information of the firm and the costs of risk sharing. However, as they are independent of goals and risk preference, the financing behaviour and capital structure decisions vary.

Corporate managers have the authority to make financial decisions such as those involving capital structure, equity ownership and dividend policy. Therefore, it is an advantage for them to pursue their own interests without considering the consequences in terms of the firm's value. On the other hand, the common stockholders are inclined to move away from specific risks by holding well-diversified portfolios, while management are bearing the costs of managerial discretion and are therefore distracted from maximising the firm's value and the common stockholders' wealth (Crutchley and Hansen, 1989). The entrenched managers mitigate the conflicts by introducing debt financing. However, another agency conflict arises between stockholders and bondholders as debt financing increases. Having sacrificed the better investment opportunity, without proper compensation and contractual protection, the creditors are exposed to debt overhang (Myers, 1977), asset substitution (Fama and Miller, 1972; Jensen and Meckling, 1976; Jensen, 1986) and bankruptcy default.

The dilution of equity in most large corporations has separated ownership from control. This encourages management to conduct business with little supervision which gives them an incentive to act in their best interests; managers have an incentive to pursue opportunistic behaviour with the firm's cash. Examples of such behaviour include lofty salaries and expensive perks. They also have an incentive to encourage the firm to grow which might not be in the firm's best interest but may instead increase their own power, influence and prestige.

The contractual device that agency theories provide to deal with this management indiscretion is debt; promises on interest and principal payments on debt must be kept or else the firm will be rendered bankrupt and managers will eventually lose their jobs. It also serves as a control over managerial extravagance as it reduces the availability of cash. Jensen (1986) suggests that effective governance might encourage more leverage for companies facing free cash flow problems. Managers then focus on activities that can enable the retirement of debt. Debt financing thus unifies the interests of both shareholders and management through their respective need to survive.

The agency problem is also frequently discussed within the trade-off theory (Baker and Wurgler, 2002; Fama and French, 2002) as the target is to discipline managerial discretion and therefore arrive at the firm's optimal mixture of debt and equity financing. Debt finance can be used to ameliorate the agency problems between a firm's owner and its management. It can also create another kind of agency problem on its own. If a firm is debt financing, its stock owners have an incentive to pursue riskier projects because shareholders are interested in a return that is higher than that of the firm's bonds. Meanwhile, the firm's bondholders are only interested in the payments that are specified on the debt contract. Thus, stockholders are sometimes interested in pursuing riskier projects than bondholders would like. This behaviour is described as the asset substitution effect. It describes a situation where a firm trades its low-risk assets for high-risk investments. The result is an increased risk to the firm's bonds without any additional compensation. Bondholders might respond to this by charging higher interest for the firm's bonds or increasing their supervision and control of the firm's activities. Hence, one can see that debt has two opposing effects on the agency dilemma. From this perspective, therefore, debt has the potential to include a firm's value either positively or otherwise.

Crutchley and Hansen (1989) propose three main solutions to both equity and debt agency conflicts, referring to the adjustment of a firm's ownership structure, dividend policy and leverage level. By increasing managers' common stock ownership, Jensen and Meckling (1976) suggest that the alignment of interest between managers and stockholders encourages managers to act in the better interests of shareholders. However, the compensation cost increases as the managers' wealth becomes less diversified. Agency conflicts can also be reduced when managers take advantage of a dividend payout increase and see it as a good signal to issue more equity capital. The market participants are able to monitor firms' performance as the disclosure requirements and the supervision system are planted in the market. However, flotation costs are incurred when the securities are listed for paying the growing dividends. By lifting the level of debt financing, managers are more closely monitored by creditors and the conflicts between managers and stockholders are therefore reduced. However, debt financing has potential opposing effects on the agency dilemma. The risk of asset substitution, debt overhang and bankruptcy for creditors rises along with the inefficient utilisation of debt.

2.2.4 Signalling theory

The key concept of the information asymmetry of Jensen and Meckling (1976) is developed by Ross (1977) and the signalling theory emerges. Managerial incentives are the intuitive nature of the signalling theory that affects a firm's financing decision-making process. Connelly *et al*. (2011) review this theory and claim it has three primary elements: signaller, receiver and signal. They argue that signallers are the insiders, including managers or executives, who possess information about firms (Ross, 1977) and 'signal' refers to the part of the information – of all the private information they hold – that the insiders delivered to the public. This incomplete information, including both positive and negative aspects, may mislead the signal receiver and the outsiders receive a less beneficial action, particularly due to their partial conflicts of interest with the signallers so the signallers benefit at the cost of the receivers (Bird and Smith, 2005). For example, shareholders would benefit from a firm with profitable prospects but they bear the transaction costs and the signals can be ignored due to their observability (Connelly *et al*., 2011). The signals can also be false due to the signallers' own interests.

2.2.5 Pecking order theory

The pecking order theory originated from Myers (1984) and was developed on the basis of Jensen and Meckling's (1976) agency theory, Myers and Majluf's (1984) idea of information asymmetry and Ross's (1977) signalling theory. Considering the conflicts between market investors and managers, signalling theory is premised on how the equity market reacts to firms' public announcements. Ross (1977) formalises the signalling theory and claims that information is unequally owned by insiders, as managers, and outsiders, as investors and banks. Managers or insiders are better informed than outsiders and thus outsiders believe the choice of capital structure and dividend policy reveals a firm's performance to the market. Ryen *et al*. (1997) and

Koch and Shenoy (1999) argue that a dividend increase would be a good signal as outsiders may react positively; however, investors may react negatively to a bad signal such as the announcement of a reduction in dividend payments. Alternatively, outsiders may interpret the announcement of debt issuance as a good signal as it increases the market's perception of value. Outsiders may assume that this leverage increase reveals a firm's sound financial prospects with potential profits that managers are not willing to share.

The pecking order theory therefore assumes that firms follow a pecking order to obtain various sources of finance to maintain financial flexibility, to avoid negative signals, and also to reflect the costs of the respective preferences. The first preference is for retained earnings, then it moves to debt and finally to external equity. Therefore, it indicates the importance of agency, information asymmetry and the signalling consideration for firms with their different suppliers of capital. In contrast to the trade-off theory, there is no well-defined optimal capital structure in the pecking order theory; instead, there is a financial hierarchy. This stands out, firstly, because of the significant effect of information asymmetries, although Harris and Raviv (1991) hold an opposite view. Secondly, there is more of the time-series variance in actual debt ratio. Booth *et al*. (2001) and Yang *et al*. (2010) review the pecking order theory and believe that it generally explains firms' financing behaviour. Mazur (2007) supports the pecking order theory and proves the insignificance of effective tax rates or non-debt tax shields. Therefore, the trade-off model is not applicable to the listed companies in this case. De Jong *et al*. (2011) also support this theory. Noulas and Genimakis (2011) present a model which supports the pecking order theory with regard to growth and profitability, although in the context of size, the static trade-off theory is solely supported.

The traditional version of the pecking order theory claims that firms prefer internal financing to external financing and when external financing is necessary, they prefer debt to equity. Firms only turn to outside funds when the internal funds are insufficient. This is because of the existence of asymmetric information between the insider managers and the outsiders. Insider managers are better informed than other market participants so the adverse selection costs could lead to the dominance of debt financing (Myers and Majluf, 1984). The issuance of equity is overvalued by outside investors; therefore, the firms' share price will be marked down due to the costs of adverse selection. Conversely, if the firms are financing by leverage, their cost of capital increases along with the probability of bankruptcy. Shyam-Sunder and Myers (1999) provide evidence to strongly support the pecking order hypothesis of capital structure. They believe that financing hierarchy is a better explanation of the broad financing patterns. Frank and Goyal (2003) also confirm that the pecking order theory is a better descriptor of the behaviour of large firms as opposed to small ones. According to Halov and Heider's (2005) emphasis, large firms encounter the relatively lower costs of adverse selection more than smaller firms when considering the possibility of risky or mispriced debt. The issuance of equity is the last financing option when other internal funds and debt are not available.

Chen (2004) develops a 'new pecking order' which reverses the original orders to retained earnings, equity, and long-term debt for Chinese companies due to the unique institutional characteristic and financing constraints in China's banking sector. Furthermore, taking financial distress costs into consideration, Lemmon and Zender (2004) assert a different modified pecking order which explains the model well. Delcoure (2006) also proposes a modified pecking order to explain the capital structure decisions in Central and Eastern European (CEE) countries.

Although it is more prevalent because of its greater time-series explanatory power in the existing literature, there are sharply distinguishing views opposed to the pecking order theory. Fama and French (2002) receive mixed results from the comparison study between the pecking order and trade-off models. They share many predictions such as the positive relationship between profitability and dividend payout, leverage and firm size, as well as the negative relationship between investments and book leverage, leverage and target dividend payout. However, the conflicts lie in the relationship between leverage and profitability and equity issuance and growth opportunities. Seifert and Gonenc (2010) provide evidence from 23 emerging markets on the pecking order theory although they fail to find evidence to support the preference of cheap leverage as the pecking order theory suggests. Bharath *et al*. (2009) argue that unbalanced information affects firms' capital structure policies but it does not strictly follow the interpretation of the pecking order theory as adverse selection strongly leads to differences in debt financing. Jung *et al*. (1996) did not find support for the assumption of the pecking order theory that managers maximise shareholder wealth; instead, they claim that the costs of managerial discretion better articulated the reaction of stock price and the firms' issuance decision. To conclude, the pecking order theory of capital structure is broadly tested and the most influential. However, it is considered to have the greatest support when narrower samples are included (Frank and Goyal, 2003). Decline in support for the pecking order theory is assumed to be the result of either small firms that do not usually follow the pecking order pattern gradually becoming publicly traded firms, or the importance of equity increasing due to the easier access to the financial market in recent years. However, the adverse selection risk premium proposed by the pecking order theory still exists and information contained in the financing deficit holds its explanatory power.

2.3 Investigation of the market timing theory

Most recently, Baker and Wurgler (2002) attempt to investigate the determinants of capital structure relative to stock performance which intuitively expands the capital structure theory. The market timing model assumes that financing decisions are built upon the time-varying relative costs of the capital structure. The issuances of securities have long-term effects on capital structure because the observed capital structure at date t is the cumulative outcome of past attempts to time the market. This theory emphasizes that firms prefer equity when the relative costs are low and they prefer debt otherwise. Graham and Harvey's (2001) survey evidence is compatible with this assumption and timing consideration becomes a major concern for corporate executives as its significant influence is recognised by two thirds of CEOs when they make financing decisions. Welch (2004) reveals the long-lasting effect of equity price shocks on capital structure. By using aggregate measures of market valuation, Huang and Ritter (2005) elaborate on the market timing theory and a persistent market timing effect on capital structure is observed.

The equity market timing theory examines firms' financing policies based on the aggregation of the stock performance. When firms' stock is overvalued by the market, they prefer to issue new equity as this is less costly than other securities. When firms' stock is perceived to be undervalued, they repurchase their own share as this is good timing for them to buy low and sell high. A growing body of research has attempted to identify the timing of equity issuance and the impact of past stock valuation on the current capital structure from a different perspective. Some of the research evaluated the market timing model for capital structure policies as either when firms go public for trading to expand their capital, or when new equity is issued in publicly traded firms which are the so-called initial public offer and seasoned equity offering firms (IPO and SEO thereafter) (Alti, 2006). Some research investigated firms' financing policy at a given point of time with regard to equity and debt issues, stock repurchase and dividend policy (Marsh, 1982). Some studies attempted to explore the underlying motivation of managers' timing behaviour while some tested the persistence of equity timing effects (Flannery and Rangan, 2004; Hovakimian, 2006). Rather than equity market timing, some research also focused on debt financing in terms of either the level or maturity of debt issuance (Butler *et al*., 2004; Barry *et al*., 2005).

2.3.1 The issuance of securities – initial public offering and seasonal equity offering

Initial public offering (IPO) indicates that privately held firms sell their security to the general public for the first time to raise additional capital (Ritter, 1989). When the equity capital raised privately from a small group of investors is not sufficient for future prospects, most firms are willing to accumulate more capital by selling their stock to a greater number of investors. Existing shareholders also benefit from the freedom to sell their shares in open market transactions. Ritter (1989) points out that these IPO benefits come with substantial costs for the publicly traded firms which affects the cost of capital for firms going public. These costs vary from legal, auditing and underwriting payments to the contribution of uncountable time and effort from management to launch the offering and the dilution regarding selling shares at an offer price.

Initial public offerings (IPOs) can be a way for firms to raise capital to acquire financial resources. In most cases, IPO refers to the issuance of equity although it equally applies to debt. The launch of an IPO can be a good signal for a firm that has performed successfully over a period of time and has a demand for more diversified investors. Along with the launch, the stock's liquidity will be increased and thus the cost of capital will be reduced. Meanwhile, the issuance of debt discloses private information to the public. Therefore, the outside investors could be more rational and accurate in estimating the firm's value and settle for a lower underpricing of the new issuance.

A seasoned equity offering (SEO) is a new equity offering in publicly traded firms after IPO. Recent research documents the importance of equity issuance and therefore the market timing consideration increasingly becomes a worldwide phenomenon (Henderson *et al*., 2006; Bo *et al*., 2011). Ni *et al*. (2010) examine equity financing behaviour in the Chinese market with regard to firms' IPOs and SEOs, confirming that the timing effect plays an important role in equity offerings in China. Henderson *et al*. (2006) present a growing tendency of international equity offerings and confirm that the timing effect dominates in SEO events across the US and UK markets. Kim and Weisbach (2008) examine public equity offerings from 38 countries and support the market timing effect in SEO events.

Previous scholars categorise the IPO market as 'hot' and 'cold' to detect timing opportunities in IPOs. Choe *et al*. (1993) identify hot as the higher IPO volume and more favourable market conditions. Bayless and Chaplinsky (1996) add the low asymmetric information into the definition of the hot market. Aktaş, Karan and Aydoğan (2003) declare that IPO performance is stronger in the hot issue market as it is consistent with bull markets. Additionally, as suggested by Alti (2006), firms' IPO issue significantly more equity and less debt in the hot market than those that perform in the cold market. Welch (1995) also suggests that IPO issuers are able to time the market; however, he ignores the issue regarding timing possibilities and other dynamics of IPO after-market firms. Baker and Wurgler (2002) empirically investigated the capital structure decision on stock performance following the IPO date and see high market-to-book values as a source of irrational behaviour. According to, Baker and Wurgler (2002:27), "[m]anagers issue equity when they believe its cost is irrationally low and repurchase equity when they believe its cost is irrationally high." Since high market-to-book values are temporary, a firm's capital structure becomes the function of its managers' ability to exploit the irrational investor and has by definition a long-term memory.

Taggart (1977), Marsh (1982), Asquith and Mullins (1986), Korajczyk *et al*. (1992), Jung *et al*. (1996) and Hovakimian *et al*. (2001) share the view that firms issue equity along with high market valuations which stands as a temporary mispricing signal in hot market conditions. Loughran *et al*. (1994) and Pagano *et al*. (1998) also find such evidence in initial public offerings. Jeanneret (2000) points out that, in French SEO markets where market conditions are more favourable, managers take advantage of a window of opportunity and issue equity when market-to-book value is high. Pastor and Martin (2004) argue that Spanish firms' underperformance is a consequence of SEO decisions. Stehle *et al*. (2000) note that German firms also suffer from poor post-issue performance under various benchmarks. With evidence from the Netherlands, Kabir and Roosenboom (2003) show that the market valuation is consistent following the announcement of rights issues. However, the window of opportunity hypothesis was rejected for equity financing. Of further interest is whether the pecking order or market timing theories are applicable to other emerging markets.

2.3.2 Stock repurchase

The stock repurchasing decision will be made when a firm assumes that the market valuation is low according to the assumption of the market timing theory (Baker and Wurgler, 2002). Stock repurchase is an investment undertaken by a firm for its own shares and then it either cancels them or holds them in treasury for reissue. Buying back a certain number of outstanding shares results in an increase in earnings per share. Therefore, the market valuation of the remaining stock has the propensity to rise.

Firms use three common methods to repurchase their shares and there are four explanations for firms deciding to buy back their own shares. First, the motivation for share repurchase is to assist firms as they adjust their capital structure. When debt levels are lower and equity levels are higher than their requirement, a stock repurchase can act as a means of restoring an ideal debt-equity balance. For firms that are more active in moving leverage ratio and looking forward to fast development, there are two methods for corporate repurchase of shares – fixed-price offers and Dutch auctions which are both good choices. Meanwhile, using executive stock option programmes can also change capital structure in a more subtle way. Firms' stock option granted each year can be significant but it is so unreasonable as to concern the need for repurchases as, on an ongoing basis, the level of debt has a tendency to decrease. A second reason for stock repurchase is to reduce a firm's free cash flow on the balance sheet. The excess cash that cannot be efficiently reinvested in the business is considered to be wasted if it exists on the balance sheet. The free cash flow model can be extended in the future to an idea of abandonment. In the case where there are no growth opportunities and a firm is on the edge of exiting the industry, to preserve its business, excessive cash flows or borrowing money to repurchase shares can be an effective way of returning assets or resources back to the capital markets.

When managers lack imagination, which is considered to be managerial failure, stock repurchase has been criticised. In general, managers demonstrate their responsibility to shareholders in the form of share repurchase so firms invest the excess capital with positive NPV projects. Share repurchase also offers a way of releasing and channelling capital from profitable firms to growth firms when considering a broader economic cycle. Accordingly, it becomes an essential part of firms' business cycle and helps capital flow from the old economy to the new economy.

Ikenberry *et al.* (1995) state that equity repurchases follow low valuations. Therefore, according to Jagannathan *et al*. (2000), the third motive for repurchase is a substitution for dividend payments due to its financing flexibility and tax benefits for investors. This method allows shareholders to receive the excess capital. Given their tax treatment, why firms pay dividends is still a puzzle for researchers. However, in order to pay them, the repurchasing decisions become part of a more tax efficient approach that restricts firms from wasting excess capital. The financing flexibility of repurchasing is also a better managerial solution to that of dividend payout. Jagannathan *et al*. (2000) have consistent evidence that dividends have been replaced because flexibility is inherent in firms' buyback which follows poor stock market performance and increases dividends following good market performance.

Compared with dividend payouts, rather than expecting to be paid on a regular basis (in most cases, twice yearly in the UK and quarterly in the US), buyback can be accelerated or deferred with regard to a firm's growth, increased profitability or particular investment requirements. In line with the motive for dividend substitution, there is an increasing trend that share repurchase has become a more popular corporate distribution instead of the traditional cash dividend as part of a total amount of capital. In general, although dividend payments still survive, most dividend-paying firms have, in the past, shown a modest increase, but it is mainly eliminated, while the fraction of return capital to investors through share repurchase is growing at a faster speed.

The fourth common motive for the buyback of shares involves the association with an undervaluation of the market. As share repurchase can be interpreted as a bad signal for the market, the fourth common motive acts as a misleading signal and therefore profit arises from a perceived undervaluation of the firm. Research suggests that repurchase is evidence of this mispricing or undervaluation because of the information asymmetry between managers who have access to private or privileged information while the market is blind to such data. Instead of disclosing the information, stock repurchase can be used as a signal to reveal a firm's outlook, therefore delivering the message that the firm is in good health and has good prospects and thus establishing investor confidence. Firms' stock may not be undervalued in response to publicly disclosed information; it is, however, still mispriced based on a manager's private information.

In theory, temporary market inefficiency is to be blamed for this mispricing as it is an occasional deviation from a firm's current market value of its intrinsic value. Repurchasing is a strategy to convince investors or the market that the firm deserves a higher valuation as this share is perceived to be undervalued. Dittmar and Dittmar (2007) believe that stock repurchasing mirrors stock issuances and mergers. It is believed that repurchasing stock, especially when it has a high return, is a means of undervaluation because the market cannot effectively interpret the publicly released information.

2.3.3 Dividend policy

Apart from issuing the equity, share repurchase, dividend payments are another important source of payouts for a firm; however, it has never been discussed within the market timing theory. Using Jordanian data, Al-Najjar (2011) investigated the interrelationship between firms' capital structure and dividend policy. He examined the suggested factors which indicated a positive relationship with capital structure. He also tested the relationship between the same factors and the dividend payout ratio. It has been discovered that the financing policy is driven by the similar determinants of a firm's capital structure and dividend policy. However, Al-Najjar (2011) did not clearly specify the relationship between the dividend payout ratio and the debt-to-asset ratio. It is difficult to verify how the financing policy changes along with that of the dividend policy. The dividend policy is important because it provides a source of stable income for investors to scrutinise. It is also a valuation tool for financial analysts since dividends can be a signal of the trade-off between the retaining earnings to shareholders and reinvesting the cash to fund the firm's investment opportunities. Lenders are also concerned about dividend policy because the dividends paid to shareholders might negatively influence the repayment they expect to receive.

The financing investment can be generated from both internal and external sources. Internal sources refer to retained earnings and deprecations. On the other hand, external sources include the debt and the equity issuance. Therefore, firms' financing decisions can be divided into two – dividend choice and capital structure choice. The former involves the retained earnings to be reinvested and the dividends to be paid out. The latter involves the debt to be borrowed and the equity to be issued. Dividend changes provide a signal of the management's earnings forecasts. Bhaduri (2000), Kose and William (1985) and Miller and Rock (1985) state that the dividend payment represents the improved financial position and thus shows that there is an increased ability to issue debt. The signalling theory of capital structure also supports this argument.

In Miller and Modigliani's (1961) irrelevance theorem, the pattern of dividend is irrelevant to the firm's value because when investment opportunities have been exhausted, investors can still receive payment as the uninvested distributable cash retained earnings should be paid out to shareholders as a dividend. MM's approach is based on fairly exclusive assumptions that can be relaxed and therefore dividends and capital structure are relevant to a firm's value. In an imperfect capital market, individual investors cannot adjust their dividend payment without any cost as a taxation distinction between dividend income and capital gains increases investor preference for dividend payout. The asymmetric information between inside management and outside investors can lead to a pecking order of financing choices for managers, therefore affecting the dividend policy for investment. Lintner (1956) states that firms have been reluctant to reduce dividends and have been greeted by a significantly negative stock market reaction when they do. Managers pay dividends out of long-term and sustainable earnings. Consequently, firms bearing exceptional investment opportunities with retained earnings are preferred as dividend payments rank before resorting to debt to equity issuance.

Another capital market imperfection that has a bearing on dividend policy, as argued by Bhattacharya (1979), refers to imperfect and incomplete information. He assumes that dividend decisions are used as signals to declare a firm's future prospects as the higher the payout, the better the future prospects. Zwiebel (1996) questions the reason for ostensibly cash-constrained managers paying out dividends. If the pressure that the shareholders bear because of there being less profitable assets in place is sufficient to motivate management to disgorge excess cash from the firm, then it is difficult to see why the costly constraint of debt is simultaneously necessary and what role the cross-temporal commitment of debt serves. In this regard, Zwiebel argues that the debt and dividends are interchangeable. It is still not clear which the firms prefer and the reason for the preference for dividends. However, it does show that when debt and dividends are settled as tax neutral, similar to the Miller equilibrium (Miller, 1977), managers are more prone to pay out dividends, contrary to free cash flow theories in which managers would have a strong aversion to doing so. Finally, the author suggested that capital structure decisions and dividend policy should be examined jointly rather than in isolation.

Myers (1984) points out that the pecking order model does not offer an explanation for dividend payment decisions. However, the decision to pay dividends should be affected by pecking order considerations. Because of the cost of financing investment with new risky securities, the dividends are less appealing to firms which own more debt, have a high volume of current and expected growth, and lack free cash flow.

Consistent with Myers (1984), Fama and French (2002) acknowledge the significant positive relationship between dividend payouts and firms' profitability. However, the fewer the growth opportunities a firm has, the greater the dividends that are paid out. Myers (1984) also believes that dividends do not vary in the short term because the sticky feature of dividends is that the leverage is absorbing the variation in net cash flows. In line with the pecking order theory, debt financing greatly absorbs the short-term variation in investment. The trade-off theory shares the same prediction with the pecking order theory in this sense.

Some firms approve the 'clientele effect' in that dividend policy is used to attract those investors who are interested. The free cash flow theory suggests that firms that are able to commit to dividend payments from cash flows that cannot be reinvested have higher values than those that retain the free cash flows.

As the pecking order theory suggests, the dividend payment can be seen as a good signal relative to a firm's future prospects. Less information asymmetry will result in more equity issuance in the equity market and therefore less debt will be issued. Agency models also show associations between the dividend policy and capital structure decisions. These models are based on the assumption that the dividend payments are a substitution for debt financing as a mechanism to mitigate agency problems. Therefore, Bhaduri (2000) suggests that dividend policy has a negative impact on debt financing from an agency point of view.

Above all, it can be confirmed that dividend policy can affect capital structure and shareholders' wealth. However, to what extent they affect each other and whether the relationship is positive or negative has not been concluded in the European context.

2.4 Interpretation of the market timing theory

Research into equity market timing (Baker and Wurgler, 2002) does not formulate any clearer evidence regarding these two versions of market timing. By identifying the time when equity issuance is relatively cheaper than other types of external financing, the equity market timing theory suggests that managers are able to exclude other types of external funds as the firm's share price is overvalued by the market.

According to Baker and Wurgler (2002), provided that managers are able to time the equity market, the misevaluation should be associated with the timing of the debt and equity issues. If this timing behaviour successfully defeats the market when the firm's cost of equity is low, existing shareholders will be the winners but at the expense of new shareholders. Although recent research argues that the timing of security issuance decisions plays an essential role in corporate financial policy, in terms of the interpretation of market timing theory, there are two contradictory versions of the timing effect: equity mispricing and adverse selection (Baker and Wurgler, 2002). The former emerges from irrational management decisions and the latter is caused by asymmetric information. Chazi and Tripathy (2007) retest the theory and argue that the explanations of the effect of market timing are not clear. Their results give more weight to real mispricing rather than perceived mispricing and managers do not time equity issuance dependent on the levels of information asymmetry. Similarly, Elliott, Koeter-Kant and Warr (2008) also decompose the roles involved in the choice of capital structure choice. In their view, irrational equity mispricing, instead of time-varying adverse selection, is more significantly correlated with firms' debt-equity decisions. Mukherjee and Mahakud (2012) identify the nature of historical market-to-book ratio and confirm it as a better proxy for growth opportunities than market timing in the Indian market.

2.4.1 Debt or equity financing in market timing?

As the two main funding sources, debt and equity exert a different influence in their sensitivity to firm value changes. While bondholders have the promise to have a fixed payment in the case of bankruptcy, stockholders are entitled to the residual and the variation of the stock price may be more affected by any public information about future prospects than about bond price.

When releasing good news which has been processed by management and which may significantly move stock price up but not on bond prices, the current stock price can be considered to be an undervaluation to managers compared to the current bond prices. For this reason, when the assets are undervalued, managers consider debt issue to be a better choice according to the signalling theory and equity issue is the last resort. In the same vein, the pecking order theory suggests that the costs caused by the information asymmetry when issuing security are at a high level and dominate the financing decision. Jensen and Meckling (1976) suggest that firms make financing decisions fundamentally based on the cheapest available source of funds so they can maximise their value. As the pecking order theory suggests, the retained earnings are the first preference, followed by external funds and debt is prior to equity due to its lower cost of information asymmetry. Firms only consider equity issuance as a last resort when the debt capacity is completely exhausted. According to the pecking order theory, firms with few growth opportunities and exceptional operational cash earnings will have a relatively lower level of leverage; conversely, firms with high investment opportunities with less free cash flows will be more highly levered. This theory does not emphasize the balance between interest tax shields and the cost to financial distress; it actually generates a number of predictions that opponents to this argument present in the trade-off theory.

2.4.2 The costs of capital structure

In the market timing theory, firms issue securities as opposed to their costs. As the costs of securities comprise both costs of equity and costs of debt, there is a loophole in market timing that does not consider the costs of debt. The previous market timing test includes the cost of equity as an explanatory factor; however, the variation in debt is ignored when considering firms' external financing decisions. The potential costs of debt are mainly from both direct and indirect financial distress. Direct bankruptcy costs are mainly generated from bankruptcy proceedings in the form of legal and administrative costs. Indirect financial distress costs are based on the debt overhang problem which is suggested by Myers (1977) or the firms' reluctance to liquidate which is argued by Jensen and Meckling (1976).

These indirect bankruptcy costs can also cause a loss in profits when stakeholders reject the opportunity to do business with them and they are not insignificant (Altman, 1984; Castanias, 1983). Titman (1984) also points out that customer demand for a firm's business, products or services could have a great impact on the probability of bankruptcy. The liquidation costs, and other associated costs, also dismantle the relationship between firms and their customers and suppliers, therefore contributing to the end result of bankruptcy (Altman, 1984). Haugen and Senbet (1978) refer to the irrelevance of bankruptcy costs without distinguishing direct costs and indirect costs. However, they generalized their idea in 1988 and clarified that the bankruptcy costs and, therefore the incidence of insolvency can be avoided by reorganising the firm's capital structure to optimal, i.e., stockholders repurchase the stock, bondholders purchase the stock and outsiders can purchase both debt and equity at the total market value.

Previous scholars have predicted that capital structure may be sensitive to a series of issues. On a firm's level, the common concepts are taxation, the possibility of bankruptcy, liquidity, tangibility, firm size, agency costs and information asymmetry. The effect of the dividend policy has recently received much attention and, above all, the factors affecting the firm's capital structure will be critically analysed.

2.4.3 Debt capacity and market timing

Under assumptions from the trade-off theory, firms issue debt because the interest payments are tax deductible. However, moving away from the assumption of a perfect capital market, the imperfections, such as agency costs, bankruptcy costs and transaction costs can offset the benefits of the issuance of debt. Thus, for the purpose of maximising a firm's value, there is a limit on the amount of borrowings and firms should not exceed the limit on the amount of debt that they are allowed to use. This limit is the amount of borrowings issued when a firm's corporate value no longer increases. Therefore, debt capacity is considered to be the maximum value of debt that a firm is able to extend.

In the previous literature, the term 'debt capacity' has been raised but never exactly defined. Donaldson (1962) states that the limit on debt usage is reached when firms face an unacceptably high probability of trouble. However, the meaning of trouble is not defined in his paper. Myers and Pogue (1974) later confirm the same definition while Myers (1984) believes that the question of whether debt capacity is to be extended does not depend upon the firm's willingness but on the creditors'. Given that the ability of a firm to be levered is determined by the outside creditors, Jaffee (1971) argues that it is optimal for lenders to restrain the appropriate limit for debt capacity due to the existence of the costs of financial distress. The willingness of a firm to utilise debt financing is thus the natural definition for debt capacity.

In this scenario, there can be conflicts between a firm's optimal capital structure (if there is one) and a lender's willingness to extend the amount of debt issuance. The firm's ability to make financing decisions may be restricted by this divergence. In the meantime, how the investments affect the firm's debt capacity will also affect their value to the firm.

Research by Shyam-Sunder and Myers (1999) and Chirinko and Singha (2000) states that debt capacity, as a 'sufficiently high' debt ratio, involves the assessment of the limit of debt not exceeding the firm's financial viability due to the costs of financial distress, thus curtailing further debt issues. Debt capacity, which is defined by Turnbull (1979) as the maximum level of debt, can be issued dependent on the amount that creditors are willing to extend to the firm. His paper empirically tested the assumption and showed that the maximum amount of credit depends on the lenders' willingness to raise the credit.

According to Turnbull (1979), the relationship between optimal capital structure and debt capacity always involves the former occurring before the latter. In the pecking order model, firms with higher profitability can pay higher dividends while keeping more low-risk debt capacity to finance investment in the future (Fama and French, 2002). Therefore, the debt capacity will be able to measure whether the firm can achieve the optimal capital structure. Allen (2000) shows that UK and Australian firms prefer to maintain spare debt capacity to seek more investment opportunities or to make acquisitions. Beattie *et al.* (2006) state that firms with high leverage tend to target the debt lever to reduce the opportunity to maintain financial slack if the amount functioned at or near the debt capacity. It is difficult to predict the relationship between the capital structure and financial slack since the financial slack is hard to maintain when the debt capacity is low.

Debt capacity is also discussed by Taggart (1977) who refers to a determinant of debt-equity ratio for its long-term effect. This research confirms that firms issue equity and bonds based on the permanent capital and their debt capacity. Firms' financing decisions regarding bond and equity issues are in line with the debt capacity and the excessive debt levels are stimulated to be reduced. When the speed of adjustment is relatively slow, it is the short-term fluctuation in the external financing deficit that the liquid assets and short-term debt is absorbing. Taggart (1977) also provides evidence that the impact of managers' timing strategies can either increase or decrease their firms' adjustment speed to their target capital structure.

2.4.4 Transparency and market timing

Transparency refers to the accuracy and speed of information with regard to trading opportunities in the market. This information is released to market participants and they are therefore able to make judgements and decide on the prices, the quantities and the choice of investments to trade. This is virtually associated with the proprietary real-time and market-wide information. Firms obtain capital mainly from the market; the equity price is an important factor in asset allocation for European firms. The huge fluctuation in volume suggests that market timing considerations are more important than ever before in determining a firm's capital structure.

Transparency refers to market transparency and firms' transparency. Market transparency can be improved through the allocation of capital such as efficient risk sharing and low costs; the prices are efficient when they fully reveal the information of the intrinsic value of the equity and the market is liquidated when the incoming orders are accommodated in a timely manner with minimal effect on prices and investor protection. In general, it reflects a fairly operated market that is free from abuse, therefore maintaining investor confidence (Financial Services Act (FSA), 1986; Securities and Investments Board (SIB), 1995). Firms' transparency relies on the remedy of the agency costs, information asymmetry and adverse selection.

The disparity in information is the linchpin of research into corporate finance and in particular whether maximising a firm's value is the management's target and whether it is achievable. The investors may evaluate the firm's performance according to the inaccurate or incomplete information. On the other hand, corporate executives are often more informed than outsiders. Research regarding firms' financing decisions is distinct but related as it is mainly dominated by the information asymmetry between inside management and outside investors, influenced by the pecking order and signalling theories.

As Ross (1977) suggests in the signalling theory, a firm's financing behaviour is built upon the managerial perception of the firm's market valuation. When it is undervalued, a firm will tend to issue debt rather than equity and when it is overvalued, equity is preferred as it minimises the transaction and information costs. Outside investors lack information so inside managers of undervalued firms can deliver a good signal to the market and therefore push the stock price up. However, due to signal observability and credibility, this signal may not be received or trusted by the receivers in the market.

Managers are obliged to disclose only correct information as the cost of misleading is excessively expensive. Therefore, the level of debt can be an effective indicator because a debt contract compels managers to pay back any loans and the consequences of missing payments are dismantling, such as liquidation, insolvency or bankruptcy. Conversely, equity issuance has less power to restrain managers as their payment can be deducted or omitted when financial distress occurs. Hence, observing the higher level of debt can be more reliable than equity as it can also be considered as higher future cash flows. As firms are able to reimburse bondholders in the future, the public can trust that the firm's cash flow is sufficient to meet these obligations.

2.5 Discussion of the conflicts between capital structure theories

2.5.1 Trade-off theory and pecking order theory

Trade-off theory and pecking order theory are not mutually exclusive based on the construction of the models and firms' variables to explain financing decisions. By assuming that capital markets are efficient and integrated, Modigliani and Miller (1958) advocate that a firm's value is irrelevant to its capital structure policy. In this scenario, firms do not benefit by strategically or opportunistically switching between debt and equity. Given the existence of imperfect market conditions, attention needs to be paid to the determining factors of a firm's capital structure and its attempt to adjust the debt to equity ratio towards an optimum (if any). The trade-off theory advocates an optimal debt-equity ratio which optimises tax benefits with the costs of financial distress (Modigliani and Miller, 1963).

The pecking order theory exerts a stronger explanatory power than the trade-off theory regarding firms' financing behaviour (Shyam-Sunder and Myers, 1999). Frank and Goyal (2003) strongly disagree and support the argument that net equity issuance offers a better approximation of a firm's financing decisions compared to that of net debt issuance. Chirinko and Singha (2000) also question the hypothesis of pecking order by criticising the econometric methods applied by Shyam-Sunder and Myers (1999). They argue that firms reorganise their capital structure mainly from debt financing including both bank lending and non-bank sources and, depending on the terms and conditions, they classify their priority of debt due to their priority of claims. Lemmon and Zender (2010) also provide evidence that there is a preference for debt to equity when heterogeneity in the margin of debt is controlled for. This contradictory evidence weakens the strength of the explanatory power of the pecking order theory regarding a firm's capital structure decision. However, the central tenet of the pecking order theory, the claim of information asymmetry, is essential when analysing firms' financing behaviour (Fama and French, 2005). Consequently, there has been an accumulation of both empirical and theoretical literature to evaluate the ability and viability of this theory (i.e., Frank and Goyal, 2003; Agarwal and O'Hara, 2006; Chang *et al*., 2006; Dittmar and Thakor, 2007; Gomes and Phillips, 2007; Bharath *et al*., 2009; Autore and Kovacs, 2010).

Consequently, the above competition between the trade-off theory and the pecking order theory leads to the following. The trade-off theory pursues a firm's value maximisation but the pecking order theory is sensitive to managerial motivations. While the assumption of capital structure in the trade-off theory is relatively static, the pecking order model predicts a dynamic capital structure. The trade-off theory reflects the impact of taxes, transaction costs and financial distress, but the pecking order theory results from the impact of financial slack and profitable projects. The trade-off theory regards firms from their own accord but the pecking order theory learns from the signals in the capital market. Compared with the trade-off theory, the pecking order theory also takes proprietary data into account. Therefore, the pecking order theory embeds a stronger explanatory power in broader world practices.

2.5.2 Trade-off theory and market timing theory

As illustrated above, the static trade-off theory assumes that the optimality of capital structure is achieved when tax benefits and the costs of financial distress are balanced (Modigliani and Miller, 1963). By opposing the trade-off theory, firstly, Baker and Wurgler (2002) proposed that there is no assumption of optimal capital structure; the market timing financing decisions are made on the basis of accumulation into the capital structure over time. Secondly, in the trade-off theory, the imperfect factors were added to the theory of Modigliani and Miller (1958) but the hypothesis of market efficiency and symmetric information remains. Instead of the impact of current market-to-book ratio, the evidence in the market timing theory shows that the impact of past variations in market valuation is more important.

2.5.3 Pecking order theory and market timing theory

Considering the conflicts between potential investors and managers, the pecking order theory involves the conditions of information asymmetry. The high uncertainty and asymmetric information will lead to managers preferring to increase leverage when there is a good investment opportunity as the market value is higher than book value. However, more profitable firms with sufficient retained earnings are more likely to issue less debt. As the cost of equity issuance is more expensive than debt issuance, managers who are supposed to maximise the wealth of the existing shareholders generate their own preferences. Cheaper debt issuance takes priority over equity issuance and the stock price will be marked down if the firm is forced to issue equity (Jung *et al*., 1996). Drawing from the market timing model, the issuance of equity will cause a firm's long-term underperformance (Loughran and Ritter, 1995; Spiess and Affleck-Graves, 1995). Stein (1995) claims that managers will act to maximise the shareholders' wealth by issuing stock when it is overvalued and the markets underrate this choice. There are different interpretations of the timing model, one of which assumes that managers have the acknowledgement when the equity is overpriced. Due to the underreaction of the market to equity issuance, the future performance of the firms which issued equity is below par in the long term. This is because the market corrects the overvaluation that occurred at the time when the equity was issued. The market reaction post-equity issuance is also found in the pecking order model. However, whether the timing effect is a first-order consideration following the security issuance remains unknown. Moreover, none of the models justify the abnormal returns after the issuance in the long term.

In the view of the market timing model, the assumption of semi-strong efficiency is strictly distinct from the pecking order theory. The pecking order theory assumes unbalanced information between inside managers and other market participants. Myers and Majluf (1984) argue that, driven by information asymmetries, the capital structure choice will adhere to a hierarchy of financing sources. The internal funds are set in first place, debt is preferred when there is an availability of assets-in-place, and equity comes last. The announcement effects of the securities issues are the primary proxy for the degree of information asymmetry. This financing order aims to avoid the impression of irrational outside investors who consider the firm to be overvalued and thus rationally discount the firm's stock price. However, in the market timing theory, there is no assumption that the market is semi-efficient and there is no prediction that, according to Huang and Ritter (2005), the equity issues are rare. For either rational or irrational reasons, a window of opportunity occurs given that the relative cost of equity varies over time (Huang and Ritter, 2009). Huang and Ritter (2005:3) also claim that "the pecking order is just a special case under the market timing theory".

Equity market timing also challenges the modified pecking order theory because firms with high market-to-book value reduce debt financing by avoiding issuing equity in the future rather than using retained earnings. Thus, the market timing theory explains the relationship between equity issuance and the capital structure while the traditional theories cannot (Baker and Wurgler, 2002). It confirms that high market valuation coincides with both seasoned (Hovakimian *et al*., 2001) and initial public equity issuance (Pagano *et al*., 1998). Firms are more inclined to issue debt or repurchase equity when market values are low.

2.5.4 Agency theory and market timing theory

The agency theory of capital structure stems from the information asymmetry between different contracting parties and aims to mitigate the agency costs, therefore producing more free cash flow, maximising a firm's value and generating earnings forecasts. The equity market timing theory draws from the impact of past stock valuations on current capital structure although the underlying explanation of a manager's timing behaviour is not yet clear. There are two conflicting versions concerning the prediction of a firm's equity market timing effect: adverse selection and time-varying mispricing. The studies which support the 'adverse selection' version (e.g., Myers and Majluf, 1984) believe that both inside managers and outside investors are rational and the costs of adverse selection vary across firms or across time. In line with the agency theory, this version of market timing is following the perception that conflicts between shareholders and managers are due to the presence of information asymmetry. In contrast, other studies (e.g., Loughran and Ritter, 1995) hold that the insight of equity mispricing suggests that managers and investors are irrational and that time-varying mispricing is the major motivation behind their issue of equity capital when its cost is assumed to be low, and their repurchase of stock when its cost is irrationally high. In contrast to the assumption of agency theory, this version of equity market timing does not rely on the hypothesis that the market is inefficient and that managers make financing decisions solely associated with outright mispricing.

Conforming to the assumption of equity market timing theory, the agency theory predicts that managers will issue equity when stock valuation is high and there are profitable growth prospects in place (Zwiebel, 1996). The entrenched managers do not subsequently rebalance their debt ratio. However, the interpretation of a manager's negative behaviour in restructuring the debt level is divergent. Graham and Harvey (2001) find that, instead of profiting from new investors, managers pursue private benefits at the expense of existing investors. Managers rebalance their capital structure less frequently and restore less than optimal leverage since they have discretion over financing and dividend policies (Morellec *et al.*, 2008). Additionally, there is no optimal capital structure to pursue in the market timing theory but the extremely successful outcome from solving the agency cost problem is to achieve the target level of capital structure.

2.5.5 Signalling theory and market timing theory

The signalling theory, which was originally developed by Ross (1977), examines the information asymmetry between managers and investors (Spence, 2002). The signal fundamentally refers to the managerial incentives which explain this approach's central tenets. The debt funding of a firm is interpreted as a good signal to the markets as it increases investor trust. Since principal and interest payments on debt are a fixed contractual obligation, positive cash flows are expected in the future according to the management's confidence. However, the issuance of equity will be identified as a negative signal to investors as this might reveal an overpricing of the equity by the decision-maker who has superior information.

The effect of the announcement of dividend policy is also presented in the signalling model. The changes in dividend policy act as a signal of managerial growth prospects. Miller and Rock (1985) argue that dividend-paying firms can be defined as good news firms although that is not necessarily the case. A dividend payment is recognised as a positive signal which implies a firm's ability to raise leverage towards the promising financial prospects. Accordingly, the firm's share price will react positively to either debt issues or dividend payments. In contrast, a negative change in stock price results from the announcement of equity issues.

Diverging from the signalling theory, the equity market timing theory suggests that a high market valuation is the driving force behind the equity financing decisions and a low market valuation leads to equity repurchase decisions. This assumption, instead of discussing the effect of a firm's financing policy, claims that the impact of the market behaviour on a firm's capital structure decision is substantial and persistent.

2.6 Determinants of capital structure

The theoretical and empirical studies investigated the factors which could have an impact on firms' capital structure. These determinants, which have survived in many tests, include profitability, size, asset structure, growth opportunities, liquidity, volatility and dividend payout ratio.

2.6.1 Profitability

On the relationship between profitability and leverage, prior research does not agree. In the pecking order theory, the available amount of internally generated funds is a firm's first preference. When retained earnings are not sufficient to finance investment, borrowing is considered prior to issuing new equity. Equity financing is the least preferred choice because it is bounded by higher costs which may result from asymmetric information (Myers and Majluf, 1984; Myers, 1984) or transaction costs. Therefore, a firm's profitability through its effect on the level of internally generated earnings is essential to its capital structure. All things being equal, more profitable firms will obtain finance through internally retained earnings and are less prone to selecting external funds and therefore have a lower level of debt in their capital structure. On the contrary, firms with low profitability are obliged to resort to debt financing.

A positive relationship between profitability and leverage is proposed in the trade-off theory while the pecking order theory suggests the opposite. The static trade-off theory states that profitable firms should lever up because of the advantage of lower costs of financial distress and the tax deductibility of leverage. A positive relationship between profitability and leverage is expected in this regard. However, in the dynamic trade-off model, there is a chance that leverage is negatively related to profitability as the firm passively accumulates profits (Kayhan and Titman, 2007).

There are also arguments under the agency theory. Jensen (1986) assumes that debt can be used to discipline managers who pay out profits. Therefore, management discretion can be restrained in the more profitable firms with high free cash flow. There is a positive relationship between profitability and leverage. By contrast, Chang (1999) suggests a negative association because the optimal contracts between management and outside investors can represent the contradictory benefits of debt and equity.

2.6.2 Firm size

A firm's scale is one of the key factors in the determinants of capital structure. The trade-off theory supports the positive relationship between firm size and debt finance. It suggests that the larger the firm, the more diversified and stable the cash flows, thus reducing the probability of financial distress (Rajan and Zingales, 1995). In addition, compared to large firms, smaller firms have less opportunity to obtain external funds due to the higher costs of information asymmetries. Long-term debt is preferred for large-scale firms whilst short-term debt is more favourable for smaller firms (March, 1982). The reason lies in the advantage of the economies of scale in long-term debt issuance. Therefore, firms have easier access to the market and can finance at a lower cost of debt. Since the information disclosed by larger firms is more visible to outsiders than for smaller firms, size may be considered as a proxy for asymmetry information for outside investors. However, the negative relationship between firm size and leverage ratio is proposed by the pecking order theory as, in the absence of long-term debt, smaller firms would make more use of short-term debt. Due to the asymmetric information, smaller firms face higher costs for issuing new equity compared to large firms.

According to previous research, firm size is mainly extracted from total sales and total assets; most studies applied the natural logarithm of either as the measure of the size of a firm. Chen and Strange (2005) used the natural logarithm of total assets while Anderson and Reeb (2003) applied the book value of total asset values. Alternatively, some capital structure studies select the number of employees as the measurement of firm size. In this study, I will use a different proxy. The advantage will be that it avoids the unreliable interpretation due to mathematical mistakes being applied.

2.6.3 Tangibility

There are also mixed predictions referring to the relationship between tangibility and debt finance. The trade-off and pecking order theories support the positive while the agency theory suggests the negative. Tangibility is the nature of the assets which can assist outsiders in their valuation of firms. The tangible assets mainly refer to property, plant and equipment assets which can be used as collateral. When firms hold more tangible assets, the risk for lenders is low, therefore reducing the expected financial distress. In this case, the positive prediction can be given due to the impact of tangibility on capital structure.

According to the agency theory, the negative relationship between tangibility and debt finance is caused by the close monitoring function of bondholders; it is difficult for managers to consume excessive perquisites from highly leveraged. The costs incurred from this agency relationship are normally higher for firms with fewer tangible assets. Therefore, it is a voluntary decision by firms with fewer tangible assets to choose higher debt levels, thus controlling the consumption of perquisites.

2.6.4 Growth opportunity

Barclay and Smith (1995, 1996) and Guedes and Opler (1996) prove that growth opportunities are negative determinants of leverage in the US context. Equipped with more growth opportunities, firms tend to finance in equity rather than debt. Drobetz and Fix (2005) suggest that firms are more than willing to avoid underinvestment and asset substitution which can result from agency conflicts between stockholders and bondholders. From a free cash flow point of view, Jensen (1986) similarly suggests that firms with high growth are more disciplined and need less control of free operating cash flow by debt payments. With more flexibility in making future investments, debt in this case is a riskier choice as higher agency costs are incurred. Growth opportunities are always considered as intangible assets in nature and cannot be collateralized. Since there will be no current income generated, growth opportunities are only valuable when firms are in existence which means that the bankruptcy costs can be higher (Myers, 1984).

However, according to Scherr and Hulburt (2001), growth opportunities in small firms have a mixed impact on the debt maturity structure in the US, while Esho *et al*. (2002) and Cai *et al*. (2008), for example, did not find any association between the growth and debt maturity structures of firms. Fan *et al*. (2011) confirm the relationship between growth opportunities and the debt maturity structure in a substantial international sample consisting of 39 large countries from both developed and developing economies. However, these results do not hold in the subsamples when distinguishing between developed and developing economies. In particular, UK firms show that the impact is insignificant. In line with Fan *et al*. (2011), the inspection conducted by Antoniou *et al*. (2006) did not consider growth opportunities to be significant regarding their impact on the debt maturity structure but the suboptimal investment was not considered. Whilst their research was based on three European countries (UK, France and Germany), Ozkan (2000, 2002) compiles a larger data set, confirming a significant negative association between investment opportunities and debt maturity for UK firms. His findings are consistent with Myers (1977) who shows that the maturity structure of firms can be employed to restrict the encountered underinvestment. With this concern, this study also expects a negative relationship between growth opportunities and firms' leverage.

2.6.5 Asset liquidity

Efficient liquidation is economically important and it has an impact on capital structure decisions (Sibilkov, 2009). However, the prediction of the association between asset liquidity and capital structure is mixed. First, firms' liquidity reveals their ability to meet the short-term obligations; consequently, a higher proportion of leverage is expected because they are able to pay short-term obligations when they fall due. In this case, leverage is positively related to liquidity which is consistent with trade-off models. Harris and Raviv (1990) find that the increase of liquidity ratio results in a fall in the costs of financial distress and investors are more in favour of debt to obtain information regarding a firm's profitability. The expected costs of default, which is partially influenced by liquidity, can be balanced against the benefits of debt.

By contrast, the pecking order theory indicates a negative impact of liquidity on capital structure decisions. Firms with greater liquidity are reluctant to borrow. The leverage ratio can be lower than optimal because of agency problems, risk aversion and the performance pressures associated with debt. Entrenched managers attempt to control the risk of default and therefore protect their human capital (Berger *et al*., 1997). Similarly, asset liquidity can be manipulated by management to the advantage of shareholders but, in contradiction to the interests of debtholders, the agency costs of debt increase accordingly.

2.6.6 Volatility

Although Antoniou *et al*. (2008) and Frank and Goyal (2004) do not support the significant impact of volatility in operating income on a firm's leverage level, volatility is commonly considered as the business risk or the probability of default that determines a firm's capital structure.

The pecking order theory suggests an inverse relationship because riskier firms bearing high risk to financial distress reduce that finance with high leverage. Conversely, with lower risk, firms tend to have a longer debt maturity structure (Titman and Wessels, 1988; Ozkan, 2002). The probability of financial distress increases along with earnings volatility in that firms may find it difficult to accomplish their debt servicing commitment; hence, their debt capacity decreases with the increase in volatility of earnings resulting in an expected negative impact on leverage.

However, Harris and Raviv (1990) and Ross (1977) disagree with the pecking order hypothesis and argue that there is a positive relationship between earning volatility and a firm's leverage ratio. When the leverage ratio increases, the more volatile the net profit becomes. The agency theory illustrates that a firm can reduce its level of debt in order to lower the volatility of the net profit.

2.6.7 Product uniqueness

The static trade-off approach predicts that firms which supply a unique or specialized product tend to have lower leverage ratio (Titman and Wessels, 1988). The bankruptcy costs are relatively higher because, in the event of liquidation, such firms possibly impose the potential costs on their customers, input suppliers and workers. The specific skills and products may create a boundary for their workers and their suppliers in the search for servicing and markets in the future. Such firms are less likely to finance by leverage because the uniqueness of their capital also limits the probability of the use of an alternative when facing bankruptcy. Noticeably, the higher the expenditure on research and development, the more opportunities there are for firms to generate unique products that other firms find difficult to duplicate. Subsequently, such products can be highly priced due to the costs of advertising, marketing and promotion.

2.7 Conclusion

This chapter reviews both the theoretical and empirical literature on capital structure. The theoretical advancement on capital structure can be traced to the inception of MM's (1958) irrelevance proposition, followed by the trade-off theory, the agency theory, the pecking order theory, the signalling theory and the market timing theory. In general, the trade-off theory argues that firms will raise debt to a certain level when the marginal benefit of adding more debt is less than the marginal cost (i.e. higher probability of bankruptcy). The pecking order theory, on the other hand, postulates that firms choose their source of finance according to a particular order in which retained earnings (internal funds) are the first choice, debt is the second and issuing equity comes as a last resort.

Capital structure has been discussed for decades; however, the main focus of the literature is on the search for optimal capital structure. For instance, the early studies assumed a static form of capital structure decisions. In particular, the recent studies on optimal capital structure have assumed a dynamic form of capital structure decisions; firms aim to adjust their capital towards a target. This change of focus in the literature is also accompanied by a change in the methods used to analyse capital structure approaches, from the static models analysed by ordinary least squares, to panel data methods and finally dynamic panel data methods. An addition to the capital structure theories is the market timing theory of Baker and Wurgler (2002). The market timing theory argues that firms tend to issue equity capital when the cost of issuing equity is low and they issue debt when the cost of equity is high. The market timing theory was less fortunate compared to other capital structure theories in terms of the empirical studies that have investigated it. The market timing theory becomes more important with the development of the equity market. In this vein, Europe may provide a fertile ground for such studies because of the different levels of equity market developments in each country. Also, the efforts to create capital market integration and monetary union among European countries are still ongoing, thus causing dynamic changes in these markets at different time intervals. Since the research into market timing theory has been mainly conducted in the US and is rarely covered by other countries, investigating the market timing effect in Europe may add invaluable empirical evidence to the literature. Given the reasons discussed above, there is also scant literature investigating market timing theories in Europe and in particular providing evidence from cross-county data.

Therefore, the existing voids in previous research lead to three testable predictions in this thesis: first, as European countries are affected by the market more gradually, the market timing theory will find supportive evidence for the recent time period; second, the determinants of a firm's target capital structure in the period 2000-2012 and how fast it adjusts to it; and third, the factors that move a firm's capital structure away from its optimal capital structure during this time period.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter addresses the selection of econometric models and justifies the estimation methods applied to address the research questions stated in the introduction chapter. It also specifies the selected sample, the collected data and the variables defined to address the research questions. The end of the chapter concludes by summarising and interpreting the results based on the preferred method of estimation.

This thesis uses panel data models as the primary technique and is complemented with partial adjustment models. Panel data contributes to different models and estimators due to its varieties and the focus of analysis. In this study the panel data is short, because the time line is relatively short and the number of firms is larger. Additionally, as lagged dependent variable is considered, the special case of an autoregressive distributed lag (ADL) model – partial adjustment model is well fitted in this study. The estimation methods are applied to above models and the examinations are based on four different estimators provided for the capital structure model in prior work. This includes the pooled ordinary least squares (OLS) (Kayhan and Titman, 2007), the fixed effects (FE) estimator (Flannery and Rangan, 2006), the instrumental variable estimator (Huang and Ritter, 2009) and the Blundel-Bond (1998) system generalized method of moments (GMM) estimator (Lemmon *et al*., 2008). Out of these the system GMM estimator appears to perform best (Flannery and Hankins, 2013) as it corrects for the endogeneity introduced by estimating a panel model with a lagged outcome as a regressor and captures firms' financing decision from previous years which reflects the time varying behaviour in the presence of adjustment costs. As it is more complex than all other estimators, its explanation is the longest one.

The rest of this chapter proceeds as follows. Section 2 and 3 provides both sides of panel data and the choice of estimation methods (i.e. OLS, FE and GMM). It summarises motivation, model specifications and raised limitations. Section four discusses the possible estimation methods in recent empirical capital structure research and generates the motivation of selections for partial adjustment model. Section 5 describes the measurement and explanations for the hypothesis of the included variables. Section 6 particular attention is paid to issues raised by the econometric analysis and includes bias and its solutions. Section 7 introduces the sample selected and the various sources where the data collected. Section 8 presents the conclusion.

3.2 Panel Data Models and the choice of estimation methods

3.2.1 Evidence from prior studies

Linear regressions are broadly applied for the capital structure research to investigate how explanatory variables explain the variations in the debt ratio. The Ordinary Least Squares (OLS) estimator is among the most commonly used methods over the last five decades. Noulas and Genimakis (2011) test the OLS is an appropriate estimation technique with a comparatively high degree of explanatory power to evaluate the impact of determinants of capital structure in Greece. They extend the analysis by employing the nonparametric Kruskal-Wallis test and Monte Carlo simulation to verify the relationship between gearing and the institutional-level variable due to expected deviations from normality in the leverage ratio. They also suggest that the dynamic panel data model could be a better option for the temporary deviations from the optimal capital structure in terms of shocks and other random changes. Talberg *et al*. (2008) apply OLS for separate regression model for each industry to detect the possible disparities of the impact from different business and then pool industries in one regression. Bevan and Danbolt (2004) analyse UK firms by using an FE model, but the results obtained contradict with estimates of that from a pooled OLS regression. Their OLS estimates are in line with those reported in earlier studies, but they argue that potential bias may stem from the exclusion of firm-specific and time-invariant heterogeneity. Considering the data across firms and over time, Chen (2004) employs an OLS regression model complemented by FE and RE models. The results show a rejection of both static trade-off theory and pecking order theory. Cassar and Holmes (2003) utilise the OLS regression and claim that longitudinal studies provide better insights into the financial choices of the firm owing to the panel nature of the dataset.

They point out the possible disadvantage of a lack of data points over time, which tends to produce large standard errors and therefore results in less efficient estimates.

Above all, linear regressions, especially OLS, estimations on panel data are widely applied in prior literature. However, it is not the only method used as it limits the consideration of unobservable individual effects that reduce the efficiency of the obtained estimates and also impose limitations in explaining the dynamics of capital structure choices. The most frequent combination is the OLS in one form or another complemented by a FE model. The next sections provide evidence of OLS and FE, and present the relevant methodology applied.

3.2.2 Panel data models and its advantages

The crucial feature of panel data is that it measures units as cross-sectional data, which refers to *n* firms, but can be extended over a period of time *t*. This leads by definition to larger datasets and, due to the larger amount of information of each observation contains, increases the efficiency of the obtained estimates, i.e. the standard errors are lower comparing to those of cross-section datasets (Hsiao, 2003).

Furthermore, when compared to time series or cross-sectional data, panel data allows the inclusion of dynamic dimensions. This makes sense when the dependent variable at time *t* is influenced by its past value, e.g. at *t*-1, and hence reduces the explanatory power of exogenous regressors. As a result, estimates can be expected to be most efficient when significant lagged variables are included. Comparing with a cross-sectional data, panel data provides a more precise inference of model parameters, because they have more degrees of freedom and, in addition, there are more sample variability resulting from inter-individual differences and intra-individual dynamics (Hsiao *et al.*, 1995). There is also the possibility to obtain a more precise description for each individual by pooling the data. Hence, considering that there are similar conditions on certain variables, panel data help understanding one individual from observing others. Hsiao *et al.* (1993) suggest that by replacing the observation which is in question with the data on other similar individuals as supplement can result in a more accurate output.

Additionally, panel data are more powerful in constructing and testing compared to a single cross-section or time series data. Panel data can capture the changes at individual level while cross-sectional data are not able to differentiate the sequential observation in different subintervals of the cycle over the time period. In addition, panel data reduces the omitted variable bias result from the effects of unknown explanatory variables. In terms of the estimation of time-adjustment pattern, according to Pakes and Griliches (1984), the inter-individual differences in panel data reduce the possibility of high collinearity between current and lagged variables. Although most studies using panel data do not use the dynamic models, the inclusion of lagged dependent variables can be highly beneficial.

On the other hand, there are also challenges when applying panel data. Although panel data allows us following the same individual over a certain time period, it is inappropriate to conclude that different proxies follow the same trends. The analysis becomes more difficult when non-linear or dynamic models are involved. In practice, missing values from panel data sets can lead to a problem when there are no alternative options except dropping the missing observations from the sample.

3.2.3 The Ordinary Least Squares and its assumptions

The OLS estimation is the first attempt as it is the most basic procedure and, according to the Gauss-Markov theorem, it is the best linear unbiased estimator (BLUE) (Koop, 2008). The notion of the 'best' is that there will be none better than OLS as it provides the smallest variance in the estimates. 'Unbiased' implies the minimum distance between the sampling distribution and the whole observation. 'Linearity' refers to a constant change in dependent variable when there is only one-unit of change in an explanatory variable. This is identical to all the classical linear regression models. However, OLS is as a special case and subject to a series of assumptions that need to be met. According to Hayashi (2000), there are five underlying assumptions of the classical linear regression model and these are presented in the subsequent sections.

1) The linearity assumption

Linearity refers to the relationship between dependent variable y – the left hand side of the Equation (1) – and independent variables – the right hand side of the Equation (1) – are linear and correlated with each other. In general terms, the linear model is specified as:

$$y_{it} = \beta x_{it} + \varepsilon_{it} \quad (1)$$

where i $(i = 1, \dots, n)$ represents the individual firms or countries and *t* denotes the time period. β is the unknown parameter which is estimated from the marginal and partial effects of the regressor x_{it} in time t for individual i. ε_{it} is the unobserved error term or residual resulting from a randomly distributed noise or disturbances factors of the observed individuals. By definition, β is constant for all i and t and is the standard assumption that can be defined as:

$$y_{it} = \alpha + \beta x_{it} + \varepsilon_{it} \quad (2)$$

Here, α captures the effects that all individuals i have in common and is stable over time t, and hence gives the intercept. Accordingly, *t* is assumed to be identically and independently distributed (i.i.d.) for all *i* with the expectation of mean zero and variance (Greene, 2002). The linearity implies that the marginal effect does not depend on the level, i.e. past values, or regressors and the error term represents that part of the dependent variable that cannot be explained by the included regressors. Due to several possibilities of transforming variables, the linearity assumption is a rather weak assumption.

2) The strict exogeneity assumption

The second assumption is strict exogeneity which entails that the following function is a constant of value zero. This is a conditional mean on the regressors for all observations: $E(\varepsilon_i|x) = E\ (\varepsilon_i|\ x_1, \dots, x_n) = 0;\ i = 1, \dots, n$. Firstly, this assumption implies that the unconditional mean of the error term is zero and stems from the basic law of the total expectation probability theory: $E(\varepsilon_i) = 0;\ i = 1, \dots, n$. Secondly, if the cross moment $E(xy)$ of two random variables x and y is zero, this means that x is orthogonal to y or vice versa. Since $E(x_{jk}\varepsilon_i) = 0;\ \ i, j = 1, \dots, n; k = 1, \dots K.\ \ x_{jk}$ is an explanatory variable, k is the dimensional vector implies that the effects of a change in x_{jk} are identical for all units and all time periods. However, the average rank for unit i may be different from that for unit j (Hayashi, 2000).

Under strict exogeneity, the regressors are orthogonal to the error term for all observations which includes the error term from the same observation and from the other observations. Thirdly, when the mean of the error term is zero, the othogonality conditions are equivalent to the zero-correlation condition. Therefore, strict exogeneity requires the regressors to be uncorrelated with the error term.

3) Spherical error variance

This assumption indicates that there is no conditional heteroskedasticity and no serial correlation between observations' error terms. The homoskedasiticity assumption states that the variance of error terms is constant and can be described as: $Var(\varepsilon_i|X) \equiv E(\varepsilon_i^2|X) - E(\varepsilon_i|X)^2 = E(\varepsilon_i^2|X)$. Due to strict exogeneity, this condition can be stated equivalently in a more familiar expression. Consider the conditional variance, which is equivalent to the requirement that $Cov\left(\varepsilon_i, \varepsilon_j|X\right) = 0;\ i, j = 1, \ldots, n; i \neq j$. Therefore, the error terms are uncorrelated with each other, meaning that there is no serial correlation in the error term.

4) No perfect multicollinearity

OLS assumes that the regressors are not perfectly correlated with each other. Statistically, it means that the rank of the $n \times k$ data matrix, X is k with probability 1. A low t statistics and high p-values can be the signal of a multicollinearity problem. Since multicollinearity leads to the insignificance of the correlated variables, it is less serious as long as the estimates are significant, because it merely reduces rather than increases the standard error.

5) Other assumptions of the model

Hayashi (2000) suggests the consideration of additional assumptions that refer to the properties of regressors and error term. First, the error term is normally distributed and, second, the regressor is fixed and is not a random variable. Accordingly, the above assumption of OLS, especially for small sample OLS, cover the linearity, strict exogeneity, strict multiconlinearity, spherical disturbance and includes the conditional homoskedasticiy with no serial correlation. The latter is also referred to as autocorrelation or autoregressive disturbances of order m (AR(m)). Hence, the error term has to follow a normal distribution with zero mean, constant variance and uncorrelated with any independent variable. When either of these assumptions is violated, OLS is no longer the best linear unbiased estimator anymore.

The OLS estimator is applied in both finite sample and infinite samples. Finite sample OLS is with smaller sample and with stricter assumptions while infinite sample OLS investigates the statistical properties when the sample size is infinite. Accordingly, the efficiency increases with the number of observations, which makes OLS an asymptotically symmetric estimator. Hayashi (2000) states that the number of observations in large sample OLS has to be equal or greater than 30. Comparing with small sample OLS, the infinite sample OLS becomes increasingly popular because the assumptions of small sample OLS are very strict. The strict exogeneity assumption requires that all the explanatory variables have to be orthogonal to the disturbance. In a time series model, for instance, this requires that the explanatory variables are uncorrelated with all past, current and future values of the error term. However, in large sample OLS, the estimation demands only the orthogonality between the explanatory variable and the current disturbance. In addition, it does not require the Gaussian distribution of the error term as small sample OLS does. Furthermore, it is necessary but difficult to derive the exact distribution in small sample OLS, but in large sample OLS, the asymptotic distribution is sufficient and relatively simpler to calculate. Finally, infinite sample requires the sample to be ‘the larger the better’ as the number of observations it supposed to come close to infinity.

3.2.4 Pooled OLS model

A pooled ordinary least squares (POLS) estimation is the result of an increase in the number of observations by merging the data across sections and time into one ‘long’ dataset (Wooldridge, 2010). This approach is based on the assumption that individuals are sufficiently homogeneous to allow for the transformation of N cross-sections and the respective variations over time T to a dataset that consists of $N \times T$ observations that are 'pooled' together (*ibid*.). As it assumes an error term that mainly results from cross-sectional disturbances, the relevance of the time-dimension is treated secondary and can only be controlled for by including appropriate dummy variables. A distinction between panels with more cross-section units N than temporal units T and more temporal units T than cross-section units N is made by Stimson (1985). While the former is known as 'cross-sectional dominant', the latter is referred to as 'temporal dominant' (*ibid*.). This empirical study is a typical 'cross-sectional dominant' pooled panel as there are 1,195 firms for 15 countries over 13 years. Hence, the basic regression model is established as follows: $y_{it} = x'_{it}\beta + u_{it};\ \ i = 1, \dots, 1195; t = 1, \dots, 13$; where i denotes the cross-section aspect and t represents the time dimension, x'_{it} is a $1 \times k$ vector of observations on k illustrative variables for the i^{th} firm in the t^{th} period, β is a $k \times 1$ vector of parameters; u_{it} is a term of disturbance. As pooled model subsumes time series for several cross-sections, it is characterised by having repeated observations on fixed units. Comparing it with the independent regression model, the pooled regression is more likely to ignore the unobserved heterogeneity or the omitted variables and therefore could affect or be correlated with the explanatory variable, which leads to a biased estimation. Independent regression model on the other hand, are usually not equipped with large scale of samples, thus skipping the joint characteristics between the individual units.

The random disturbance in pooled OLS (i.e. $y_{it} = x'_{it}\beta + u_{it}; i = 1, \dots, 1195; t = 1, \dots, 13$) can be decomposed as $u_{it} = \alpha_i + \varepsilon_{it}$; where α_i denotes the unobservable single effect and ε_{it} represents the error-term, i.e. the remaining disturbance that cannot be explained by α_i. If u_{it} is correlated with the explanatory variable α_i, it is a Fixed Effects model (FE) and OLS is not consistent unless transformed by exchanging ε_{it} as an estimate. If u_{it} is not correlated to any explanatory variable x_{it}, it is Random Effects model (RE).

The weakness of pooled panel data model is due to its unrealistic way the data is aggregated, which considers the data for each firm i as one of the numerous different points in time. Since each firm i has its own origin, pooling the data artificially homogenises observations as they converge to the same value and lose their individual property. This results in one intercept that applies to all observations, whereas FE and RE add more weight to individual firm level properties. Accordingly, the pooled OLS is inconsistent when the FE model is applicable.

The pooled OLS estimator after considering the individual effects model is then:

$$y_{it} = \alpha + x'_{it}\beta + (\alpha_i - \alpha + \varepsilon_{it}) \qquad (3)$$

In this model, time dummies x_{it} is controlling for any time-specific effects that are assumed to be fixed. The above equation is based on a single intercept applicable to all observations and complemented by the individual effect $\alpha_i - \alpha$. To this individual effect the error term is added, which leads to $\alpha_i - \alpha + \varepsilon_{it}$ and is required to be uncorrelated with x_{it} so as to obtain consistent estimates when pooling the data. However, in many circumstances autocorrelation among the error terms cannot be avoided. To verify the existence of the determinants of capital structure in the European firms in this study, the regression model adopted can be written as follows:

$$y_{it} = \alpha_i + \beta_1 x_{1it} + \beta_2 x_{2it} + \beta_3 x_{3it} + \cdots, + \beta_k x_{kit} + \varepsilon_{it} \qquad (4)$$

where y_{it} signifies the firm and time-variant capital structure and x_{it} symbolizes the explanatory variables or regressors of firm i at time t with k-dimensional regressors of the static panel model. Since the pooled OLS does not deconstruct the error term, all individual effects that cannot be explained by the regressors end up in the composite error term.

In summary, pooled model is appropriate or consistent only when it is correctly specified and regressors x_{it} are uncorrelated with the error term ε_{it} (actually, it is only appropriate when $\alpha_i = \alpha$ for all i). However, when pooled data are used, the error term ε_{it} for a given firm i is more likely to be positively correlated over the time dimension t (it is not ε_{it} that is serially correlated, it is $(\alpha_i - \alpha + \varepsilon_{it})$, the composite error term). This induces bias, increases inefficiency and, most importantly, increases the risk of inconsistent estimates resulting from the OLS estimator, which is only BLUE when all above discussed assumptions are satisfied.

3.2.5 Fixed effects model

The FE model is a panel data model that attributes unobserved effects to each individual. According to Wooldridge (2010), these effects are allowed to be arbitrarily correlated with the explanatory variables in each time period. This allows for individual effects the estimation thus become more effective than the OLS regression. It is crucial for the analysis of the panels where the effects of variables vary within individuals and makes the FE model appealing. First of all, it has an ability to absorb all across-group movements and is able to control for all stable characteristics of the individuals, which reduces potential bias. Secondly, the FE model allows a limited form of endogeneity as the variables are correlated with a stable part of the disturbance only. Although all time invariant variables are controlled in a FE regression, a FE method will not provide estimates for time invariant variables, because there is no within-variation.

To apply a FE model, there are two important requirements for the data sets. The first requirement refers to the number of measurements on the dependent variable, which minimum is two. The second requirement is the need for a difference in the measurement of the independent variables. This forms the basis to identify the individual effects denoted as α_i and refers to the unobservable individual factors noted earlier. These are identified for each individual and are treated as a time-invariant constant. Hence, the FE model can be expressed as follows:

$$y_{it} = \alpha + x_{kit}\beta_k + Z_i\gamma + \alpha_i + \varepsilon_{it} \quad (5)$$

Where α is a constant term, $x_{kit}\beta_k$ is estimated by both the FE and RE model, because they are time variant factors. However, the time invariant dimension $Z_i\gamma$ represents can only be included in the RE model. This is because the FE already treats each individual as distinct and therefore results in multicollinearity when both time-invariant effects and α_i are part of the right hand side. Hence, α_i is the unobserved individual effect for each individual and therefore correlated to some extent with the regressors x_{kit}, which permits a partial form of endogeneity, $E(\alpha_i|x_{it}, Z_i) \neq 0$. ε_{it} represents the random or idiosyncratic error term and is part of the composed disturbance factor u_{it}, which equates to $\alpha_i + \varepsilon_{it}$, which is allowed to be correlated with the time-invariant element of the error term α_i. However, the time variant model component x_{kit} is expected to be uncorrelated with the error term component ε_{it} as it would otherwise imply an endogeneity problem. Since the FE estimator is – as much as the OLS estimator – asymptotic efficient, an increase in the number of observations increases its efficiency.

There are certainly some limitations when applying the FE model. As anticipated, FE models are unable to estimate coefficients when observations do not vary within a given dimension. Since the estimation builds on the first-difference model, it requires observations to vary within the variables and refers most commonly to the time dimension – the FE model is therefore also known as within estimator. Accordingly, time-invariant dimensions are excluded as they are 1) put on par with the individual effects and 2) do not allow taking the first difference because the difference is zero. Although the interest of the FE model lies in the estimation of the β coefficients, it needs controlling for the incidental parameters α_i.

Another potential downside of the FE model is that the effect of variables cannot be assessed when they have little within-group variation. This particularly applies when the size of sample that does not change from one time period to the next. In this case the FE estimation should be avoided, but this may lead to potential omitted variable bias and there is currently no solution to this dilemma. Moreover, the inclusion of individual effects means that the number of individual effects equates to the number of the observations, which imposes limitations to the computation. This not only restricts the number of observations that can be computed, but also absorb the explanatory power of the function. Since all individual effects are unknown, they need to be estimated and hence add uncertainty to the model. Such uncertainty is reduced when balanced data is used, which means that data are available for the entire sample period for each observation.

FE regressions are essential when certain data fall into categories such as industries and countries, with distinct characteristics for each individual. With such categorical data it is possible to control for characteristics that are expected to affect the dependent variable. Since it is difficult to include all the relevant control variables, the existence of unobservable factors might result in omitted variable bias. When these unobservable factors are time-invariant, the FE model eliminates omitted variable bias. However, when these effects are time variant, the omitted variable bias persists as long as it is merely the (constant) individual effect the FE model is able to capture. When all theoretically relevant control variables are included, it is likely that the unobservable factors are an unavoidable disturbance and not the result of variables that remained excluded. The nature of the unobservable factors implies that it is never certain to firmly confirm that the omitted variable bias does not exist. Therefore FE regression is an effective precaution even when there is a low possibility that variables have been omitted.

To sum up, panel data can be processed in different models and estimators due to its varieties and the focus of analysis. The static panel is commonly discussed as ‘panel’ model whilst dynamic panel data model (DPD) is usually including the lagged dependent variables that considering the modelling of a partial adjustment mechanism (Baum, 2006). POLS estimation will be applied to address the defined research questions, which will also allow analysing the dynamics of the change at an individual level. The general form of the model can be specified as:

Capital structure = f (market timing, profitability, firm size, tangibility, volatility, growth opportunities, liquidity, dividend pay-out ratio, industry dummy, year dummy)

where the capital structure proxies are sub-sectioned as total debt, long-term debt and short-term debt or market leverage and book leverage respectively. Given that in this thesis short unbalanced panels are utilised and both static and dynamic panel model developed, all available estimators (OLS, FE, GMM) are used. However only the most efficient ones are applied and reported in the empirical chapter.

3.3 The Generalized Methods of Moments (GMM) estimations

3.3.1 GMM estimators applied in prior studies

GMM estimators, in particular system GMM, gained popularity in recent research for dynamic panels because it provides feasible and efficient estimates for dynamic panel models. Ozkan (2001) expect that both observed and unobserved shocks could have an impact on firm’s financing decision as well as affecting other explanatory variables.

Given the endogeneity problem that raised in the model, Ozkan (2001) use GMM to mitigate the problem by controlling for firm-specific effects and time dummies. De Miguel and Pindado (2001) also adopt the GMM panel model to investigate how capital structure moves towards its optimum and estimate the adjustment speed captured by a time- and firm-constant coefficient. Drobetz and Wanzenried (2006) benefit from the partial adjustment model with lagged capital structure and speed of adjustment. They start estimating with first difference GMM, where the levels of all right-hand side variables are the second lags as instruments. Subsequently, a one-step GMM estimator is applied to cross-validate the estimates with heteroskedasticity adjusted standard errors. Further, as a two-step GMM is employed, they conclude that faster growing financially constrained firms adjust faster.

Gaud *et al*. (2007) suggest that a dynamic panel data model is the better tool to observe the changing financial behaviour. GMM and instrumental analysis is therefore applied. Second order correlation between error terms of the first-differenced equation can distort this method and therefore Arellano and Bond (1991) develops the two-step GMM estimator that exhibits consistent results even when there is a heteroskedasticity problem. With the focus on Portuguese firms, also Serrasqueiro and Nunes (2010) applied GMM whilst taking AR(1) disturbances into account.

3.3.2 The main motivation of GMM estimation

Endogeneity

The generalised method of moments (GMM) has the advantage of lower bias and higher precision when endogeneity is present (Hansen, 1982). Endogeneity is one of the most tedious problems in econometric research, can be treated in such estimation without the need to search for additional instrumental variables outside the model. In this thesis, normative firm characteristic factors that affect capital structure can also have a relationship among each other and therefore is potentially endogenous. Despite increasing inefficiency, ignoring the endogeneity problem would lead to inconsistencies.

Roberts and Whited (2012) indicate that this confrontation mainly results from the circumstances where there are omitted variables, measurement error and simultaneity. Omitted variables errors occur when one of the key determinants of dependent variables is missing although it should be included. This leads to biased results, because an essential element of the equation that explains the dependent variable is likely to result in a correlation of all explanatory variables. Simultaneity bias arises when there is reverse causality from the dependent variable and hence is a determining factor of independent variables. Measurement error results from the difficulties in quantifying variables or using incorrect proxies for unobservable factors that influence either dependent or independent variables.

It is therefore important to discuss the identification and treatment for endogeneity. Instrumental variables assist in resolving said endogeneity problem when strict exogenous substitutes are available. When correlated to the variable of primary interest whilst being unaffected by the dependent variable, i.e. uncorrelated with the error term, instrumental variables resolve econometric problems, but such substitutes are rare and their identification is challenging. As the existence of a perfectly correlated instrumental variable is unlikely, the only alternative is to search for a variable that shows some correlation with the variable of primary interest. However, the use of inappropriate instruments often referred to as weak instruments, bear the risk of producing biased and inconsistent coefficients that may too lower efficiency levels. In the event of fewer instrumental variables than predictors, the estimating equations are considered as under-determined, which leads to an under-identified equation. When the number of instrumental variables equates to the predictors, the equation is ‘just identified’. Accordingly, when the number of instrumental variables exceeds the number of the predictors, it is likely that the equation is over-determined and, therefore, leads to an over-identified structural equation (Murray, 2006).

Accordingly, the limitation of instrumental variables analyses is a strong motivation to apply GMM estimators. Roberts and Whited (2012) warned that the endogenous may be found in more than one regressors, which results in even more difficulties in finding a strictly exogenous instrument and the bias of the validity of the IV parameter estimates due to the instrument are associated only with the variation in the endogenous variable.

Unobserved heterogeneity

Another hazard with which the proposed estimators might be confronted is the presence of the fixed individual effects, i.e. unobserved heterogeneity. As discussed above, in equation (5), α_i is the unobserved individual effect for each individual and therefore correlates to some extent with the regressors x_{kit}. The omitted variable might have an impact on both left and right hand sides of the regression model. Explanatory variables will be correlated with errors, hence regression coefficients will be over- or underestimated. The treatment of firm-level unobserved heterogeneity is GMM estimators (Arellano and Bover, 1992; Blundell and Bond, 1998) which are designed for such situation, while FE estimates will suffer. In this study, the FE regression naturally cancels out the majority of the cross-sectional differences across firms; the preserved time series variation in firms' financing policy can be sticky, and therefore this estimation uses inflated t-statistics. A dummy variable which is able to sort by each year is thus included in the model, and this combines the time- and firm-fixed effects, and controls for the variables that vary over time but that are constant across firms. The omitted variable bias can therefore be avoided, due to being from unobserved variables that are either constant over time or across firms. The results obtained from the FE suffer from a downward 'Nickell Bias' on the estimate of the lagged dependent variable, leading to an overestimation of the other explanatory variables, which is a particularly serious problem for short panels (Nickell, 1981). This analysis utilises the two-step system GMM, in order to overcome any inefficiencies that may arise if the FE model had been used.

3.3.3 GMM estimation: assumptions, moment restrictions and identification

The assumptions of GMM estimation are similar to those of large sample (asymptotic) theory in OLS. The assumptions for both difference and system GMM estimators required for the data generating process are the linearity, the ergodic stationarity[1], the

[1] Stationarity defined as a property if the population average remains unchanged over time. The property of an erogdicity is defined in terms of the probability of invariant event (Hayashi, 2000).

predetermination regressors and the rank condition[2] (Hayashi, 2000). Roodman (2009b) clearly structured at least six assumptions for the application of GMM. First of all, the panel data set that is employed in the GMM should be short panel, which means that there are fewer time periods but a large number of individuals. Secondly, there is a linear relationship between the observations. Thirdly, it requires a single dynamic dependent variable that depends on its own lagged variable. In addition, the independent variables that are correlated with either past or possibly current error term, hence, GMM does not require the strict exogeneity assumption as OLS does. Further, it allows for the existence of arbitrarily distributed FE, where time variations can be used to identify parameters in the panel data. Moreover, it accounts for heteroskedasticity and serial correlation within but not between individuals. The great advantage of this estimation is that the regressors do not need to be strictly exogenous and stochastic error term[3], which makes the model more applicable and robust. Finally, it utilises the internal instruments based on lags of the instrumented variables. This eases the pressure to look for 'good' instruments outside the immediate dataset and hence increases the validity of the obtained coefficients. It is worth noting that some regressors can be predetermined instead of strictly exogenous, the estimators allow the inclusion of external instruments (*ibid.*).

Identification is the minimal requirement for consistency that makes GMM a good estimator. However, only in the case that when the parameters of the relationships are exactly or just identified, the moment restrictions imply a single GMM estimator for each, it provides a consistent estimation. In the face of underidentification, when there are fewer restrictions than parameters to be estimated, the therefore do not have the property of consistency. When there are more moment restrictions than necessary to estimate the parameters consistently, the parameters that are estimated are considered as overidentified. Although GMM is a common strategy to achieve consistency when the

[2] According to Hayashi (2000), the rank condition is for identification, to guarantee that there is a unique solution to the equation. This is a necessary condition to ensure that the number of equations is greater than or equal to the number of unknowns and this is the order condition for identification. This can be interpreted into 1) the number of predetermined variables that are greater than or equal to the number of regressors; or 2) the orthogonality conditions is greater than or equal to number of parameters; or 3) the number of orthogonality conditions are greater than or equal to parameters. This condition determines the identification of the parameters.

[3] Stochastic error refers to an estimation error that causes misspecification in the model when an essential explanatory variable is missing or the examined relationships are incorrect (Peter and Terry, 1997)

exogeneity assumption is violated, it is not generally asymptotically efficient and therefore not preferred in such case either.

3.3.4 The difference GMM estimator (Arellano-Bond estimation) and system GMM estimator (Arellano-Bover/Blundell-Bond estimator)

Hansen (1982) proposed the difference GMM estimator which is a progress of transforming all regressors by differencing the function. This progress can remove the individual effects of the data and can therefore be transformed as follows:

$$y_{it} = \beta_1 y_{i,t-1} + \beta_2 k_{it} + \beta_3 X_{it} + u_{it} \quad (6)$$

$$y_{i,t-1} = \beta_1 y_{i,t-2} + \beta_2 k_{i,t-1} + \beta_3 X_{i,t-1} + u_{i,t-1} \quad (7)$$

With the FE swept out, the constant term is removed as well. The first difference transformation is retrieved from the Equation (6) minus Equation (7) shown as follows:

$$y_{it} - y_{i,t-1} = \beta_1 y_{i,t-1} + \beta_2 k_{it} + \beta_3 X_{it} + u_{it} - (\beta_1 y_{i,t-2} + \beta_2 k_{i,t-1} + \beta_3 X_{i,t-1} + u_{i,t-1})$$

$$\Delta y_{it} = \beta_1 \Delta y_{i,t-1} + \beta_{2\Delta} k_{it} + \beta_3 \Delta X_{it} + \Delta u_{it} \quad (8)$$

From the equation above, the dependent variable $y_{i,t-1}$ is still correlated with the disturbance Δu_{it}, and this is a first-order moving average process, MA(1). The null hypothesis in the Arellano and Bond (1991) estimation is *no* autocorrelation and is applied to the differenced residuals. Hence, it is necessary to test for AR(2) in first differences. It detects autocorrelation in levels and is also necessary to test the overidentification and absence of the serial correlation of the residuals. There is also the possibility that the lagged levels of the regressors are poor instruments for the standard first-differences GMM estimator, hence, system GMM should be considered.

System GMM estimation is developed by Arellano and Bover (1995) and Blundell and Bond (1998), by additionally assuming that first differences of instrumenting variables are uncorrelated with the FE. The basis of system GMM tests on two structural equations, which are the original equation and the transformed one. This levels equation in system GMM is to obtain a system of two equations: one differenced and one in levels (Anderson and Hsiao, 1982). Additional instruments are obtained when the second equation is added joined. The efficiency increases because variables in the levels of the second equations are instrumented with their own first differences. It is therefore claimed to be more flexible and superior than any other estimators analysed due to its ability to reduce the bias and improve efficiency (De Soto, 2009). Without a particular specification, one-step GMM estimators are normally calculated as the default in practice. However, in order to control the heteroskedasticity and panel-specific autocorrelation, the two-step GMM estimator can be applied to correct the covariance matrix.

3.3.5 The strengths of GMM estimation

In this thesis the Arellano-Bover (1995) and Blundell-Bond (1998) system GMM estimators are applied and this methodological choice is based on its superior features and ability to resolve the drawbacks comparing with other models. Due to the potential measurement errors may appear when estimating the equation. This refers in particular to the endogenous variables x_{it}, where interactions between dependent and independent variables occur. For example, profitability can be an endogenous variable as the profitable firms may have more debt and vice versa. Therefore, it can be suspected that a correlation between regressors and the error term exists. Not only are the exogenous instruments listed above added, but also the lagged levels of the endogenous regressors. Importantly, this approach transforms the endogenous variables as pre-determined and they are not correlated with the error term in equation.

The FE approach allows to split the composite error term u_{it} included in Equation (7) into unobserved country-specific effects v_i, which refers to each individual, and the random error ε_{it} (Mileva, 2007). The error component is therefore $u_{it} = v_i + \varepsilon_{it}$. The difference GMM transformation equation uses first-differences. As long as it does not vary with time, the regressor can be transformed by first differencing the fixed country-specific effects (*ibid.).* Therefore after the fixed effects is removed, from Equation (7), after differencing, the results are as follows:

$$u_{it} = v_i + \varepsilon_{it}$$

$$u_{it} - u_{i,t-1} = v_i + \varepsilon_{it} - (v_i + \varepsilon_{i,t-1}) = \varepsilon_{it} - \varepsilon_{i,t-1} \qquad (10)$$

Therefore, the equation becomes as following:

$$\Delta u_{it} = \Delta u_{it} + \Delta \varepsilon_{it}$$

In addition, the serial correlation can appear as a result of the dynamic panel which presents the lagged dependent variable $\beta_1 y_{i,t-1}$. This problem is the first-differenced lagged dependent variable. To solve this problem, it can also be instrumented with its past levels.

Finally, in this thesis, the GMM estimator best fits this setting of panel dataset which has a short time dimension ($T = 13$) and a relatively larger cross sectional dimension ($N = 1195$). As illustrated above, the Arellano-Bond estimator is specifically designed for panels consisting of small T and large N. The Arellano-Bond estimator is not appropriate for large T panels as the correlation of the dependent variable with the error term that holds the cross-sections fixed effect, varies along with time (Roodman, 2009b). Therefore, GMM estimators are selected for the current research due to its validity, suitability, reduced bias and improved efficiency.

3.3.6 The weaknesses of GMM estimation

To begin with, the weakness of the difference GMM estimator appears when it is hard to reject non-significance when estimators are indeed different from zero. Further, when many instruments are included in the system GMM relative to the difference GMM, the GMM estimator is not an appropriate approach when the number of observations is small. This is because the Sargan or Hansen test may exert weak results when the number of instruments is larger, relative to the number of firms in this study. Moreover, an additional assumption is required when there is an FE included in the equation in levels. This assumption is that first-differenced instruments applied as the variables in level are uncorrelated with v_i and therefore uncorrelated with the FE. Whether the instruments should be considered only in the first-difference equitation or in the level equation can be specified (Roodman, 2009b). In addition, there is an underappreciated problem that arises in the application of both difference and system GMM: instrument proliferation and weak instruments. Instrument proliferation happens when the instruments are ‘numerous’ and ‘suspect’ in system GMM, therefore “overfits endogenous variable even as it weaken the Hansen test of the instruments’ joint validity” (Roodman, 2009a:135). This particular problem is discussed in Tauchen

(1986), Altonji and Segal (1996), Andersen and Sørensen, (1996), Ziliak (1997) and Bowsher (2002). Weak instruments arise when the instruments are weakly correlated with the included endogenous variable. It is a common problem in empirical research because in search of the relevant but strictly exogenous instruments are rather difficult. Lastly, as illustrated above, there are different types of endogeneity. It is not certain that GMM can tackle all kinds of endogeneity, but nonetheless addresses a number of issues that would otherwise lead to inconsistent estimates.

3.3.7 The model specification of GMM estimation

To identify the impact of the determinants of capital structure in a panel dataset of 15 European countries over a sample period of 13 years (2000-2012), the resulting model specification is:

$$y_{it} = \beta_1 y_{i,t-1} + \beta_2 k_{it} + \beta_3 X_{it} + u_{it} \tag{11}$$

$$i = 1, \ldots, 1195; t = 1, 2, 3, \ldots 13$$

According to the above equation, y_{it} is the dependent variable represented by the debt ratio as a percentage of total debt to total assets. The first term on the right-hand side, $y_{i,t-1}$, is its lagged value and implies that the current debt ratio is a function of its past value. k_{it} is a matrix of FE variables that vary across individuals and over time, while x_{it} is a collection of the following control variables that vary in accordance to the nature of the empirical chapters.

3.4 Partial adjustment model and the choice of estimation methods

This study makes use of an ADL model and a specific case of ADL model, which is the partial adjustment model. First speed of adjustment study can be traced back to Spies (1974). Taggart (1977), Jalilvand and Harris (1984) and Auerbach (1985) find out that the estimates of the adjustments speed fluctuate largely. Jalilvand and Harris (1984) find faster capital structure adjustment speed than the conclusion yields from Taggart (1977) that annual long-term debt adjustment speeds. Most recent discussions regarding speed of adjustments conducted by Bond (2002), Lööf (2004), Drobetz and Wanzenried (2006), Flannery and Rangan (2006) and Lemmon *et al*. (2008) and the partial adjustment model is their chosen estimation method. The derivation of this partial adjustment model is as follows. Equation (12) defines the linear relationship between the optimal leverage ratio, TLR_{it}^{*} of firm i at time t, and a set of N explanatory variables X_{jit} (where $j = 1, 2, \dots, N$) that have been investigated in the prior work of cross-sectional capital structure:

$$TLR_{it}^{*} = \sum_{j=1}^{N} \alpha_j X_{jit} \qquad (12)$$

This tests firms' speeds of adjustment to generally examine changes in leverage ratios rather than issuance and repurchase choices. Hence it is necessary to integrate the dynamism in the above equation, which takes into consideration that the target leverage ratio varies. The observed leverage ratio TLR_{it}, of firm i at time t is defined as the optimal leverage ratio, which is $TLR_{it} = TLR_{it}^{*}$. The purpose of Equation (12) is to provide an estimate of each firm's optimal leverage ratio, which is defined as the debt ratio that firms would choose in the absence of information asymmetries, transaction cost and any other adjustment costs (e.g. Hovakimian *et al.*, 2001; De Miguel and Pindado, 2001). However if adjustment is costly, firms may not fully adjust their actual debt ratio from the previous period to the current optimal debt ratio. The notion of partial adjustment is formalized as follows:

$$TLR_{it} - TLR_{it-1} = \delta_{it}(TLR_{it}^{*} - TLR_{it-1}) \qquad (13)$$

Where δ_{it} represents the adjustment speed that is restricted by its costs to the target leverage ratio TLR_{it} and TLR_{it-1} denotes the leverage ratio of the previous year. The adjustment costs $|\delta_{it}| < 1$ and implies that $TLR_{it} \rightarrow TLR_{it}^{*}$ as $t \rightarrow \infty$. On the other side, when $|\delta_{it}| = 1$, the adjustment occurs at the fastest speed where the current observed leverage can become equal to firms' optimal leverage. Nevertheless, in reality, the expected value of $|\delta_{it}|$ stays below 1, because of the existence of adjustment costs. Hence, firms accept a gap between current and target leverage ratio and therefore do not fully adjust from period $t - 1$ to period t. In rare cases, firms over-adjust their capital structure so that they exceed their optimum. In this case, $|\delta_{it}|$ is greater than 1 and Lööf (2004) interpret it as an unexpected disruption originating from the macro-economic environment.

Previous studies provided evidence that the long-term adjustment process determines the speed of adjustment of firms' capital structure externally (e.g., Jalilvand and Harris, 1984; Shyam-Sunder and Myers, 1999). In contrast, the proposed model follows Drobetz and Wanzenried (2006), Hovakimian *et al*. (2001) and De Miguel and Pindado (2001), where firms adjust to a target leverage ratio that is not determined externally, but internally by including it in the model. The optimal leverage ratio becomes a linear function of determining factors of capital structure and is specified in Equation (12). Below the formula that describes this linear relationship between the speed of adjustment δ_{it} and the constant β_0 plus the time-variant firm-specific component Z_{it} and its coefficient β_1, while δ_{it} is assumed to be firm-specific and dynamic:

$$\delta_{it} = \beta_0 + \beta_1 Z_{it}. \tag{14}$$

It reflects the relationship between the individual effect of each determinant, denoted by Z_{it} and the speed of adjustment is a scalar rather than a vector and therefore offsets the effects of multicollinearity. Accordingly, the nature of Z_{it} changes with the determinants it represents. It is time-variant when it represents firm-specific determinants, but time invariant and not firm-specific when being based on macroeconomic factors.

The following equation is rearranged and based on the optimal adjustment model defined in Equation (13). Firstly, the optimal leverage TLR_{it}^* is presented as a linear function of the determinants of the capital structure. Secondly, after replacing δ_{it} with its determinants, it can be shown as:

$$\begin{aligned} TLR_{it} &= (1 - \delta_{it})TLR_{it-1} + \delta_{it}TLR_{it}^* + u_t \\ &= (1 - \beta_0 - \beta_1 Z_{it})TLR_{it-1} + (\beta_0 + \beta_1 Z_{it})\left(\sum_{j=1}^{N} \alpha_j X_{jit}\right) + u_{it} \end{aligned} \tag{15}$$

where u_t is the idiosyncratic error term with an expected mean of zero and constant variance, therefore it is uncorrelated to any regressor. Multiplying Equation (15) out, Equation (16) is obtained and is central element of the empirical investigation:

$$\begin{aligned} TLR_{it} &= (1 - \delta_{it})TLR_{it-1} + \delta_{it}TLR_{it}^* + u_t \\ &= (1 - \beta_0 - \beta_1 Z_{it})TLR_{it-1} + (\beta_0 + \beta_1 Z_{it})\left(\sum_{j=1}^{N} \alpha_j X_{jit}\right) + d_t + \eta_i + u_{it} \end{aligned} \tag{16}$$

where d_t is time-specific and η_i a firm-specific effect respectively. Therefore, the firm-specific η_i is unobservable, but a significant relationship with the optimal leverage ratio is assumed. These disturbances difference across firms but are fixed for a given firm over time. In contrast, the time-specific effects vary over time but are the same for all firms in a given year, capturing mainly economy-wide factors that are outside the firm's control. Nevertheless, there is a risk that the time-specific model component cancels out the explanatory power that comes from macroeconomic effects. Hence, it is necessary to include macroeconomic forces in Z_{it} so that less explanatory power is attributed to the time-specific effect in d_t.

The main interest in estimating Equation (16) is in β_1. This is a coefficient on the interaction term between Z_{it}, the driving forces of the speed, and TLR_{it-1}, the lagged leverage. The null hypothesis is $\beta_1 = 0$, in this case the firm-specific factors and or macro-economic conditions have no impact on firms' speed of adjustment there is no adjustment made across time and by the firm. But according to Drobetz and Wanzenried (2006), this explanation is true if and only if the estimated coefficient on $(1 - \beta_0)$ is insignificant in the meanwhile. As shown in the Equation (16) the model component Z_{it} has not only an impact on the speed of adjustment to the optimal leverage ratio, it too affects the optimum leverage ratio itself. This equation also shows that the latter varies over time, but for the purpose of this work said dynamism is secondary.

Banerjee *et al*. (2004) and Lööf (2004) apply a non-linear least squares regression to estimate the parameters similar to those presented in Equation (16). However, according to (Drobetz and Wanzenried (2006), this estimation technique produces biasedness and inconsistencies because the error term is correlated with the lagged leverage TLR_{it-1}. Flannery and Rangan (2006) also argue that the speed of adjustment in earlier studies is biased downwards by ignoring firms' FE. Rather, when FE is included, the speed of adjustment increases to almost 38%, roughly three times the magnitude comparing with the results when the FE are neglected. Therefore, due to the unobserved heterogeneity, studies that ignore the FE underestimate the speeds of adjustments. This thesis is consistent with Drobetz and Wanzenried (2006) and uses the dynamic leverage model by controlling for FE *via* first-difference transformation. Yet the inclusion of unobservable firm-specific effects is essential, because TLR_{it-1} will be correlated with

η_i that does not vary over time and a first-difference transformation to eliminate FE introduces a correlation between lagged dependent variable and differenced errors. Therefore the ΔTLR_{it-1} and Δu_i will be correlated through the term TLR_{it-1} and u_{it-1}, whereas OLS produces inconsistent estimates.

Another estimation problem, not necessarily specific to the dynamic specification, arises because the firm-specific variables are unlikely to be strictly exogenous. Shocks that affect the leverage of firms are also likely to affect some of the regressor variables, such as firm profitability and firms' size. Furthermore, it is possible that some of the regressor variables are correlated with past and current value of the idiosyncratic component of disturbances. Moreover, the difference in using of dependent variable could result in such results. Flannery and Rangan (2006) select market leverage as the dependent variable. This market-based variable reflects more the performance of shares rather than the managerial decision. Lemmon *et al*. (2008) argue that book leverage is likely to be a weak instrument for market leverage and thus take a different approach to the estimation. Instead, they estimate the speeds of adjustment using 'system GMM' estimators developed by Blundell and Bond (1998). The authors claim that the speeds of adjustment in the range of 25% for this specification and is the approximate midpoint between OLS and FE. Drobetz and Wanzenried (2006) also apply the one-step GMM for inference on the coefficients for the more consistent results. However in this study, the two-step GMM is applied as it is more asymptotically efficient than one-step GMM (Hayashi, 2000). This is because two-step uses the consistent variance covariance matrix but one-step GMM estimators use weight matrices that are regardless of estimated parameters (Windmeijer, 2004). The two-step standard errors are not biased downwards anymore due to Windmeijer's (2004) correction procedure.

The equations are estimated separately and all coefficients are adjusted for heteroskedasticity. Moreover, the Wald test is used to verify the specification of the target leverage ratio. This refers to the null hypothesis, which expects the coefficients determining the target leverage ratio to be equal to zero. There is a restriction on second order correlation on GMM as well. Second correlation in the differenced residual will make the GMM not consistent and hence the results for the test of second order serial correction in the residual is reported too. With regard to the validity of the chosen instruments, a Sargan (1958) test for the null hypothesis is conducted that the overidentifying restrictions are valid. The test indicates whether these instruments are independent from the residuals.

In line with Baker and Wurgler (2002), this study will trace the impact of the persistence of the past market valuation on the current capital structure. They argue that the lagged leverage has to be included because leverage ranges from 0 to 1, which implies that a leverage close to one of the extremes can only result in a unidirectional move, regardless the value of the explanatory variable. Ignoring the lagged leverage variable could potentially bias all other regressors (Baker and Wurgler, 2002). This study estimates the following specification by applying the two step system GMM:

$$TLR_{it} - TLR_{it-1} = \delta_{it}(TLR_{it}^{*} - TLR_{it-1}) + \beta' Z_{it-1} + \varepsilon_{it} \qquad (17)$$

$$TLR_{it}^{*} = f(X_{it-1}) \qquad (18)$$

where TLR_{it}^{*} and TLR_{it} are the observed and target debt ratios respectively. Z_{it-1} is a vector of firm characteristics intended to determine the target debt ratios and ε_{it} the normally distributed error term. The main focus is on the coefficient δ_{it}, which represents the fraction of leverage 'deficit' for firm i.

3.5 Diagnostic tests and econometric issues

A number of issues that accompany the econometric analysis have been noted in previous sections, but little has been said on possible solutions. There are certainly limitations that cannot be removed as it lies in the nature of the quantitative analysis, but there are also precautions that can and must be taken and are discussed in the next sections.

Autocorrelation

First of all, as panel data is applied, the number of observations is relatively large while the number of years is relatively small. The potential autocorrelation could be a spatial autocorrelation, which results from spillover or neighbourhood effects due to the interconnected economic activities between European countries, such as investment, trading, and capital flows. It can also derive from the misspecification of the error term, which is serially correlated with itself and between the different time periods. There are also possibilities for autocorrelation due to the manipulation of the data or it contains moving average, interpolation or seasonal adjustment within the data. In this thesis, the banking concentration is based on average data. Thus the test that can be used to examine whether the autocorrelation problem is essential are *Likelihood-based testing,* the *Breusch-Godfrey test,* the *Box-Piere and Ljung test,* the *Durbin Watson statistic* and the *Dubin's H-test*.

Missing values

The second common problem is gaps in the data. This could be because the information requested was not provided or does not exist. Incomplete data in the panel could cause observations to be omitted from the analysis; omitted observations means a loss of explanatory power. Accordingly, it is necessary to tackle this 'missingness'. Various methods were conducted to regain some of the information from the non-missing variables in those observations. First of all, many studies opt to drop firms when key data are not available. While the econometric software automatically ignores the missing value, the user might have no intention of losing these data. However, the awareness of the disadvantage of this simplistic method tells that bias can be created when the incomplete data substantially affects the variables of central interest. A second solution is called 'hot deck', which means a selection of a fixed values from another observations with the same covariates. This is not necessarily deterministic if there were many observations with the same covariate pattern. Third solution is simply replacing the gap with the mean of the aggregate value. The fourth solution can result from regression imputation, which replaces a single fitted value.

Outliers

The third confrontation in this study is the existence of outliers. The outlier is an observation that is numerically distant from the rest of the data which can affect the efficiency of the model (Wooldridge, 2010). Although may contain relevant information, major statistical techniques assume that the underlying dataset follows a specific distribution, which properties change when outliers are not treated accordingly. A key distinction in dealing with outliers is to differentiate the parametric (i.e. OLS) from the non-parametric (i.e. Kernel Density) estimation.

The parametric approach is based on the assumption that the relationship between variables follows the predefined functional form and hence the data originates from a parametric distribution. The respective probability density function defines the frequency of each individual contained in the distribution, which means that a low frequency increases the probability of individuals being an outlier. This effect is enforced by the fact that samples and not populations are analysed, where an outlier-effect may even be stronger than it would normally be. The presumed functional relationship of variables is of no relevance for the non-parametric distribution, which functional form is left open. Although not totally free from any definition – there needs to be an assumption which factors might be correlated with each other –, non-parametric models allow for some flexibility how these factors interact with each other (Wooldridge, 2010). It therefore does not necessarily need to be a linear relationship as most parametric models presumes. The Kernel density estimation (KDE), for instance, can estimate the probability density distribution of the dataset and if the estimated density function is high, the reason is unlikely to be an outlier. To verify for the said distribution, this study plot the Kernel density and compares the actual density with the normal density and hence gives an indication to what extent outliers are present. It is further possible to draw graphs to identify the extreme values that lie well outside the norm. Secondly, *Pnorm* can be used as a graphical method to produce the standardized normal probability plot, which is sensitive to the values at the centre of the distribution. To verify for outliers at the tails of the distribution, *Qnorm* plots the quantiles of the residuals and contrasts them with those resulting from a normal distribution. Beside the visual test, there is also a numerical test called Shapiro-Wilk W test (Shapiro,1965). It helps in identifying outliers and gives a p-value greater than 0.05 when residuals are normally distributed.

Test for misspecification of functional form

Parameter stability tests can be used to test the implicit assumption that the parameters are constant over the entire time period. One typical technique is to split the T observation into T_1 observation used as estimation and $T_2 = T_1 - T$ observations to be used for testing and evaluations. Parameter stability tests can be split into two types. One is the F-test for coefficient stability which tests whether the estimated parameters in the two sub-samples are significantly different from each other. The other one is the

Chow test of predictive failure, which tests the parameters estimated over the second sub-sample.

Test for heteroskedasticity

Heteroskedasticiy occurs when the error variance differs across observations. In econometrics the measure used for spread is the variance and therefore heteroskedasticity is the consequence of unequal spread. An equal variance means that the disturbances are homoscedastic. This problem is diagnosed in STATA and fixed with the following methods. When logging some of the variables cannot resolve the problem, explanatory variables can be multiplied with other variables. The VCE robust regression is an option to calculate robust standard errors which will affect only the coefficients' standard errors and interval estimates and does not affect the point estimates. The ANOVA F-test will be suppressed, as will the adjusted R square measure because neither is valid when robust standard errors are being computed. If the assumption of homoskedasticity is valid, the simple estimator of VCE is more efficient than the robust version.

Test for multicollinearity

Multicollinearity exists when there is a correlation among independent variables in the regression. A correlation matrix for explanatory variables can be used for investigation. However, if the correlations are high, it is not hard evidence for the question whether multicollinearity is present. When the correlation between the explanatory variable is greater than 0.5 it is likely that there is a multicollinearity problem and cautiousness is required. Retrieving more data or dropping one of the highly correlated variables are simple but often not a feasible solution to this problem.

3.6 Variables

3.6.1 The basis of financial capital

Firms raise funds from a broad spectrum of types of financial capital, traditionally divided into internal and external finance approaches. Generally, internal finance includes retained earnings, current assets, fixed assets and personal savings. These sources account for internal resource allocation which occurs when firms decide to internally finance their operations (Damodaran, 2005). The disadvantage of internal finance is the lack of flexibility and decrease in capital, which could make firms sensitive to unpredictable liquidity requirements, which they might not immediately have access to. However, given the existence of asymmetric information, firms tend to prioritise their internal finance.

With respect to external finance, firms typically raise capital through either financial institution and or through financial markets, therefore, firms have the flexibility of allocating the source of funds between debt, which is mainly borrowed from financial institutions, and equity, which is channelled through financial markets. Therefore, researchers pay particular attention to the distinction between debt and equity (*ibid.*). Good capital structure decisions take advantage of unforeseen opportunities to maximise a firm's value, while keeping in reserve a relatively generous financial flexibility. Debt holders benefit from tax-deductible interest payments. Furthermore, debt holders can be in a strong position to force an indebted firm to make cash disbursements despite the firm's financial position. In addition, debt holders usually have priority over equity holders in case of liquidation. However, higher leveraged firms tend to have tighter cash flows and weaker solvency, which can lead to inefficient continuations, and which could ultimately put them at risk of bankruptcy. Equity holders, on the other hand, are more financially stable, with more value in liquidation and more growth opportunities to develop. However, the dividends paid to shareholders are subject to tax payments, ownership is partially relinquished and there are more obligations to disclose information concerning the operation of the firm. Loss resulting from allocative inefficiency or excess burden is called deadweight loss. The equilibrium between the marginal benefit and marginal cost of debt should be at the optimum level. Therefore, it is essential for firms to make efficient and value-maximising decisions according to the cost and benefit of debt and equity. It is also worth noting the factors that can potentially influence financial policy with regards to capital structure.

In conclusion, a firm's capital structure is a composite of all the liabilities that can be found on its balance sheet (Martin *et al*., 1991), and to maximise its performance, the cost of capital needs minimising. The cost of capital can be classified into groups within pure debt instruments and equity issues (Modigliani and Miller, 1958). The cost of debt derives from the contractual commitment regarding fixed interest payments of returning the principal debt at maturity. It becomes outstanding when firms go bankrupt, and then the costs include direct legal and other deadweight costs and indirect costs which are embedded in the future financing flexibility, and the agency costs in terms of the separation between shareholders and debt holders. The cost of equity capital is known as the minimum return on a capital investment that is required by investors when they buy a firm's stock. Kolbe *et al*. (1984) identify the cost of equity capital as the expected rate of return for shareholders. This can only be determined in capital markets. It is an opportunity cost of capital; therefore, it relies on the risk of a particular investment project. Debt holders are eligible to claim a firm's assets before shareholders in the event of liquidation, and thus debt financing is a safer policy, due to its lower cost compensation. The relationship between these two costs, interestingly, is believed to be positive. Therefore, as the level of leverage of a firm increases, its cost of equity capital will grow accordingly.

3.6.2 Capital structure proxies

In investigating the determinants of capital structure, leverage or debt ratio is commonly used as a dependent variable. However, there are considerable discussions about the choice and interpretation of these dependent variables. The concerns derive from the choice between market value and book value of leverage, and, in addition, the choice between total debt, short-term debt and long-term debt.

a) Market leverage and book leverage

First of all, there is ambiguity in the preference for using market value or book value in capital structure studies. There is a need for book value, as it reveals the price paid for a particular asset on a firm's balance sheet. This recorded price reflects the past financial activities, since it never changes as long as the firm retains the same ownership. Although, it is backward looking, it can, however, be helpful when tracking the profits and losses in the past.

In addition, according to the rules from generally accepted accounting principles (GAAP), tangible assets (such as property, building and equipment) that appear on the balance sheet can only be valued at their respective book value. The issue with this is that firms that have 'consumed' their assets do not show any significant remaining value, but, nonetheless, it can be assumed that firms are exposed to competitive pressures that force them to reinvest in new equipment. This brings the assets' values closer to market value and, above all, this is the basis on which firms make their investment decisions. The optimum leverage therefore incorporates the target value as part of a firm's future capital structure decision. In contrast to the book value, the market value indicates the current value of an asset. This extracts the present value of the real investment options, and therefore is forward looking. Debt financing can thus distort future growth opportunities. The profit or loss lies in the difference between the market and book value if an investment has been owned for a long period of time.

Although Barclay *et al*. (1995) exclude book leverage in their analysis, they nonetheless recognise its value as a means to determine the extent to which firms are able to securitise debt as a function of their tangible assets. This brings Myers (1984) to the conclusion that firms are, by definition, underfinanced when growth is based on debt, because the availability of tangible assets imposes a physical limit to their debt issuance. This applies in particular to the service sector, where tangible assets are naturally low in value compared to the manufacturing sector, and hence they are an inadequate measure. In such circumstances, intangibles need taking into account, as they are part of the reason why firms grow and hence can justify debt issuance (Barclay *et al*., 1995). Myers (1977) found rational reasons that motivate managers to define leverage targets in terms of book values. However, there are also studies that do not promote the use of book values to quantify a firm's debt, e.g. Welch (2004). Yet, the choice of book debt ratio is not crucial, because they also use net or gross debt issues as dependent variables. Long and Malitz (1985) and Fama and French (2002) point out the ambiguity in literature when predicting the leverage, and they observed considerable discrepancy between the book and market leverage. Rajan and Zingales (1995) argued that the results from a market value measurement turn out slightly different by confirming the higher level of stock leverage in France and Italy. Titman and Wessels (1988) pointed out the essential differences in the results from the different measurements taken between market value and book value, however a data limitation led them to use the book value of debt. Bowman (1980) also supported the proposition that the misspecification due to using book value is very small. In the survey conducted by Graham and Harvey (2001), they reported that managers prefer book values when deciding on the capital structure of a firm. Given all this, in this study, the book value of leverage will be considered.

b) Total debt, long-term debt and short-term debt

Second, there is a distinction to be made when considering total debt, long-term debt or short-term debt. The tax credits that firms aim to maximise are not applicable to all short-term debt but apply to most current liabilities. Differences in the length of repayment due will cause differences in the cost of capital. There are mainly four reasons for this. First, with respect to short-term liabilities, the use of long-term liabilities has more opportunities to influence turnover. Every turnover period follows another one. Therefore, using long-term debt, profitability is higher than that which could be achieved using short-term debt. This also indicates the demand for higher returns for long-term creditors. Second, with the repayment of long-term debt, and considering the impact of compounding interest, the cost of capital can be higher than that from using short-term debt. Third, long-term debt is subject to a greater inflationary impact, according to the formula that the nominal interest rate is equal to the total amount of the real interest rate and expected price changes; where, the nominal interest rates on long-term liabilities are bound to be higher than the nominal interest rate of current liabilities. Finally, due to the longer period of bounding, long-term debt can result in instability in the business, and therefore, there will be greater credit risk of default (Bradley *et al*., 1984).

The goal of financial management is to maximise the value of the firm. Only when the risk is constant, should a firm raise its level of debt, which should be relatively low-cost, in order to reduce the average cost of capital, and thereby increase the rate of return on capital. If the leverage ratio is raised, however, it increases the risk that when the profit margin is not sufficient to compensate for the cost of the additional risk, the firm’s own rate of return on capital will fall (Graham, 1996). Therefore the optimum capital structure is achieved by balancing equity and debt, which is the position when the weighted cost of capital is the lowest.

In addition, there are other concerns with respect to the measurement of leverage. Acharya *et al*. (2011) used ‘net leverage’ in their paper; whereby, the term referred to the book leverage net of cash and cash equivalents. They claimed that this reflects a more realistic measurement of leverage, since instead of debt alone, firms will use cash reserves in the event of going bankrupt. However, since the cash reserves are not available in the current data-set, this study will use the book value of the total debt ratio as the dependent (response) variable. In the further analysis of the determinants of target capital structure, the estimation will be replicated by using the ratio of long-term and short-term debt and the market value of the assets. The different measurements are applicable for the robustness tests.

Welch (2004) criticises the capital structure proxies in previous literature based on the financial debt is more likely to be non-financial liabilities rather than equity. With reference to the Compustat database, the total liabilities consist of total current liability, other liabilities, deferred tax and income tax payable, minority interest and total long-term debt. Subsequently, these components can be divided into greater detail. The commonly used interpretation of the debt ratio, therefore, is suspicious, because it reflects only a minor part of the assets, and of the equity. Non-financial liabilities, which are excluded in the previous investigation, may also be of a higher, equal or lower significance compared with financial debt. Mathematically speaking, an increase or decrease in either of these can result in a converse effect in the other, and therefore, it is flawed to recognise this as a change in leverage. Welch (2004) suggests avoiding using a misdefined variable for future research, and that instead, financial debt divided by financial capital, or total liabilities divided by total assets could result in a better and more consistent outcome.

3.6.3 Determinants of capital structure

Several theoretical and empirical studies have investigated the factors which could impact on a firm’s capital structure (Rajan and Zingale, 1995; Fama and French, 2002). These determinants include market timing, profitability, size, tangibility, growth opportunities, liquidity, volatility, dividend pay-out ratio and research and development investment. In line with most mainstream capital structure empirical studies, most measures of these factors can be considered as conventional or classical. The advantage of applying the same measures is that it can aid comparing the results from current research to previous studies. However, some of those measures are mixed and are pointed out as 'being flaws' in capital structure research (Welch, 2004).

3.6.4 Market timing variable

In line with Baker and Wurgler (2002), this study established an 'external finance weighted-average' market-to-book ratio to define the past stock market valuation. Accordingly, the variable for a given firm year is defined as follows:

$$\left(\frac{M}{B}\right)_{efwa,t-1} = \sum_{s=0}^{t-1} \frac{e_s + d_s}{\sum_{r=0}^{t-1} e_r + d_r} \left(\frac{M}{B}\right)_s \tag{19}$$

where the summations are taken from the beginning of the IPO year, and *e* and *d* represent the net equity issues and net debt issues, respectively. By comparing the results with a set of lagged market-to-book ratios, this measurement of market timing can more precisely capture which lags are the most relevant ones.

3.6.5 Firm-specific factors

Profitability

Profitability is recognised as one of those essential determinants of the capital structure. The pecking order theory developed by Myers (1984) predicts a negative relationship, while the static trade-off model and the 'agency' theory developed by Jensen (1986) predict a positive relationship. Profitability has been widely measured by the return on assets (ROA) throughout the last five decades, and is the ratio of operation earnings before interest and depreciation over total assets (Myers, 1977; Titman and Wessels, 1988; Harris and Raviv, 1990; Rajan and Zingale 1995; Wiwattanakantang, 1999; Deesomsak *et al.*, 2004; Noulas and Genimakis, 2011). There are alternatives, such as return on equity (ROE), which shows how much net income is generated based on shareholders' equity (Heffernan and Fu, 2010). Hall *et al.* (2004) and Panno (2003) applied a ‘Pre-tax Profit Margin, which is the ratio of pre-tax profits to sales turnover, to measure the profitability.

However, since the economic value added (EVA) does not allow drawing conclusions on a firm’s profitability – all it does is associate a generated economic value in relation to the equity capital provided –, a ‘profitable’ firm is not by definition a generator of economic value. To conclude that a profitable firm is also generating economic value, the cost of capital, which is the cost of externally financed funds and the opportunity cost of equity, should be smaller than the firm’s profits. In addition, De Wet (2004) discovered that there is no superior impact of EVA on leverage effects over other traditional accounting values.

Due to the data availability, this thesis applies commonly applied proxy return on assets, namely the ratio of earnings before interest, tax and depreciation and amortisation (EBITDA) to total assets and earnings before interest and tax (EBIT) to total assets for cross check.

Firm size

The theory of capital structure provides mixed conclusions regarding the relationship between the firm size and debt finance. Different outcomes can result from different measurements of the firm size. According to prior research, a firm’s size is mainly extracted from its total sales and total assets. Most studies have applied a natural logarithm of either of these as a measure of the size of a firm, e.g. Chen and Strange (2005) used the natural logarithm of total assets, while Titman and Wessels (1988), Whited (1992) and Rajan and Zingales (1995) measured firm size by the natural logarithm of sales. Anderson and Reeb (2003) applied the measure based on the book value of the total assets values. Alternatively, a few capital structure studies used the number of employees as a measurement of firm size.

In this study, different proxies for the size of the firm are used. The advantage of this is to avoid an unreliable interpretation due to any mathematical mistakes applied.

Tangibility

The tangibility is a common variable of interest, which demonstrates the liquidation value of a firm, because it can be used as collateral in applying debt. More tangible assets lead to a lower asymmetric information risk, and, therefore, a higher level of debt ratio is expected. The positive relationship between tangibility and the level of debt is predicted by both the trade-off theory and the agency theory. By contrast, the intangible assets are not physical in nature and mainly entail patents, goodwill and copy rights, which reflect the uniqueness of the firm (Rajan and Zingales, 1995). There is little disagreement in terms of the composition of this variable. Bhaduri (2000) though believes that the maturity structure of the debt instruments can alter the value of the collateral assets. Therefore, three different measurements are applied separately rather than just sticking with an aggregate proxy. These three proxies consists of: the ratio of land and building to total assets, the ratio of plant and equipment to total assets, and the ratio of inventories to total assets.

Although it was Bhaduri (2000) who subsectioned the tangibility proxy according to its different nature, there is scant advantage for the current paper to follow this line. Instead, in line with a large number of empirical studies (March, 1982; Rajan and Zingale, 1995), this study uses the fixed assets divided by total assets as a measurement of the asset structure of a firm.

Growth opportunity

Growth opportunity refers to capital assets that add value to firms but that cannot be collateralised as tangible assets. Trade-off theory predicts an inverse relationship between growth opportunity and a firm's capital structure, because an increase in growth opportunities leads to higher agency costs and therefore lowers managerial discretion (Booth *et al.*, 2001). Pecking order theory conversely encourages high-growth firms to issue debt. It predicts a positive association, on account of that firms issue equity when their market value is high. The confidence gained is due to the better prospects of the firm, which can afford a higher debt ratio as its earnings generated are enough to cover the periodic interest payments.

In this study, the ratio of the average growth rate of sales to total assets is employed, because the market-to-book ratio is an alternative control variable when considering the market timing effect. As a proxy of growth options, the market-to-book ratio is simply calculated as the total assets' book value minus equity's book value plus equity's market value, all divided by the total assets' book value.

Liquidity

Liquidity is measured by the current ratio, which measures whether or not a firm has enough cash or liquid assets to pay its current liabilities in the course of the next fiscal year. Typically, a high current ratio is preferred by short-term debt holders, because their overall risk can be reduced. However, a lower current ratio is also a good indicator for outside investors, since they are more concerned about growing the business using the firm's assets.

Volatility

A number of volatility measurements are reported in empirical studies. These range from the standard deviation of the return on sales (Booth *et al*., 2001), the variance of the first difference in operating cash flow divided by total assets (Bradley *et al*., 1984; Chaplinsky and Niehaus, 1993; Wald, 1999), to the standard deviation of the percentage change in operating income (Titman and Wessels, 1988). It represents business risk in previous studies and has been found to be negatively correlated with leverage. In line with previous studies, this thesis also expects a negative influence of volatility in earnings on debt. Volatility in earnings is suggested to be a direct proxy for the firms' risk and is measured as the variance of the EBITDA scaled by total assets.

Dividend policy

Dividend policy is included in the model because its importance is relevant to capital structure, as addressed by Miller and Modigliani (1961). Myers (1984) criticises that the pecking order model omits an interpretation of the impact of dividend payments. However when firms decide to pay dividends, pecking order theory has an impact on dividend decisions. When compared to the issuance of equity, which is a risky process, when firms are less profitable, usually they have large-scale current and expected investments and a high level of leverage. When controlling for firm-specific factors, excluding profitability, i.e. size, tangibility, the results shows that firms prefer to pay-out their retained earnings as dividends. Thus, the dividend payout ratio appears as negative in relation to the growth opportunities and leverage (Miller and Modigliani, 1961). Myers (1984) further noted that in the short term, dividends are sticky, and with little opportunities for managers to change the dividend payout ratios, which thus requires firms to maintain flexible debt levels to compensate for payouts that do not match with the free cash flow. Accordingly, Martin and Scott (1974), Frank and Goyal (2004) and Mazur (2007) concluded that dividend payouts have an impact on capital structure and therefore also on the adjustment speed. This is because firms' quasi-obligation to pay dividends reduces their ability to use internal financing options to invest and, therefore, push up the use of funds from outside. Consequently, the correlation between the dividend payout ratio and external funds is expected to be positive.

Earlier, Lintner (1956) tested whether the influence of the dividend policy could be interpreted by trade-off and pecking order theory. Allen and Michaely (1995) and Fama and French (2002) also claimed that the model supplies a decent indicator of a firm's dividend behaviour. It sets up a long-term target payout ratio for the firm, which defines a target divided for the following year as a function of common share earnings. By considering the adjustment costs, a firm moves only partially to its optimum capital structure target in the second year. Hence, the speed of adjustment remains below 1. This present study, however, simplifies the notation and follows the payout ratio as a measurement of the dividend policy of the firms. It is calculated as cash dividends over net profit.

Research and development expenditure

There are at least two indicators for product uniqueness in the previous literature. One of them is the ratio of selling expenses to sales (Bhaduri, 2000; Mazur, 2007). This is because the expensive selling price is closely related to the marketing expense from promoting the specific product. Another commonly applied proxy though is research and development (R&D) expenses relevant to total sales. This is because research and development expenditure spending directly incurs the uniqueness of the product.

However, for Luxemburg, there is no information available for research and development for the whole estimation time period, and for the other countries, like Austria, France, Sweden, UK, and especially Portugal, there is scarce information for certain years. This type of information is considered confidential for commercial reasons thus placed restrictions on disclosure. In this study, this variable is still included, in order to investigate the importance of uniqueness on capital structure decision-making during the past 13 years in Europe.

Industry dummies

Industry dummies are constructed on the basis of the General Industry Classification available from DataStream (DataStream code: 06010). This classification represents a firm's general industry classification, including Industrial, Utility, Transportation, Bank/Savings and Loans, Insurance and Other firms. This study will exclude banking, insurance and other financial firms, and therefore four industry dummies are created: industrial, utility, transportation and others. Others may include materials, oil and gas, leasing, medical firms, etc. I will select one of industrial company as the base industry, in order to avoid the dummy variable trap.

3.6.6 Determinants of the speed of adjustment

Firm-level determinants of adjustment speed

a) Distance

The distance variable is inspired by Banerjee *et al*. (2004), Lööf (2004) and Drobetz and Wanzenried (2006). It measures the adjustment cost as the distance associated with the observed and target debt ratio It assumes the fixed costs of adjustment to the optimum capital structure, including legal fees, underwriting fees, administration fees and listing fees etc., to cover a large part of the total cost, and the adjustment can be represented as the absolute difference between the optimum debt ratio and the observed debt ratio, and additionally, that the greater the deviation, then

$$DIST = |TLR^*_{it} - TLR_{it}| \quad (20)$$

where the TLR^*_{it} is the fitted value from the FE regression of the debt ratio of firm i on the capital structure determinants as of time t. This shows a negative relationship between the cost and capital structure, because if the cost of adjustment exceeds a critical limit, firms show a preference to change their dividend policy rather than approaching capital markets when attempting to reach their set target leverage (Drobetz and Wanzenried, 2006). Therefore, the costs associated with a sub-optimum dividend policy increase and are dependent on the difference between the target and observed leverage (*ibid.).* For firms able to internally allocate resources to meet dividend payouts without the need to increase debt, the correlation between DIST and the adjustment speed is expected to be negative.

b) Growth

Firms with opportunities to grow and that are able to efficiently communicate this, might be in a better position to select between equity and debt to finance their operations. In contrast, firms that have few possibilities to expand, are likely to maintain their total assets and hence total liabilities at a constant rate. This means that they are still able to select between debt and equity, but it is rather in replacement than in addition to existing sources of finance. This reduces their flexibility in adjusting their capital structure, and this limitation is thus communicated to outsiders and hence could lower the firm's value.

The free cash hypothesis suggests that higher levels of leverage are beneficial for firms that lack growth opportunities (Jensen, 1986), and indeed this was observed by Antoniou *et al*. (2008), De Jong *et al*. (2008) and Flannery and Rangan (2006). On the contrary, high-growth firms are more flexible in adjusting their leverage, as they have access to alternative sources of funding. Although they may face restrictions in equity issuance, their growth prospects allow them to access external finance more easily than low-growth firms. Hence, they are by nature more likely to operate at a higher leverage, as long as they are able to deal with the cost of capital. This suggests that a firm's growth prospects are positively correlated with leverage, and that this assumption holds true even when information asymmetries are present.

c) Size

Quite controversial is the empirical evidence of the adjustment speed with regard to firm size. Banerjee *et al*. (2004) and Lööf (2004) suggest a positive relationship, because large firms pay more attention to leverage, whereas small firms treat such choices as secondary. This conclusion is supported by the costs involved in changing the capital structure composition, which is higher for small firms, which hence indicates a slower adjustment towards the target ratio. Moreover, large firms benefit from both their ease of access to capital markets and public awareness, which lowers information asymmetry and increases transparency. This lowers the gap between the firm value that insiders and outsiders believe to be the true value.

In contrast, Titman and Wessels (1988) suggest that small firms adjust at a faster rate, because large firms have access to capital markets, which reduces their pressure in capital structure choices. Since larger firms exploit this opportunity, which puts them in a better position to borrow at favourable conditions, it makes them more dependent on external finance. This leads to a higher leverage ratio. Yet, for the same reason as applies for small firms, the presence of costs associated with capital structure adjustments – despite being lower for large firms – reduces their willingness to adjust when there are consequences of a gap between the current and target leverage ratio being inferior to the next best financing alternative. It is the small firms' cost sensitiveness that motivates them to adjust quicker to the ideal leverage ratio, even though the cost of doing so is relatively higher compared to large firms. This is because they are more sensitive to the consequences of a suboptimum capital structure, which increases their speed of adjustment. Smaller firms in previous studies have appeared to have faster adjustment speeds, in spite of the evidence that these firms tend to employ relatively less leverage on their balance sheets. This is so because the financial distress costs related to deviating from a target leverage are relatively higher for these firms. In addition, it may also imply that small firms are also likely to have financing deficits, and therefore lower adjustment costs for them. As a result, they may have more incentives to move towards their target levels at a faster speed.

However, Drobetz and Wanzenried (2006) achieved mixed results for Switzerland and claimed that no further interpretations could be made. In the present study, it is expected that firm size will have a negative impact on the speed of adjustment. Accordingly, firms larger in size are expected to move slower towards their target leverage. This implies that smaller firms may find it easier to change their capital structure by altering the composition of new issuance, which may stem from more growth opportunities. This is contrast to the finding of Banerjee *et al*. (2004) and Lööf (2004), who showed that larger firms are more sensitive to changes affecting their capital structure than smaller firms.

d) Profitability

According to the pecking order theory that firms follow when retained earnings are high, firms use internal funds first and only access external sources when the former are insufficient. Since the reserves of profitable firms are large, they run their operations with more equity than would be necessary, whereas firms with few financial reserves operate at higher levels of debt. Hence, a firm's capital structure is usually driven by its internally available resources rather than the access to capital markets as the debate on firm size would suggest. However, restrictions in accessing external finance can still be restrictive and so can slow down the growth of firms that are already weak, due to either being undercapitalised or operating above the optimum leverage. This results in relatively higher opportunity costs, which can cause firms to deviate from the optimum and may motivate them to adjust quicker to the target leverage ratio (Drobetz and Wanzenried, 2006). Consequently, the correlation between profitability and the speed of adjustment is expected to be negative.

e) Tangibility

As noted earlier, the availability of tangible assets increases the probability of a firm accessing external finance, because this would give creditors the necessary security in the event of default. This assertion has been put forward by Hovakimian *et al*. (2004) and Leary and Roberts (2005), and is also supported by Sibilkov (2009), who associated the cost of managerial discretion with the availability of liquid assets. As the latter increases with the degree of leverage, the cost of managerial discretion increases too (Sibilkov, 2009; Benmellech *et al.*, 2005). Apart from the fact that the presence of tangible assets tends to invite an increase in leverage, asset-rich firms do not by definition need to be sensitised on their leverage. Although, high liquidity is associated with higher costs, debt is usually secured by tangible assets and is easier to be replaced by alternative funding. This exposes firms that lack tangible assets to the goodwill of fund providers and means that high levels of debt are more risky for this category. According to Flannery and Rangan (2006), this concern arises mainly due to the absence of tangibles in the event of a default, the fear of which can considerably and rapidly lower a firm's value. Consequently, the cost of capital is likely to be higher for ‘unsecured’ debt rather than for debt secured by tangible assets, which imposes a premium on firms using unsecured debt to finance their operation. Since this raises concerns over the capital structure composition of firms short on tangibles, they react to deviations from the target capital structure quicker than firms that are able to provide tangible assets as collateral (Drobetz and Wanzenried, 2006). Hence, an inverse relationship is expected between tangibility and adjustment speed.

Traditionally, growth, size, profitability, tangibility and R&D are the key determinants of target leverage (Rajan and Zingales, 1995), but in this study, I also empirically investigate their interaction with lagged capital structure. As they significantly affect the firm’s capital structure, it is assumed that they also affect the speed of adjustment.

Macroeconomic factors of adjustment speed

a) Term spread and short-term interest rate

According to (Drobetz and Wanzenried, 2006), the slope of the term structure of the interest rate is generally assumed to be a predictor of future business cycle stages. This has implications on the term spread, i.e. the difference between the yield on long-term and short-term government bonds, which is commonly acknowledged to be high when the economic outlook is good and low otherwise (e.g. Estrella and Hardouvelis, 1991; Harvey, 1991). However, when macroeconomic conditions are stable, but investors anticipate a slowdown, the interest in assets that become profitable when the slowdown begins increases. Since government bonds are considered as risk-free, investors favour long-term over short-term assets and the dynamics in said market behaviour initiates an increase in the demand for the former and an oversupply of the latter. This ultimately reduces the gap in the term spread (Graham and Harvey, 2001).

The described logic is also reflected in Chen (1991), who found that a term spread that is expected to be above the average signals a continuous economic growth for 4-6 quarters. Since more funds are accessible when the macroeconomic certainty is high, firms have more opportunities to balance their capital structure when this condition applies. Hence, the speed of adjustment is expected to be higher in times of economic prosperity and, as predicted by Hackbarth *et al*. (2005), this leads to a positive coefficient resulting from the interaction term between the historical leverage and the term spread. Similarly, the short- term interest rate should exert a negative impact on the adjustment speed, because it is high when uncertainty is high and hence when economic growth is weak.

The historical value that the lagged leverage ratio reflects not only matters because it avoids the search for alternative instruments, it is also consistent with the market timing theory. As managers' are willing to issue equity when a firm is valued high, it assumes that the resulting capital structure at time t reflects opportunities in the past to choose between equity and debt. When seen in combination with the business cycle, the certainty that economic prosperity gives, suggests a high firm value. It is an opportunity to issue equity. However, economic growth also increases the availability of internal funds and hence the possibilities to reallocate resources. In contrast, recessions reduce the sources of finance, and this applies in particular to firms with few tangible assets. To address the emerging liquidity constraints, European central banks traditionally lower interest rates and hence condition the issuance of debt. Graham and Harvey (2001), Drobetz *et al.* (2006) and Henderson *et al.* (2004) indeed observed a negative correlation between interest rates and debt issuance, which applies to both short- and long-term debt. Despite firms' preference for short-term over long-term debt issuance when the interests of the former are more favourable, Henderson *et al*. (2004) observed that firms borrow because they see an opportunity to expand their operations, which is not just driven by the intention to replace equity with debt to increase mangers' control over assets. Accordingly, debt issuance is also influenced by the interest rates of government bonds, just as they reflect the business cycle. The correlation between term spread and the speed of adjustment is therefore expected to be positive and negative with respect to the short-term interest rate. For the purpose of this study, the term spread (TERM) refers to the term spread of national government bonds from all European countries with maturities of more than ten years and the three-month Eurodollar interest rate, whereas ISHORT refers to the three-month Eurodollar deposit rate (Drobetz and Wanzenried, 2006).

b) Default spread and TED spread

The default spread (DEF) is defined as the difference between the yields on US low-grade (BAA) and high-grade (AAA) corporate bonds, which is assumed to be a viable indicator for the ‘global default risk’, which reflects the economy’s health (Ferson and Harvey, 1993). TED is generally recognised as the difference between the 3-Month LIBOR based on US dollars and the 3-Month Treasury bill (Drobetz and Wanzenried 2006). The series is lagged by one week because the LIBOR series is lagged by one week due to an agreement with the source. The inclusion of this parameter is based on its association with the ‘political’ risk premium studies, like Ferson and Harvey (1993), attributed to changes in international trade. According to Drobetz and Wanzenried, (2006:949), “[t]he yield differential widens when the risk of disruption in the global financial system increases”. On the assumption that the adjustment speed is highest when economic growth offers the possibility to do so (Hackbarth *et al.*, 2005), Drobetz and Wanzenried (2006) expected the correlation between the speed of adjustment and default spread to be negative. In a similar vein, the negative association also extended to the TED spread. Nonetheless, they expected the relationship with the speed of adjustment to be stronger for both the term spread and short-term interest rates relative to the default spread and TED, as these were found to be insignificant in Baker *et al.* (2003). However, these dimensions are still worth considering and are expected to be in line with Drobetz and Wanzenried (2006).

c) Bank concentration

The influence of market concentration in the banking industry has gained momentum recently, and is associated with significant implications on leverage. González and González’ (2008) reconciliation of the literature examining the impact of bank concentration on capital structure confirms this, but with contradictory findings. For instance, despite low market concentration, US firms find it more difficult to access capital (Berlin and Mester, 1999; Petersen and Rajan, 1994, 1995), whereas studies in Europe, such as D’Auria *et al.* (1999) and Degryse and Ongena (2005) suggest that a high market concentration in the banking sector leads to higher costs for bank-financed debt in Italy and Belgium respectively. González and González (2008) refer also to Cetorelli and Gambera (2001), who identified market concentration as a restrictive factor to economic growth. It therefore restricts firms’ access to debt, but Cetorelli and

Gambera (2001) also found a preference to lend to industries with better growth prospects.

In line with Petersen and Rajan (1994, 1995) and Berlin and Mester (1999), Baert and Vennet (2008) found a significant negative relationship between the degree of bank concentration and firms' debt ratio in the EU-15 countries. This indicates the persistence of the credit constraints resulting from the market power that banks are able to exert, but it only applies when no information asymmetry is present (González and González, 2008). When taking information asymmetry into account, banks' awareness of said asymmetries incentivises them to maintain a close relationship with their customers, with the expectation of minimising the lack of information they have (González and González, 2008). Such evidence is supported by Petersen and Rajan (1994, 1995), whose analysis of small businesses revealed that market concentration leads to a preference to lend to firms that are more dependent on external finance. As they are then more willing to disclose information, information asymmetry decreases and this makes González and González (2008) believe that leverage increases with the degree of bank concentration.

However, the higher costs associated with bank concentration suggest that the speed of adjustment to the target leverage ratio is slower when the bank concentration is high. This is the expectation in the present study, where, in accordance with Demirgüç-Kunt *et al*. (2004) and Beck *et al*. (2006), the concentration ratio is defined as the cumulative assets of the three largest commercial banks in relation to all the assets that the commercial banks of a country hold.

3.7 Sample selection and data sources

The selection of sample countries is motivated by the importance and influence of Europe in the world economy. A stable but competitive, harmonious but sustainable European financial market will promote a high degree of convergence of economic growth and improve social cohesion and living conditions. The EU under its current name was established in 1993 with 12 member states, and after a wave of enlargements has since grown to 28. In this study however, only the EU-15 is considered, as these major European countries carry distinct financial and institutional traditions. The EU-15 includes both market-oriented markets, such as the United Kingdom, and bank-oriented markets, such as Germany, whilst France follows in between these two traditions.

The firm-based variables are mainly retrieved from DataStream, which provides detailed balance sheet information and income statement data for firms in Europe. Financial firms are excluded since their finance behaviour may reflect special factors, such as regulatory factors, and therefore could result in a potential bias. Only the non-financial firms' portfolios traded in the stock exchanges of these 15 countries are included.

According to Baker and Wurgler (2002:4), "[k]nowing the IPO date allows us to examine the behavior of leverage around the IPO, which is … related to the market-to-book ratio[, and] … also allows us to study the evolution of leverage from a fixed starting point." IPO date and the deals values are collected from the Zephyr database, which is produced by Bureau van Dijk. Zephyr convers comprehensive information regarding IPO events and other sources of company information, and it covers disclosures over more than ten years of deals in Europe. However, the information is limited, as this database can only trace the deals back to 1997. I used the international securities identification number (ISIN) code to identify the IPO date and value for the listed firms in my sample. Furthermore, the sample was merged with data from DataStream. However, there is a large amount of missing data, e.g. from firms that went public before 1997. In order to allow for more observations in the sample, instead of using the actual IPO price and IPO date, I also used the share price for the year end for the first year of the IPO.

The data for the country specific variables were obtained from the Federal Reserve Bank of America and Bank Scope. As a comprehensive financial analysis tool, Bank Scope contains information on over 35,000 world banks, and the information includes detailed spreadsheet data (balance sheet and income statements) and ownership information, including shareholder and subsidiary structures. In order construct term spread, default spread, and TED spread, data for long-term interest rate which government bond with maturity more than five years), 3 month Eurodollar interest rate (short term), yields on US low-grade (BAA) corporate bond, 90-day yield on the US treasury bill, yields on US high-grade (AAA) corporate bond are collected from Federal Reserve Bank of America.

Gaud *et al*. (2007) use the most similar sample to investigate the debt-equity choice in Europe; indeed, 13 European countries in their sample were also included in my sample. However, in their analysis, they did not separate financial firms and non-financial firms. The nature of financial firms is greatly different from non-financial ones, with respect to the product and services they provide, the regulations they abide by, and most importantly, their marketability and the way they raise their capital. Therefore, the bias cannot be avoided when considering both types of firms in terms of a financing policy put forward.

In general all the variables used in this thesis are constant and inflation adjusted. In addition, all these data are collected and converted to the single currency euro for EU countries. The exchange rate can be another factor that has an impact on determining the European financial markets stock returns dynamics. The purpose of implementing a single currency is to eliminate the effect of the exchange rate regime instability. The time period in this sample is from 2000 to 2012, subject to the availability of the data. The period was chosen because it should show a more severe impact due to the corporate liquidity constraints during the great impact from financial integration, liberalisation and global financial recession. In order to satisfy the requirements of the GMM estimator, firms with a minimum of three consecutive years of data are retained.

3.8 Conclusion

The aim of this chapter is to provide a detailed explanation on the data, the variables and the methods used in the following empirical chapters. The early studies in the literature tended to use OLS to test cross-sectional data on the determinants of capital structure. The rapid progress in technology has facilitated greater access to historical data. This in turn has led to the use of panel data analysis as a key part of econometric techniques to investigate and validate the assumptions of many economic and finance theories. The development of new theories has also been accompanied by the development of the methods applied, for example dynamic panel data techniques have become the preferred approached to investigate dynamic capital structure theory, such as trade-off theory. The trade-off theory assumes that firms adjust their capital towards a target capital, and thus it is important to estimate the speed of the adjustment process. This is only possible by using robust dynamic panel estimation, such as GMM. This thesis thus uses a variety of models, namely OLS, FE, and GMM to estimate the results; with the results from the OLS modelling presented in the market timing analysis, from OLS, FE and GMM in the discussion on determinants of capitals structure, and from FE and GMM in the investigation on drivers of speed of adjustment. For example market timing studies used pooled OLS by estimating cross-sectional models at different time intervals. The analysis of market timing may not be achieved otherwise, hence it is important to understand the long-term effects of markets on the financing decision. On the other hand, in order to investigate the speed at which firms adjust their capital towards a target capital the GMM approach is deemed appropriate and has been commonly used in the literature. The GMM model allows estimating unbalanced panels with multiple endogenous variables, which too refers to the dynamic processes in firm leverage that OLS is unable to address consistently. The GMM estimator corrects for autoregressive disturbances in the dependent variable – i.e. the firm's capital structure – when lagged variables become part of the explanatory variables.

CHAPTER 4: CAPITAL STRUCTURE TRENDS IN EUROPE

4.1 Introduction

The aim of this chapter is to examine the market timing theory in firms' corporate capital structure decisions in Europe. The market timing theory was recently developed by Baker and Wurgler (2002). It suggests that firms tend to time their capital structure decision by issuing equity when the cost of equity is low, and issuing debt when the cost of equity is high. There are a few empirical studies investigating the presence of market timing, the majority of which focus on US firms. However, empirical evidence on market timing in Europe is very slim, and thus the literature requires more studies to fill such a significant gap. The importance of studying market timing in Europe stems from the fact that Europe has undergone several stages of financial integration which consequently suggests that this impacts on firms' resource allocation and therefore reduces the cost of capital. In addition, the liberalisation of financial markets contributed to the equity development of the capital markets in most European countries. It resulted in a shift from bank-oriented to market-oriented economies. The financial crisis that emerged in 2008 provides up-to-date evidence that more needs to be done to reform the financial market. Therefore, providing evidence from Europe will significantly add to the literature, in particular by comparing the findings from Europe with those from the US.

This chapter builds on the pioneer work by Baker and Wurgler (2002) and replicates closely the tests they conducted. The study utilises the OLS as in Baker and Wurgler (2002) to estimate cross-sectional models on yearly basis to examine the long-term effect of equity market value on capital structure. This analysis involves a number of stages: the first stage investigates whether changes in capital structure correlate with the current market-to-book value of the firm. This stage of analysis is expected to provide evidence on the short-term effects of a firm's market timing. The second stage correlates the components of capital structure with the same independent variables used in the first stage, to provide a robustness check of the consistency of the results from the first stage. The third stage tests whether the weighted average market-to-book value captures the historical path of the market timing effect. The fourth stage estimates the same model as stage three, but does so with controlling certain firm-specific factors, in order to validate different sets of control variables.

To the best knowledge of the author, this study is the first to conduct a comprehensive analysis of the market timing theory in Europe using a sample from fifteen European countries. The results reveal that European firms tend to issue debt when the market value of equity is high, which is in contrast to the equity market timing theory assumption and empirical evidence from the US.

The remainder of this chapter proceeds as follows. Section 2 presents the design of tests, an overview of the data and samples around an initial public offering (IPO) event over a set time period. Section 3 summaries the variables included in the analysis. Section 4 investigates the impact of firm factors on the cumulative change of capital structure and explores the influence of the firms' past attempts to time the market. Section 5 discusses the results by reflecting on the underlying assumption of the existing capital structure theories. Section 6 offers the robustness test and section 7 provides the conclusions.

4.2 Design of tests, data and sample

4.2.1 Introduction to the tests design

This chapter conducts three tests for market timing following Baker and Wurgler (2002). The first test identifies the two dependent variables change in book leverage and change in market leverage. The second and third test use book leverage and market leverage as dependent variables. The independent variables in the three tests use different combination of a bundle of response variables in some cases alternative proxies for the same response variable (i.e. profitability and firm size). Similar approaches were adopted by Rajan and Zingales (1995), Shyam-Sunder and Myers (1999), Fama and French (2000) and Baker and Wurgler (2002).

4.2.2 Data and Sample

Prior studies regarding the IPO assume that it is the first time the share price becomes available on data set. In this study the IPO data is collected from Zephyr then the collected sample is merged with accounting and financial information from DataStream using ISIN number. The IPO date is essential as it provides information regarding market valuation. The main sample composed of the list of firms for which the IPO date could be determined. The age of IPO issuers, denoted by k in the sample, it represents the difference between the IPO year and the current year across the time period. This k (age) reflects the survival of the firms and it falls in wide ranges between -10 and 143. For example, the -10 indicates that the current value is 10 years before IPO and it indicates the year that the corresponding firms going public is $k = 0$. The oldest firm which have 143 years public trading history in sample and was an Austrian firm (id=1228). Until 2012, there were 50 UK firms, 25 French firms, and 9 German and Dutch firms who has survived more than 20 years since their IPOs. It is worth noting that in Europe, including in the UK, the newly listed firms are generally much larger and older than those in the United States. Pagano *et al*. (1998) proposed that the reasons are either the lower listing costs or the 'lack of enforcement of minority property rights'. In the case of Europe, the former reason does not truly explain the issue, as the listing costs are similar to those in the US, however the latter is the true explanation. La Porta *et al*. (1997) acknowledge that a large number of small and young firms in Europe are held back and find it fairly difficult to gain the trust of investors in the public equity market. This especially happens when it is legitimately small in respect of its size to the country's GDP and the country's number of IPOs per inhabitant. Consequently, most firms have concerns and are hesitant about going public, and hence IPO firms tend to have a long operating history since incorporation before they go public. To identify the timing behaviour, this study forms and only reports the new subsample by break the firms' trading history to five intervals as pre-IPO, IPO, IPO+1, IPO+4, IPO+8 and IPO+11. Additionally, results from all samples are to capture the trends of the timing behaviour. They are obtained for robustness check therefore included in Appendix A.

4.3 Summary statistics

Table 4.1 presents summary statistics of all the firms' capital structure and financing decisions. Panel A summary is according to IPO date and Panel B is according to the calendar year. Panel A shows that book leverage accounts for on average 44 per cent of European firms' total assets before the IPO. At the IPO date, leverage ratio sharply declines to half of its original, at 22 per cent. A year after the IPO date, firms experience another rise in leverage as a 0.58 on average relative to the previous year. At IPO+4, the book leverage is reduced to one-third of its previous values, although with an increasing trend. As observed every three years after IPO+4, about 30 per cent less debt financing is used than before the IPO. The market leverage was sharply reduced at IPO+1, however it does not fluctuate a lot, as it generally exhibits an average of 0.25 for the remaining time period. In terms of the net equity issues (the retained earnings and the net debt issues), there are no fixed patterns to follow, as both move up and down at every interval. The change in retained earnings is always negative; however, this does not imply that firms always distribute more dividends than the total amount of earnings reserved. At IPO, the change in retained earnings is also negative, but is reduced by 8 per cent. At IPO+1, there is a 7 per cent rise in the change in retained earnings on an aggregate level. In general, the event of IPO changes the way in which firms arrange their capital structure. Prior to their IPO, firms are on average heavily leveraged, but are more likely to engage with equity financing after they go public.

Panel B reports the sample summary statistics per calendar year, from 2000 to 2012. This pooled sample comprises of multiple observations for the same firms (excluding financial firms). The aim of this classification is to analyse the data without considering the survival of the IPO age. In this sample, a generally stable level of book leverage and an upward trend in the market leverage can be found up to 2003. Net debt issues do not follow a pattern, moving up and down every three or four years. It also can be observed that there is a huge change - resulting from the financial crisis - in firms' capital structure. For instance, book leverage experiences a sharp reduction, from 12% to 0.06% from 2009, market leverage decreased 6% in 2010, net equity issues reduced 2 per cent, and net debt issues also fell tremendously and reflected roughly a 16 per cent reduction after the start of the global financial crisis. The financial crisis caused a supply shock to non-financial firms' external finance. It acted as an unexplored negative shock that constrained such firms' financial ability and limited their investment opportunities (Duchin et al., 2010).

Table 4.1 Summary statistics of capital structure and financing decisions

This table reports mean and standard deviation of leverage and components of the change in assets. It reports descriptive statistics of the leverage variables over the sample period from year 2000 to 2012. The sample contains an unbalanced panel of 1,195 European firms. Leverage is defined as book leverage and market leverage. Book value leverage is book debt to assets and Market value of leverage which is book debt to the results of book debt plus market equity. The weights are the amount of external finance raised in each year, where negative weight is replaced by zero. The second is the market-to-book ratio in year t-1, defined as assets minus book equity plus market equity all divided by assets. External finance is defined as net equity issues plus net debt issues, $\boldsymbol{e/A_t}$%. The net equity issues are the change in book equity minus the change in balance sheet retained earnings divided by total assets, $\boldsymbol{\Delta RE/A_t}$%. The newly retained earnings are the change in retained earnings divided by total assets. The net debt issues are the residual change in total assets divided by total assets, $\boldsymbol{d/A_t}$ Panel A summary is according to IPO date and shows data in calendar time for all non-financial European firms in DataStream.

	Book Leverage			**Market Leverage**			$\boldsymbol{e/A_t}$**%**			$\boldsymbol{\Delta RE/A_t}$**%**			$\boldsymbol{d/A_t}$**%**		
Year	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
							Panel A: IPO Time								
pre IPO	**91**	**0.444920**	**1.411362**	**100**	**0.237528**	**0.167783**	**61**	**0.015420**	**0.256515**	**61**	**-0.02574**	**0.244564**	**61**	**0.024889**	**0.362477**
IPO	36	0.229370	1.413865	42	0.281855	0.236383	25	0.103248	0.286484	25	-0.10042	0.186063	25	0.071877	0.41722
IPO+1	**190**	**0.364462**	**0.791859**	**387**	**0.197730**	**0.199456**	**32**	**0.051313**	**0.419396**	**32**	**-0.03118**	**0.418128**	**32**	**0.051000**	**0.491785**
IPO+ 4	369	0.137818	1.293442	464	0.264088	0.220577	314	0.002740	0.254123	314	-0.02738	0.214143	314	0.021451	0.330182
IPO+ 8	**299**	**0.169114**	**1.203480**	**353**	**0.255064**	**0.217486**	**268**	**0.026942**	**0.250693**	**268**	**-0.05885**	**0.239886**	**268**	**0.044569**	**0.297217**
IPO+ 11	275	0.195962	1.203340	308	0.278023	0.215080	248	0.016704	0.268510	248	-0.04327	0.247430	248	0.066590	0.301333
							Panel B: Calendar Times, All Firms								
2000	817	0.186473	1.154759	904	0.277915	0.227056	0	.	.	0	.	.	0	.	.
2001	850	0.201054	1.111646	971	0.298190	0.237479	787	0.021280	0.253509	787	-0.04173	0.230400	787	0.028551	0.326871
2002	739	0.106778	1.220189	1006	0.308758	0.241544	677	0.023490	0.227683	677	-0.03021	0.206759	677	0.017324	0.278049
2003	838	0.131176	1.218753	1025	0.345289	0.251441	653	0.021700	0.237442	653	-0.02780	0.226851	653	0.042053	0.320726
2004	846	0.106694	1.210033	1041	0.292784	0.232243	762	0.009906	0.216597	762	-0.03428	0.198021	762	0.074867	0.263917
2005	930	0.122554	1.187703	1070	0.277882	0.223511	811	0.001534	0.230407	811	-0.05553	0.211901	811	0.069497	0.273634
2006	984	0.111554	1.202159	1111	0.251297	0.208142	888	0.014574	0.219733	888	-0.05231	0.193958	888	0.033496	0.28884
2007	1039	0.128020	1.138024	1162	0.234604	0.195826	947	0.014979	0.231056	947	-0.05916	0.221622	947	0.046658	0.291635
2008	1113	0.128608	1.176823	1218	0.259521	0.199818	1016	0.058362	0.253453	1016	-0.06377	0.234299	1016	0.020516	0.302079
2009	1118	0.067540	1.477478	1228	0.362518	0.253712	1066	0.069870	0.318136	1066	-0.05769	0.296145	1066	0.180857	0.44562
2010	934	0.040290	1.387948	1230	0.305042	0.233938	906	0.048430	0.329637	906	-0.00284	0.327182	906	0.023840	0.396708
2011	1048	0.025141	1.327169	1249	0.284954	0.231896	880	0.031511	0.295381	880	-0.06576	0.287999	880	0.042217	0.345289
2012	1031	0.063760	1.417776	1139	0.311750	0.244402	924	0.086819	0.305459	924	-0.10584	0.299871	924	0.095722	0.319923

4.4 Empirical results

4.4.1 The annual change of capital structure and its components

This section mainly focuses on the market-to-book value which reflects either a higher potential growth or market mispricing in the firm. Table 4.2 displays the results obtained from the estimations and Panel A reports the changes in capital structure. Panels B, C, D subsequently reports whether the effect is through net equity issues, the newly retained earnings or net debt issues as the market timing theory advocates. In Table 4.2 the first row in Panel A is termed as 'IPO' and denotes the capital structure changes, starting with the leverage value before firms go public and then up to the end of the IPO year; the second row is termed 'IPO+1' and indicates the change in leverage at the end of the IPO+1 year; and so on till IPO+11. The last variable, the lagged leverage is included because leverage is bounded between zero and one. When the leverage is near one of the boundaries, the change in leverage can only go in one direction, regardless of the value of the other variables, therefore, not controlling for lagged leverage may obscure the effects of the other variables.

Results provide a clear evidence that market-to-book ratio is positively related to leverage ratio as well as a channel through lower net debt issues, retained earnings or growth in assets. For instance, at IPO+1, a one unit increase in the market-to-book is associated with a 0.018 increases in leverage. Similarly at IPO+8, a one unit increase of the market-to-book ratio leads to a 0.052 increase in leverage. This implies that firms promote debt financing when their market valuation is high. A higher market-to-book ratio increases the investment potential and therefore tends to attract debt financing until a firm reaches its maximum debt capacity. This, however does not reflect what 'market timing' theory suggests but can be explained by the pecking order theory.

The net effect of a high market-to-book ratio also has a negative influence on net equity issues. At IPO+4, a unit increase in the market-to-book ratio is related to a 0.02 decrease in equity. The newly retained earnings also exert a positive relationship with the market-to-book ratio, at IPO+8, it shows 0.026 increase in when one unit of market-to-book increases. The one unit increase in assets' growth, represented by the net debt issues, is associated with a 0.034 decrease in market-to-book ratio. Tangibility and profitability reduces leverages, the size proxy displays mixed results along with different firm age with respect to IPOs. Firms with higher profitability tends to issue more equity, but higher retained earnings rules out this effect, it therefore can conclude that higher profitable firms are more likely to use less retained earnings and instead to use external finance through equity.

In conclusion as of the annual change of capital structure as well as its components, European firms are taking external financing thus increasing leverage while stock price is high and rather not to issue equity as the theory advocates. This result is consistent with Bevan and Danbolt (2004) who argues that the market value of equity inflates the level of debt issuance. However, this behaviour is in contrast to literally understood ‘equity market timing’, it can be referred to as ‘debt market timing’ instead.

Table 4.2 Determinants of annual changes in leverage and components

OLS regression of book and market leverage on the market-to-book ratio, fixed assets, profitability and firm size

$$\left(\frac{D}{A}\right)_t - \left(\frac{D}{A}\right)_{t-1} = -\left(\frac{e_t}{A_t}\right) - \left(\frac{\Delta RE_t}{A_t}\right) - \left[E_{t-1}\left(\frac{1}{A_t} - \frac{1}{A_{t-1}}\right)\right] = \alpha + \beta_{mb}\left(\frac{M}{B}\right)_{t-1} + \beta_{ppe}\left(\frac{PPE}{A}\right)_{t-1} + \beta_{ebitda}\left(\frac{EBITDA}{A}\right)_{t-1} + \beta_{sales}\log(S)_{t-1} + \varepsilon_t$$

The constant α is not reported. $\left(\frac{D}{A}\right)_t - \left(\frac{D}{A}\right)_{t-1}$ in the model and $\Delta(D/A)_t$ in the results reflects the changes in book leverageBook value leverage is book debt to assets. Fixed assets intensity is defined as net property, plant, and equipment divided by assets, shown as ***PPE/A**$_{t-1}$*, Profitability is defined as operation income before depreciation divided by assets, shown as ***EBITDA/A**$_{t-1}$*. Firm size is defined as the log of net sales, shown as ***Log(S)**$_{t-1}$*. To capture the impact of annual changes in leverage and components, this model includes the market-to-book ratio in year t-1, defined as assets minus book equity plus market equity all divided by assets. Results obtained from external finance shown in panel A, those from its components are shown in panel B, panel C and panel D. It is defined as net equity issues plus net debt issues. $(e/A)_t$)%: the net equity issues are the change in book equity minus the change in balance sheet retained earnings divided by total assets. The newly retained earnings are the change in retained earnings divided by total assets, $(\Delta(RE/A)_t$. The net debt issues are the residual change in total assets divided by total assets: $((-E\_(t-1)\ (1/A\_(t\ )\ -\ 〖〖1/A〗\_(t-1)〗\_))$)%. Robust standard errors shown as ***se***. *** p<0.001, ** p<0.01, * p<0.05, † p<0.1

		M/B$_{t-1}$		EBITDA/A$_{t-1}$		PPE/A$_{t-1}$		Log(S)$_{t-1}$		
Year	**N**	*β mb*	*se*	*β ebitda*	*se*	*β ppe*	*se*	*β sales*	*se*	R^2
Panel A: Change in Book Leverage ($\Delta(D/A)_t$) %										
IPO	86	0.0224	-0.0241	-0.652	-0.73	0.181	-0.198	0.0143	-0.0223	0.046
IPO+1	118	0.0177†	-0.0092	-0.47	-0.814	-0.0555	-0.137	0.0145	-0.0157	0.021
IPO+4	310	0.0186	-0.0171	-0.734	-0.538	0.136	-0.0874	-0.0193†	-0.00987	0.089
IPO+8	266	0.0519†	-0.0306	-1.742†	-1.028	0.137	-0.12	0.00546	-0.0126	0.067
IPO+11	242	-0.0418	-0.0319	-0.0396	-0.409	0.0837	-0.0894	-0.00957	-0.0108	0.058
Panel B: Change in Leverage Due to Net Equity Issues ($-(e/A)_t$) %										
IPO	86	-0.00488	-0.00799	0.983	-0.934	-0.0277	-0.0905	-0.0107	-0.00933	0.075
IPO+1	118	-0.00663	-0.0171	0.748	-0.497	-0.00714	-0.138	-0.0108	-0.0142	0.035
IPO+4	310	-0.0191*	-0.00868	0.680**	-0.253	-0.111*	-0.0501	0.00945	-0.00862	0.094
IPO+8	266	-0.0208†	-0.0111	0.518	-0.335	-0.129†	-0.066	0.000628	-0.00657	0.124
IPO+11	242	0.000364	-0.0166	0.372	-0.394	-0.0636	-0.0735	0.00925	-0.00822	0.101
Panel C: Change in Book Leverage Due to Newly Retained Earnings ($-\Delta(RE/A)_t$) %										
IPO	86	0.0026	-0.00646	-1.538†	-0.813	0.0749	-0.0797	0.0128	-0.00842	0.178
IPO+1	118	0.00802	-0.00593	-1.171	-0.737	0.0431	-0.0901	0.0144	-0.0105	0.067
IPO+4	310	0.0107	-0.00799	-0.678**	-0.243	0.0137	-0.0355	-0.00296	-0.00624	0.12
IPO+8	266	0.0259**	-0.00992	-0.694*	-0.304	0.114†	-0.064	0.00877	-0.00586	0.176
IPO+11	242	-0.00548	-0.0153	-0.437	-0.382	0.048	-0.0646	-0.00406	-0.00756	0.11
Panel D: Change in Book Leverage Due to Growth in Assets($(-E\_(t-1)\ (1/A\_(t\ )\ -\ 〖〖1/A〗\_(t-1)〗\_))$)%										
IPO	86	-0.0206†	-0.0116	1.396	-1.024	-0.222	-0.137	-0.0161	-0.0162	0.11
IPO+1	118	-0.0203†	-0.0111	1.059	-0.845	0.0218	-0.145	-0.0167	-0.0154	0.052
IPO+4	310	0.00107	-0.0112	0.344	-0.392	0.0144	-0.0807	0.00364	-0.0125	0.05
IPO+8	266	-0.0337**	-0.0127	0.978**	-0.372	-0.165†	-0.09	-0.00799	-0.0092	0.128
IPO+11	242	0.0346†	-0.018	0.0469	-0.451	0.00841	-0.0886	-0.00243	-0.00939	0.144

4.4.2 The determinants of capital structure

Baker and Wurgler (2002) created an 'external finance weighted-average' market-to-book ratio as a variable to investigate the long-term effects of the equity market. They elaborate that it has a stronger explanatory power of this variable compared to those variables with the unweighted version. This variable is also built into the average of the net debt issues and net equity issues and the interaction with current market-to-book ratio for each firm. This longer-term effect that is embedded in this particular variable is driven from the outside source of funds, which indicate practical opportunities in variations of leverage. The advantage of this approach, first of all, is that, it takes account of the historical impact and addresses the relevant variation in market valuation instead of capturing 'local opportunism', Second, it provides more efficient results whilst it accurately picks up the most likely relevant lags.

In line with Baker and Wurgler (2002), this study also replaced the negative weight to zero, the observation per firm year where the weighted average market-to-book ratio is above 10.0 replaced to zero. This aims of this amendment it to always have a positive weighted average market-to-book. This variable collects only the growth of firms' external finance in each year, and demonstrates that the weights are designed to reflect the market timing behaviour. The cases where weights are equal to zero it indicate that the market valuation in the respective year is not available.

Table 4.3 provides the results on the impact of the weighted average market-to-book ratio and the unweighted market-to-book ratio, profitability, tangibility and firm size (Rajan and Zingales, 1995) on both the book and market value of leverage. The estimation also includes a lagged market-to-book ratio to control for the current variation in the level of the market-to-book ratio. Therefore, the rest of the impact is driven from the weighted average market-to-book ratio and explains both the past and the current within firm variation in the market-to-book ratio. The current market-to-book ratio is a better proxy for investment opportunities. The past market-to-book ratio is better proxy for market timing.

The result shows that market leverage is less predictable than book leverage as book leverage is consistently positive relevant to the market-to-book ratio. However, the weighted average variable is consistent with the unweighted counterpart. The market-to-book ratio exerts a different impact on firm's financing decisions with respect to both book and market leverage. This mixed result was expected, as prior work proved that there might be ambiguity while applying both book and market value measurements (Long and Malitz, 1985; Rajan and Zingale, 1995; Fama and French, 2002).

With regard to the market aspect of leverage, there is no significant association between the market-to-book ratio and market leverage until the year IPO+2, and then also for IPO+3 and IPO+4 subsequently (as reported in Appendix A). Both the weighted and unweighted market-to-book ratios are significant and negatively affect the variation of market leverage. At IPO+4, for example, there is a 0.018 decrease of leverage while one unit increase appears in the historical market-to-book ratio. This implies that past attempts to market timing have a cumulative impact on firms' capital structure when the market value is high. The existence of the market timing effect therefore is confirmed, albeit, with weak evidence in terms of market leverage however there is a delay in responding, and also the book leverage disagrees with this result.

In terms of book leverage, one unit of weighted market-to-book increase its value to 0.53 when firms go public and the following year the positive impact is still strong, at a significance level of 0.001, however, it then reduces to 0.46. The cross-section variation in the level of the market-to-book ratio is controlled by the unweighted market-to-book ratio, which provides the same positive effect and increases 0.11 in the IPO year and 0.12 at IPO+1. The data shows that the historical market-to-book impact was positive for the sample for the period after a firm's IPO, although its size declines.

This positive effect is consistent with the findings from prior studies based on Europe, such as Chittenden *et al*. (1996), Michaelas *et al*. (1999), Bevan and Danbolt (2002) and Bruinshoofd and De Haan (2012) who all share the view that firms holding high investment opportunities desire debt financing rather than equity finance. Barclay and Smith (1999) argue, from a financial flexibility point of view, that firms with a stronger ability to generate future profits are more likely to issue debt instead of equity. They predicted that firms' financial flexibility is able to be maintained if debt financing is obtained with a few restrictive covenants. High growth potential is positively associated with higher investment opportunities, and this corresponds to high market-to-book ratios.

Table 4.3 shows that the effects of the weighted average market-to-book ratios are equally robust with the previous test however in the IPO year and at IPO+1, the historical market valuation is particularly important for a firm's capital structure decision. The impact of the historical information declines while that of the current variation in market-to-book is increasing. This long lasting effect of historical valuations breaks the normative understanding that managers tend to reserve an optimal level of leverage that based on the current characteristics of the firms, as trade-off theory suggests.

Table 4.3 also indicates the different economic importance embedded within the explanatory power among these variables. The most precise and largest effect is through profitability, which is represented by the results from EBITDA to the total assets. This decreases the leverage, alongside the growth with firm's IPO age. In the IPO year for example, one unit of increase in profit reveals a 6.718 decreases in book leverage and 1.402 market leverage, at the significance level of 0.001. In the first after the IPO (IPO+1), a one unit increase in profits reveals a 9.052 decreases in book leverage and 1.437 market leverage at the same significance level. This effect continues and last through all the sample period and is of most economic importance in Europe, where more profitable firms thus to issue equity instead of leverage.

Table 4.3 Determinants of leverage

OLS regression of book and market leverage on the market-to-book ratio, fixed assets, profitability and firm size

$$\left(\frac{D}{A}\right)_t = \alpha + \beta_{mbwa}\left(\frac{M}{B}\right)_{etwa,t-1} + \beta_{mb}\left(\frac{M}{B}\right)_{t-1} + \beta_{ppe}\left(\frac{PPE}{A}\right)_{t-1} + \beta_{ebitda}\left(\frac{EBITDA}{A}\right)_{t-1} + \beta_{sales}\log(S)_{t-1} + \varepsilon_t$$

The constant α is not reported. Leverage is defined as book leverage and market leverage. Book value leverage is book debt to assets and Market value of leverage which is book debt to the results of book debt plus market equity. The market-to-book ratio is defined in two ways. The first, ***M/B$_{efwa,\ t-1}$,*** is a weighted average market-to-book ratio from the IPO year to year t-1. The weights are the amount of external finance raised in each year. External finance is defined as net equity issues plus net debt issues, where this is negative; the weight is set to zero. The second, ***M/B$_{t-1}$*** is the market-to-book ratio in year t-1, defined as assets minus book equity plus market equity all divided by assets. ***PPE/A$_{t-1}$***, fixed assets intensity is defined as net property, plant, and equipment divided by assets. ***EBITDA/A$_{t-1}$***: profitability is defined as operation income before depreciation divided by assets. ***Log(S)$_{t-1}$***: firm size is defined as the log of net sales. Panel A shows the result for book leverage. Panel B shows the results for market leverage. Robust standard errors shown as ***se*** *** p<0.001, ** p<0.01, * p<0.05, † p<0.1

Year	N	***M/B$_{efwa,\ t-1}$***		**M/B$_{t-1}$**			***EBITDA/A$_{t-1}$***	***PPE/A$_{t-1}$***		***Log(S)$_{t-1}$***		
		β_{mbwa}	se	β_{mb}	se	β_{ppe}	se	β_{ppe}	se	β_{sales}	se	R^2
Panel A: Book Leverage												
IPO	83	0.533***	-0.0774	0.112**	-0.0413	-6.718*	-2.81	0.949*	-0.376	-0.191**	-0.0649	0.608
IPO+1	110	0.458***	-0.0626	0.121**	-0.0397	-9.052***	-2.327	0.686†	-0.363	-0.115*	-0.0472	0.579
IPO+4	261	0.128***	-0.0257	0.214***	-0.0543	-5.803***	-1.472	0.779*	-0.304	0.00359	-0.0327	0.289
IPO+8	201	0.0712*	-0.0353	0.354***	-0.0863	-9.887***	-2.13	0.391	-0.33	-0.0153	-0.04	0.432
IPO+11	187	0.102†	-0.0557	0.274*	-0.113	-7.787***	-1.828	0.566	-0.406	0.0307	-0.0444	0.322
2000-2012	3,873	0.155***	-0.00883	0.315***	-0.0176	-7.435***	-0.446	0.853***	-0.088	-0.0296**	-0.0109	0.348
Panel B: Market Leverage												
IPO	87	0.00895	-0.00924	0.0134	-0.0106	-1.402***	-0.37	0.310***	-0.0652	0.00781	-0.00992	0.434
IPO+1	117	0.0085	-0.00953	0.00656	-0.00936	-1.437***	-0.3	0.286***	-0.0653	0.00505	-0.00889	0.352
IPO+4	296	-0.0177***	-0.00464	0.00133	-0.00688	-0.875***	-0.13	0.211***	-0.0514	0.0250***	-0.00661	0.3
IPO+8	225	-0.00025	-0.00548	-0.0195*	-0.00878	-0.914***	-0.199	0.259***	-0.0562	0.0215*	-0.00831	0.39
IPO+11	196	-0.0112*	-0.00445	-0.00284	-0.00565	-1.052***	-0.119	0.272***	-0.052	0.0201*	-0.00814	0.423
2000-2012	4,184	-0.00579***	-0.00119	-0.00534**	-0.00187	-0.884***	-0.0384	0.281***	-0.013	0.0204***	-0.00163	0.312

The second largest effect can be found in the historical path of market timing which is represented by the 'weighted average market-to-book ratio'. Tangibility has a stronger impact due to the larger value of the estimated coefficient, but this weighted average market-to-book displays a more determining effect, due to the stronger significance of 0.001 up to IPO+8, when it then reduces to 0.0712 at a significance level of 0.05. The association with the leverage is positive from the IPO year until the end of the sample time period, and this effect is significantly consistent particularly with the market value of leverage.

The firm size which is represented by log sales in the model has a constant positive impact on market leverage; however it does not matter for book leverage apart from in the IPO year and for one year after the IPO. The result also shows that, larger firms' level of debt financing increases with firm's IPO age.

4.4.3 Determinants of leverage: alternative control variables

Table 4.4 reports the estimation results of the determinants of capital structure controlling for eight alternative variables employed by Fama and French (2000). These factors are the current market-to-book ratio, dividend payout to book value of equity and market value of equity, depreciation expenses over total assets, research development expenses divided by total assets, and a dummy variable designed for those firms who have no research and development expense available, profitability and size also included by but defined differently as earnings before interest and taxes divided by the total assets and log value of the total assets.

Table 4.4 Determinants of leverage: alternative control variables

OLS regression of book and market leverage on determinants suggested by Fama and French (2000)

$$\left(\frac{D}{A}\right)_t = \alpha + \beta_{mbwa}\left(\frac{M}{B}\right)_{etwa,t-1} + \beta_{mb}\left(\frac{M}{B}\right)_{t-1} + \beta_{ebit}\left(\frac{ET}{A}\right)_{t-1} + \beta_{divbe}\left(\frac{Div}{BE}\right)_{t-1} + \beta_{divme}\left(\frac{Div}{ME}\right)_{t-1} + \beta_{dpa}\left(\frac{Dp}{A}\right)_{t-1} + \beta_{rda}\left(\frac{RD}{A}\right)_{t-1} + \beta_{rdd}RDD_{t-1} + \beta_{size}\log(A)_{t-1} + \varepsilon_t$$

The constant α is not reported. Leverage is defined as book leverage and market leverage. Book value leverage is book debt to assets and Market value of leverage which is book debt to the results of book debt plus market equity. The market-to-book ratio is defined in two ways. The first, ***$M/B_{efwa,\ t-1}$*** is a weighted average market-to-book ratio from the IPO year to year t-1. The weights are the amount of external finance raised in each year. External finance is defined as net equity issues plus net debt issues, where this is negative; the weight is set to zero. The second, ***$M/B_{t-1,}$*** is the market-to-book ratio in year t-1, defined as assets minus book equity plus market equity all divided by assets. ***ET/A_{t-1}***: earnings before interest and taxes are scaled by assets. ***Div/BE%*** and ***Div/ME%***: common dividends are scaled by book equity and market equity. ***Dp/A %***: depreciation expense is scaled by assets. ***RD/A %***: research and development expense is scaled by assets. ***RDD*** is a dummy set to one if the firm has no R&D expenses. ***$Log(A)_{t-1}$***: size is log of total assets. Panel A shows the result for book leverage. Panel B shows results form market leverage. Robust standard errors shown as ***se***. *** p<0.001, ** p<0.01, * p<0.05, † p<0.1

Year	N	$M/B_{efwa,\ t-1}$		M/B_{t-1}		ET/A_{t-1}		Div/BE%		Div/ME%		Dp/A %		RD/A %		RDD		$Log(A)_{t-1}$		
		β_{mbwa}	*se*	β_{mb}	*se*	β_{ebit}	*se*	β_{divbe}	*se*	β_{divme}	*se*	β_{dpa}	*se*	β_{rda}	*se*	β_{rdd}	*se*	β_{size}	*se*	R^2
Panel A: Book leverage																				
IPO	66	0.342***	-0.0892	-0.0751	-0.0906	-14.51**	-4.496	0.139**	-0.0518	-0.134***	-0.0373	0.108	-4.916	5.976	-8.333	0.305	-0.654	-0.0908	-0.0769	0.717
IPO+1	91	0.291***	-0.0712	-0.0542	-0.0557	-15.29***	-2.849	0.115***	-0.0332	-0.114***	-0.0256	-6.936	-4.255	4.784	-5.111	0.117	-0.412	-0.0422	-0.0588	0.699
IPO+4	240	0.0708**	-0.0245	0.142**	-0.0533	-7.389***	-1.503	0.0332***	-0.00824	-0.0442***	-0.0104	-3.392†	-1.877	-1.218	-1.834	-0.0693	-0.129	0.0426	-0.0294	0.461
IPO+8	185	0.0458	-0.0353	0.272***	-0.0809	-11.33***	-2.414	0.0357**	-0.0109	-0.0558***	-0.0122	-6.288**	-2.312	-4.746†	-2.483	-0.249	-0.152	-0.0462	-0.0422	0.564
IPO+11	175	0.0869†	-0.052	0.1	-0.0874	-7.820***	-1.739	0.0383	-0.0404	-0.116**	-0.0433	-1.526	-2.333	-5.082*	-2.556	-0.485*	-0.189	-0.0393	-0.0428	0.473
2000-2012	3,509	0.108***	-0.00881	0.202***	-0.017	-9.503***	-0.473	0.0390***	-0.00351	-0.0621***	-0.00401	-3.169***	-0.718	-2.583***	-0.701	-0.0513	-0.0438	-0.0331**	-0.0111	0.489
Panel B: Market Leverage																				
IPO	70	-0.0189	-0.0125	-0.00759	-0.0133	-2.588***	-0.392	0.00844	-0.00721	-0.0160**	-0.00496	-1.2	-0.827	0.671	-1.017	0.0479	-0.0593	0.0206†	-0.0104	0.581
IPO+1	96	-0.0111	-0.0109	-0.00706	-0.0135	-2.501***	-0.408	0.00304	-0.00691	-0.00743	-0.00541	-0.192	-0.764	-1.115	-1.013	-0.00718	-0.0647	0.00793	-0.00992	0.47
IPO+4	270	-0.0186***	-0.00451	0.00115	-0.00761	-0.881***	-0.145	0.000278	-0.00115	0.000197	-0.00149	0.163	-0.398	-0.584*	-0.266	0.0378	-0.0256	0.0399***	-0.0064	0.371
IPO+8	205	-0.00535	-0.00579	-0.0308**	-0.00948	-0.909***	-0.215	0.00402**	-0.00124	-0.00667***	-0.00148	-0.0366	-0.499	-0.211	-0.465	0.0593†	-0.0322	0.0371***	-0.00832	0.449
IPO+11	180	-0.0152**	-0.00481	-0.0119	-0.00877	-0.998***	-0.13	0.00121	-0.00208	-0.00508	-0.00309	-0.516	-0.427	-0.529	-0.359	0.0432	-0.0318	0.0257**	-0.00779	0.441
2000-2012	3,743	-0.00759***	-0.00129	-0.0131***	-0.00234	-0.923***	-0.0432	0.00173***	-0.000432	-0.00224***	-0.000518	0.0297	-0.111	-0.463***	-0.0864	0.0497***	-0.00686	0.0313***	-0.00163	0.33

The results confirm that there is a significant negative impact of profitability on capital structure and this effect appears strongest in the IPO year and at IPO +1. The effect of weighted average market-to-book ratio remains strong and has a positive impact on book leverage however a weak and negative on market leverage when alternative firm-specific factors are controlled. In the IPO year and at IPO+1, the dividend to book equity has positive effect on book leverage and negative effect on market equity. This result is in line with the findings from Baker and Wurgler (2002). In these two time slots, none of the other variables to appear to have an impact on either book or market leverage.

At IPO+4, the impact from profitability is reduced to half (7.389) as before (15.29), however it still stands out among the other firms' factors as it is two times more than the second largest coefficient, which is the depreciation of total assets. The impact of the historical market valuation sharply decreases to 0.0708, while the current market-to-book ratio begins to affect a firm's capital structure decisions. A consistent effect from the previous year from the dividend to both market and book equity can be observed, while research and development and the log assets still have no significant results. Depreciation starts to have a strong effect, as one unit increase leads to a decrease of 3.392 in leverage at a relatively small significance level of 0.1.

At IPO+8, the effect from the weighted average market-to-book disappears, while that of the current market-to-book doubles. The same happens to the impact from depreciation. Dividend has a relevantly consistent level of impact, whilst profitability increases its impact on book leverage. It is worth noting that research and development first has a negative impact on leverage, however it then kicks in at IPO+4 for market leverage. There is an occasional impact from the dummy variable that represents no research and develop, which appears at IPO+5, IPO+6, IPO+9 etc. Size measured by log assets has a significant impact on market leverage, but the results from book leverage did not appear to show a positive relationship. The coefficient is on average around 0.03, and there is no effect at IPO+1.

4.5 Discussion

The results imply that there is no evidence of equity market timing affecting capital structure in Europe. Although equity market timing is suggested in the US studies (Baker and Wurgler, 2002), it does not extend to the current study sample from Europe. The original incentive to conduct market timing investigation in Europe came around as a result of European stock markets' rapid development in the global financial market over the past two decades. In particular, improvements in technology and trading systems lowered the barriers of trading business, therefore increasing the demand for equity financing. However, in Europe, firms which go public do still prefer debt finance; they issue debt rather than equity when stock prices are high. The motivations behind the debt preference can be explained as follows.

First, the structure of Europe's economies is significantly influenced by and heavily reliant on banks; therefore, it is a more bank-oriented financial system. In the last two decades, Europe's banking system has expanded rapidly. Bank loans and bank deposits represent the main source of external finance for European firms (Rajan and Zingales, 2003). Second, as one of the impacts of the integration of European Union, EU members can benefit from the single market and currency, lower inflation, stable economic growth, and therefore have more straightforward access to long-term investment through lower interest rates. In addition, during financial crises, firms are limited to issue new equities, but they are able to raise their funds from banks or the bond market. Finally, European firms mainly comprise of small and medium-sized businesses. The debt instruments are not only a preference, but also a primitive option. Equity market liquidity has significantly improved for firms with large market capitalisation, as well as institutional investors, but a sharp decrease in liquidity has been seen for mid-cap equities. The more than 20 individual existent stock exchanges are also a reflection of the fragmentation and home bias of the equity stock market. The result also documents how European firms' capital structure decisions are profit-driven. The historical market valuations represented in the model by the weighted average market-to-book value have been an essential and persistent factor for firms to time the market. In other words, when firm stock price is high, they prefer to issue debt.

The results confirm that high leverage is associated with high levels of market-to-book ratio. Thus it is in consensus with the trade-off theory, that is the market-to-book ratio provides information for extensive growth and investment opportunities. This element has a substantial impact on firms financing decisions, because when a firm issue excessive debt to finance growth they become financially constrained due to the limit of debt overhang. When firms' growth opportunities drop to a fairly low level the debt overhang will potentially lead to high probability of bankruptcy. Trade-off theory also suggests that a firm's capital structure tends to move along with the changes in the market-to-book ratio. The result confirms that assumption and proves that there is a significant effect of past market valuation on leverage i.e. long-term effect. The long-term effect implies that firms are active in adjusting their capital and the cost of adjustment is relatively low compared to the cost of being far from the target capital.

The market timing theory suggests that the market-to-book ratios either the current or weighted average, reflect the historical information of the firm's market valuation. The primary motivation of this theory is that mangers hold the belief that they can time the market and the underlying interpretation is that this causes either adverse selection or time-varying mispricing. The adverse selection is a rational behaviour due to information asymmetry firms shows their good prospect by issuing equity. The mispricing is quite opposite to the assumption due to the irrational behaviour from wrong perception of investors or managers. However, the results in this study suggest that leverage moves up along with the higher market valuation. Managers continue to issue debt when they observe the over-valued equity. Both the temporary and historical fluctuations in the market-to-book ratio reflect this act on firms' capital structure variation. The fact that firms favour debt when stock price is high cannot be explained by the market timing theory.

The market-to-book ratio in the pecking order theory is considered to be a measure of growth opportunities. The positive association between the market-to-book ratio and capital structure resulting from high growth opportunities will tend to push leverage higher toward a debt capacity. The obtained results from this study accurately reconcile with this interpretation. Raising external finance is costly (transaction cost) because mangers have more information about the firm's prospect than outside investors. Myers and Majluf (1984) suggest that outside investors rationally discount the firm's stock price when mangers issue equity instead of riskless debt. To avoid this discount, managers avoid issuing equity whenever possible. Therefore, internal finance is preferred, not only because of the loss of control, but also because of the expensive issuance (transaction) costs, especially in the case of new equity issue.

The results for this chapter shows that European firms behaves against the equity market timing as they issue debt rather than equity when equity market value is high. The implication of the results may lend its explanation to the following facts. First, most of the European firms are operating in bank-dominated economies. That is it seems that accessing debt from banks is an easy option for these firms. Second, the high taxation in Europe, firms tend to exploit to high market value and hence lower the debt ratio by issuing more debt. This could be the explantion indeed in case of market inefficient and overheated prices. Firms might be taking higher risk by doing so. As when prices all , the will look over leveraged. Third, European firms see the high value of equity as good sign of firms's future. This encourgate them to contract more debt.

The results also support the trade-off theory in terms of active adjustment of capital that stems from low cost of adjustment. However firms resort to debt as a second choice hence the first preference is to issue funds from internal funds (retained earnings) to finance growth opportunities; this approach is in line with pecking order theory.

4.6 Robustness check

This section is examine the impact of historical information on the improving the goodness of fit of the models. More precisely, whether counting for historical information (by including the historical weighted average market-to-book) will have more explanatory power for the model. Figure 1 compares the explanatory power of the estimations with and without the weighted average market-to-book ratio over the IPO time. The solid line traces out the cross-sectional R square when the weighted average market-to-book is missing, and the dashed line traces out the R square when it is added. Panels A and C report the results for the multivariate regression of the book leverage relevant to both variables, as recommended by Rajan and Zingales (1995) and Fama and French (2000), while Panels B and D report those of the market value of leverage. The magnitude of the coefficient in the results from the estimations with the weighted average market-to-book shown in panel A are far larger than those of the estimation without, especially in the IPO year and in the first two years after the IPO when there is high volatility in the share price. This higher explanatory power is also present in the other three charts. It statistically indicates that the stronger historical market-to-book ratio impact cannot be ignored.[4]

[4] To obtain more confidence, Akaike's information criterion (AIC) and Bayesian information criterion (BIC) are applied to justify the better goodness of fit among the applied estimations. The BIC is also known as Schwarz information criterion (SIC). The unexplained variation in dependent variable and independent variables leads to higher value of the BIC. Akaike (1971) developed the AIC but proposed in in Akaike (1974) that is under the name of 'an information criterion' to weigh the goodness of fit of an estimated statistical model. It trades off the complexity of an estimated model against how well the model fits the data by grouping it in the concept of entropy. The increase of the number of free parameters to be estimated improves the goodness of fit. Consequently, for the best fit model, the higher value of AIC while the lower value in BIC is preferred (not reported).

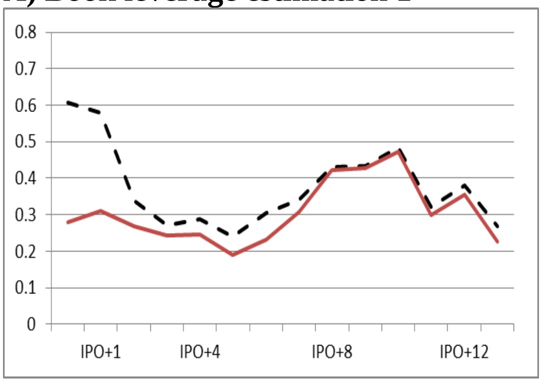
Figure 4.1 Comparison on explanatory power of determinants of capital structure as firm's IPO age

R^2 for OLS regressions of book leverage and market leverage on determinants of capital structure

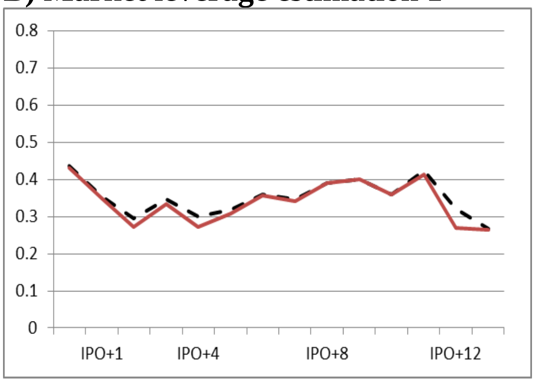
$$\left(\frac{D}{A}\right)_{IPO+t} = \alpha + \beta X_{t-1} + \varepsilon_t$$

Leverage is defined as book leverage and market leverage. Book value leverage is book debt to assets and Market value of leverage which is book debt to the results of book debt plus market equity. In this chart, the solid line is the year $t-1$ value. The dashed line uses an external finance weighted-average value from the IPO Year through year $t-1$. Market-to-book ratio is defined in two ways. The first is a weighted average market-to-book ratio from the IPO year to year $t-1$. The weights are the amount of external finance raised in each year. External finance is defined as net equity issues plus net debt issues, where this is negative; the weight is set to zero. The second is the market-to-book ratio in year $t-1$, defined as assets minus book equity plus market equity all divided by assets. Fixed assets intensity is defined as net property, plant, and equipment divided by assets. Profitability is defined as operation income before depreciation divided by assets. Firm size is defined as the log of net sales. Earnings before interest and taxes are scaled by assets. Common dividends are scaled by book equity and market equity. Depreciation expense is scaled by assets. Research and development expense is scaled by assets. RDD is a dummy set to one if the firm has no R&D expenses. Size is log of total assets. Panel A, C shows the result for book leverage. Panel B, D shows results form market leverage.

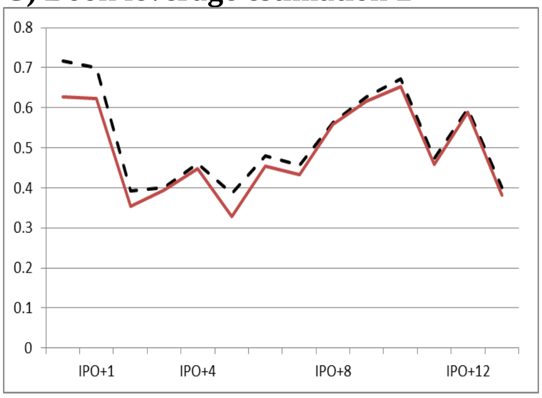
A) Book leverage estimation 1



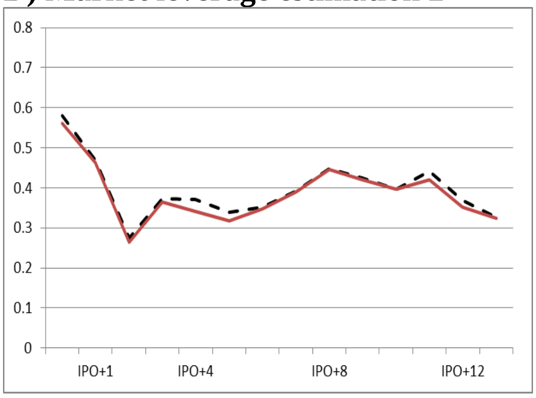
B) Market leverage estimation 1



C) Book leverage estimation 2



D) Market leverage estimation 2



Multicollinearity is also assessed by using Variance Inflation Factors. The value is smaller than 3, therefore, the standard errors are not inflated and there is no need for further investigation of this issue.

4.7 Conclusion

This chapter empirically investigates the market timing effect on capital structure in Europe. The chapter use data from EU-15 countries during the period 2000 to 2012. The analysis follows the structure and methodological approach of Baker and Wurgler (2002). The results generally provide evidence against the theoretical assumption of the equity market timing. That is, European firms tend to issue debt when the market valuation of equity is high. This evidence not only applies to the current market valuation, but also to the historical market valuation as well. The main assumption of the market timing theory is that firms capitalise on the situation when the equity market value is high (i.e. low cost of equity) and thus, resort to issuing equity, compared to other sources of finance during such a time. One explanation for the findings is that in general European firms capitalise on the high value of their equity (low leverage), i.e. low probability of bankruptcy, and issue debt in order to obtain it at a lower cost, which consequently contributes to reducing their weighted average cost of capital. This scenario does make sense, given the high tax brackets in Europe, flexible financial markets, relatively integrated capital markets, and the availability of low interest rates over the last decade. The other explanation is that the analysis of market timing relies on a proxy that captures the current and historical market timing effects (market-to-book ratios). This proxy is also considered by other theories as a reflection of the growth opportunities. In this vein, the evidence here suggests that firms with significant growth opportunities rely more on debt capital in our sample. The availability of cheap funds from banks and other lenders support such a scenario. The results imply that European firms may preferably act in either a trade-off theory or pecking order theory; however, this chapter does not explicitly confirm such an implication, which thus calls for further investigation, and which this study will conducts in the next chapters.

Appendix A

Tables for Chapter 4:

Table 4.5 Determinants of annual changes in leverage and components

The constant a is not reported. $\Delta(\boldsymbol{D/A})_{\boldsymbol{t}}$ in the results reflects the changes in book leverage. Book value leverage is book debt to assets***M/B**$_{t-1}$* is the market-to-book ratio in year t-1, defined as assets minus book equity plus market equity all divided by assets. ***PPE/A**$_{t-1}$*, fixed assets intensity is defined as net property, plant, and equipment divided by assets. ***EBITDA/A**$_{t-1}$*, profitability is defined as operation income before depreciation divided by assets. ***Log(S)**$_{t-1}$* ,firm size is defined as the log of net sales. To capture the impact of annual changes in leverage and components, this model includes the market-to-book ratio in year t-1, defined as assets minus book equity plus market equity all divided by assets. Results obtained from external finance shown in Panel A, those from its components are shown in Panel B, Panel C and Panel D. It is defined as net equity issues plus net debt issues. $(\boldsymbol{e/A})_{\boldsymbol{t}}$)%: the net equity issues are the change in book equity minus the change in balance sheet retained earnings divided by total assets. The newly retained earnings are the change in retained earnings divided by total assets, $(\Delta(\boldsymbol{RE/A})_{\boldsymbol{t}}$. The net debt issues are the residual change in total assets divided by total assets:$((-\boldsymbol{E}\_(\boldsymbol{t-1})\,(\boldsymbol{1/A}\_(\boldsymbol{t}\ )\ -\ 〖〖\boldsymbol{1/A}〗\_(\boldsymbol{t-1})〗\_))$)%. Robust standard errors shown as ***se***. *** p<0.001, ** p<0.01, * p<0.05, † p<0.1

Year	N	**M/B** $_{t-1}$		***EBITDA/A**$_{t-1}$*		***PPE/A**$_{t-1}$*		***Log(S)**$_{t-1}$*		
		β_mb	*se*	*β_ebitda*	*se*	*β_ppe*	*se*	*β_sales*	*se*	R^2
Panel A: Change in Book Leverage ($\Delta(D/A)_t$) %										
IPO	86	0.0224	-0.0241	-0.652	-0.73	0.181	-0.198	0.0143	-0.0223	0.046
IPO+1	118	0.0177†	-0.0092	-0.47	-0.814	-0.0555	-0.137	0.0145	-0.0157	0.021
IPO+2	163	0.00999	-0.00993	-0.47	-0.339	0.163	-0.136	0.00292	-0.0183	0.076
IPO+3	294	0.0268	-0.0175	-0.712	-0.557	0.0855	-0.0934	0.00464	-0.00832	0.034
IPO+4	310	0.0186	-0.0171	-0.734	-0.538	0.136	-0.0874	-0.0193†	-0.00987	0.089
IPO+5	320	0.018	-0.0155	-0.219	-0.506	-0.0691	-0.124	0.0141	-0.013	0.046
IPO+6	316	0.00919	-0.00893	-0.154	-0.412	0.0119	-0.0982	0.0151	-0.0108	0.137
IPO+7	296	-0.00251	-0.00739	-0.196	-0.248	0.0834	-0.0642	-0.0147*	-0.00725	0.224
IPO+8	266	0.0519†	-0.0306	-1.742†	-1.028	0.137	-0.12	0.00546	-0.0126	0.067
IPO+9	256	0.0247	-0.0187	-0.769	-0.776	0.115†	-0.0641	-0.0013	-0.00954	0.038
IPO+10	247	-0.013	-0.0121	0.397	-0.528	-0.0651	-0.0528	-0.0058	-0.00828	0.041
IPO+11	242	-0.0418	-0.0319	-0.0396	-0.409	0.0837	-0.0894	-0.00957	-0.0108	0.058
IPO+12	222	0.0227	-0.0292	-0.581	-0.657	-0.0691	-0.106	0.0154	-0.0179	0.082
IPO>12	7,125	0.0180***	-0.00491	-0.657***	-0.192	0.121***	-0.0322	-0.000987	-0.00262	0.025
2000-2012	4,718	0.0198**	-0.00608	-0.601**	-0.217	0.103***	-0.0301	-0.00748†	-0.00394	0.020
Panel B :Change in Leverage Due to Net Equity Issues ($-(e/A)_t$)%										
IPO	86	-0.00488	-0.00799	0.983	-0.934	-0.0277	-0.0905	-0.0107	-0.00933	0.075
IPO+1	118	-0.00663	-0.0171	0.748	-0.497	-0.00714	-0.138	-0.0108	-0.0142	0.035
IPO+2	163	-0.0117†	-0.00688	-0.15	-0.219	-0.124	-0.0925	-0.00489	-0.0103	0.131
IPO+3	294	-0.0108	-0.00702	0.181	-0.233	-0.0828	-0.0575	0.00641	-0.00626	0.202
IPO+4	310	-0.0191*	-0.00868	0.680**	-0.253	-0.111*	-0.0501	0.00945	-0.00862	0.094
IPO+5	320	-0.0191†	-0.0109	0.485	-0.329	0.0632	-0.0658	-0.00524	-0.00644	0.128
IPO+6	316	-0.0111	-0.00745	0.194	-0.228	0.0188	-0.0681	0.00217	-0.00565	0.014
IPO+7	296	0.00551	-0.00692	-0.174	-0.172	-0.0529	-0.0496	0.0146*	-0.00594	0.403
IPO+8	266	-0.0208†	-0.0111	0.518	-0.335	-0.129†	-0.066	0.000628	-0.00657	0.124
IPO+9	256	-0.0126	-0.0135	0.414	-0.375	-0.0371	-0.0519	0.0145*	-0.00604	0.317
IPO+10	247	0.00382	-0.00938	-0.157	-0.255	0.00116	-0.0593	0.0059	-0.00658	0.199
IPO+11	242	0.000364	-0.0166	0.372	-0.394	-0.0636	-0.0735	0.00925	-0.00822	0.101
IPO+12	222	-0.018	-0.0189	0.616	-0.445	0.0786	-0.069	0.00811	-0.00998	0.082
IPO>12	7,125	-0.0115***	-0.00213	0.362***	-0.0744	-0.108***	-0.0171	0.00374*	-0.00159	0.081
2000-2012	4,718	-0.0147***	-0.00272	0.427***	-0.0879	-0.068***	-0.0189	0.00758***	-0.00218	0.084

Year	N	M/B $_{t-1}$		$EBITDA/A_{t-1}$		PPE/A_{t-1}		$Log(S)_{t-1}$		
		β_mb	***se***	***β_ebitda***	***se***	***β_ppe***	***se***	***β_sales***	***se***	R^2
Panel C: Change in Book Leverage Due to Newly Retained Earnings $(-\Delta(RE/A)_t)$ %										
IPO	86	0.0026	-0.00646	-1.538†	-0.813	0.0749	-0.0797	0.0128	-0.00842	0.178
IPO+1	118	0.00802	-0.00593	-1.171	-0.737	0.0431	-0.0901	0.0144	-0.0105	0.067
IPO+2	163	0.00675	-0.00523	-0.241	-0.157	0.0735	-0.0723	0.00342	-0.00852	0.106
IPO+3	294	0.00544	-0.00667	-0.428†	-0.228	0.0613	-0.0536	-0.00199	-0.00644	0.199
IPO+4	310	0.0107	-0.00799	-0.678**	-0.243	0.0137	-0.0355	-0.00296	-0.00624	0.12
IPO+5	320	0.0159	-0.0102	-0.618†	-0.332	-0.0325	-0.0639	0.00724	-0.00584	0.148
IPO+6	316	0.00962†	-0.00538	-0.367†	-0.219	0.0412	-0.0661	0.00333	-0.00486	0.022
IPO+7	296	-0.00704	-0.00482	-0.0231	-0.158	0.0662	-0.0507	-0.00499	-0.0052	0.413
IPO+8	266	0.0259**	-0.00992	-0.694*	-0.304	0.114†	-0.064	0.00877	-0.00586	0.176
IPO+9	256	0.0155	-0.0124	-0.645†	-0.357	0.0239	-0.0427	-0.0083	-0.00558	0.358
IPO+10	247	-0.0097	-0.00856	0.102	-0.209	-0.0143	-0.0521	-0.00381	-0.00583	0.223
IPO+11	242	-0.00548	-0.0153	-0.437	-0.382	0.048	-0.0646	-0.00406	-0.00756	0.11
IPO+12	222	0.0126	-0.0179	-0.633	-0.44	-0.0487	-0.0652	-0.00279	-0.0094	0.079
IPO>12	7,125	0.00962***	-0.0019	-0.560***	-0.068	0.119***	-0.0162	9.52E-05	-0.00148	0.093
2000-2012	4,718	0.0126***	-0.00246	-0.604***	-0.0829	0.0695***	-0.0178	-0.00302	-0.00201	0.094
Panel D: Change in Book Leverage Due to Growth in Assets$((-E_{(t-1)}(1/A_{(t)} - 〖〖1/A〗_{(t-1)}〗_)))$%										
IPO	86	-0.0206†	-0.0116	1.396	-1.024	-0.222	-0.137	-0.0161	-0.0162	0.11
IPO+1	118	-0.0203†	-0.0111	1.059	-0.845	0.0218	-0.145	-0.0167	-0.0154	0.052
IPO+2	163	-0.000913	-0.00893	0.713*	-0.307	-0.0447	-0.119	0.00477	-0.0152	0.034
IPO+3	294	-0.00221	-0.00835	0.384	-0.281	-0.041	-0.0724	-0.0036	-0.00748	0.016
IPO+4	310	0.00107	-0.0112	0.344	-0.392	0.0144	-0.0807	0.00364	-0.0125	0.05
IPO+5	320	0.000708	-0.0103	0.221	-0.315	0.0318	-0.08	-0.00655	-0.00722	0.047
IPO+6	316	-0.00548	-0.00791	0.187	-0.309	-0.0836	-0.0762	-0.0138	-0.00851	0.1
IPO+7	296	0.0105	-0.00794	0.232	-0.222	-0.105	-0.0677	0.00515	-0.00746	0.294
IPO+8	266	-0.0337**	-0.0127	0.978**	-0.372	-0.165†	-0.09	-0.00799	-0.0092	0.128
IPO+9	256	-0.0201†	-0.0121	0.622†	-0.34	-0.096	-0.0665	-0.000411	-0.00781	0.067
IPO+10	247	0.0137	-0.0161	-0.251	-0.32	0.037	-0.0974	0.00357	-0.0118	0.005
IPO+11	242	0.0346†	-0.018	0.0469	-0.451	0.00841	-0.0886	-0.00243	-0.00939	0.144
IPO+12	222	0.00486	-0.0188	0.289	-0.355	0.167	-0.113	-0.0201	-0.0141	0.042
IPO>12	7,125	-0.00536†	-0.00288	0.488***	-0.0941	-0.114***	-0.0214	-0.00264	-0.00214	0.013
2000-2012	4,718	-0.00780*	-0.00317	0.423***	-0.105	-0.0774**	-0.0237	0.000988	-0.00299	0.013

Table 4.6 Determinants of leverage

The constant a is not reported. Leverage is defined as book leverage and market leverage. Book value leverage is book debt to assets and market value of leverage which is book debt to the results of book debt plus market equity. The market-to-book ratio is defined in two ways. The first, $\boldsymbol{M/B_{efwa,\ t\text{-}1}}$, is a weighted average market-to-book ratio from the IPO year to year t-1. The weights are the amount of external finance raised in each year. External finance is defined as net equity issues plus net debt issues, where this is negative; the weight is set to zero. The second, $\boldsymbol{M/B_{t\text{-}1}}$, is the market-to-book ratio in year t-1, defined as assets minus book equity plus market equity all divided by assets. $\boldsymbol{ET/A_{t\text{-}1}}$: earnings before interest and taxes are scaled by assets. ***Div/BE%*** and ***Div/ME%***: common dividends are scaled by book equity and market equity. ***Dp/A%***: depreciation expense is scaled by assets. ***RD/A%***: research and development expense is scaled by assets. ***RDD*** is a dummy set to one if the firm has no R&D expenses. $\boldsymbol{Log(A)_{t\text{-}1}}$: size is log of total assets. Panel A shows the result for book leverage. Panel B shows results form market leverage. Robust standard errors shown as ***se***. *** p<0.001, ** p<0.01, * p<0.05, † p<0.1

		$M/B_{efwa,\ t\text{-}1}$		$M/B_{t\text{-}1}$		$EBITDA/A_{t\text{-}1}$		$PPE/A_{t\text{-}1}$		$Log(S)_{t\text{-}1}$		
Year	*N*	β_{mbwa}	*se*	β_{mb}	*se*	β_{ppe}	*se*	β_{ppe}	*se*	β_{sales}	*se(f)*	R^2
						Panel A: Book Leverage						
IPO	83	0.533***	-0.0774	0.112**	-0.0413	-6.718*	-2.81	0.949*	-0.376	-0.191**	-0.0649	0.608
IPO+1	110	0.458***	-0.0626	0.121**	-0.0397	-9.052***	-2.327	0.686†	-0.363	-0.115*	-0.0472	0.579
IPO+2	133	0.148***	-0.0372	0.137***	-0.0404	-4.994**	-1.781	0.774†	-0.394	-0.0509	-0.0412	0.339
IPO+3	249	0.114***	-0.029	0.193***	-0.0456	-4.734***	-1.233	0.849**	-0.27	0.0148	-0.0339	0.271
IPO+4	261	0.128***	-0.0257	0.214***	-0.0543	-5.803***	-1.472	0.779*	-0.304	0.00359	-0.0327	0.289
IPO+5	266	0.141***	-0.0301	0.258***	-0.0565	-4.599**	-1.489	0.767*	-0.353	0.0311	-0.039	0.239
IPO+6	252	0.145***	-0.0272	0.201***	-0.0477	-5.072***	-1.308	0.595†	-0.312	0.0291	-0.0302	0.306
IPO+7	233	0.107***	-0.0265	0.299***	-0.06	-6.511***	-1.544	0.760*	-0.348	0.00996	-0.0329	0.342
IPO+8	201	0.0712*	-0.0353	0.354***	-0.0863	-9.887***	-2.13	0.391	-0.33	-0.0153	-0.04	0.432
IPO+9	192	0.0499	-0.0409	0.491***	-0.0975	-10.79***	-1.784	0.686*	-0.304	-0.00787	-0.0379	0.434
IPO+10	188	0.0767†	-0.0444	0.522***	-0.116	-11.33***	-1.751	0.328	-0.33	-0.0219	-0.0403	0.483
IPO+11	187	0.102†	-0.0557	0.274*	-0.113	-7.787***	-1.828	0.566	-0.406	0.0307	-0.0444	0.322
IPO+12	170	0.115*	-0.049	0.351**	-0.108	-8.129***	-1.874	0.479	-0.373	0.0408	-0.0528	0.381
IPO>12	6,261	0.147***	-0.00656	0.301***	-0.0153	-5.788***	-0.345	1.053***	-0.0782	0.0483***	-0.0085	0.269
2000-2012	3,873	0.155***	-0.00883	0.315***	-0.0176	-7.435***	-0.446	0.853***	-0.088	-0.0296**	-0.0109	0.348
						Panel B: Market Leverage						
IPO	87	0.00895	-0.00924	0.0134	-0.0106	-1.402***	-0.37	0.310***	-0.0652	0.00781	-0.00992	0.434
IPO+1	117	0.0085	-0.00953	0.00656	-0.00936	-1.437***	-0.3	0.286***	-0.0653	0.00505	-0.00889	0.352
IPO+2	145	-0.0152*	-0.00669	-0.00339	-0.00667	-0.572***	-0.15	0.319***	-0.0712	0.0144†	-0.00852	0.294
IPO+3	279	-0.0124*	-0.00483	-0.0149**	-0.00511	-0.783***	-0.127	0.210***	-0.0526	0.0303***	-0.00692	0.347
IPO+4	296	-0.0177***	-0.00464	0.00133	-0.00688	-0.875***	-0.13	0.211***	-0.0514	0.0250***	-0.00661	0.3
IPO+5	291	-0.0110*	-0.00445	-0.00549	-0.00757	-0.726***	-0.131	0.265***	-0.0529	0.0314***	-0.00665	0.318
IPO+6	271	-0.00469	-0.00398	-0.0130†	-0.00693	-0.561***	-0.132	0.288***	-0.0483	0.0324***	-0.00604	0.361
IPO+7	252	-0.00689	-0.00433	-0.0167*	-0.0073	-0.511***	-0.148	0.284***	-0.0509	0.0322***	-0.00654	0.347
IPO+8	225	-0.00025	-0.00548	-0.0195*	-0.00878	-0.914***	-0.199	0.259***	-0.0562	0.0215*	-0.00831	0.39
IPO+9	208	-0.00267	-0.00501	-0.004	-0.00803	-1.070***	-0.13	0.255***	-0.0608	0.0313***	-0.00766	0.401
IPO+10	201	0.0021	-0.00531	-0.0231*	-0.0108	-0.955***	-0.139	0.209***	-0.055	0.0228**	-0.00714	0.359
IPO+11	196	-0.0112*	-0.00445	-0.00284	-0.00565	-1.052***	-0.119	0.272***	-0.052	0.0201*	-0.00814	0.423
IPO+12	187	-0.00641	-0.00643	-0.00114	-0.0177	-0.920***	-0.21	0.258***	-0.0535	0.0283**	-0.00869	0.32
IPO>12	6,724	-0.00457***	-0.00111	-0.0188***	-0.00193	-0.994***	-0.0344	0.244***	-0.0125	0.0327***	-0.00143	0.266
2000-2012	4,184	-0.00579***	-0.00119	-0.00534**	-0.00187	-0.884***	-0.0384	0.281***	-0.013	0.0204***	-0.00163	0.312

Table 4.7 Determinants of leverage: alternative control variables

The constant α is not reported. Leverage is defined as book leverage and market leverage. Book value leverage is book debt to assets and market value of leverage which is book debt to the results of book debt plus market equity. The market-to-book ratio is defined in two ways. The first, ***$M/B_{efwa,\ t-1}$***, is a weighted average market-to-book ratio from the IPO year to year t-1. The weights are the amount of external finance raised in each year. External finance is defined as net equity issues plus net debt issues, where this is negative; the weight is set to zero. The second, ***M/B_{t-1}***, is the market-to-book ratio in year t-1, defined as assets minus book equity plus market equity all divided by assets. ***ET/A_{t-1}***: earnings before interest and taxes are scaled by assets. ***Div/BE%*** and ***Div/ME%***: common dividends are scaled by book equity and market equity. ***Dp/A%***: depreciation expense is scaled by assets. ***RD/A%*:** research and development expense is scaled by assets. ***RDD*** is a dummy set to one if the firm has no R&D expenses. ***$Log(A)_{t-1}$***: size is log of total assets. Panel A shows the result for book leverage. Panel B shows results form market leverage. Robust standard errors shown as ***se***. *** p<0.001, ** p<0.01, * p<0.05, † p<0.1

Year	N	$M/B_{efwa,\ t-1}$		M/B_{t-1}		ET/A_{t-1}		Div/BE%		Div/ME%		Dp/A%		RD/A%		RDD		$Log(A)_{t-1}$		
		β mbwa	se	β mb	se	β ebit	se	β divbe	se	β divme	se	β dpa	se	β rda	se	β rdd	se	β size	se	R^2
Panel A: Book leverage																				
IPO	66	0.342***	-0.0892	-0.0751	-0.0906	-14.51**	-4.496	0.139**	-0.0518	-0.134***	-0.0373	0.108	-4.916	5.976	-8.333	0.305	-0.654	-0.0908	-0.0769	0.717
IPO+1	91	0.291***	-0.0712	-0.0542	-0.0557	-15.29***	-2.849	0.115***	-0.0332	-0.114***	-0.0256	-6.936	-4.255	4.784	-5.111	0.117	-0.412	-0.0422	-0.0588	0.699
IPO+2	119	0.120**	-0.0399	0.0904*	-0.038	-5.388**	-2.022	0.0281*	-0.0111	-0.0491*	-0.022	-5.116	-3.43	-3.129	-3.004	-0.126	-0.178	0.0206	-0.048	0.392
IPO+3	224	0.0651†	-0.0343	0.127**	-0.0445	-5.827***	-1.362	0.0281**	-0.00993	-0.0464**	-0.0157	-1.475	-2.36	-1.99	-2.109	-0.159	-0.137	0.0363	-0.0346	0.402
IPO+4	240	0.0708**	-0.0245	0.142**	-0.0533	-7.389***	-1.503	0.0332***	-0.00824	-0.0442***	-0.0104	-3.392†	-1.877	-1.218	-1.834	-0.0693	-0.129	0.0426	-0.0294	0.461
IPO+5	247	0.0640*	-0.0252	0.175***	-0.0439	-6.758***	-1.285	0.0323***	-0.00846	-0.0482***	-0.013	-3.283†	-1.895	-2.600†	-1.326	-0.268†	-0.152	0.0039	-0.0277	0.387
IPO+6	235	0.0843***	-0.0244	0.0648†	-0.0379	-6.285***	-1.435	0.0396***	-0.00615	-0.0623***	-0.00724	-6.814**	-2.253	-0.229	-1.727	-0.183†	-0.0984	0.00471	-0.0253	0.479
IPO+7	222	0.0968***	-0.0256	0.174***	-0.0509	-7.610***	-1.799	0.0405*	-0.0158	-0.0664**	-0.0217	-2.893	-2.162	-1.806	-3.06	-0.197	-0.133	-0.00108	-0.0324	0.457
IPO+8	185	0.0458	-0.0353	0.272***	-0.0809	-11.33***	-2.414	0.0357**	-0.0109	-0.0558***	-0.0122	-6.288**	-2.312	-4.746†	-2.483	-0.249	-0.152	-0.0462	-0.0422	0.564
IPO+9	176	0.0688†	-0.0362	0.321***	-0.0856	-12.68***	-2.079	0.0630***	-0.0166	-0.0747***	-0.0203	-4.502†	-2.407	-4.156†	-2.369	-0.431**	-0.163	-0.034	-0.0364	0.628
IPO+10	172	0.0997*	-0.0424	0.279*	-0.111	-12.37***	-1.856	0.0574***	-0.0129	-0.0922***	-0.0176	-0.421	-2.78	-2.197	-2.478	-0.159	-0.161	-0.0449	-0.0383	0.672
IPO+11	175	0.0869†	-0.052	0.1	-0.0874	-7.820***	-1.739	0.0383	-0.0404	-0.116**	-0.0433	-1.526	-2.333	-5.082*	-2.556	-0.485*	-0.189	-0.0393	-0.0428	0.473
IPO+12	153	0.0752†	-0.0452	0.260*	-0.116	-10.09***	-2.093	0.0198	-0.0144	-0.0617***	-0.014	-3.186	-2.519	0.268	-2.133	0.102	-0.188	0.0258	-0.0479	0.598
IPO>12	5,646	0.0986***	-0.00612	0.159***	-0.0135	-7.358***	-0.365	0.0322***	-0.00326	-0.0566***	-0.00337	0.81	-0.545	-4.101***	-0.77	0.0154	-0.0353	0.0267**	-0.00882	0.402
2000-2012	3,509	0.108***	-0.00881	0.202***	-0.017	-9.503***	-0.473	0.0390***	-0.00351	-0.0621***	-0.00401	-3.169***	-0.718	-2.583***	-0.701	-0.0513	-0.0438	-0.0331**	-0.0111	0.489

Year	N	$M/B_{efwa,\ t-1}$		M/B_{t-1}		ET/A_{t-1}		*Div/BE%*		*Div/ME%*		*Dp/A%*		*RD/A%*		**RDD**		$Log(A)_{t-1}$		
		β_mbwa	se	β_mb	se	β_ebit	se	β_divbe	se	β_divme	se	β_dpa	se	β_rda	se	β_rdd	se	β_size	se	R^2
Panel B: Market Leverage																				
IPO	70	-0.0189	-0.0125	-0.00759	-0.0133	-2.588***	-0.392	0.00844	-0.00721	-0.0160**	-0.00496	-1.2	-0.827	0.671	-1.017	0.0479	-0.0593	0.0206†	-0.0104	0.581
IPO+1	96	-0.0111	-0.0109	-0.00706	-0.0135	-2.501***	-0.408	0.00304	-0.00691	-0.00743	-0.00541	-0.192	-0.764	-1.115	-1.013	-0.00718	-0.0647	0.00793	-0.00992	0.47
IPO+2	129	-0.0118	-0.00858	-0.0102	-0.00914	-0.564**	-0.187	-0.00126	-0.00171	0.00349	-0.00289	0.0518	-0.602	-1.074*	-0.477	0.0311	-0.043	0.0217*	-0.0109	0.276
IPO+3	250	-0.0115*	-0.00542	-0.0169*	-0.00693	-0.714***	-0.129	-0.000369	-0.00115	0.000289	-0.00155	0.388	-0.437	-0.371	-0.341	0.0462	-0.029	0.0452***	-0.00652	0.374
IPO+4	270	-0.0186***	-0.00451	0.00115	-0.00761	-0.881***	-0.145	0.000278	-0.00115	0.000197	-0.00149	0.163	-0.398	-0.584*	-0.266	0.0378	-0.0256	0.0399***	-0.0064	0.371
IPO+5	265	-0.0152**	-0.00484	-0.0059	-0.0083	-0.743***	-0.137	0.0019	-0.00117	-0.000703	-0.00182	-0.0523	-0.382	-0.804**	-0.243	-0.0196	-0.0275	0.0366***	-0.00688	0.339
IPO+6	250	-0.00555	-0.00405	-0.0272***	-0.00666	-0.530***	-0.136	0.00227	-0.00151	-0.00316†	-0.00191	0.197	-0.315	-0.606*	-0.247	0.0171	-0.0253	0.0376***	-0.00603	0.351
IPO+7	237	-0.00454	-0.00459	-0.0300***	-0.00756	-0.577***	-0.141	0.00279	-0.00245	-0.00359	-0.00262	0.406	-0.365	-0.547	-0.356	0.0530*	-0.0254	0.0422***	-0.00599	0.392
IPO+8	205	-0.00535	-0.00579	-0.0308**	-0.00948	-0.909***	-0.215	0.00402**	-0.00124	-0.00667***	-0.00148	-0.0366	-0.499	-0.211	-0.465	0.0593†	-0.0322	0.0371***	-0.00832	0.449
IPO+9	189	-0.00605	-0.00532	-0.0171*	-0.00849	-0.935***	-0.138	0.00635**	-0.0023	-0.00509†	-0.00262	-0.746†	-0.447	0.146	-0.369	0.0754*	-0.0308	0.0421***	-0.00801	0.424
IPO+10	179	0.00158	-0.0061	-0.00819	-0.0142	-0.960***	-0.152	-0.00271	-0.00272	0.00407	-0.00362	-0.419	-0.462	-0.0316	-0.359	0.0772**	-0.0286	0.0326***	-0.00707	0.397
IPO+11	180	-0.0152**	-0.00481	-0.0119	-0.00877	-0.998***	-0.13	0.00121	-0.00208	-0.00508	-0.00309	-0.516	-0.427	-0.529	-0.359	0.0432	-0.0318	0.0257**	-0.00779	0.441
IPO+12	165	-0.0150*	-0.00677	0.000127	-0.0249	-0.720*	-0.282	-0.00231	-0.00358	-0.00244	-0.0022	-0.381	-0.518	-0.307	-0.354	0.0914**	-0.0329	0.0362***	-0.00826	0.37
IPO>12	6,001	-0.00627***	-0.00118	-0.0231***	-0.00238	-1.151***	-0.0414	0.00114*	-0.000467	-0.00152***	-0.000402	0.790***	-0.105	-0.841***	-0.0997	0.0158**	-0.00582	0.0387***	-0.00149	0.327
2000-2012	3,743	-0.00759***	-0.00129	-0.0131***	-0.00234	-0.923***	-0.0432	0.00173***	-0.000432	-0.00224***	-0.000518	0.0297	-0.111	-0.463***	-0.0864	0.0497***	-0.00686	0.0313***	-0.00163	0.33

CHAPTER 5: DETERMINANTS OF CAPITAL STRUCTURE

5.1 Introduction

The aim of this chapter is to theoretically update the capital structure investigation within a European context. In terms of studies of European countries, there is a need for up-to-date evidence on the determinants of capital structure, given the recent developments in the European capital markets. There is abundant literature concerning determinants of capitals structure, however, this body of research is mainly dominated by single-country cases or comparisons between two countries. The motivation also comes from the economic and political changes in Europe over the last two decades, especially financial integration. It has been suggested that this impacts on firms' resource allocation, and therefore reduces cost of capital. In addition, the liberalisation of financial markets resulted in a shift from bank- to market-oriented economies, and contributed to the development of equity market. Therefore the analysis was conducted by differentiating the firms from continental Europe and the UK.

The financial crisis that emerged in 2008 provides up-to-date evidence that more needs to be done to reform the financial market. In general, this analysis aims to provide policy-makers with a comprehensive picture of effects that apply to the entire political union. This is a necessary condition if firms are to benefit from the financial integration the EU aims to achieve. It therefore helps firms in maximising their firm value, and helps economies to benefit from economic growth. This need is augmented by the presence of the exogenous shocks that may leave long-term effects on the market such as the implementation of new integration policies, the financial crisis, the launching of a bundle of prudent regulations to stabilise the market post-crisis, and the call for new governance policies. During the last decade, Europe has experienced such exogenous shocks either partially or collectively. Thus, conducting an investigation into the determinants of capital structure will add more evidence to the literature on how capital structure decisions are taken during such times.

The layout of this chapter is as follows. Section 2 begins by introducing the data and sample employed in this chapter. Section 3 briefly reviews the descriptive statistics for the entire sample. Section 4 provides the empirical analysis obtained from GMM for the sample from the EU-15 countries. Section 5 considers the cross-country comparison analysis on the determinants of capital structure at a firm's level. Section 6 extends to robustness analyses, and section 7 presents the conclusion.

5.2 Data and sample

This chapter aims to provide new evidence on the determinants of capital structure by analysing data from 1,195 non-financial European firms from 15 countries between 2000 and 2012. Thus, this analysis included an unbalanced panel and, in this case, there are 13 years of observations for each firm (see Table 5.10 in Appendix B for a cross-country summary of a number of firms over the 13 years.). The firm-based variables are mainly retrieved from DataStream, which provides detailed balance sheet information and income statement data for firms in Europe. Financial firms are excluded, since their finance behaviour may reflect special factors, such as regulatory factors, and therefore could result in a potential bias. Only the non-financial firms' portfolios traded in the stock exchanges of these 15 countries are included. Throughout this study, year dummies are included to control for any cross-sectional interdependence. Industry dummies are also included to capture any industry differences.

Table 5.1 Descriptive statistics of leverage of all firms in EU-15 countries with pooled data

The table reports descriptive statistics of the leverage variables over the sample period from year 2000 to 2012. The sample contains an unbalanced panel of 1,195 European firms. The debt ratio are defined as follows: Total Debt Ratio is the sum of long-term debt and short-term debt divided by book value of total assets, and Long-term Debt Ratio is the ratio of long-term debt divided by book value of total assets, and Short-term Debt Ratio refers to the short-term debt ratio. Market Leverage is calculated as total debt divided by (total asset-common equity + market capitalisation at year end). Tangibility is defined as net property, plant, and equipment divided by total assets. Firm size is defined as the log of total assets. Non-debt tax shields are defined as depreciation expense is scaled by total assets. CapEx refers to capital expenditure divided by total assets. Robustness check when log value of capital expenditure is applied instead. R&D is research and development expense scaled by sales. Liquidity is current ratio based on current assets divided by current liability. Dividend policy is dividend payout ratio and is measured as dividend paid per share divided by earning per share. Volatility is measured as logarithm of variance of EBITDA (earnings before interest, tax and depreciation and amortization). All the variables are winsorised at 0.01 level. For the subprime crisis period use the dates given by the NBER http://www.nber.org/cycles/cyclesmain.html, i.e., pre-crisis is year before 2007, crisis time period is from year 2007 to 2009; post-crisis is set as year 2010-2012.

	Variable	**Observation**	**Mean**	**Std. Dev.**	**Min**	**Max**
Dependent	Total Debt Ratio	15536	0.2443	0.1729	0	0.7627
Variables	Long-term Debt Ratio	15536	0.1685	0.1489	0	0.6795
	Short-term Debt Ratio	15525	0.0747	0.0802	0	0.3890
	Market leverage	14745	0.1908	0.1501	0	0.6170
Independent	Growth	14354	1.5397	0.9374	0.5990	6.4570
Variables	Profitability	15407	0.1283	0.0982	-0.2528	0.4522
	Tangibility	15530	0.2856	0.2097	0.0075	0.8755
	Firm Size	15536	13.8661	1.8780	9.6097	18.5769
	Non-debt Tax shields	15518	0.0466	0.0299	0.0024	0.1709
	R&D	15535	0.0182	0.0458	0	0.2930
	CapEx	15536	0.0508	0.0444	0	0.2443
	Liquidity	15443	1.5739	0.9797	0.3300	6.5400
	Dividend Payout Ratio	12287	0.4221	0.4130	0	2.8333
	Volatility	10375	7.2701	2.5427	2.2393	15.5986

5.3 Descriptive statistics of determinants of capital structure

The included dependent variables are total leverage, long-term leverage, short-term leverage and market leverage. The included independent variables are growth, profitability, tangibility, size as in total assets, non-debt tax shields, effective tax rates, research and development, capital expenditure, liquidity, dividend policy and volatility. Three different methods are applied to estimate the empirical models: the pooled ordinary least squares (OLS) (Kayhan and Titman, 2007), the fixed effects estimator (Flannery and Rangan, 2006), and the Blundel-Bond system generalised method of moments (GMM) estimator. The GMM estimator considers the endogeneity and reverse causality in the models, and captures firms' financing decisions from previous years; this can reflect the time-varying behaviour in the presence of adjustment costs.

The results show that growth opportunity, which arguably also represents market performance, exerts a positive relationship towards capital structure. The total needs of capital structure in European firms statistically fluctuate according to changes in numerous factors, except for tangibility and non-debt tax shields. Research and development expenses and profitability are the most influential factors; both have a large and negative impact on the book value of debt ratio, and the market leverage ratio. The European firms do adjust their capital structure and they are faster than has been revealed by previous research.

The summary statistics of the variables are shown in Table 5.1. The mean of the total debt ratio of the firms from all European countries varies from 0.23 to 0.26 over the sample period 2000 to 2012 (see Table 5.8a in Appendix B). The mean of the long-term debt ratio ranges from 0.145 to 0.185, more than twice the short-term debt ratio at 0.064 to 0.088. The mean of market leverage ranges from 0.168 to 0.238. The level of all type of debt is among the highest in the year 2008. During the crisis period, we can see a substantial increase in firms' long-term debt level. This indicates that a necessity to raise funds to raise productivity amplifies a firm's financial performance and therefore

Table 5.2 Comparison of descriptive statistics of leverage of firms in bank-based (continental) and market-based (UK) countries in Europe

The table reports descriptive statistics of the leverage variables over the sample period from year 2000 to 2012, separating the firms from bank-based (continental) to market-based countries (UK) in Europe. The sample contains an unbalanced panel of 1,195 European firms. The debt ratio are defined as follows: Total Debt Ratio is the sum of long-term debt and short-term debt divided by book value of total assets, and Long-term Debt Ratio is the ratio of long-term debt divided by book value of total assets, and Short-term Debt Ratio refers to the short-term debt ratio. Market Leverage is calculated as total debt divided by (total asset-common equity + market capitalisation at year end). Tangibility is defined as net property, plant, and equipment divided by total assets. Firm size is defined as the log of total assets. Non-debt tax shields are defined as depreciation expense is scaled by total assets. CapEx refers to capital expenditure divided by total assets. Robustness check when log value of capital expenditure is applied instead. R&D is research and development expense scaled by sales. Liquidity is current ratio based on current assets divided by current liability. Dividend policy is dividend payout ratio and is measured as dividend paid per share divided by earning per share. Volatility is measured as logarithm of variance of EBITDA (earnings before interest, tax and depreciation and amortization). All the variables are winsorised at 0.01 level. For the subprime crisis period use the dates given by the NBER http://www.nber.org/cycles/cyclesmain.html, i.e. pre-crisis is year before 2007, crisis time period is from year 2007 to 2009; post-crisis is set as year 2010-2012.

	Variable	**Observation**		**Mean**		**Standard Deviation**	
		Continental	**UK**	**Continental**	**UK**	**continental**	**UK**
Dependent	Total Debt Ratio	11885	3651	0.2517	0.2204	0.1711	0.1766
Variable	Long-term Debt Ratio	11885	3651	0.166	0.1746	0.1438	0.1644
	Short-term Debt Ratio	11874	3651	0.0839	0.044976	0.0834	0.0596
	Market leverage	11284	3461	0.2033	0.149979	0.1535	0.1307
Independent	Growth	9095	3167	2.0289	0.7766	1.7314	1.0743
Variable	Profitability	11764	3643	0.1228	0.1463	0.0962	0.1023
	Tangibility	11881	3649	0.2824	0.2961	0.2009	0.2356
	Firm Size	11885	3651	13.8690	13.8568	1.9173	1.7440
	Non-debt Tax shield	11869	3649	0.0468	0.0457	0.0297	0.0305
	R&D	11885	3650	0.0182	0.0181	0.0452	0.0480
	CapEx	11885	3651	0.0502	0.0530	0.0437	0.0465
	Liquidity	11792	3651	1.5951	1.5053	0.9679	1.0141
	Dividend Payout Ratio	9120	3167	0.4234	0.4183	0.4446	0.3041
	Volatility	7956	2419	7.2097	7.4688	2.6012	2.3294

helps them to achieve corporate profits. It also reflects firms' incentive of issuing debt due to the tax advantage. The decline of short-term financing is consistent with its procyclical characteristics with respect to economic growth. Due to the financial constraint during the crisis time, firms prefer long-term financing instead of short-term investment.

Continental European countries issue a similar amount of debt to those in the UK, but they prefer short maturity of debt; they use twice as much short-term debt than firms in the UK. The asymmetric information hypothesis claims that short-term debt is subject to less information asymmetry and is less risky than long-term debt in terms of the adverse selection (Myer and Majluf, 1984). In addition, Jensen (1986) suggests in the agency hypothesis that, to reduce moral hazard costs, short-term financing disciplines managers. According to Zwiebel (1996), managerial control is more limited than that of long-term debt, as mangers have an incentive to increase the profitability and productivity due to the short maturity commitment. They are bound to avoid less profitable or negative NPV projects. Comparing with those in the UK, firms in continental European countries exert extensively high growth opportunities with a slightly lower profitability.

5.4 Determinants of capital structure in Europe at firm level: pooled data for EU-15 countries

5.4.1 Results obtained from OLS and FE

The estimation begins with the classical OLS estimators applied to a function that includes the lagged dependent variable as one of the independent variables. Subsequently, the fixed effect estimation is applied to address the concerns regarding some sources of inefficiency in the OLS results. Table 5.3 shows the results of the regression models, by examining all capital structure variables including total debt ratio, long-term debt ratio, short-term debt ratio, and market leverage variables during the sample time period.

The results from OLS estimations show that the profitability, non-debt tax shields, capital expenditure, firm size, growth, liquidity, tangibility, cash flow sensitivity and dividend policy have significantly affected the total debt ratio. The results from volatility, effective tax rate and research and development are insignificant; however, with the ratio of R&D to sales, it appears significant. The results obtained from FE are consistent with that of simple regression except for dividend policy which remains insignificant in relationship with Total debt ratio. Subsequently, the results show similarities in Table 5.3 when long-term and short-term debt ratio, and market leverage variables are applied as alternative dependent variables for estimation.

The Breusch-Pagan test identifies the presence of heteroskedasticity in the estimated results. Therefore, the model applied accounts for heteroskasticity and robust standard errors are presented in the tables. Another test is conducted to detect any multicollinearity among the independent variable, the test reveals no evidence of multicollinearity in the model.

Table 5.3 OLS and Fixed Effect Estimation on firm's determinants of capital structure in EU-15

The table reports OLS and Fixed Effects Estimation on firms' determinants of capital structure in EU-15 for the period from year 2000 to 2012. The sample contains an unbalanced panel of 1,195 European firms. The debt ratio are defined as follows: Total Debt Ratio is the sum of long-term debt and short-term debt divided by book value of total assets, and Long-term Debt Ratio is the ratio of long-term debt divided by book value of total assets, and Short-term Debt Ratio refers to the short-term debt ratio. Market Leverage is calculated as total debt divided by (total asset-common equity + market capitalisation at year end). Tangibility is defined as net property, plant, and equipment divided by total assets. Firm size is defined as the log of total assets. Non-debt tax shields are defined as depreciation expense is scaled by total assets. CapEx refers to capital expenditure divided by total assets. Robustness check when log value of capital expenditure is applied instead. R&D is research and development expense scaled by sales. Liquidity is current ratio based on current assets divided by current liability. Dividend policy is dividend payout ratio and is measured as dividend paid per share divided by earning per share. Volatility is measured as logarithm of variance of EBITDA (earnings before interest, tax and depreciation and amortization). All the variables are winsorised at 0.01 level. For the subprime crisis period use the dates given by the NBER http://www.nber.org/cycles/cyclesmain.html, i.e. pre-crisis is year before 2007, crisis time period is from year 2007 to 2009; post-crisis is set as year 2010-2012. Standard errors in parentheses *** p<0.001, ** p<0.01, * p<0.05, † p<0.1

	Total Debt Ratio		Long-term Debt Ratio		Short-term debt Ratio		Market Value of Leverage	
VARIABLES	**OLS**	**FE**	**OLS**	**FE**	**OLS**	**FE**	**OLS**	**FE**
Lagged dependent	0.871***	0.498***	0.844***	0.414***	0.662***	0.166***	0.853***	0.449***
variable	(0.00478)	(0.00892)	(0.00556)	(0.00965)	(0.00772)	(0.0102)	(0.00578)	(0.00985)
Growth	0.0163***	0.0195***	0.0114***	0.0106***	0.00306***	0.00546***	0.0142***	0.0140***
	(0.00107)	(0.00157)	(0.00111)	(0.00162)	(0.000820)	(0.00112)	(0.00106)	(0.00155)
Profitability	-0.245***	-0.314***	-0.181***	-0.219***	-0.0781***	-0.105***	-0.270***	-0.354***
	(0.0112)	(0.0133)	(0.0117)	(0.0138)	(0.00856)	(0.00949)	(0.0110)	(0.0128)
Tangibility	0.00743†	0.0391**	0.0183***	0.0697***	-0.00998**	-0.0237**	0.00268	0.0117
	(0.00425)	(0.0125)	(0.00446)	(0.0130)	(0.00321)	(0.00892)	(0.00416)	(0.0120)
Firm Size	0.00262***	0.0312***	0.00475***	0.0316***	-0.00224***	-0.00131	0.00316***	0.0511***
	(0.000414)	(0.00216)	(0.000438)	(0.00225)	(0.000312)	(0.00154)	(0.000401)	(0.00207)
Non-Debt Tax Shied	0.0196	-0.106†	0.0504	-0.0262	0.0123	0.0149	0.0262	0.114†
	(0.0310)	(0.0646)	(0.0323)	(0.0667)	(0.0237)	(0.0458)	(0.0302)	(0.0624)
R&D	-0.0871***	-0.137*	-0.101***	-0.0645	-0.0134	-0.112**	-0.0905***	-0.128*
	(0.0177)	(0.0538)	(0.0184)	(0.0557)	(0.0135)	(0.0384)	(0.0172)	(0.0515)
CapEx	0.186***	0.107***	0.113***	0.0454	0.0781***	0.0162	0.213***	0.0890**
	(0.0215)	(0.0281)	(0.0224)	(0.0290)	(0.0164)	(0.0199)	(0.0209)	(0.0271)
Liquidity	-0.0054***	-0.0133***	0.00343***	0.0209***	-0.0126***	-0.0374***	-0.00411***	-0.0103***
	(0.000858)	(0.00154)	(0.000881)	(0.00159)	(0.000654)	(0.00110)	(0.000824)	(0.00147)
Dividend Payout Ratio	0.00236	0.00348†	0.00256	0.00469*	0.000190	0.000842	-0.000255	0.00327†
	(0.00165)	(0.00184)	(0.00172)	(0.00190)	(0.00126)	(0.00131)	(0.00160)	(0.00176)
Volatility	-0.0019***	-0.00160***	-0.00129***	-0.000448	-0.00086***	-0.00100***	-0.00165***	-0.000932*
	(0.000303)	(0.000388)	(0.000316)	(0.000401)	(0.000232)	(0.000276)	(0.000294)	(0.000372)
Crisis Dummy	0.00861***	0.00968***	0.00730***	0.00996***	0.00190†	0.00144	0.0227***	0.0186***
	(0.00142)	(0.00128)	(0.00147)	(0.00133)	(0.00108)	(0.000913)	(0.00137)	(0.00123)
Constant	0.00962	-0.293***	-0.0436***	-0.388***	0.0827***	0.150***	-0.000489	-0.591***
	(0.00732)	(0.0327)	(0.00764)	(0.0340)	(0.00572)	(0.0234)	(0.00711)	(0.0313)
Observations	8,777	8,777	8,777	8,777	8,777	8,777	8,771	8,771
R-squared	0.845	0.401	0.785	0.280	0.530	0.197	0.814	0.434
Number of firms		1,230		1,230		1,230		1,230

Table 5.4 Comparing determinants of capital structure in pre-crisis, crisis and post-crisis periods by OLS estimation

The table reports OLS Estimation on firms' determinants of capital structure in EU-15 for the period from year 2000 to 2012. The sample contains an unbalanced panel of 1,195 European firms. The debt ratio are defined as follows: Total Debt Ratio is the sum of long-term debt and short-term debt divided by book value of total assets, and Long-term Debt Ratio is the ratio of long-term debt divided by book value of total assets, and Short-term Debt Ratio refers to the short-term debt ratio. Market Leverage is calculated as total debt divided by (total asset-common equity + market capitalisation at year end). Tangibility is defined as net property, plant, and equipment divided by total assets. Firm size is defined as the log of total assets. Non-debt tax shields are defined as depreciation expense is scaled by total assets. CapEx refers to capital expenditure divided by total assets. Robustness check when log value of capital expenditure is applied instead. R&D is research and development expense scaled by sales. Liquidity is current ratio based on current assets divided by current liability. Dividend policy is dividend payout ratio and is measured as dividend paid per share divided by earning per share. Volatility is measured as logarithm of variance of EBITDA (earnings before interest, tax and depreciation and amortization). All the variables are winsorised at 0.01 level. For the subprime crisis period use the dates given by the NBER http://www.nber.org/cycles/cyclesmain.html, i.e. pre-crisis is year before 2007, crisis time period is from year 2007 to 2009; post-crisis is set as year 2010-2012. Standard errors in parentheses *** p<0.001, ** p<0.01, * p<0.05, † p<0.1

	Total Debt Ratio			**Long-term Debt Ratio**			**Short-term Debt Ratio**			**Market Value of Leverage**		
VARIABLES	**Pre-crisis**	**Crisis**	**Post-crisis**	**Pre-crisis**	**Crisis**	**Post-crisis**	**Pre-crisis**	**Crisis**	**Post-crisis**	**Pre-crisis**	**Crisis**	**Post-crisis**
Lagged dependent	0.828***	0.872***	0.909***	0.806***	0.844***	0.862***	0.623***	0.662***	0.656***	0.805***	0.853***	0.915***
	(0.00979)	(0.00479)	(0.00658)	(0.0113)	(0.00557)	(0.00869)	(0.0136)	(0.00771)	(0.0133)	(0.00917)	(0.00587)	(0.00775)
Growth	0.0152***	0.0168***	0.0109***	0.0144***	0.0119***	0.00956***	-0.00150	0.00318***	0.000201	0.00961***	0.0155***	0.0116***
	(0.00222)	(0.00107)	(0.00155)	(0.00222)	(0.00111)	(0.00185)	(0.00151)	(0.000818)	(0.00142)	(0.00164)	(0.00107)	(0.00155)
Profitability	-0.241***	-0.252***	-0.204***	-0.224***	-0.187***	-0.178***	-0.0370*	-0.0796***	-0.0540***	-0.224***	-0.288***	-0.225***
	(0.0239)	(0.0112)	(0.0161)	(0.0239)	(0.0116)	(0.0192)	(0.0162)	(0.00852)	(0.0148)	(0.0175)	(0.0111)	(0.0161)
Tangibility	0.0111	0.00682	0.00859	0.0270**	0.0178***	0.0198**	-0.0191***	-0.0101**	-0.00551	2.34e-06	0.00134	0.00524
	(0.00845)	(0.00426)	(0.00584)	(0.00855)	(0.00446)	(0.00699)	(0.00569)	(0.00321)	(0.00526)	(0.00622)	(0.00423)	(0.00582)
Firm Size	0.00340***	0.00259***	0.00104†	0.00530***	0.00473***	0.00302***	-0.00204***	-0.00224***	-0.00175***	0.00331***	0.00311***	0.00121*
	(0.000821)	(0.000415)	(0.000584)	(0.000835)	(0.000438)	(0.000708)	(0.000548)	(0.000312)	(0.000524)	(0.000597)	(0.000408)	(0.000574)
Non-Debt Tax Shied	-0.106†	0.0129	-0.0542	-0.0247	0.0449	0.0321	-0.0373	0.0108	-0.000614	-0.0319	0.00972	-0.0391
	(0.0600)	(0.0311)	(0.0447)	(0.0600)	(0.0323)	(0.0531)	(0.0407)	(0.0237)	(0.0406)	(0.0437)	(0.0307)	(0.0441)
R&D	-0.177***	-0.0861***	-0.0512*	-0.179***	-0.101***	-0.0993***	-0.0114	-0.0133	0.000597	-0.0898**	-0.0886***	-0.0656**
	(0.0392)	(0.0177)	(0.0233)	(0.0393)	(0.0184)	(0.0277)	(0.0265)	(0.0135)	(0.0211)	(0.0286)	(0.0174)	(0.0229)
CapEx	0.185***	0.196***	0.172***	0.134***	0.121***	0.0932*	0.0764**	0.0802***	0.0504	0.135***	0.239***	0.216***
	(0.0404)	(0.0215)	(0.0341)	(0.0404)	(0.0224)	(0.0407)	(0.0274)	(0.0164)	(0.0310)	(0.0294)	(0.0212)	(0.0337)
Liquidity	-0.0061***	-0.00543***	-0.00254*	0.00392*	0.00339***	0.00410**	-0.0139***	-0.0126***	-0.0106***	-0.00318*	-0.00428***	-0.00200†
	(0.00180)	(0.000860)	(0.00114)	(0.00178)	(0.000882)	(0.00135)	(0.00122)	(0.000654)	(0.00104)	(0.00130)	(0.000837)	(0.00112)
Dividend Payout Ratio	0.00281	0.00203	0.00221	0.000953	0.00229	0.00377	0.00120	0.000116	-0.000853	0.00102	-0.00113	0.00108
	(0.00339)	(0.00165)	(0.00210)	(0.00340)	(0.00172)	(0.00250)	(0.00230)	(0.00126)	(0.00192)	(0.00247)	(0.00163)	(0.00207)
Volatility	-0.0019***	-0.00200***	-0.00176***	-0.000483	-0.00136***	-0.00122*	-0.00146***	-0.000878***	-0.000707†	-0.00138***	-0.00188***	-0.00182***
	(0.000562)	(0.000303)	(0.000422)	(0.000562)	(0.000316)	(0.000503)	(0.000381)	(0.000231)	(0.000385)	(0.000409)	(0.000298)	(0.000416)
Constant	0.0175	0.0138†	0.0219*	-0.0461**	-0.0400***	-0.0221†	0.0948***	0.0836***	0.0731***	0.00363	0.0107	0.0178†
	(0.0144)	(0.00730)	(0.0101)	(0.0145)	(0.00761)	(0.0121)	(0.0100)	(0.00570)	(0.00946)	(0.0105)	(0.00719)	(0.00999)
Observations	2,652	8,777	2,942	2,652	8,777	2,942	2,652	8,777	2,942	2,650	8,771	2,941
R-squared	0.797	0.845	0.902	0.734	0.785	0.824	0.525	0.530	0.520	0.834	0.808	0.888

Figure 5.1 Comparison on the change of explanatory power of determinants of capital structure at pre-, post- and crisis time

The charts describe how the impact of firm-level factors on capital structure changes through pre-crisis, crisis time and post crisis time. The axis shows the value of coefficients from the OLS estimation whilst the line represents the impact of each firm-level factor. For the subprime crisis period use the dates given by the NBER http://www.nber.org/cycles/cyclesmain.html, i.e. pre-crisis is year before 2007, crisis time period is from year 2007 to 2009; post-crisis is set as year 2010-2012. To avoid small sample bias, OLS estimation is applied. The sample contains an unbalanced panel of 1,195 European firms. The debt ratio are defined as follows: Total Debt Ratio is the sum of long-term debt and short-term debt divided by book value of total assets, and Long-term Debt Ratio is the ratio of long-term debt divided by book value of total assets, and Short-term Debt Ratio refers to the short-term debt ratio. Market Leverage is calculated as total debt divided by (total asset-common equity + market capitalisation at year end). Tangibility is defined as net property, plant, and equipment divided by total assets. Firm size is defined as the log of total assets. Non-debt tax shields are defined as depreciation expense is scaled by total assets. CapEx refers to capital expenditure divided by total assets. Robustness check when log value of capital expenditure is applied instead. R&D is research and development expense scaled by sales. Liquidity is current ratio based on current assets divided by current liability. Dividend policy is dividend payout ratio and is measured as dividend paid per share divided by earning per share. Volatility is measured as logarithm of variance of EBITDA (earnings before interest, tax and depreciation and amortization). Panel A shows the impact of determinants on total debt ratio, Panels B, C, D show that on long-term debt ratio, short-term debt ratio and market leverage, respectively. When there is no significant result from the determinants, its coefficients has been replaced by 0, meaning, there is no impact of that factor on firms' capital structure.

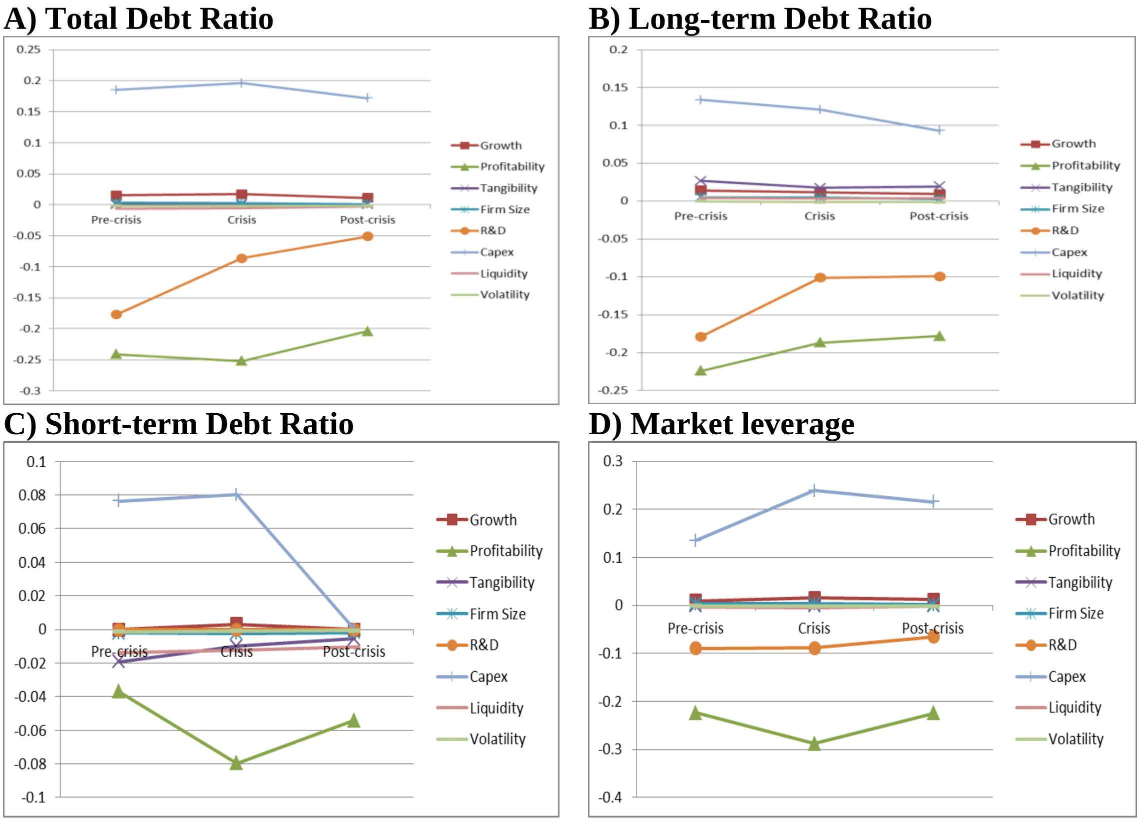


Table 3 presents the OLS estimation on firms' determinants of capital structure in EU-15 countries for the pre-, post- and crisis periods. Figure 5.1 shows the tendency of the impact of firm-level factors towards firms' capital structure, pre- and post-crisis, and also during the crisis period.

The regression results of the pre-, post- and crisis periods aim to provide insight into the impact of the financial crisis on firms' capital structure. The impact of the determinants of capital structure does not reverse because the signs of the coefficients do not change for the pre-, post- and crisis periods. However, there are three notable differences presented in the above charts.

As time moves from pre-crisis to post-crisis, the relevance of profitability and R&D increases in determining the total debt ratio. Capital expenditure, however, matters more during the crisis than in any other stage. As capital expenditure reflects confidence in future earnings, firms rely more on external finance. During the post-crisis period, capital expenditure increases along with debt, but its impact gradually becomes less influential when compared to earlier stages. In contrast, R&D and profitability continue to be negatively correlated with long-term debt. The negative impact of profitability becomes weaker during the financial crisis, however it increases thereafter. The weak internal financing capital during the crisis could be a reason for this. The marginal influence of profitability on capital structure can be explained by the pecking-order theory. During the financial crisis, firms become less profitable and this therefore increases the difficulty in resourcing from retained earnings. Firms may take advantage of external financing as much as they can to be financially stable and healthy to pass the crisis time. The negative impact of R&D saw a growth during the crisis. These firms may be financially highly constrained due to the high expenditure on research and development, and they therefore operate with a lower borrowing capacity.

5.4.2 Results obtained from GMM

Table 5.5 shows the results of the system GMM two-step model, estimations obtained for each dependent variable. Dependent variables are stated at the top of each column in the table. The results of the GMM system proves that long-term debt increases with growth opportunities, firm size, non-debt tax shields, capital expenditure, and decrease with profitability and liquidity. Short-term financing increases with growth opportunities, tangibility and capital expenditure and declines with firm size, liquidity and volatility. The following section will mainly discuss the results of book value debt ratios (total debt, long- and short-term debt) i.e. first, second and third columns in Table 5.5. Table 5.5 is the estimation on the firms in the EU-15 countries, whilst Table 5.6

differentiate the market based economy, i.e. the UK and continental Europe's bank-based economy. The discussion on the market value of leverage is moved forward to the robustness test section.

Growth opportunities

There is a significant and positive relationship between firms' growth and capital structure in European firms. This is consistent with Rajan and Zingales (1995), but contradicts the findings by Jensen (1986), Titman and Wessels (1988) and Fama and French (2002). The result suggests that firms with more investment or growth opportunities borrow more debt over time. This also implies that firms issue debt when their market value is high compared to the book value of equity. Firms with substantial growth rates afford to have greater financial leverage since it can generate enough earnings to support the additional interest expenses. In the UK, the impact of growth is not significant on long-term debt but significantly influenced on short-term financing because it is less subject to information asymmetry. Therefore there is a particular interest in seeking short-term debt financing when firms' high growth is high.

Profitability

Profitability is significantly negatively related to firms' capital structure in all European countries, regardless of market based or bank based economies. The result verifies the pecking order theory that is firms prefer internal finance over external funds when they are profitable. If investments and dividends are fixed, then more profitable firms become less levered over time. The dynamic trade-off theory also supports the negative relationship by arguing that firms passively accumulate profits (Kayhan and Titman, 2007). Issuing new equity is the final option because of its high costs which may arise from asymmetric information or transaction costs. In either case, the realised profitability and the available amount of earnings to be retained are important determinants of current capital structure (Myers, 1984).

Tangibility

The coefficient of tangibility is only positive and statistically significant for the short-term debt ratio. Further verification is achieved by examining the result from both the continental countries and the UK. In the UK, there is a positive relationship between the capital structure and tangibility which is suggested by both the trade-off and pecking order theories. Firms may have easier access to long-term debt as the lender is better protected by high tangibility (collateral effect). The agency theory on the other hand encourages debt financing is to control managers' complacent behaviour. In continental Europe, there is no statistically significant impact of tangibility on these firms' capital structure but the results show that *Capital expenditure* has a significant positive impact on short-term debt ratio in continental European firms. This is consistent with both the trade-off and pecking order theory. When capital expenditure is high, it displays a confidence in future earnings and the firm is more prone to issuing debt.

Size

The size proxy represented by total assets has significantly positive impact on total and long-term debt ratio at a 10% level. The result from long-term debt ratio is consistent with the trade-off theory. It supports the suggestion that larger firms are more diversified and therefore less likely to fail (too-big-to-fail). Larger firms are more transparent and therefore less prone to the asymmetric information effect in debt financing compared to small firms (Rajan and Zingale, 1995). The negative impact is on the short-term debt and the significance level is also applies to subsample of firms in both continental Europe and the UK. As the information asymmetry is more observed in small firms, they have limited access to long-term debt. Such firms prefer resort short-term debt to avoid the risk of bankruptcy. This result is consistent with but argued by Titman and Wessels (1988) that the sample was restricted to only the largest of the firms.

Table 5.5 Regression with system-GMM for all firms EU-15 countries

The table reports descriptive statistics of the leverage variables over the sample period from year 2000 to 2012. The sample contains an unbalanced panel of 1,195 European firms. The debt ratio are defined as follows: Total debt ratio is the sum of long-term debt and short-term debt divided by book value of total assets, and long-term debt ratio is the ratio of long-term debt divided by book value of total assets, and short-term debt ratio refers to the short-term debt to total assets. Market value of leverage is calculated as total debt divided by (total asset-common equity + market capitalisation at year end). Growth is market-to-book ratio, profitability is defined as earnings before interest and taxes are scaled by assets, Tangibility is defined as net property, plant, and equipment divided by total assets. Firm size is defined as the log of total assets. Non-debt tax shields are defined as depreciation expense is scaled by total assets. CapEx is directly collected from Zephyr. Robustness check when log value of capital expenditure is applied instead. R&D is research and development expense scaled by sales. Liquidity is current ratio based on current assets divided by current liability. Dividend policy is dividend payout ratio and is measured as dividend paid per share divided by earning per share. Volatility is measured as variance of EBITDA (earnings before interest, tax and depreciation and amortization). For the subprime crisis period use the dates given by the NBER http://www.nber.org/cycles/cyclesmain.html, i.e., pre-crisis is year before 2007, crisis time period is from year 2007 to 2009; post-crisis is set as year 2010-2012. Standard errors in parentheses *** p<0.001, ** p<0.01, * p<0.05, † p<0.1

Variables	Total Debt Ratio	Long-term Debt Ratio	Short-term Debt Ratio	Market Leverage
Lagged Debt Ratio	0.636***	0.665***	0.165***	0.476†
	(0.0490)	(0.0341)	(0.0420)	(0.269)
Growth	0.0356**	0.00932*	0.0453***	0.228***
	(0.0112)	(0.00407)	(0.0126)	(0.0498)
Profitability	-0.460***	-0.186*	-0.491***	-3.012***
	(0.125)	(0.0812)	(0.119)	(0.587)
Tangibility	-0.166	-0.0425	0.0482†	-0.621
	(0.138)	(0.0481)	(0.0259)	(0.394)
Firm Size	0.0158†	0.00577†	-0.0375*	-0.122*
	(0.00897)	(0.00323)	(0.0150)	(0.0525)
Non-Debt Tax Shield	0.556	0.679†	-0.0116	2.555*
	(0.379)	(0.393)	(0.145)	(1.240)
R&D	-0.879	-0.0840	-0.112	-5.884
	(0.601)	(0.104)	(0.0805)	(5.354)
CapEx	1.171***	0.584†	0.119†	1.996
	(0.330)	(0.352)	(0.0712)	(1.300)
Liquidity	-0.0728**	-0.0380†	-0.0372***	-0.0176
	(0.0261)	(0.0228)	(0.00883)	(0.0445)
Dividend Pay-out Ratio	0.00353	-0.0350	0.00783	-0.0394
	(0.0216)	(0.0257)	(0.00577)	(0.0866)
Volatility	0.000440	0.00562	-0.00451**	-0.0231
	(0.00479)	(0.00584)	(0.00168)	(0.0193)
Crisis Dummy	0.00389	0.00997**	-0.00256	-0.0168
	(0.00295)	(0.00321)	(0.00224)	(0.0104)
Constant	-0.0417	-0.0270	0.652**	2.161*
	(0.152)	(0.0966)	(0.236)	(0.884)
Observations	8,777	8,777	8,777	8,771
Number of firms	1,230	1,230	1,230	1,230
Number of instruments	74	78	22	26
Sargan/Hansen Test	0.205	0.144	0.627	0.588
AR(1)	0	0	0	0
AR(2)	0.860	0.093	0.160	0.324
Wald Test(χ^2)	1074.29	1741.79	200.78	206.93

Table 5.6 Regression with system-GMM for all firms in Continental Europe and the UK

The table reports descriptive statistics of the leverage variables over the sample period from year 2000 to 2012. The sample contains an unbalanced panel of 1,195 European firms. The debt ratio are defined as follows: Total debt ratio is the sum of long-term debt and short-term debt divided by book value of total assets, and long-term debt ratio is the ratio of long-term debt divided by book value of total assets, and short-term debt ratio refers to the short-term debt to total assets. Market value of leverage is calculated as total debt divided by (total asset-common equity + market capitalisation at year end). Growth is market-to-book ratio, profitability is defined as earnings before interest and taxes are scaled by assets, Tangibility is defined as net property, plant, and equipment divided by total assets. Firm size is defined as the log of total assets. Non-debt tax shields are defined as depreciation expense is scaled by total assets. CapEx is directly collected from Zephyr. Robustness check when log value of capital expenditure is applied instead. R&D is research and development expense scaled by sales. Liquidity is current ratio based on current assets divided by current liability. Dividend policy is dividend payout ratio and is measured as dividend paid per share divided by earning per share. Volatility is measured as variance of EBITDA (earnings before interest, tax and depreciation and amortization). For the subprime crisis period use the dates given by the NBER http://www.nber.org/cycles/cyclesmain.html, i.e., pre-crisis is year before 2007, crisis time period is from year 2007 to 2009; post-crisis is set as year 2010-2012. Standard errors in parentheses *** p<0.001, ** p<0.01, * p<0.05, † p<0.1

	Total Debt Ratio		**Long-term Debt Ratio**		**Short-term Debt Ratio**		**Market value of Leverage**	
VARIABLES	**Continental**	**UK**	**Continental**	**UK**	**Continental**	**UK**	**Continental**	**UK**
Lagged Debt Ratio	0.799***	0.659***	0.655***	0.480***	0.291***	0.170**	0.767***	0.576***
	(0.087)	(0.0588)	(0.0412)	(0.0671)	(0.0326)	(0.0553)	(0.175)	(0.0466)
Growth	0.0392†	0.0184***	0.0113***	0.00787	0.0327**	0.0249**	0.207***	0.00832*
	(0.0201)	(0.00545)	(0.00275)	(0.00616)	(0.0102)	(0.00932)	(0.0385)	(0.00404)
Profitability	-0.964***	-0.239***	-0.312***	-0.145**	-0.312***	-0.197*	-2.365***	-0.275***
	(0.238)	(0.0498)	(0.0722)	(0.0483)	(0.0627)	(0.0771)	(0.367)	(0.043)
Tangibility	-0.403	0.0632**	0.0305*	0.128***	0.00254	0.0472*	-0.912**	0.0483*
	(0.251)	(0.0228)	(0.0121)	(0.0309)	(0.0103)	(0.0208)	(0.353)	(0.0238)
Firm Size	0.00751†	0.00838***	0.0079***	0.00755**	-0.00352**	-0.0162*	-0.121**	0.0161***
	(0.00389)	(0.00224)	(0.00157)	(0.00279)	(0.00114)	(0.0073)	(0.0447)	(0.00483)
Non-Debt Tax Shield	1.471***	0.17	0.220*	-0.840**	0.274**	-0.205	2.382†	0.157
	(0.354)	(0.135)	(0.103)	(0.324)	(0.0941)	(0.127)	(1.306)	(0.232)
R&D	-0.86	-0.183**	-0.0994†	-0.129†	-0.155**	-0.138*	-1.170**	-0.165**
	(1.334)	(0.0575)	(0.0514)	(0.0768)	(0.0502)	(0.0608)	(0.403)	(0.0508)
CapEx	1.015	0.0406	0.0371	0.115	0.0776†	-0.0168	2.517**	0.0416
	(0.674)	(0.0971)	(0.0542)	(0.144)	(0.0466)	(0.0653)	(0.865)	(0.129)
Liquidity	0.0112	-0.00888**	0.00197	-0.00902*	-0.0212***	-0.014***	-0.0744*	-0.00482
	(0.0115)	(0.00327)	(0.00268)	(0.00438)	(0.00201)	(0.00371)	(0.0302)	(0.00533)
Dividend Pay-out Ratio	-0.148*	0.0134*	-0.0517*	0.0171†	-0.00193	-0.00154	-0.0591	0.000589
	(0.0599)	(0.00596)	(0.0259)	(0.00925)	(0.00236)	(0.00499)	(0.0585)	(0.0129)
Volatility	-0.0268*	-0.0034***	-0.0163†	-0.00236†	-0.000177	-0.00226*	-0.0408†	-0.00295†
	(0.0121)	(0.000951)	(0.00933)	(0.00137)	(0.000489)	(0.000922)	(0.0209)	(0.0016)
Crisis Dummy	-0.00855	0.0161***	0.00363	0.0134***	-0.00157	0.00409*	-0.0289***	0.027***
	(0.00708)	(0.00355)	(0.00246)	(0.00336)	(0.00169)	(0.00176)	(0.00769)	(0.00313)
Constant	0.259†	-0.0421	0.08	0.00593	0.119***	0.276*	2.248**	-0.139†
	(0.145)	(0.0307)	(0.0887)	(0.0435)	(0.0241)	(0.112)	(0.787)	(0.0723)
Observations	6,493	2,284	6,493	2,284	6,493	2,284	6,488	2,283
NO. of firms	934	296	934	296	934	296	934	296
NO. off	19	157	22	36	23	79	18	227
Sargan/Hansen	0.888	0.102	0.13	0.64	0.114	0.456	0.121	0.082
AR(1)	0	0	0	0	0	0	0	0
AR(2)	0.441	0.397	0.37	0.546	0.63	0.334	0.364	0.06
Wald Test (χ2)	919.87	1359.1	2434.44	669.91	580.9	90.32	171.92	1073.86

Non-debt tax shields

There is a significant negative impact on UK firms' capital structure and evidence shows that UK firms following trade-off model and issuing long-term debt to respond to the high tax bracket. In continental Europe, however, the favour of debt financing is not reflected by the relationship with non-debt tax shields. The strategy of avoidance of taxation from deductibility from interest payment is recognised as 'debt bias' – tax bias towards debt financing as noted by Serena *et al.* (2012). Countries in continental Europe design radical remedies for this debt bias by limiting interest deductibility when the net interest expenses exceed a defined percentage of the EBITDA[5].

Research and development expenses

Research and development has a significant negative effect on both long-term and short-term debt ratio in both continental Europe and the UK. This result is supported by the pecking order theory that assumes lower information asymmetry associated with tangible assets, therefore making equity issuances less costly. Titman (1984) suggests that firms producing unique products should have less debt in their capital structure. Firms in unique industries with high level research and development expenditure tend to be financially constraint with high financial distress cost and consequently less debt. This result is also consistent with the static trade-off approach which predicts that firms producing unique products should have lower debt ratios. Firms with relatively unique products are expected to advertise more and, in general, spend more on promoting and selling their products. In Europe tax credits to incentivise R&D vary across countries, but R&D expenditure can be assumed to reduce the effective tax rate to some extent. Therefore, European firms which tend to invest heavily in R&D are potentially creating intangible assets thus find it difficult to fund such investments with short-term debt.

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[5] For example, in Italy and Germany since 2008 they are applying an instrument called Earning-stripping rule to eliminate the distortion of the corporate tax system. According to Serena, *et al*. (2012), there is other alternatives to limit the debt bias: an Allowance for Corporate Equity (ACE) or a Comprehensive Business Income Tax (CBIT).

Liquidity

Asset liquidity is significantly and negatively related to both long-term debt and short-term debt ratios. Firms with greater liquid assets may use fewer debts to finance their investments. As it is based on the current ratio, the rationale for a negative effect of liquidity on leverage relies on the degree of managerial discretion (Morellec, 2001), therefore the costs of the debt. Shareholders benefits at the expense of bondholders can manipulate these current assets, i.e. instead of selling assets and expropriate value they will rather operate these assets.

Dividend policy

The dividend policy shows a positive and significant impact for the long-term debt ratio in the UK, but a negative impact in Continental Europe. This negative impact of dividend policy on firms' debt level is observed in continental Europe. Dividends are paid out to shareholders from firms' earnings – the higher the dividend payout, the fewer the European firms issue debt. On the contrary, the positive relationship indicates that an increase in the dividend payout ratio is a factor for UK firms that enhance the long-term debt ratio. In line with the trade-off theory, this finding is also consistent with empirical studies, such as Ince and Owers (2012) and Klapper and Tzioumis (2008). As has been discussed, dividends are sticky because they exert a signalling effect. This effect reduces managers' ability to treat them as the flexible component of profits and limits the free cash flow available for reinvestment. It therefore obliges managers to seek for external financing sources, there is an incentive for firms to utilise more debt financing. Although this plays a role in monitoring and disciplining debt holders and reduces agency problems, it is also known that firms prefer to retain a greater amount of earnings to increase their flexibility. These scenarios might occur separately or jointly, but they provide a sound explanation of why dividend payments decrease the amount of internal funds and increase the total financing needs with debt.

Volatility

The volatility is significantly negatively affects the short-term debt ratio. In addition, it postulates a negative relationship between earnings volatility and all analysed types of debt across Europe. From a pecking order perspective, firms with a high volatility of earnings endeavour to accumulate cash to avoid underinvestment in the future. Firms with more variable cash flows, which produce higher business risks, have a higher probability of bankruptcy. In addition, the potential default risk related to high earnings volatility causes risk-averse managers to avoid excessive debt levels.

5.5 Robustness test

Market value of leverage

Market leverage is essentially future-oriented rather than the book value of leverage which represents the history of a firm's performance. Therefore, this paper uses the market value of leverage to provide some robustness to the results. Market leverage is calculated as total debt divided by the sum of market capitalisation and a difference between total asset and common equity. The 'market capitalization' item specifies the value of the year end according to the official interpretation from DataStream. The results captured by market value of leverage are mostly consistent but do not satisfactorily depict the association with all the explanatory variables. It is significantly and positively associated with growth opportunities and non-debt tax shields, and it is negatively related to profitability and firm size. While firm size being a variable with conflicting results, this analysis showed consistent results with the book value of leverage and is supported by the pecking order theory. In terms of speed of adjustment, firms in the UK adjust almost twice as fast as the continental Europe which indicates that debt financing ratio is very persistent for market oriented economy.

Sensitivity Tests

The output of the system GMM estimator (Roodman, 2009b) is applied, provides this study with statistics that show a first-order correlation but no second-order autocorrelation in the first-differenced residuals. This is consistent with the assumption that error terms are free from serial correlation. In addition, the Sargan/Hansen test statistics also reveal that the instrument used in the GMM estimation is valid. The result indicates that the variables used are uncorrelated to the residuals.

5.6 Cross-country comparison analysis on determinants of capital structure at firm level

The cross-country comparison analysis focuses on firms in the UK, Germany, France, Italy and Spain to avoid small sample bias[6]. Summary statistics are presented in in Table 5.8 and Table 5.9 and categorised by year, industry and country respectively. Table 5.8a provides a general picture of the levels of various types of debt financing for all publicly traded firms in the EU-15 countries. This table reveals that firms in south European countries: Italy and Spain borrow more than firms in central European countries, which refers to the UK, France and Germany. In general, these European firms have more than two times more long-term debt financing than short-term debt, with firms in the UK shows a particular interest in long-term rather than short-term debt financing. The choice of firms' maturity structure of external funds is based on the self-awareness of their future prospects. Firms who believe that their prospects become worse use long-term debt to retain the current spread, whereas firms who believe that their prospects will improve, they use short-term debt because the credit spread will be lower in the future (Flannery, 1986). The capital market's is aware of this rational and consequently charges a higher interest rate for firms seeking long-term debt. Since firms are better informed about their prospects than the market, they select the maturity structure that best fits their situation. The market orientation of the UK eases British firms' access to capital markets when compared to the short-maturities debt banks that normally provide. Secondly, macro-economic events can also have an impact on the level of liquidity in the markets, as all debt levels surged in 2008 and 2009 as shown in Table 5.8a. Firms in the UK, France and Germany are less affected or experienced a delayed impact. Alternatively, a bad signal about the firm may have a temporary impact on firms' ability to issue debt, i.e. rollover losses from debt refinancing to replace firms' current maturing debt can lead to a liquidity crisis and therefore increases the probability of bankruptcy (Diamond, 1991). Consequently, firms need to make sure that their debt maturities are spread out. Firms that are more flexible in choosing among

[6] Kelly and Maxwell (2003) suggest that the least possible rule of thumb is four times the degrees of freedom on one estimated parameter. Thus, there should be at least 40 firms in the sample as there are 10 parameters in the model to test the determinants of capital structure. Therefore, estimations for countries with fewer firms than suggested by the rule of thumb are ignored.

sources of finance can afford to spread the debt across shorter maturities than those with little room to alter their capital structure. However, it can be mitigated through the issuance of longer-term debt. Table 5.8b summarises the descriptive statistics of the firm level determinants of capitals structure.

According to the summary statistics presented in Appendix B, firms in the UK have the highest growth potential, whereas Italian firms are rather stagnating. French firms, which are the most profitable, may benefit from higher levels of tangible assets – it is on average a 23% of total assets – and influences their ability to access external funds. There are no big differences in the non-debt tax shield of firms across countries. Different tax systems can distort firms' financing and capital structure decisions. French firms spend most on R&D relative to firms from other EU-15 countries. Accordingly, R&D spending in France is 8% of total sales, but only 3% in Germany, 2% in the UK and 1% in Italy and Spain. This finding demonstrates that France provides the most favorable R&D tax credits – the Crédit d'Impôt Recherche (CIR). French firms benefit from this in the form of immediate depreciation of overhead costs and tax deductions on income when investing in R&D. They therefore adjust the capital structure and contribute to technological development, whilst increasing firms' competiveness and therefore spur economic growth. Hence, it can be expected that there is a significant positive impact of R&D on firms in France. With regard to capital expenditure, Germany, France and the UK show the highest levels of expenditure. On average, the dividend payout ratio is highest in Germany, followed by Italy and Spain as shown in Table 5.8b. Firms in these countries may have immediate access to cash or they favor debt financing as they are more liquid and therefore a statistical significant impact is expected.

The regression analysis presented in Table 5.7 shows that *profitability* is the most influential factor and is negatively correlated with firms' capital structure across all samples regardless long-term or short-term debt ratio. This is consistent with the pecking order theory: when firms are more profitable, they prefer finance from internal funds to escape from the consequences of information asymmetry. The only exception is the UK, where firms follow the trade-off theory. When there is more profitability, they issue more debt, presumably to take advantage of the tax reduction interest payments produce. *Growth opportunity* is the second most important determinant of

European firms' capital structure. It is a significantly positive relationship towards both long- and short-term debt ratios, except for UK and German firms, which have a significant negative impact on short-term debt ratio. This suggests that market performance has a compelling impact on firms' financing behaviour in other European countries. *Tangibility* has a positively significant effect on the total debt ratio for the UK, Italy, Germany and Spain. This positive relationship confirms the normative interpretation that it is easier for firms to access debt when there is more collateral. However, there is a negative impact of tangibility on the long-term debt ratio of French firms and the short-term debt ratio of German firms. As it applies to the majority of cases in the EU-15 countries, *firm size* is also positively and significantly correlated with the long-term debt ratio and this is consistent with the trade-off theory. However, in Germany, France, Italy and Spain firm size has a significant negative impact on short-term debt ratio, while being irrelevant for UK firms. There are positive associations with *non-debt tax shields* with total debt ratios in the UK, Germany, France, Italy, and a negative relationship in Spain.

Moreover, *research and development* is proven to have a strongly significant impact on firms' financing activities and it reduces leverage issuance except for firms in Italy. This may be due to the higher costs research and development cause, which, however, can be transformed into tax credits and encourages equity financing, except in Italy. The results are consistent with those of *capital expenditure*, and a stronger negative impact is observed on firms' long-term debt ratio for all countries. This negative relationship also applies to the short-term debt ratio for German firms, indicating that German firms rely more on their industries and prefer expanding their tangible assets.

Dividend policy has a significant impact on firm's capital structure in Germany, Italy and Spain, and is irreverent for firms in France and Spain. The results show a negative impact on German firms' long-term debt, and Spainish firms' short-term debt. It positively affects Italian firms' long-term debt and German firms' short-term debt ratio. Hence, Italian firms' financing decisions follow the pecking order and see dividend payout as a good sign of firms financial health. It reduces the information asymmetry and therefore stimulates the need for external financing. However the pecking order model also assumes that dividends are sticky as Fama and French (2002) explained. The negative link of dividend and leverage results from high-leveraged firms' averseness to pay dividends, in particular when the firms lack collateral.

Liquidity has a negative coefficient across all firms in the sample countries and is statistically insignificant for France. This implies that firms in the UK, Germany, Italy and Spain believe that lower asset liquidity makes it more costly for managers to expropriate value from bondholders. Thus, lower asset liquidity reduces the costs of debt and, consequently, incentivises using more debt. Firms' capital structure in the sampled European countries has a similar reaction. It is the result of the *volatility*'s significant negative effect on the total debt ratio, while France, being statistically insignificant, and Spain is not applicable. Statistically, French firms are least volatile and it can be assumed that their changes in value are made at a steadier pace.

As a result, there is a strong implication from the findings in that the observed capital structure patterns across European firms are very dynamic. However the results provide more support for the pecking order theory, which has more explanatory power for short-term debt in all countries. With regard to long-term debt financing, the trade-off theory mostly applies to firms in Spain and France, while pecking order and trade-off theories are equally supported in Italy and the UK, but the pecking order theory has strong support in Germany.

Table 5.7a Summary of firm level factors correlated with capital structure by countries: total debt ratio

The table reports results from system GMM regression on the determinants of the leverage over the sample period from year 2000 to 2012. The sample contains an unbalanced panel of 1,195 European firms. The debt ratio are defined as follows: Total debt ratio is the sum of long-term debt and short-term debt divided by book value of total assets, and long-term debt ratio is the ratio of long-term debt divided by book value of total assets, and short-term debt ratio refers to the short-term debt to total assets. Market value of leverage is calculated as total debt divided by (total asset-common equity + market capitalisation at year end). Growth is market-to-book ratio, profitability is defined as earnings before interest and taxes are scaled by assets. Tangibility is defined as net property, plant, and equipment divided by total assets. Firm size is defined as the log of total assets. Non-debt tax shields are defined as depreciation expense is scaled by total assets. CapEx is capital expenditure scaled by total assets. R&D is research and development expense scaled by sales. Liquidity is current ratio based on current assets divided by current liability. Dividend policy is dividend payout ratio and is measured as dividend paid per share divided by earning per share. Volatility is measured as variance of EBITDA (earnings before interest, tax and depreciation and amortization). For the subprime crisis period use the dates given by the NBER http://www.nber.org/cycles/cyclesmain.html, i.e. pre-crisis is year before 2007, crisis time period is from year 2007 to 2009; post-crisis is set as year 2010-2012. Standard errors are shown below the coefficients. *** p<0.001, ** p<0.01, * p<0.05, † p<0.1

Country Variable	UK	Germany	France	Italy	Spain
Lagged Dependent Variable	0.699***	0.799***	0.935***	0.797***	0.883***
	-0.0516	-0.00678	-0.0227	-0.0151	-0.0139
Growth	0.0193***	0.00941***	0.0296†	0.0182***	0.0229***
	-0.00451	-0.000746	-0.0162	-0.00263	-0.00257
Profitability	-0.247***	-0.192***	-0.335***	-0.277***	-0.148***
	-0.0371	-0.00515	-0.0945	-0.0239	-0.0331
Tangibility	0.0655***	0.0241***	-0.149†	0.0273**	0.0563***
	-0.0145	-0.00495	-0.0845	-0.00992	-0.0118
Size	0.00920***	0.00142**	-0.0023	0.00541***	0.00643*
	-0.00236	-0.00044	-0.00203	-0.00123	-0.00259
ND Tax Shield	0.211†	0.269***	0.736**	0.295***	-0.543***
	-0.126	-0.0231	-0.257	-0.061	-0.121
RD	-0.173**	-0.0578***	-0.316***	-0.0243	-0.0711***
	-0.0532	-0.00835	-0.0857	-0.0761	-0.0159
CapEx	-4.25e-09**	2.46e-09***	4.46e-09**	-1.85e-09†	-1.10e-08**
	-1.31E-09	-3.99E-10	-1.53E-09	-9.85E-10	-4.00E-09
Liquidity	-0.00428†	-0.00395***	-0.00173	-0.0142***	-0.0101***
	-0.00233	-0.000452	-0.00434	-0.00157	-0.00198
Dividend	0.0165†	-0.00102***	-0.000889	0.00129*	-0.00431*
	-0.00964	-0.000142	-0.00259	-0.000615	-0.00209
Volatility	-0.00298***	-0.000781***	-0.00348	-0.00109**	0.00242*
	-0.000864	-0.000195	-0.00333	-0.000408	-0.00122
Year	Y	Y	Y	Y	Y
Constant	-16.05	2.813	17.89†	5.86	18.16**
	-9.989	-2.042	-10.68	-4.715	-6.041
Observations	2,185	1,301	1,317	718	556
Number of firms	288	184	183	109	85
Number of instruments	32	157	147	90	83
Sargan/Hansen (p-value)	0.167(0.093)	0.205	0.7	0.106	0.358
AR(1)	0	0	0	0	0
AR(2)	0.125	0.217	0.34	0.66	0.177

Table 5.7b Summary of firm level factors correlated with capital structure by countries: long-term debt ratio

The table reports results from system GMM regression on the determinants of the leverage over the sample period from year 2000 to 2012. The sample contains an unbalanced panel of 1,195 European firms. The debt ratio are defined as follows: Total debt ratio is the sum of long-term debt and short-term debt divided by book value of total assets, and long-term debt ratio is the ratio of long-term debt divided by book value of total assets, and short-term debt ratio refers to the short-term debt to total assets. Market value of leverage is calculated as total debt divided by (total asset-common equity + market capitalisation at year end). Growth is market-to-book ratio, profitability is defined as earnings before interest and taxes are scaled by assets. Tangibility is defined as net property, plant, and equipment divided by total assets. Firm size is defined as the log of total assets. Non-debt tax shields are defined as depreciation expense is scaled by total assets. CapEx is capital expenditure scaled by total assets. R&D is research and development expense scaled by sales. Liquidity is current ratio based on current assets divided by current liability. Dividend policy is dividend payout ratio and is measured as dividend paid per share divided by earning per share. Volatility is measured as variance of EBITDA (earnings before interest, tax and depreciation and amortization). For the subprime crisis period use the dates given by the NBER http://www.nber.org/cycles/cyclesmain.html, i.e. pre-crisis is year before 2007, crisis time period is from year 2007 to 2009; post-crisis is set as year 2010- 2012. Standard errors are shown below the coefficients. *** p<0.001, ** p<0.01, * p<0.05, † p<0.1

Country Variable	UK	Germany	France	Italy	Spain
Lagged Dependent Variable	0.545***	0.721***	0.836***	0.829***	0.776***
	-0.0673	-0.00878	-0.054	-0.0147	-0.0179
Growth	0.0137**	0.00780***	0.0359†	0.0190*	0.0239***
	-0.00478	-0.000572	-0.0192	-0.00908	-0.00245
Profitability	-0.210***	-0.171***	-0.169	-0.136**	-0.287***
	-0.0447	-0.00641	-0.114	-0.0463	-0.0369
Tangibility	0.0948***	0.0354***	-0.332†	0.0329*	0.0984**
	-0.0218	-0.00703	-0.191	-0.015	-0.0354
Size	0.0142***	0.00674***	0.00486	0.00936***	0.0200***
	-0.00326	-0.000905	-0.00526	-0.0014	-0.00351
ND Tax Shield	0.227	0.208***	0.853**	0.119**	0.156
	-0.156	-0.0255	-0.316	-0.0403	-0.167
RD	-0.189***	-0.0541***	-0.593***	0.0179	-0.229***
	-0.0571	-0.0114	-0.155	-0.0745	-0.0688
CapEx	-7.43e-09***	-3.69e-09*	5.45E-09	-3.09e-09**	5.72e-09†
	-1.81E-09	-1.61E-09	-4.61E-09	-1.13E-09	-3.29E-09
Liquidity	-0.00145	0.000877	-0.000624	-0.00463†	0.0298***
	-0.00284	-0.000826	-0.0194	-0.00237	-0.00567
Dividend	0.0154	-0.00166***	-0.00732	0.00109**	-0.00167
	-0.0111	-0.000157	-0.00631	-0.00041	-0.00314
Volatility	-0.00241*	-0.00114***	0.00914*	-0.000476	0.00330**
	-0.00105	-0.000217	-0.00465	-0.000541	-0.00112
Year	Y	Y	Y	Y	Y
Constant	-23.04*	-7.088**	2.739	-18.09***	32.08***
	-10.07	-2.58	-13.83	-4.35	-7.567
Observations	2,185	1,301	1,317	718	556
Number of firms	288	184	183	109	85
Number of instruments	32	154	87	86	80
Sargan/Hansen (p-value)	0.164	0.117	0.61	0.47	0.251
AR(1)	0	0	0	0	0
AR(2)	0.53	0.125	0.174	0.347	0.619

Table 5.7c Summary of firm level factors correlated with capital structure by countries: short-term debt ratio

The table reports results from system GMM regression on the determinants of the leverage over the sample period from year 2000 to 2012. The sample contains an unbalanced panel of 1,195 European firms. The debt ratio are defined as follows: Total debt ratio is the sum of long-term debt and short-term debt divided by book value of total assets, and long-term debt ratio is the ratio of long-term debt divided by book value of total assets, and short-term debt ratio refers to the short-term debt to total assets. Market value of leverage is calculated as total debt divided by (total asset-common equity + market capitalisation at year end). Growth is market-to-book ratio, profitability is defined as earnings before interest and taxes are scaled by assets. Tangibility is defined as net property, plant, and equipment divided by total assets. Firm size is defined as the log of total assets. Non-debt tax shields are defined as depreciation expense is scaled by total assets. CapEx is capital expenditure scaled by total assets. R&D is research and development expense scaled by sales. Liquidity is current ratio based on current assets divided by current liability. Dividend policy is dividend payout ratio and is measured as dividend paid per share divided by earning per share. Volatility is measured as variance of EBITDA (earnings before interest, tax and depreciation and amortization). For the subprime crisis period use the dates given by the NBER http://www.nber.org/cycles/cyclesmain.html, i.e. pre-crisis is year before 2007, crisis time period is from year 2007 to 2009; post-crisis is set as year 2010- 2012. Standard errors are shown below the coefficients. *** p<0.001, ** p<0.01, * p<0.05, † p<0.1

Country Variable	UK	Germany	France	Italy	Spain
Lagged Dependent Variable	0.0842	0.708***	0.239**	0.257***	0.526***
	-0.0594	-0.00754	-0.0741	-0.0218	-0.023
Growth	-0.0108*	-0.00684***	0.0143	0.0151**	0.0167***
	-0.00532	-0.00079	-0.0108	-0.00485	-0.0022
Profitability	0.165†	-0.0722***	-0.200*	-0.165***	-0.179***
	-0.0889	-0.0061	-0.0947	-0.0269	-0.0404
Tangibility	0.0597†	-0.0187***	-0.0578	-0.019	0.0755***
	-0.0356	-0.00502	-0.101	-0.0124	-0.0218
Size	-0.00661	-0.00957***	-0.00803*	-0.00810*	-0.0258***
	-0.00445	-0.001	-0.00379	-0.00389	-0.00409
ND Tax Shield	-1.747†	0.393***	0.346	0.221*	-0.414***
	-0.909	-0.0242	-0.324	-0.089	-0.0976
RD	0.0844	-0.399***	-0.159†	-0.0417	0.0177
	-0.0853	-0.0376	-0.0909	-0.0619	-0.111
CapEx	1.03E-09	-5.41e-09**	3.98E-09	2.42E-09	2.49e-08***
	-1.55E-09	-2.04E-09	-2.97E-09	-2.87E-09	-2.78E-09
Liquidity	-0.0171***	-0.00497***	-0.0426*	-0.0287***	-0.0564***
	-0.00513	-0.000774	-0.0178	-0.00464	-0.00386
Dividend	0.0102	0.00100***	-0.00133	-0.000255	-0.00937***
	-0.012	-0.000158	-0.00411	-0.000994	-0.00281
Volatility	0.000226	0.000623***	0.00307	0.00348**	0.00258†
	-0.00125	-0.000187	-0.00208	-0.00119	-0.00134
Year	Y	Y	Y	Y	Y
Constant	3.252	9.987***	3.29	1.509	-2.118
	-8.66	-1.805	-6.525	-4.292	-5.276
Observations	2,185	1,301	1,317	718	556
Number of firms	288	184	183	109	85
Number of instruments	30	0.206	84	86	82
Sargan/Hansen (p-value)	0.317	151	0.255	0.47	0.532
AR(1)	0	0	0	0	0
AR(2)	0.33	0.86	0.160	0.439	0.752

Table 5.7d Summary of firm level factors correlated with capital structure by countries: market leverage

The table reports system GMM regression on the determinants of the leverage over the sample period from year 2000 to 2012. The sample contains an unbalanced panel of 1,195 European firms. The debt ratio are defined as follows: Total debt ratio is the sum of long-term debt and short-term debt divided by book value of total assets, and long-term debt ratio is the ratio of long-term debt divided by book value of total assets, and short-term debt ratio refers to the short-term debt to total assets. Market value of leverage is calculated as total debt divided by (total asset-common equity + market capitalisation at year end). Growth is market-to-book ratio, profitability is defined as earnings before interest and taxes are scaled by assets.Tangibility is defined as net property, plant, and equipment divided by total assets. Firm size is defined as the log of total assets. Non-debt tax shields are defined as depreciation expense is scaled by total assets. CapEx is capital expenditure scaled by total assets. R&D is research and development expense scaled by sales. Liquidity is current ratio based on current assets divided by current liability. Dividend policy is dividend payout ratio and is measured as dividend paid per share divided by earning per share. Volatility is measured as variance of EBITDA (earnings before interest, tax and depreciation and amortization). For the subprime crisis period use the dates given by the NBER http://www.nber.org/cycles/cyclesmain.html, i.e., pre-crisis is year before 2007, crisis time period is from year 2007 to 2009; post-crisis is set as year 2010 – 2012. Standard errors are shown below the coefficients. *** p<0.001, ** p<0.01, * p<0.05, † p<0.1

Country Variable	**UK**	**Germany**	**France**	**Italy**	**Spain**
Lagged Dependent Variable	0.617***	0.631***	0.709***	0.653***	0.709***
	-0.0428	-0.0129	-0.0617	-0.0253	-0.0185
Growth	0.00877†	-0.0126***	-0.00507	0.0769***	0.0437***
	-0.00498	-0.00305	-0.011	-0.0158	-0.00541
Profitability	-0.289***	-0.130***	-0.389**	-1.178***	-0.526***
	-0.0416	-0.0207	-0.123	-0.093	-0.0449
Tangibility	0.0768***	0.0830***	0.0571	-0.0342	0.116***
	-0.019	-0.012	-0.0914	-0.0571	-0.018
Size	0.00927***	0.0183***	-0.00917	0.0420***	0.0521***
	-0.00196	-0.00203	-0.0119	-0.00583	-0.00344
ND Tax Shield	0.0764	0.284***	0.0463	1.211***	-1.297***
	-0.17	-0.062	-0.229	-0.297	-0.262
RD	-0.233***	-0.0297	0.0723	-0.182	-0.287***
	-0.0517	-0.0223	-0.154	-0.254	-0.0651
CapEx	-3.35e-09**	-5.46e-09†	9.41E-09	-6.50E-09	-1.44e-08**
	-1.29E-09	-3.14E-09	-1.24E-08	-5.69E-09	-4.47E-09
Liquidity	-0.00920**	-0.00786***	-0.0660**	0.0149	0.0134***
	-0.00299	-0.00106	-0.0222	-0.015	-0.00296
Dividend	0.0039	0.00185***	-0.0099	0.00277**	0.0700***
	-0.00261	-0.000548	-0.00611	-0.000986	-0.0109
Volatility	-0.00174	-0.00643***	-0.0108*	-0.00554*	0.00849***
	-0.00115	-0.000396	-0.00499	-0.00239	-0.00132
Year	Y	Y	Y	Y	Y
Constant	-72.96***	-90.84***	-69.20***	-84.24***	0
	-9.796	-4.118	-16.81	-10.49	0
Observations	2,272	1,286	1,311	701	546
Number of firms	293	182	182	109	84
Number of instruments	32	153	144	79	83
Sargan/Hansen (p-value)	0.161	0.186	0.14	0.467	0.241
AR(1)	0	0	0	0	0
AR(2)	0.215	0.369	0.254	0.712	0.313

5.7 Conclusions

This chapter investigates the determinants of capital structure choices in European firms between 2000 and 2012. The results provide strong evidence in support of the trade-off theory and pecking-order theories. The developed financial markets, the low cost of debt and the high tax brackets in Europe have contributed to the domination of the trade-off theory. In other words, firms resort to high leverage to benefit from a tax deduction although only to a certain level at which such benefits begin to increase the probability of bankruptcy. The pecking order approach, evident in the results for profitability, confirms that firms resort to internal funds rather than debt in order to refrain from draining their liquidity which in turn increases the probability of bankruptcy. This also ensures that they avoid incurring high costs of short-term finance that in turn will escalate the costs of long-term finance. On a country basis, the results suggest that the pecking order theory prevails for all countries. The trade-off theories are supported in the UK but the pecking order theory has stronger support in continental European countries. The speed of adjustment analysis reveals that continental Europe is by far slower to adjust their capital towards optimal levels than the UK. Thus, the cost of adjustment of bank oriented economies is higher than the cost of being on the optimal level of capital.

Appendix B

Tables for Chapter 5

Table 5.8a Descriptive statistics for changes by year in EU-15 countries – dependent variables

The table reports descriptive statistics of the leverage variables over the sample period from year 2000 to 2012. The sample contains an unbalanced panel of 1,195 European firms. The debt ratio are defined as follows: Total debt ratio is the sum of long-term debt and short-term debt divided by book value of total assets, and long-term debt ratio is the ratio of long-term debt divided by book value of total assets, and short-term debt ratio refers to the short-term debt to total assets. Market value of leverage is calculated as total debt divided by (total asset-common equity + market capitalisation at year end).

Year	Variable	Mean	Median	Standard Deviation	Min	Max
2000	Total Debt Ratio	0.237	0.224	0.168	0	0.763
	Long-term Debt Ratio	0.145	0.118	0.135	0	0.679
	Short-term Debt Ratio	0.092	0.067	0.088	0	0.389
	Market leverage	0.183	0.162	0.142	0	0.625
2001	Total Debt Ratio	0.250	0.248	0.169	0	0.763
	Long-term Debt Ratio	0.158	0.133	0.142	0	0.679
	Short-term Debt Ratio	0.091	0.069	0.085	0	0.389
	Market leverage	0.197	0.181	0.152	0	0.625
2002	Total Debt Ratio	0.251	0.250	0.174	0	0.763
	Long-term Debt Ratio	0.163	0.139	0.144	0	0.679
	Short-term Debt Ratio	0.088	0.064	0.085	0	0.389
	Market leverage	0.204	0.186	0.154	0	0.625
2003	Total Debt Ratio	0.250	0.242	0.176	0	0.763
	Long-term Debt Ratio	0.167	0.141	0.147	0	0.679
	Short-term Debt Ratio	0.083	0.061	0.084	0	0.389
	Market leverage	0.220	0.204	0.159	0	0.625
2004	Total Debt Ratio	0.235	0.228	0.173	0	0.763
	Long-term Debt Ratio	0.162	0.133	0.148	0	0.679
	Short-term Debt Ratio	0.073	0.048	0.078	0	0.389
	Market leverage	0.191	0.175	0.147	0	0.625

Year	Variable	Mean	Median	Standard Deviation	Min	Max
2005	**Total Debt Ratio**	0.232	0.220	0.168	0	0.763
	Long-term Debt Ratio	0.161	0.135	0.147	0	0.679
	Short-term Debt Ratio	0.070	0.048	0.073	0	0.389
	Market leverage	0.186	0.169	0.146	0	0.625
2006	**Total Debt Ratio**	0.236	0.224	0.171	0	0.763
	Long-term Debt Ratio	0.165	0.138	0.151	0	0.679
	Short-term Debt Ratio	0.069	0.047	0.072	0	0.389
	Market leverage	0.175	0.153	0.139	0	0.625
2007	**Total Debt Ratio**	0.244	0.230	0.172	0	0.763
	Long-term Debt Ratio	0.173	0.146	0.154	0	0.679
	Short-term Debt Ratio	0.070	0.048	0.075	0	0.389
	Market leverage	0.168	0.147	0.133	0	0.625
2008	**Total Debt Ratio**	0.266	0.260	0.180	0	0.763
	Long-term Debt Ratio	0.185	0.157	0.159	0	0.679
	Short-term Debt Ratio	0.079	0.053	0.085	0	0.389
	Market leverage	0.187	0.169	0.139	0	0.625
2009	**Total Debt Ratio**	0.259	0.252	0.181	0	0.763
	Long-term Debt Ratio	0.187	0.168	0.159	0	0.679
	Short-term Debt Ratio	0.070	0.043	0.083	0	0.389
	Market leverage	0.238	0.227	0.168	0	0.625
2010	**Total Debt Ratio**	0.241	0.231	0.171	0	0.763
	Long-term Debt Ratio	0.175	0.157	0.148	0	0.679
	Short-term Debt Ratio	0.064	0.040	0.076	0	0.389
	Market leverage	0.206	0.186	0.157	0	0.625
2011	**Total Debt Ratio**	0.239	0.229	0.170	0	0.763
	Long-term Debt Ratio	0.168	0.151	0.145	0	0.679
	Short-term Debt Ratio	0.068	0.043	0.078	0	0.389
	Market leverage	0.196	0.171	0.156	0	0.625
2012	**Total Debt Ratio**	0.237	0.223	0.170	0	0.763
	Long-term Debt Ratio	0.172	0.153	0.147	0	0.679
	Short-term Debt Ratio	0.064	0.041	0.075	0	0.389
	Market leverage	0.206	0.179	0.161	0	0.625

Table 5.8b Descriptive statistics for each EU-15 country – dependent variables

The table reports descriptive statistics of the country differences on the leverage variables over the sample period from year 2000 to 2012. The sample contains an unbalanced panel of 1,195 European firms. The debt ratio are defined as follows: Total debt ratio is the sum of long-term debt and short-term debt divided by book value of total assets, and long-term debt ratio is the ratio of long-term debt divided by book value of total assets, and short-term debt ratio refers to the short-term debt to total assets. Market value of leverage is calculated as total debt divided by (total asset-common equity + market capitalisation at year end.

	Variable	Total Debt Ratio	Long Term Debt Ratio	Short Term Debt Ratio	Market Leverage
Germany	Mean	0.214	0.144	0.069	0.169
	Median	0.194	0.121	0.042	0.143
	Standard Deviation	0.174	0.142	0.077	0.148
	Min	0	0	0	0
	Max	0.763	0.679	0.389	0.617
Belgium	Mean	0.262	0.174	0.087	0.218
	Median	0.252	0.142	0.059	0.196
	Standard Deviation	0.188	0.160	0.091	0.164
	Min	0	0	0	0
	Max	0.763	0.679	0.389	0.617
Denmark	Mean	0.238	0.164	0.074	0.171
	Median	0.243	0.142	0.047	0.132
	Standard Deviation	0.163	0.138	0.082	0.141
	Min	0	0	0	0
	Max	0.763	0.679	0.389	0.563
Spain	Mean	0.310	0.198	0.110	0.256
	Median	0.309	0.163	0.087	0.248
	Standard Deviation	0.179	0.162	0.090	0.161
	Min	0	0	0	0
	Max	0.763	0.679	0.389	0.617
Finland	Mean	0.236	0.166	0.070	0.198
	Median	0.247	0.152	0.058	0.174
	Standard Deviation	0.138	0.113	0.059	0.146
	Min	0	0	0	0
	Max	0.605	0.516	0.317	0.617
France	Mean	0.238	0.164	0.073	0.191
	Median	0.225	0.139	0.053	0.168
	Standard Deviation	0.162	0.143	0.071	0.146
	Min	0	0	0	0
	Max	0.763	0.679	0.389	0.617
Greece	Mean	0.256	0.152	0.103	0.216
	Median	0.276	0.132	0.079	0.196
	Standard Deviation	0.174	0.142	0.096	0.168
	Min	0	0	0	0
	Max	0.748	0.634	0.389	0.617

	Variable	Total Debt Ratio	Long Term Debt Ratio	Short Term Debt Ratio	Market Leverage
Ireland	Mean	0.230	0.188	0.042	0.178
	Median	0.234	0.177	0.028	0.176
	Standard Deviation	0.186	0.174	0.046	0.149
	Min	0	0	0	0
	Max	0.763	0.679	0.195	0.617
Italy	Mean	0.278	0.176	0.101	0.237
	Median	0.293	0.161	0.082	0.231
	Standard Deviation	0.154	0.133	0.082	0.148
	Min	0	0	0	0
	Max	0.763	0.679	0.389	0.617
Luxemburg	Mean	0.189	0.145	0.043	0.138
	Median	0.121	0.101	0.022	0.109
	Standard Deviation	0.187	0.157	0.067	0.127
	Min	0	0	0	0
	Max	0.723	0.679	0.389	0.556
Netherlands	Mean	0.225	0.140	0.084	0.170
	Median	0.215	0.124	0.056	0.161
	Standard Deviation	0.163	0.133	0.092	0.128
	Min	0	0	0	0
	Max	0.763	0.679	0.389	0.617
Austria	Mean	0.247	0.162	0.085	0.212
	Median	0.231	0.129	0.073	0.192
	Standard Deviation	0.150	0.134	0.070	0.142
	Min	0	0	0	0
	Max	0.763	0.679	0.389	0.617
Portugal	Mean	0.402	0.240	0.155	0.358
	Median	0.412	0.228	0.135	0.356
	Standard Deviation	0.174	0.151	0.112	0.167
	Min	0	0	0	0
	Max	0.763	0.679	0.389	0.617
Sweden	Mean	0.241	0.176	0.065	0.165
	Median	0.248	0.173	0.045	0.156
	Standard Deviation	0.140	0.122	0.067	0.108
	Min	0	0	0	0
	Max	0.758	0.676	0.389	0.607
UK	Mean	0.220	0.175	0.045	0.150
	Median	0.200	0.145	0.024	0.129
	Standard Deviation	0.177	0.164	0.060	0.131
	Min	0	0	0	0
	Max	0.763	0.679	0.389	0.617

Table 5.8c Descriptive statistics for industry differences in EU-15 countries – dependent variables

The table reports descriptive statistics of the industry differences on leverage variables over the sample period from year 2000 to 2012. The sample contains an unbalanced panel of 1,195 European firms. The debt ratio are defined as follows: Total debt ratio is the sum of long-term debt and short-term debt divided by book value of total assets, and long-term debt ratio is the ratio of long-term debt divided by book value of total assets, and short-term debt ratio refers to the short-term debt to total assets. Market value of leverage is calculated as total debt divided by (total asset-common equity + market capitalisation at year end. Industry covers industrial, utility, transportation and others. Others may include material, oil and gas leasing, medical firms, etc.

Industry	Variable	Total Debt Ratio	Long term Debt Ratio	Short term Debt Ratio	Market Leverage
Industrial	Mean	0.236	0.159	0.075	0.189
	Median	0.226	0.135	0.050	0.168
	Standard Deviation	0.170	0.145	0.081	0.149
	Min	0	0	0	0
	Max	0.763	0.679	0.389	0.625
Utility	Mean	0.318	0.249	0.068	0.258
	Median	0.322	0.247	0.054	0.258
	Standard Deviation	0.184	0.168	0.066	0.156
	Min	0	0	0	0
	Max	0.763	0.679	0.389	0.625
Transportation	Mean	0.312	0.252	0.058	0.271
	Median	0.323	0.256	0.042	0.272
	Standard Deviation	0.148	0.139	0.057	0.147
	Min	0	0	0	0
	Max	0.763	0.679	0.389	0.625
Others	Mean	0.322	0.199	0.123	0.328
	Median	0.338	0.164	0.124	0.377
	Standard Deviation	0.267	0.182	0.105	0.250
	Min	0	0	0	0
	Max	0.763	0.543	0.324	0.625

Table 5.9a Descriptive statistics for changes by year in EU-15 countries – independent variables

This table reports the descriptive statistics of independent variables and its changes by year in EU-15 countries. Growth is market-to-book ratio, profitability is defined as earnings before interest and taxes are scaled by assets, Tangibility is defined as net property, plant, and equipment divided by total assets. Firm size is defined as the log of total assets. Non-debt tax shields are defined as depreciation expense is scaled by total assets. CapEx is capital expenditure divided by total assets. Robustness check when log value of capital expenditure is applied instead. R&D is research and development expense scaled by sales. Liquidity is current ratio based on current assets divided by current liability. Dividend policy is dividend payout ratio and is measured as dividend paid per share divided by earning per share. Volatility is measured as variance of EBITDA (earnings before interest, tax and depreciation and amortization).

Year	*Variable*	*Growth*	*Profit*	*Tangibility*	*Size*	*Tax Shield*	*RD*	*CapEx*	*Liquidity*	*Dividend*	*Volatility*
2000	Mean	1.836	0.144	0.303	13.582	0.050	0.014	0.065	1.627	0.418	.
	Median	1.281	0.136	0.269	13.422	0.045	0.000	0.051	1.355	0.359	.
	Standard Deviation	1.375	0.101	0.208	1.957	0.031	0.040	0.054	1.017	0.374	.
	Min	0.599	-0.253	0.008	9.610	0.002	0.000	0.000	0.330	0.000	.
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	.
2001	Mean	1.735	0.124	0.309	13.646	0.054	0.016	0.063	1.576	0.427	.
	Median	1.257	0.124	0.276	13.490	0.048	0.000	0.051	1.310	0.364	.
	Standard Deviation	1.255	0.102	0.210	1.953	0.032	0.042	0.051	1.000	0.398	.
	Min	0.599	-0.253	0.008	9.610	0.002	0.000	0.000	0.330	0.000	.
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	.
2002	Mean	1.551	0.118	0.310	13.615	0.056	0.017	0.055	1.564	0.453	.
	Median	1.235	0.121	0.274	13.489	0.051	0.000	0.045	1.335	0.371	.
	Standard Deviation	0.984	0.104	0.212	1.934	0.033	0.044	0.046	0.975	0.446	.
	Min	0.599	-0.253	0.008	9.610	0.002	0.000	0.000	0.330	0.000	.
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	.
2003	Mean	1.303	0.123	0.307	13.604	0.056	0.019	0.050	1.589	0.444	3.942
	Median	1.101	0.125	0.273	13.493	0.051	0.000	0.041	1.330	0.352	3.942
	Standard Deviation	0.698	0.104	0.213	1.909	0.032	0.046	0.043	1.008	0.432	2.409
	Min	0.599	-0.253	0.008	9.610	0.002	0.000	0.000	0.330	0.000	2.239
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	5.646
2004	Mean	1.455	0.145	0.298	13.590	0.054	0.018	0.050	1.622	0.454	7.203
	Median	1.241	0.134	0.261	13.481	0.048	0.000	0.040	1.370	0.360	6.756
	Standard Deviation	0.787	0.097	0.212	1.911	0.032	0.046	0.044	1.004	0.456	2.752
	Min	0.599	-0.253	0.008	9.610	0.002	0.000	0.000	0.330	0.000	2.239
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	15.599
2005	Mean	1.517	0.141	0.293	13.705	0.044	0.018	0.051	1.589	0.420	7.180
	Median	1.276	0.129	0.258	13.606	0.038	0.000	0.040	1.350	0.346	6.633
	Standard Deviation	0.833	0.098	0.212	1.903	0.029	0.045	0.044	0.954	0.415	2.752
	Min	0.599	-0.253	0.008	9.610	0.002	0.000	0.000	0.330	0.000	2.239
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	15.599
2006	Mean	1.677	0.141	0.280	13.825	0.041	0.018	0.053	1.595	0.380	7.081
	Median	1.392	0.131	0.243	13.695	0.036	0.000	0.042	1.360	0.321	6.554
	Standard Deviation	0.965	0.097	0.207	1.865	0.027	0.047	0.045	0.962	0.348	2.707
	Min	0.599	-0.253	0.008	9.610	0.002	0.000	0.000	0.330	0.000	2.239
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	15.599

Year	*Variable*	*Growth*	*Profit*	*Tangibility*	*Size*	*Tax Shield*	*RD*	*CapEx*	*Liquidity*	*Dividend*	*Volatility*
2007	Mean	1.786	0.145	0.271	13.965	0.040	0.019	0.053	1.584	0.383	6.931
	Median	1.504	0.133	0.233	13.820	0.035	0.000	0.042	1.330	0.318	6.438
	Standard Deviation	1.001	0.093	0.206	1.823	0.028	0.047	0.045	0.991	0.388	2.607
	Min	0.599	-0.253	0.008	9.610	0.002	0.000	0.000	0.330	0.000	2.239
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	15.599
2008	Mean	1.705	0.121	0.274	14.037	0.041	0.019	0.056	1.510	0.375	6.947
	Median	1.436	0.115	0.237	13.905	0.035	0.000	0.043	1.290	0.312	6.600
	Standard Deviation	0.919	0.102	0.207	1.823	0.028	0.047	0.047	0.955	0.362	2.397
	Min	0.599	-0.253	0.008	9.610	0.002	0.000	0.000	0.330	0.000	2.239
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	15.599
2009	Mean	1.223	0.103	0.279	13.973	0.044	0.020	0.045	1.566	0.434	7.315
	Median	1.062	0.098	0.239	13.820	0.038	0.000	0.033	1.320	0.354	7.066
	Standard Deviation	0.614	0.095	0.211	1.819	0.029	0.049	0.040	1.001	0.412	2.183
	Min	0.599	-0.253	0.008	9.610	0.002	0.000	0.000	0.330	0.000	2.239
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	15.599
2010	Mean	1.385	0.123	0.268	14.081	0.042	0.019	0.041	1.571	0.488	7.582
	Median	1.171	0.114	0.227	13.947	0.037	0.000	0.030	1.340	0.391	7.202
	Standard Deviation	0.731	0.088	0.207	1.809	0.027	0.046	0.037	0.973	0.494	2.411
	Min	0.599	-0.253	0.008	9.610	0.002	0.000	0.000	0.330	0.000	2.239
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	15.599
2011	Mean	1.522	0.121	0.265	14.149	0.042	0.019	0.043	1.533	0.413	7.566
	Median	1.268	0.114	0.220	14.033	0.036	0.000	0.032	1.310	0.343	7.213
	Standard Deviation	0.875	0.093	0.206	1.806	0.027	0.047	0.037	0.948	0.427	2.494
	Min	0.599	-0.253	0.008	9.610	0.002	0.000	0.000	0.330	0.000	2.239
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	15.599
2012	Mean	1.406	0.122	0.268	14.335	0.045	0.020	0.042	1.548	0.423	7.558
	Median	1.161	0.114	0.225	14.204	0.039	0.000	0.034	1.320	0.356	7.164
	Standard Deviation	0.806	0.096	0.209	1.742	0.029	0.049	0.037	0.956	0.402	2.513
	Min	0.599	-0.253	0.008	9.610	0.002	0.000	0.000	0.330	0.000	2.239
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	15.599

Table 5.9b Descriptive statistics for each EU-15 country – independent variables

This table reports the descriptive statistics of independent variables and its country differences for the year 2000-2012. Growth is market-to-book ratio, profitability is defined as earnings before interest and taxes are scaled by assets. Tangibility is defined as net property, plant, and equipment divided by total assets. Firm size is defined as the log of total assets. Non-debt tax shields are defined as depreciation expense is scaled by total assets. CapEx is capital expenditure divided by total assets. Robustness check when log value of capital expenditure is applied instead. R&D is research and development expense scaled by sales. Liquidity is current ratio based on current assets divided by current liability. Dividend policy is dividend payout ratio and is measured as dividend paid per share divided by earning per share. Volatility is measured as variance of EBITDA (earnings before interest, tax and depreciation and amortization).

Country	*Variable*	*Growth*	*Profit*	*Tangibility*	*Size*	*Tax Shield*	*RD*	*CapEx*	*Liquidity*	*Dividend*	*Volatility*
Germany	Mean	1.458	0.128	0.254	13.890	0.050	0.029	0.052	1.909	0.417	7.243
	Median	1.183	0.124	0.228	13.641	0.042	0.006	0.040	1.600	0.317	6.871
	Standard Deviation	0.922	0.100	0.170	2.044	0.032	0.051	0.043	1.171	0.466	2.549
	Min	0.599	-0.253	0.008	9.610	0.002	0	0	0.33	0	2.239298
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	15.599
Belgium	Mean	1.517	0.129	0.326	13.257	0.055	0.028	0.065	1.673	0.353	7.069
	Median	1.206	0.121	0.330	12.949	0.050	0	0.050	1.32	0.251	6.986
	Standard Deviation	0.927	0.123	0.212	1.650	0.033	0.071	0.054	1.206	0.443	2.453
	Min	0.599	-0.253	0.008	9.610	0.002	0	0	0.33	0	2.239
	Max	6.457	0.452	0.875	18.341	0.171	0.293	0.244	6.540	2.833	15.599
Denmark	Mean	1.802	0.165	0.341	13.886	0.052	0.038	0.064	1.733	0.357	7.020
	Median	1.249	0.148	0.288	13.836	0.051	0.011	0.053	1.470	0.285	6.841
	Standard Deviation	1.356	0.113	0.215	1.615	0.024	0.060	0.050	1.105	0.402	2.391
	Min	0.599	-0.253	0.008	9.967	0.002	0	0	0.330	0	2.239
	Max	6.457	0.452	0.875	17.843	0.111	0.293	0.244	6.540	2.833	14.496
Spain	Mean	1.515	0.106	0.342	13.684	0.043	0.005	0.050	1.374	0.386	7.465
	Median	1.207	0.100	0.305	13.486	0.038	0	0.039	1.190	0.286	6.881
	Standard Deviation	1.001	0.097	0.216	1.905	0.028	0.033	0.043	0.813	0.404	2.880
	Min	0.599	-0.253	0.008	9.610	0.002	0	0	0.330	0	2.239
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	15.599
Finland	Mean	1.476	0.148	0.331	14.196	0.052	0.023	0.061	1.544	0.694	7.094
	Median	1.193	0.133	0.334	14.290	0.047	0.007	0.048	1.370	0.533	6.868
	Standard Deviation	0.867	0.086	0.196	1.450	0.026	0.045	0.046	0.728	0.551	2.223
	Min	0.599	-0.182	0.022	10.524	0.011	0	0	0.330	0	2.239
	Max	6.457	0.452	0.861	17.443	0.171	0.293	0.244	5.480	2.833	14.156
France	Mean	1.503	0.119	0.225	14.341	0.043	0.020	0.046	1.509	0.386	6.768
	Median	1.236	0.112	0.184	14.101	0.037	0	0.037	1.300	0.304	6.213
	Standard Deviation	0.866	0.082	0.186	1.965	0.029	0.048	0.039	0.833	0.388	2.631
	Min	0.599	-0.253	0.008	9.610	0.002	0	0	0.330	0	2.239
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	15.599
Greece	Mean	1.640	0.128	0.427	13.367	0.035	0.002	0.041	1.688	0.449	7.394
	Median	1.288	0.118	0.416	13.266	0.031	0	0.029	1.500	0.340	7.050
	Standard Deviation	1.096	0.097	0.229	1.310	0.019	0.005	0.044	0.984	0.442	2.252
	Min	0.599	-0.253	0.008	10.675	0.002	0	0	0.330	0	2.239
	Max	6.457	0.452	0.875	16.628	0.123	0.053	0.244	6.540	2.833	15.599
Ireland	Mean	1.485	0.111	0.288	12.921	0.042	0.004	0.050	1.854	0.216	8.291
	Median	1.248	0.112	0.262	13.358	0.032	0	0.033	1.530	0.176	7.727
	Standard Deviation	0.873	0.121	0.202	1.739	0.029	0.019	0.051	1.085	0.233	2.724
	Min	0.599	-0.253	0.008	9.610	0.005	0	0	0.370	0	3.491
	Max	5.977	0.452	0.875	16.043	0.171	0.234	0.244	6.540	1.250	15.599

Country	*Variable*	*Growth*	*Profit*	*Tangibility*	*Size*	*Tax Shield*	*RD*	*CapEx*	*Liquidity*	*Dividend*	*Volatility*
Italy	Mean	1.311	0.110	0.268	14.137	0.043	0.008	0.045	1.457	0.474	7.074
	Median	1.133	0.107	0.207	14.071	0.037	0	0.035	1.270	0.333	6.710
	Standard Deviation	0.655	0.083	0.201	1.801	0.029	0.024	0.042	0.837	0.510	2.499
	Min	0.599	-0.253	0.008	10.001	0.002	0	0	0.330	0	2.239
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	15.599
Luxemb	Mean	1.077	0.141	0.529	13.327	0.048	0	0.039	1.439	0.479	6.159
	Median	0.931	0.130	0.619	13.319	0.053	0	0.026	1.250	0.333	6.426
	Standard Deviation	0.466	0.078	0.291	2.091	0.030	0	0.037	1.131	0.416	1.682
	Min	0.599	-0.207	0.037	9.610	0.007	0	0	0.330	0	2.866
	Max	2.255	0.398	0.875	16.160	0.140	0	0.135	5.860	2.233	10.106
Netherla	Mean	1.557	0.116	0.235	13.070	0.052	0.017	0.047	1.516	0.435	7.954
	Median	1.314	0.129	0.188	13.039	0.045	0	0.035	1.330	0.380	7.518
	Standard Deviation	0.881	0.113	0.176	2.240	0.033	0.047	0.042	0.851	0.415	2.835
	Min	0.599	-0.253	0.008	9.610	0.003	0	0	0.330	0	2.239
	Max	6.457	0.452	0.795	18.370	0.171	0.293	0.244	6.540	2.833	15.599
Austria	Mean	1.203	0.131	0.370	13.697	0.053	0.009	0.065	1.562	0.373	6.439
	Median	1.131	0.132	0.361	13.622	0.049	0.001	0.055	1.450	0.297	6.324
	Standard Deviation	0.384	0.053	0.160	1.426	0.025	0.013	0.043	0.711	0.353	1.922
	Min	0.599	-0.253	0.021	10.786	0.013	0	0	0.330	0	2.239
	Max	2.848	0.264	0.823	17.224	0.154	0.068	0.244	4.510	2.833	13.872
Portugal	Mean	1.236	0.090	0.321	13.266	0.052	0	0.045	1.065	0.417	7.801
	Median	1.100	0.094	0.328	13.150	0.044	0	0.034	0.925	0.273	7.399
	Standard Deviation	0.499	0.084	0.196	1.708	0.034	0	0.046	0.694	0.539	2.874
	Min	0.599	-0.253	0.008	9.687	0.002	0	0	0.330	0	2.239
	Max	5.279	0.452	0.811	17.560	0.171	0.034	0.244	4.720	2.833	14.718
Sweden	Mean	1.593	0.146	0.253	14.807	0.043	0.029	0.046	1.703	0.483	7.435
	Median	1.285	0.137	0.223	14.980	0.042	0.015	0.038	1.440	0.425	7.049
	Standard Deviation	1.023	0.089	0.193	1.468	0.020	0.051	0.037	0.913	0.363	2.500
	Min	0.599	-0.253	0.008	10.482	0.002	0	0	0.420	0	2.888
	Max	6.457	0.452	0.875	17.459	0.171	0.293	0.244	6.540	2.833	15.599
UK	Mean	1.751	0.146	0.296	13.857	0.046	0.018	0.053	1.505	0.418	7.469
	Median	1.438	0.138	0.248	13.688	0.040	0	0.041	1.280	0.392	7.196
	Standard Deviation	1.026	0.102	0.236	1.744	0.030	0.048	0.047	1.014	0.304	2.329
	Min	0.599	-0.253	0.008	9.610	0.002	0	0	0	0	2.239
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	15.599

Table 5.9c Descriptive statistics for industry differences in EU-15 countries – independent variables

The table reports descriptive statistics of the independent variables across industry over the sample period from year 2000 to 2012. The sample contains an unbalanced panel of 1,195 European firms. The debt ratio are defined as follows: Total debt ratio is the sum of long-term debt and short-term debt divided by book value of total assets, and long-term debt ratio is the ratio of long-term debt divided by book value of total assets, and short-term debt ratio refers to the short-term debt to total assets. Market value of leverage is calculated as total debt divided by (total asset-common equity + market capitalisation at year end. Industry covers industrial, utility, transportation and others. Others may include material, oil and gas leasing, medical firms, etc.

Country	*Variable*	*Growth*	*Profit*	*Tangibility*	*Size*	*Tax Shield*	*RD*	*CapEx*	*Liquidity*	*Dividend*	*Volatility*
Industrial	Mean	1.563	0.129	0.264	13.734	0.046	0.020	0.049	1.622	0.412	7.317
	Median	1.265	0.123	0.224	13.606	0.040	0.000	0.038	1.370	0.341	6.963
	Standard Deviation	0.963	0.099	0.197	1.821	0.029	0.048	0.042	0.997	0.404	2.539
	Min	0.599	-0.253	0.008	9.610	0.002	0	0	0.330	0	2.239
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	15.599
Utility	Mean	1.396	0.123	0.468	15.393	0.057	0.003	0.066	1.101	0.593	6.542
	Median	1.254	0.113	0.471	15.626	0.044	0	0.056	0.980	0.538	6.173
	Standard Deviation	0.684	0.088	0.224	2.050	0.036	0.011	0.047	0.611	0.470	2.478
	Min	0.599	-0.253	0.008	9.610	0.004	0.000	0	0.330	0.000	2.239
	Max	6.457	0.452	0.875	18.577	0.171	0.293	0.244	6.540	2.833	15.599
Transportation	Mean	1.284	0.111	0.505	14.537	0.049	0	0.080	1.181	0.370	7.387
	Median	1.134	0.115	0.505	14.365	0.050	0	0.065	1.010	0.285	7.033
	Standard Deviation	0.513	0.100	0.208	1.634	0.021	0.002	0.061	0.676	0.472	2.484
	Min	0.599	-0.253	0.025	11.206	0.007	0	0	0.330	0	2.239
	Max	3.854	0.452	0.875	18.577	0.171	0.018	0.244	5.970	2.833	15.599
Others	Mean	0.979	0.135	0.349	13.314	0.052	0	0.087	3.232	0.362	7.705
	Median	0.956	0.114	0.366	13.517	0.015	0	0.034	2.920	0.256	6.834
	Standard Deviation	0.247	0.098	0.288	1.100	0.066	0	0.096	2.140	0.357	2.879
	Min	0.599	-0.046	0.008	9.610	0.002	0	0	0.990	0	3.537
	Max	1.989	0.398	0.875	14.787	0.171	0	0.244	5.840	1.389	13.579

Table 5.10 Number of firms observed in the estimation classified by countries and year

This table reports the number of firms across European countries through year 2000-2012. As four times the degrees of freedom on one estimated parameter is required for number of firms, there should be at least 40 firms in the sample as there are 10 parameters in the model to test the relationship with capital structure. Therefore estimation for countries have below the rule of thumb are ignored (Kelly and Maxwell, 2003).

Year / Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Ave
EU-15	1020	1050	1109	1144	1196	1219	1235	1254	1268	1282	1284	1283	1192	1195
UK	229	234	248	260	280	284	289	296	301	307	308	307	308	281
Germany	157	160	169	173	179	181	184	189	190	192	193	193	182	180
France	163	165	172	177	178	181	183	185	186	186	186	187	166	178
Italy	81	85	94	98	105	109	109	111	113	116	116	117	104	104
Spain	69	72	76	78	83	84	86	85	87	87	88	88	80	82
Netherlands	69	70	72	71	73	74	74	75	76	79	77	77	58	73
Belgium	41	43	46	47	51	53	54	55	55	55	55	54	44	50
Sweden	39	40	42	43	45	45	46	46	46	46	46	46	46	44
Finland	37	37	40	43	43	43	43	44	44	44	44	44	44	42
Portugal	29	31	33	34	37	39	39	40	40	40	40	39	35	37
Greece	30	34	34	35	35	36	36	36	36	36	36	36	36	35
Denmark	28	30	30	30	30	30	32	32	33	33	33	33	33	31
Austria	25	25	29	30	30	31	31	31	32	32	33	33	33	30
Ireland	17	18	18	19	21	22	22	22	22	22	22	22	20	21
Luxemburg	6	6	6	6	6	7	7	7	7	7	7	7	3	6

CHAPTER 6: CAPITAL STRUCTURE SPEED OF ADJUSTMENT IN EUROPE

6.1 Introduction

This chapter investigates the driving forces for the speed of adjustment of capital structure, in terms of both macroeconomic and firm-specific factors. The motivation of this chapter results from its importance to policy-makers, investors and managers in understanding what factors that might hinder firms from adjusting their capital at a fast rate. These factors may alleviate or increase the cost of adjusting, and thus may either stop firms from fully adjusting to the optimum capital, or it may force them to only partially adjust. Identifying such drivers may thus help policy-makers and managers to take protective action or to make alternative choices to improve the speed of capital structure adjustment. Literature on the determinants of the speed of adjustment is still in its infancy, and thus more studies are needed to enrich the literature.

The aim of this chapter is to contribute to the slim studies in this field by providing new evidence using cross-country firm-level data. It uses data from a panel of 1,195 firms, from fifteen European countries, over the years 2000 to 2012. The first step is to obtain the optimum capitals structure. Then, the speed of adjustment is simply calculated by the difference between the optimum capital structure and the actual capital. The model containing the determinants of the speed of adjustment is estimated using the generalized method of moments (GMM) model. The results postulates that more collateralized but less profitable growth firms adjust faster than their competitors. Macroeconomic conditions also play an essential part in firms adjusting their capital structure to the optimum. Firms adjust faster in countries that have: more concentrated banking system, higher term spreads, low short-term interest rate, and a low default spread and TED spread. In other words, the results confirm that firms are able to adjust faster in an environment with better economic prospects, healthier markets, and lower political and credit risk. In terms of firm-specific factors, there is a negative relationship between growth opportunities, profitability, tangibility and adjustment costs on firms’ (distance) and their speed of adjustment, while for research and development, a firm's size does not matter.

The remaining parts of this chapter are organised as follows. Section 2 describes the sample and variables, and compares inter-industry differences. A correlation analysis is also provided in this section. Section 3 presents the empirical results from the tests, and sets out the discussion accordingly. Section 4 concludes the chapter, and includes suggestions for future research.

6.2 Summary statistics

Table 6.1 reports the summary statistics of the capital structure variables using four major sector classification namely industrial, utility, transportation and others. The aim of such classification is to provide a general picture of European firm's capital structure, taking industry classification into account. According to Bradley *et al*. (1984), Fries *et al*., (1997), Kovenock and Phillips (1997), MacKay and Philips (2002) and Miao (2005) industry conditions, including product market competiveness and supply and demand, imply different cross- and inter-industry business risks, regardless of the firms' tangibility, R&D expenditure and information asymmetry. In this study sample firms in industrial sectors are least keen on financing with debt compared to firms in utility or transportation. Table 6.2 summarises the descriptive statistics of the explanatory variables of the determinants of the speed of adjustment of capital structure at a firm level. Table 6.2a presents the conventional firm-specific factors which affect the target capital structure. Table 6.2b illustrates the distance between the optimum and current debt ratio for all the leverage variables. Table 6.2c reports the value or rate from the macroeconomic variables.

The pairwise correlation analysis in Table 6.3 presents the regression results for the impact of all the explanatory variables on the leverage variables. The statically significant associations confirm the validation and the importance of the included variables. These figures also partly reflect the expected high degree of association between the interaction term with the target leverage at both the firm level and the macroeconomic level.

Table 6.1 Descriptive statistics of leverage

This table reports descriptive of the leverage variables over the sample period from year 2000 to 2012. The sample contains an unbalanced panel of 1,195 European firms. The debt ratio are defined as follows: Total liability Ratio is the ratio (non-equity) liabilities to total assets, and Total Debt ratio is the ratio of total debt to capital where the capital is defined as total debt plus equity. For the market value of leverage the book value of equity is replaced by the market value of equity. Categorization of industry is constructed on the basis of the General Industry Classification available from DataStream. This classification represents firms' general industry including industrial, utility, transportation and other firms. Other firms may include material, oil and gas, leasing and medical firm, etc.

	Total Debt Ratio						**Total Liability Ratio**					
	Book Value			Market Value			Book Value			Market Value		
	Mean	Median	Std	Mean	Median	Std	Mean	Median	Std	Mean	Median	Std
Industrial	0.236	0.226	0.170	0.284	0.245	0.230	0.063	0.509	1.269	0.317	0.481	1.123
Utility	**0.318**	**0.322**	**0.183**	**0.373**	**0.372**	**0.233**	**0.240**	**0.620**	**1.138**	**0.469**	**0.619**	**1.101**
Transportation	0.311	0.323	0.148	0.388	0.390	0.206	0.057	0.540	1.367	0.352	0.6025	1.109
Others	**0.321**	**0.337**	**0.267**	**0.446**	**0.545**	**0.338**	**0.525**	**0.713**	**0.322**	**0.781**	**0.856**	**0.486**
Total	0.247	0.235	0.198	0.293	0.258	0.233	0.034	0.518	1.792	0.300	0.500	1.554

Table 6.2a Determinants of the target capital structure

Categorization of industry is constructed on the basis of the General Industry Classification available from DataStream. This classification represents firms' general industry including industrial, utility, transportation and other firms. Other firms may include material, oil and gas, leasing and medical firm, etc. Tangibility is defined as the ratio of fixed assets to total assets, Sales is the logarithm of net sales, Growth is the ratio of market-to-book equity, and Profitability is the ratio of EBITDA over total assets. Research and development expense is scaled by assets. RDD is a dummy set to one if the firm has no R&D expenses. Size is log of total assets.

	Growth			**Profit**			**Tangibility**			**Sales**			**RDASSTW**		
	Mean	Median	Std.	Mean	Median	Std.	Mean	Median	Std.	Mean	Median	Std.	Mean	Median	Std.
Sorted by industry															
Industrial	1.718	1.261	1.699	0.129	0.123	0.099	0.264	0.224	0.197	13.638	13.614	1.858	0.018	0	0.039
Utility	1.777	1.376	1.616	0.123	0.113	0.088	0.468	0.471	0.224	14.630	14.530	2.041	0.001	0	0.003
Transportation	1.322	0.936	1.276	0.111	0.115	0.100	0.505	0.505	0.208	14.318	14.290	1.652	0	0	0.001
Others	0.952	0.883	0.594	0.135	0.114	0.098	0.349	0.366	0.288	12.015	12.576	2.204	0	0	0
Total	1.706	1.255	1.680	0.128	0.122	0.098	0.286	0.246	0.210	13.715	13.675	1.890	0.016	0	0.037

Table 6.2b Determinants of the speed of adjustment – firm level

DIST is the difference between the target and the current debt ratio, where the target debt ratio is computed as fitted value from a fixed effects regression of the debt ratio on the five capital structure determinants Tangibility, Size, Growth, Profit, R&D and RDD. Categorization of industry is constructed on the basis of the General Industry Classification available from DataStream. This classification represents firms' general industry including industrial, utility, transportation and other firms. Other firms may include material, oil and gas, leasing and medical firm, etc.

	Distance from Total debt ratio						Distance from Total Liability ratio					
	Book Value			Market Value			Book Value			Market Value		
	Mean	Median	Std.	Mean	Median	Std.	Mean	Median	Std.	Mean	Median	Std.
Sorted by industry												
Industrial	0.119	0.105	0.089	0.148	0.128	0.112	0.742	0.517	0.961	0.751	0.454	0.850
Utility	0.141	0.131	0.096	0.156	0.128	0.122	0.714	0.544	0.832	0.728	0.409	0.840
Transportation	0.108	0.094	0.079	0.137	0.121	0.101	0.763	0.524	1.066	0.747	0.480	0.821
Others	0.229	0.194	0.164	0.322	0.342	0.172	0.561	0.673	0.289	0.534	0.520	0.254
Total	0.121	0.106	0.090	0.149	0.128	0.114	0.740	0.520	0.954	0.748	0.452	0.846

Table 6.2c Determinants of the speed of adjustment – institutional level

TERM is the term spread, defined as the difference between the yield on long-term national government bonds (with maturities of more than ten years) and the three-month Eurodollar interest rate. ISHORT is the three-month Eurodollar deposit rate. DEF is the difference between the yields on US low-grade (BAA) and high-grade (AAA) corporate bonds, and TED is calculated as the spread between 3-Month LIBOR based on US dollars and 3-Month Treasury Bill. The series is lagged by one week because the LIBOR series is lagged by one week due to an agreement with the source. Mean is replaced by actual rate under year categorization. Categorization of industry is constructed on the basis of the General Industry Classification available from DataStream. This classification represents firms general industry as illustrated below. Other firms may include material, oil and gas, leasing and medical firm, etc.

	TERM			ISHORT			DEFAULT			TED			Bank Concentration		
	Mean	Median	Std.	Mean	Median	Std.	Mean	Median	Std.	Mean	Median	Std.	Mean	Median	Std.
Sorted by industry															
Industrial	2.435	2.979	2.168	2.349	1.750	2.022	1.341	1.160	0.473	0.504	0.385	0.375	68.376	67.025	17.181
Utility	2.687	3.110	2.755	2.342	1.750	2.017	1.341	1.160	0.473	0.503	0.385	0.375	66.997	67.025	17.320
Transportation	2.512	2.978	2.439	2.316	1.750	2.013	1.342	1.160	0.472	0.501	0.385	0.375	69.793	70.499	17.913
Others	2.519	2.603	3.200	2.369	1.750	1.995	1.323	1.160	0.468	0.488	0.385	0.369	67.233	72.201	15.803
Total	2.455	2.979	2.228	2.347	1.750	2.021	1.341	1.160	0.473	0.504	0.385	0.375	68.323	67.025	17.210

Table 6.3 Correlation matrix

This table reports the correlation coefficients between the leverage variables and all explanatory variables. TDRW is the ratio of total debt to capital where capital is defined as total debt plus equity, TDR1W is the ratio of total (non-equity) liabilities to total assets. For the market value of leverage the book value of equity is replaced by the market value of equity. Tangibility is defined as the ratio of fixed assets to total assets, Sales is the logarithm of net sales, Growth is the ratio of market-to=book equity, and Profitability is the ratio of EBITDA over total assets. Research and development expense is scaled by assets. RDD is a dummy set to one if the firm has no R&D expenses. Size is log of total assets. DIST is the difference between the target and the current debt ratio, where the target debt ratio is computed as fitted value from a fixed effects regression of the debt ratio on the five capital structure determinants Tangibility, Size, Growth, Profit, R&D and RDD. TERM is the term spread, defined as the difference between the yield on long-term national government bonds (with maturities of more than ten years) and the three-month Eurodollar interest rate. ISHORT is the three-month Eurodollar deposit rate. DEF is the difference between the yields on US low-grade (BAA) and high-grade (AAA) corporate bonds, and TED is calculated as the spread between 3-Month LIBOR based on US dollars and 3-Month Treasury Bill. The series is lagged by one week because the LIBOR series is lagged by one week due to an agreement with the source. Coefficients of correlation that are significantly from zero at the 0.001, 0.01, 0.05, 0.1 level are marked with *** , ** , * and † respectively.

	Growth	Profit	Tangibility	Sales	R&D	ISHORT	DEFAULT	TED	TERM	BANK	DIST
TDRW	-0.0443***	-0.1756***	0.2538***	0.1707***	-0.2179***	0.0817***	-0.0236**	0.0465***	0.0312***	0.0623***	0.2609***
MLEV2	-0.3218***	-0.3238***	0.2305***	0.2555***	-0.2301***	0.1237***	-0.1011***	0.0283***	-0.0758***	0.0917***	0.3814***
TDR1W	0.2994***	-0.2301***	0.0320***	0.0634***	-0.0469***	-0.0124	0.0452***	-0.0174**	0.02*	0.3791***	-0.9180***
MLEV5W	0.1247***	-0.2206***	0.0171†	0.1295***	-0.0595***	-0.0178*	0.0400***	-0.0414***	-0.0197*	0.3625***	-0.4820***
Growth	1										
profit	0.2597***	1									
Tangibility	-0.1417***	0.0680***	1								
Sales	-0.0815***	0.0560***	0.0578***	1							
R&D	0.1830***	0.0368***	-0.1992***	-0.1018***	1						
ISHORT	-0.0852***	-0.1183***	0.0299***	-0.0054	-0.0401***	1					
DEFAULT	0.1510***	0.1082***	0.0174*	-0.0478***	-0.0127	-0.7219***	1				
TED	-0.0058	-0.0920***	-0.0217**	0.0370***	0.0036	0.4913***	-0.4540***	1			
TERM	0.1408***	0.0104	-0.0218**	0.021**	-0.0028	0.0041	0.2919***	0.5193***	1		
BANK	0.2116***	-0.0493***	-0.0052	-0.0520***	0.0296***	0.0570***	-0.0924***	0.0269***	-0.0027	1	
disTDRW	0.0747***	-0.0114	0.0291**	-0.0267*	-0.0896***	0.0403***	-0.0153†	0.0374***	0.0223*	-0.0021	1
disMLEV2	-0.2138***	-0.1877***	0.0391***	0.0603***	-0.0755***	0.0832***	-0.0700***	0.0232*	-0.0697***	-0.0251**	1
disTDR1W	-0.3044***	0.1591***	-0.0356***	0.0191*	-0.0115	0.0232*	-0.0460***	0.0101	-0.0365***	-0.2718***	1
disMLEV5W	-0.4240***	-0.0905***	-0.0536***	0.1328***	-0.0527***	0.0523***	-0.0979***	0.0326***	-0.0720***	-0.3113***	1

6.3 Empirical Results

The empirical analysis for this chapter conducted on two stages following Drobtez and Wanzenried (2006). Stage one represent the estimation of target capital structure, and the calculation of the cost of speed of adjustment. Stage two, regress the macroeconomic and firm specific variables on the speed of adjustment to investigate what are the drivers of the speed of adjustment.

This analysis utilise the two-step system GMM in order to overcome any inefficiencies may arise if fixed effect model would have been used. The results obtained below show that the speed of adjustment is influenced by both the firm and institutional level, which is consistent with the theoretical predictions (Jalilvand and Harris, 1984; Shyam-Sunders and Myers, 1999; Titman and Tsyplakov, 2004). Table 6.5 shows the estimation results on how the firm-level factors affect firms' capital structures in terms of both the total debt ratio and the total liability ratio. Correspondingly, Table 6.6 represents the results from regressing macroeconomic on firms' capital structure speeds of adjustment.

The partial adjustment model is applied and the GMM estimator allows all the coefficients of the explanatory variables to be estimated simultaneously. As the formula shows below, an estimation can be made on the basis of a single parameter. To expand the understanding between the determinant variables and the speed of adjustment of the capital structure, an interaction term, $Z_{it}\,TLR_{it-1}$, is added in the model and the interpretation of its coefficient β_1 is the main focus of the discussion below. Z_{it} is the factor that moves firms' capital structures away from both the firm and macro level, and TLR_{it-1} is the lagged capital structure. For each factor that Z_{it} represents that changes the firm's capital structure speed, an estimation is performed individually, so as to be clear of the effect that the coefficient captures and to make sure there is no multicollinearity. The dynamic panel regression specification of this chapter follows the approach from Drobetz and Wanzenried (2006), where the null hypothesis that the capital structure speed of adjustment is constant and independent from a particular firm or macro level determinants is tested and is represented as $\beta_1 = 0$. Tables 6.5 and 6.6 only report the coefficients on the interaction terms for each model, denoted as β_1, and the coefficients on the lagged capital structure, symbolized as $(1 - \beta_0)$. Notably, the impacts of the estimated coefficients on the interaction terms are interpreted as follow if the sign of β_1 is negative then the effect is positive (Drobetz and Wanzenried, 2006).

Table 6.4 Firm-specific adjustment factors

GMM estimation of book and market leverage on the market-to-book ratio, fixed assets, profitability, Sales, Research and Development Expenses and R&D dummy.

$$TLR_{it} = (1-\beta_0)TLR_{it-1} - \beta_1 Z_{it}\, TLR_{it-1} + \beta_0[\alpha_1 Sales_{it} + \alpha_2 Growth_{it} + \alpha_3 Profit_{it} + \alpha_4 Tangibility_{it} + \alpha_5 R\&D_{it} + \alpha_6 RDD_{it}$$

$$+\alpha_7 TERM_{it} + \alpha_8 ISHORT_{it} + \alpha_9 DEF_{it} + \alpha_{10} TED_{it} + \alpha_{11} BANC_{it} + \alpha_{12} Industry_{it} + \alpha_{13} DSize_{it} + \alpha_{14} Year_{it}] + d_t + \eta_i + u_{it}$$

This table reports the results of estimating the above equation with the general methods of moments (GMM) dynamic panel estimator proposed by Arellano and Bond (1991) and Blundell and Bond (1998). Total debt ratio is the ratio of total debt to capital where capital is defined as total debt plus equity, Total liability ratio is the ratio of total (non-equity) liabilities to total assets. For the market value of leverage the book value of equity is replaced by the market value of equity. Tangibility is defined as the ratio of fixed assets to total assets, Sales is the logarithm of net sales, Growth is the ratio of market-to-book equity, and Profitability is the ratio of EBITDA over total assets. Research and development expense is scaled by assets. RDD is a dummy set to one if the firm has no R&D expenses. Size is log of total assets. DIST is the difference between the target and the current debt ratio, where the target debt ratio is computed as fitted value from a fixed effects regression of the debt ratio on the five capital structure determinants Tangibility, Size, Growth, Profit, R&D and RDD. Year dummies, industry dummies and firm size dummies are controlled in the estimation. Wald test and the Hausman test denote the degrees of freedom. Standard errors are in parentheses as *** $p<0.001$, ** $p<0.01$, * $p<0.05$, † $p<0.1$

	Total Debt Ratio		Total Liability Ratio	
	Book value	Market value	Book value	Market value
Lagged capital structure	-2.710	-0.482	16.99†	-4.272
	(1.735)	(1.623)	(8.884)	(3.179)
SIZE	0.244†	0.0876	-1.171†	0.345
	(0.127)	(0.112)	(0.628)	(0.227)
Observations	11,261	11,138	10,160	10,160
Number of firms	1,246	1,234	1,204	1,204
No. of instruments	37	35	32	35
AR(2) Test	0.655	0.792	0.052	0.226
Sargan /Hansen Test	0.207/0.622	0.481/0.560	0.84/0.395	0.341/0.534
Wald Test (χ^2)	722.93	3735.70	72.45	61.35
Lagged capital structure	0.480***	0.593***	-1.356***	0.317
	(0.116)	(0.104)	(0.357)	(0.384)
GROWTH	0.0720*	0.0408	2.049**	-0.370
	(0.0286)	(0.0274)	(0.626)	(0.557)
Observations	11,261	11,138	10,160	10,160
Number of firms	1,246	1,234	1,204	1,204
No. of instruments	34	36	30	34
AR(2) Test	0.649	0.723	0.149	0.834
Sargan /Hansen Test	0.073/0.757	0.132/0.299	0.165/0.244	0.879/0.886
Wald Test (χ^2)	1173.12	2239.38	41.67	61.94
Lagged capital structure	0.112	0.587***	-0.747†	-0.760***
	(0.432)	(0.123)	(0.382)	(0.195)
PROFIT	2.247	-2,265	0.348***	0.588***
	(1.901)	(3,326)	(0.0999)	(0.0795)
Observations	11,261	11,138	10,160	10,160
Number of firms	1,246	1,234	1,204	1,204
No. of instruments	36	34	31	34
AR(2) Test	0.161	0.893	0.227	0.654
Sargan /Hansen Test	0.257/0.974	0.553/0.707	0.852/0.676	0.290/0.090
Wald Test (χ^2)	840.61	1143.49	87.86	641.79
Lagged capital structure	0.349†	0.623***	-0.451	-0.922***
	(0.198)	(0.118)	(0.277)	(0.175)
TANGIBILITY	0.757	-2,589	0.342**	0.663***
	(0.622)	(3,370)	(0.112)	(0.0842)
Observations	11,261	11,138	10,160	10,160
Number of firms	1,246	1,234	1,204	1,204
No. of instruments	36	34	34	33
AR(2) Test	0.299	0.809	0.276	0.554
Sargan /Hansen Test	0.358/0.977	0.552/0.662	0.367/0.360	0.918/0.344
Wald Test (χ^2)	705.27	1223.70	42.50	161.43
Lagged capital structure	0.478***	1.051***	1.147**	0.580
	(0.139)	(0.206)	(0.376)	(1.213)
RD	4.166*	-23.86*	-20.59	-11.24
	(1.895)	(10.94)	(14.71)	(42.05)
Observations	11,261	11,138	10,160	10,160
Number of firms	1,246	1,234	1,204	1,204
No. of instruments	33	33	34	31
AR(2) Test	0.776	0.592	0.487	0.441
Sargan /Hansen Test	0.820/0.983	0.845/0.891	0.835/0.903	0.319/0.472
Wald Test (χ^2)	857.22	742.48	86.95	968.92
Lagged capital structure	-0.193	0.514**	-0.747†	-0.695***
	(0.279)	(0.179)	(0.382)	(0.156)
DIS	3.073**	-1,526	0.348***	0.558***
	(0.953)	(2,908)	(0.0999)	(0.0628)
Observations	11,261	11,138	10,160	10,160
Number of firms	1,246	1,234	1,204	1,204
No. of instruments	35	31	31	35
AR(2) Test	0.151	0.986	0.227	0.464
Sargan /Hansen Test	0.126/0.317	0.219/0.439	0.853/0.676	0.837/0.083
Wald Test (χ^2)	1308.67	811.66	87.86	771.37

6.3.1 Firms specific factors and speed of adjustment

Table 6.4 outlines the regression between the firms-level factors and the speed of adjustment of the capital structure. DIST, which refers to the gap between the observed leverage and optimum leverage, is the most important factor in this study, hence it represents the cost of adjustment (i.e. $DIST = |TLR_{it}^{*} - TLR_{it}|$ as explained in chapter 3). The estimated coefficient on the interaction term with DIST is statistically significant and indicates a negative relationship with the capital structure speed of adjustment. This finding is in line with Lööf (2004) and Banerjee *et al*. (2004) and Aybar-Arias *et al*. (2012), but in contrast to Drobetz and Wanzenried (2006). It implies that firms adjust towards the target leverage with a faster speed when the gap from the current to the target capital is smaller, i.e. the cost of adjustment is lower. If the fixed cost of adjustment is exceptionally high, firms tend to slow down their speed of adjustment because most adjustments may occurs without transaction in external capital markets, and, as a result, firms readjust using internal financing before resorting to external financing. Thus there is no positive impact on the speed that firms adjust to the optimum.

The growth negatively interacts with firms' speed of adjustment of the capital structure. The higher the growth, the lower the speed the capital structure moves up to the optimum. This result is consensus with the trade-off theory, which assumes that higher the growth opportunities lead to a higher probability of bankruptcy. Low growth firms adjust more rapidly to their optimum than higher growth firms. An alternative interpretation is that firms desire the benefits of tax deduction of interest payment that arise from debt financing. This is also in line with the prediction that firms are more likely to adjust faster to their optimum capital structure when they have excess expenditures over income, despite considering their actual growth opportunities. Profitability has a statistically and negative impact on firms' speed of adjustment. Firms with lower profitability shift their capital structure towards optimum more rapidly than those with higher profitability. One explanation for such relation is that profitable firms are more flexible and have more options in terms of financing decisions, i.e. internal funds, and in such cases, this is consistent with the pecking order theory. Firms of such kind do not rush to adjust to their optimum capital structure, compared to low profit firms.

The asset tangibility result indicates that firms with less asset tangibility have stronger incentives to adjust their firm's capital structure to optimum, as the evidence shows the less collateralised firms adjust more rapidly than those with more tangible assets. Finally, the results on the interaction term with firm size and research and development are mixed. The mixed results of firm size constructed by sales are consistent with the Drobetz and Wanzenried (2006). The analysis of speed of adjustment using the partial adjustment model with focus on firms specific factors reveal that firms adjust more rapidly towards optimum leverage on the basis of cheaper adjustment costs. Firms with Lower growth opportunities, lower profitability and fewer tangible assets, have higher speed of adjustment in Europe.

Consequently, from the firm perspective, higher growth opportunities, higher profitability, more assets and higher adjustment costs hinder the adjustment process to their target capital structure. These results lend support to the existence of a pecking order theory as tangibility and profitability are frequently used as a proxy of information asymmetry. Capital structure theory suggest that larger asset tangibility assumes a greater asset liquidity and lower level of information asymmetry, and thus lower costs of managerial discretion (Benmelech *et al*., 2005). This indicates the incentive of firms to consider being more concerned about the proper leverage position. Firms who have lower tangibility therefore generally have less value in the case of liquidation (Flannery and Rangan, 2006). In such cases, firms with lower tangibility or lower collateral quality, higher interest rates may be applied, which therefore increases the cost of debt financing. This may stimulate firms with lower tangibility to adjust their capital structure faster. The negative impact of profitability on adjustment speed is in line with pecking order theory, as retained earnings are accumulated, because more profitable firms depend relatively less on external financing. The incentive then is to control the leverage at a relatively lower level and therefore avoid overleverage for profitable firms. Financing deficit is also more likely to happen in such firms. Hence, firms with high profitability are typically flexible with their financing options, including internal financing, and are therefore deemed to have a relatively slower pace of speed of adjustment in their capitalist structure.

Table 6.5 Macroeconomic adjustment factors

GMM estimation of book and market leverage on the Term Spread, Short Interest rate, Default Spread, TED spread and Bank concentration.

$$TLR_{it} = (1-\beta_0)TLR_{it-1} - \beta_1 Z_t TLR_{it-1} + \beta_0[\alpha_1 Sales_{it} + \alpha_2 Growth_{it} + \alpha_3 Profit_{it} + \alpha_4 Tangibility_{it} + \alpha_5 R\&D_{it} + \alpha_6 RDD_{it}$$

$$+\alpha_7 TERM_{it} + \alpha_8 ISHORT_{it} + \alpha_9 DEF_{it} + \alpha_{10} TED_{it} + \alpha_{11} BANC_{it} + \alpha_{12} Industry_{it} + \alpha_{13} DSize_{it} + \alpha_{14} Year_{it}] + d_t + \eta_i + u_{it}$$

This table reports the results of estimating above equation with the general methods of moments (GMM) dynamic panel estimator proposed by Arellano and Bond (1991) and Blundell and Bond (1998). Total liability ratio is the ratio of total debt to capital where capital is defined as total debt plus equity, Total Debt Ratio is the ratio of total (non-equity) liabilities to total assets. For the market value of leverage the book value of equity is replaced by the market value of equity TERM is the term spread, defined as the difference between the yield on long-term national government bonds (with maturities of more than ten years) and the three-month Eurodollar interest rate. ISHORT is the three-month Eurodollar deposit rate. DEF is the difference between the yields on US low-grade (BAA) and high-grade (AAA) corporate bonds, and TED is calculated as the spread between 3-Month LIBOR based on US dollars and 3-Month Treasury Bill The series is lagged by one week because the LIBOR series is lagged by one week due to an agreement with the source. Year dummies, industry dummies and firm size dummies are controlled in the estimation. Correlation that are significantly from zero at the 0.001, 0.01, 0.05 and 0.1 level are marked with *** , ** , * and † respectively. Wald test and the Hausman test denote the degrees of freedom.

	Total Debt Ratio		Total Liability Ratio	
	Book value	Market value	Book value	Market value
Lagged capital Structure	0.495***	0.487***	0.544**	0.535*
	(0.120)	(0.141)	(0.207)	(0.231)
TERM	0.0239	0.0169	-0.0374†	-0.0172
	(0.0199)	(0.0205)	(0.0199)	(0.0326)
Observations	11,261	11,138	10,160	10,160
Number of firms	1,246	1,234	1,204	1,204
No. of instruments	31	33	33	40
AR(2) Test	0.485	0.546	0.137	0.370
Sargan /Hansen Test	0.341/0.794	0.208/0.361	0.497/0.098	0.998/0.083
Wald Test (χ^2)	719.79	1786.06	125.86	116.91
Lagged capital Structure	0.520***	0.694***	0.504**	0.284
	(0.144)	(0.131)	(0.174)	(0.179)
SHORT	0.0308†	0.000320	0.0380†	0.0766†
	(0.0173)	(0.0198)	(0.0230)	(0.0421)
Observations	11,261	11,138	10,160	10,160
Number of firms	1,246	1,234	1,204	1,204
No. of instruments	34	34	33	34
AR(2) Test	0.598	0.872	0.052	0.105
Sargan /Hansen Test	0.411/0.865	0.227/0.092	0.621/0.107	0.621/0.489
Wald Test (χ^2)	1481.40	1685.65	155.71	47.04
Lagged capital Structure	0.566***	0.607***	0.489*	0.471**
	(0.106)	(0.0748)	(0.225)	(0.180)
DEF	0.0787	0.154***	0.0543	0.140
	(0.0523)	(0.0437)	(0.0810)	(0.114)
Observations	11,261	11,138	10,160	10,160
Number of firms	1,246	1,234	1,204	1,204
No. of instruments	33	37	38	34
AR(2) Test	0.367	0.090	0.515	0.856
Sargan /Hansen Test	0.601/0.765	0.121/0.134	0.720/0.831	0.637/0.594
Wald Test (χ^2)	1253.09	2826.55	7917.46	51.86
Lagged capital Structure	0.660***	0.867***	0.486*	0.411†
	(0.0916)	(0.0514)	(0.215)	(0.213)
TED	0.162**	-0.0469	-0.0521	0.00327
	(0.0614)	(0.0589)	(0.136)	(0.343)
Observations	11,261	11,138	10,160	10,160
Number of firms	1,246	1,234	1,204	1,204
No. of instruments	34	37	35	30
AR(2) Test	0.393	0.585	0.625	0.432
Sargan /Hansen Test	0.134/0.382	0.085/0.091	0.338/0.797	0.581/0.578
Wald Test (χ^2)	2665.05	3267.07	126.14	40.62
Lagged capital Structure	-0.0300	1.344	-0.668	1.998**
	(0.499)	(0.925)	(1.226)	(0.709)
Bank Concentration Ratio	0.00968	-0.00620	0.0153	-0.0256*
	(0.00787)	(0.0126)	(0.0182)	(0.0107)
Observations	11,261	11,138	10,160	10,160
Number of firms	1,246	1,234	1,204	1,204
No. of instruments	34	31	32	34
AR(2) Test	0.734	0.257	0.159	0.070
Sargan /Hansen Test	0.142/0.830	0.214/0.350	0.763/0.518	0.185/0.086
Wald Test (χ^2)	1261.06	520.90	90.80	64.46

6.3.2 Macroeconomic factors and speed of adjustment

Table 6.5 reports the results for the impact of the macroeconomic variables on firms' speed of adjustment. The term spread essentially predicts economic activity and it aids firms in deciding how much capacity capital will be needed to meet future demand of funds to finance projects. A positive statistically significant impact of term spread is evident on the book value of the total liability ratio. This is also confirmed by the estimated coefficient on the short-term interest rate (negative relationship) hence good prospects assume the relationship between each of these two variables and the speed of adjustment should go in opposite direction.

The coefficient of the interaction term related to bank concentration is significantly positive, but is also reflected on the market value of the total liability ratio. This suggests that the higher the bank concentration, the higher the firms' speed of adjustment of the capital structure. Since there are two opposing impacts of bank concentration on firms' financing behaviour in banking theory, the positive relationship between bank concentration and the speed of adjustment of the capital structure reflects that, in a market when considering information asymmetry, banks' incentives may be stimulated by the higher bank concentration to establish a long-term lending relationship with borrowers (González and González, 2008). Therefore, the relationship with banks can reduce the information asymmetry and the agency costs between banks and debt holders. Another explanation of the higher bank concentration is that a lower competition and openness but more stable banking system avoids systematic crises (Beck *et al.*, 2007). A more stable banking system injects more confidence into the financial market, which is compatible to the statement suggested by Hackbarth *et al*. (2005) that when the economy is booming, firms adjust their capital structure to optimum faster than when economy is in a downturn cycle. In the economy with less credit risk, the future is highly liquid and prospects are better. Consequently, the positive coefficients on the interaction term related to DEF and TED are consistent with predictions from prior work (Ferson and Harvey, 1993; Hackbarth *et al.*, 2005). This effect, however, is also weak, as it is only significant with one of the leverage variables.

In the presence of market friction, the cross-sectional differences in the rate of reversion may in part relate to differences in the transaction costs associated with issuing and repurchasing debt equity. Convertible debt may be preferred as it can be used as a control for agency costs. A slower adjustment may result from more long-term debt, which also subject to greater agency costs. This is consistent with Myers (1977) argument that shorter maturity can lessen the underinvestment problem when the debt is fixed. Alternatively, Diamond and Rajan (2000) states that firms with more short-term debt are more likely to default, which, therefore, involves higher bankruptcy costs, which then corresponds to a decreases in agency costs in the model of Titman and Tsyplakov (2004). In either case, it is evident that the higher the convertible debt issued, the greater the agency costs, while a slower adjustment process may be linked to greater agency costs, preventing the firm from moving or returning to its target.

From the macroeconomic perspective, firms adjust to their target capital structure faster when the economic prospects are better and there is less idiosyncratic risk. A more rapid speed is also stimulated by a more concentrated banking system based on either the concept of relationship banking or when there is systematically less competition and therefore more stability in the banking sector. This again proves that under the environment with less adverse selection, our results are consistent with recent studies by Cook and Tang (2008) and Drobetz and Wanzenried (2006).

6.4 Conclusion

This chapter investigates the driving forces for the speed of adjustment of the capital structure in Europe. The study sample contained an unbalanced panel of 1,246 firms during the period 2000-2012. The Autoregressive Distributed Lagged (ADL) theory was used to estimate the partial adjustment model, and hence it effectively captures the discrepancy in the proportion between the optimum and current value of the speed of adjustment. The result reveals that both firm and macroeconomic factors have an impact on the speed of adjustment. This result is consistent with the theoretical assumption that the higher the cost of adjustment, the lower the speed of adjustment, and this is demonstrated as the coefficient of adjustment cost proxy (distance) is negative and statistically significant. Thus firms resort to internal funds to adjust their capital internally instead of resorting to external funds. The negative relation between growth opportunities and the speed of adjustment implies that a higher growth may induce a negative signalling effect, which thus increases the cost of adjustment and decreases the speed of adjustment. The higher the firm’s profitability, the lower the speed of adjustment, and firms will resort to internal funds; this is in line with the pecking order theory. Firm size and R&D provide mixed evidence, hence there is weak evidence that either would accelerate or slow the speed of adjustment. In terms of macroeconomic factors, a lower short-term interest rate and large term spread lead to a higher speed of adjustment. In other words, they reflect better economic prospects and firms will be attracted towards long-term investment. A higher default spread and TED spread decelerate the speed of adjustment; hence they reflect disruption in the global financial system, which in turns lead to a higher cost of adjustment. The higher concentration in the banking sector, the higher the speed of adjustment due to less competition among banks and more stability in the sector.

CHAPTER 7: CONCLUSION

The aim of this thesis is to investigate the determinants of capital structure in European firms. The thesis empirically tests the presence of market timing effects, the speed of adjustment of capital structure and the drivers of the speed. The thesis uses accounting and financial data from 1,195 European firms during the period 2000-2012. A quantitative approach is adopted to address the research questions, namely econometric techniques for the analysis of panel data. Recent studies on optimum capital structure have assumed a dynamic form of capital structure decisions instead of the static form perceived by early studies. Commonly, discussions in the literature relate to pecking order and trade-off theories, with little emphasise on market timing theory. This thesis fills that gap and provides new insights in to the subject from a market timing perspective. Specifically, three empirical chapters in this thesis each contribute to the literature with new evidence on: 1) the market timing effects, 2) the determinants of capital structure, and 3) the determinants of the speed of adjustment. For the analysis, this thesis focuses on Europe because of the dynamic changes in its economic, financial and regulatory environment in recent years. To reiterate the contribution of the thesis, this is the first empirical study to test the market timing theory in 15 European countries. Secondly, it adds to the scant literature on comparative studies examining the target capital speed of adjustment and its determinants. Finally, it casts a wider net in literature, from both a firm-level and a macro-level, as for what determines the speed of adjustment in capital structure.

The findings on the market timing effects on capital structure in Europe provide evidence against the theoretical assumption of equity market timing, i.e. that European firms tend to issue debt when the market valuation of equity is high. This evidence not only applies to the current market valuation but to the historical market valuation as well. European firms seem to capitalise on the high value of their equity (low leverage), i.e. low probability of bankruptcy, and issue debt in order to obtain it at a lower cost, which consequently will contribute to reducing their weighted average cost of capital. This indeed is a reasonable argument given the high tax brackets in Europe, flexible financial markets, relatively integrated capital markets, and the availability of low interest rates over the last decade. Alternatively, because the market timing proxy can be considered as a reflection of the growth opportunities, it implies that firms in the sample with significant growth opportunities relied more on debt capital.

The results from the determinants of capital structure provide strong evidence in support of the trade-off theory in terms of long-term debt in Europe. However, there is also strong evidence in support of the pecking order theory when it comes to short-term debt ratios. The findings suggest that European firms follow both trade-off theory and pecking order theory, although the long-term or short-term debt ratios react differently in their response to the underlying determinants. In the context of a high tax burden but low-cost of debt financing, European firms issue long-term debt to avoid the risk of bankruptcy. However, because managers possess better information than outsiders about a firm's growth prospects, risk and value, short-term debt is only resorted to after using internal funds first, as suggested by the pecking order theory. This theory is the focus of attention in most of the countries in the sample except for Spain and Belgium, which are supported by the trade-off theory. The results from Italian firms are equally supported by both theories, i.e. trade-off and pecking order. France and Spain adjust slowest to their target capital structure and this indicates that a higher adjustment cost may apply.

The analysis of the determinants of the speed of adjustment using a partial adjustment model reveals that both firm-level and macroeconomic factors represent driving forces for the speed of adjustment. The result is in consensus with the pecking order assumption that when the fixed costs of adjustment are excessively high, firms turn to internal finance instead of external finance. Firms with high growth may also signal negatively that the cost of the adjustment is enormously high, and hence they will try to not adjust their capital. Also, the more profitable firms with sufficient internal funds tend to adjust less rapidly. With regards to the macroeconomic conditions, the results reveal that good economic prospects are represented by a large term spread and low short-term interest rate, which accelerate the speed of adjustment of the capital structure. The less global political or default risks, represented by a low default spread and low TED spread, increase the speed that firms adjust their capital structure. In addition, a more concentrated banking system in the economy supports firms to move faster to their target, which is also consistent with relationship banking and financial stability arguments in the literature.

7.1 Policy implications

The results have close policy relevance, with extended theoretical underpinnings. The implications range from resource allocation and agency costs at a firm level to the effective integration of global capital markets. Interested parties could be corporate managers, investors and policy makers. The implications for managers stem mainly from their preference of debt financing. As a higher possibility of financial distress increases the bankruptcy costs for a firm, managers should aim to reduce such costs by giving higher priority to financial flexibility, e.g. by not fully exploiting the tax credits from debt. This is particularly important when firms have high leverage, volatile sales, growth opportunities, and special purpose assets that can become tangible assets.

The findings allow corporate managers to take adjustment costs into consideration when making financing decisions. For managers wanting to control the information about a firm's future prospects, instead of using higher cost equity issues, the preference for debt financing is a better solution to use to show that the firm's actual prospects are better than what the market and investors perceive. In this vein, managers should consider the impact of their financing decision on lenders and rating agencies. In terms of investors, the information that the findings convey can aid them in signalling the risk and building strategic portfolios more rationally. By acknowledging a firm's adjustment speed, they can better value their investments, and therefore reduce the cost of information asymmetry. Although there is no universal definition of growth or value stock, growth stocks are more likely to relate to higher profitability, lower investment opportunities for firms, and higher tangibility. The profitability and tangibility also affect the speed of adjustment with which firms rebalance their capital structure.

Policy makers may launch policies that encourage firms to invest retained profits in such a way by providing tax incentives and, thus, firms can potentially benefit from a lower tax burden. Additionally, a reconsideration of public policy to provide greater incentives for investing may offer financial innovations or easy access to products for dynamic investment, and can therefore increase the efficiency at which (external) funds are employed. Reinvestments could also be increased by imposing restrictions on managers' abilities to reduce their corporate tax burden through spending on 'luxuries'. Existing framework conditions should therefore aim to encourage investment rather than consumption with regard to the profits not being paid out as dividends, i.e. *via* strong governance. Governments should put in place prudent regulations that monitor inefficient credit allocation and that increase the risk taken by banks. In general, European firms operate in bank-dominated economies, with the exception of UK firms that operate in more market-oriented economies. The difference in structure of the real economy and the characteristics of the financial system cannot be neglected in policy setting. Hence, in economies where banks are major capital providers, a shift away from lending conditional on assets as collateral towards lending based on a firm's key performance indicators is recommended. This encourages firms to disclose better corporate reporting, regulated by internationally accepted accounting principles.

As the business cycle is significantly robust to the speed of adjustment, firms can only benefit from a healthy economy and bright prospects. The positive association between bank concentration and the rapid speed of adjustment suggests that a stable banking system could avoid systematic crises. As a more stable banking system injects more confidence in to the market, firms adjust their capital structure faster in boom years than in recessions. To avoid financial crisis contagion across countries, economists and policy maker can strictly monitor control international (short-term) capital flows. Countries should coordinate using more refined policies, such as contingency rule and better investor protection.

7.2 Limitations and future research

Estimations were not conducted from countries with insufficient numbers of firm-level observations to avoid small sample bias. Future research could therefore benefit from using a larger sample size to facilitate a more comprehensive analysis of these countries. It is also advised to perform a country specific analysis with a greater focus on regional peculiarities and preferences. Additionally, the UK as a non-EMU (Economic and Monetary Union) country has a unique market structure and national interest which is unique from continental Europe, and consequently it would be constructive for future studies to conduct a detailed comparative analysis between the UK and continental Europe or a cross-country analysis within Europe. This could extend the knowledge about attitudes to the agency cost of debt, the transparency of information, and the signalling costs across EU countries and their non-member peers. The analysis also calls for further research into small and privately held firms and financial institutions. As there is a large share of SMEs in European economies and, given the variations from their different leverage levels, disclosure requirements, and relationships with banks, ownership and organisational structure, and other economic, social and cultural differences, it can be of great interest of focus on such groups in future research.

Appendix C

Table 7 Variable definitions and sources

Panel A Proxies for Capital structure

Data sources: Zephyr; DataStream

Dependent variables		Definition	Theory and Literature
Leverage	Book Leverage	$\frac{Total\ debt}{Total\ assets}$	**Market timing theory** (Baker and Wurgler 2002) Book value of equity is primarily a lug number to balance the left-hand side and the right-hand side of the balance sheet- and it can even be negative. Book value correlated less with market values among (small) firms. More importantly, accounting rules imply that book value of equity increases with historical cash flows and decrease with asset depreciation.
	Market Leverage	$Market\ Leverage\ 1 = \frac{Total\ Debt}{Total\ Assets - Book\ Equity + Market\ Equity\ at\ year\ end}$ $Market\ Leverage\ 2 = \frac{Total\ Debt}{Book\ Debt + Market\ Equity}$ $Market\ Leverage\ 3 = \frac{Total\ Debt}{Total\ Assets - Book\ Equity + Market\ Equity}$	
	Long-term Debt ratio	$\frac{long - term\ debt}{Total\ assets}$	Bradley *et al*. (1984), Graham (1996) Fama and French (2002), Flannery and Rangan (2006)
	Short-term Debt ratio	$\frac{short - term\ debt}{Total\ assets}$	Chang *et al*. (1992), Bevan and Danbolt (2000), Song (2005)
Debt Issuance (Scaled change in debt)		$\frac{Change\ in\ total\ assets - change\ in\ book\ equity}{Total\ assets}$	Fama and French (2002)
Total liability Ratio		$\frac{Total\ liabilities}{Total\ assets}$	Drobetz and Wanzenried (2006), Huang and Song (2006)

Panel B Determinants of capital structure

Data sources: Zephyr; DataStream

Independent variables	Sign	Definition	Origin and Source
Weighted market-to-book Ratio	–	$\left(\frac{M}{B}\right)_{efwa,t-1} = \sum_{s=0}^{t-1} \frac{e_s + d_s}{\sum_{r=0}^{t-1} e_r + d_r} \left(\frac{M}{B}\right)_s$	*(+)* ***Market timing theory*** Historical market valuation have a positive impact on firm's financing decision (Baker and Wurgler, 2002)
Market-to-book ratio	–/+	$\frac{total\ assets - book\ value\ of\ equity + market\ value\ of\ equity}{market\ value\ of\ equity + book\ value\ of\ tatal\ assets}$	***(-) Agency theory***: agency cost of debt ***Trade-off theory***: financial distress (Titman and Wessel, 1988) ***(+) Signalling, pecking order theory***
Firm size	+/–	$\log(total\ assets)$ $\log(sales)$ $\log(Number\ of\ employees)$	***(+)Trade-off and Agency theory***: Bankruptcy costs/Tax ***(-) Consistent with information asymmetry*** Agency theory: agency costs of debt. Other theories: access to the market, economies of scale (Rajan and Zingales, 1995; Wiwattanakantang, 1999; Huang and Song, 2002; Booth *et al*., 2001; Al-Sakran, 2001; Friend and Lang, 1988; Barclay and Smith, 1996; Barton *et al.* 1989; Hovakimian *et al*. 2004)
Profitability (ROA)	+/–	$\frac{earnings\ before\ interest, tax\ , depreciation\ and\ amortisztion}{Total\ assets}$ $\frac{earnings\ before\ interest\ and\ tax}{Total\ assets}$	***(+) Trade-off theory, Tax. Free cash flow theory, signalling theory*** (Jensen and Meckling, 1976; Myers, 1977; Harris and Raviv, 1990) ***(-) Pecking order theory*** dilution of ownership structure (Harris and Raviv, 1991; Rajan and Zingales, 1995)
Tangibility (Asset Structure)	+	$\frac{fixed\ assets(PP\ and\ E)}{Total\ assets}$	***(+) Trade-off theory, Tax. Free cash flow theory, signalling theory*** (Jensen and Meckling, 1976; Myers, 1977; Harris and Raviv, 1990) ***(-) Pecking order theory*** dilution of ownership structure (Harris and Raviv, 1991; Rajan and Zingales, 1995)
Liquidity	–/+	$\frac{current\ assets}{current\ liabilities}$	***(+) Trade-off theory***, ***Tax. Free cash flow theory, signalling theory*** (Jensen and Meckling, 1976; Myers, 1977; Harris and Raviv 1990) ***(-) Pecking order theory.*** dilution of ownership structure (Harris and Raviv, 1991; Rajan and Zingales, 1995)

Data sources: Zephyr; DataStream

Independent variables	Sign	Definition	Origin and Source
Volatility (business risk ,cost of financial distress)	–/+	The variance of the annual percentage change in operating income before interest, taxes and depreciation	***(-) Trade-off theory***: financial distress ***(+) Agency theory*** (Bradley *et al*., 1984)
Dividend policy	–/+	$\frac{dividend\ paid\ per\ share}{earning\ per\ share}$	***Dividend irrevalance theory*** ***(+) Trade-off theory*** (Modigliani and Miller, 1958; Miller and Modigliani, 1961; Miller, 1977)
R&D Expenses	–	$\frac{research\ and\ development\ expenses}{total\ sales}$	This is the cumulated capital spending, as reported in the statement so cash flows, for the sector. It generally does not include acquisitions (Jensen *el al*., 1992; Frank and Goyal, 2003)
Capital Expenditure	+	$\frac{capital\ expenditure}{total\ assets}$	***(+) Pecking order theory*** Increase financing deficit, more financing needs (Shyam-Sunder and Myers 1999; Myers, 2001)
Industry Dummy		It is equal to 1 when it is belong to a specified category, and it is equal to 0 otherwise	It is from General Industry Classification (DataStream code: 06010). This classification represents a firm's general industry classification, including non-financing industries: i.e. industrial, utility, transportation, and others.

Panel C Determinants of speed of adjustment

Data sources: Federal Reserve Bank of America; Bank Scope, IMF and World Bank

Determinants of Speed of Adjustment	Expected Sign	Definition	Origin
Distance	–	The absolute difference between the target leverage and observed leverage, and additionally, the greater the deviation, the $DIST = \|LEV_{it}^{*} - LEV_{it}\|$ where the LEV_{it}^{*} is the fitted value from the fixed effect regression of the debt ratio of firm i on the capital structure determinants as of time t.	Cost of speed of adjustment (Drobetz and Wanzenried, 2006)
Term Spread	+	It is defined as the difference between the yield on long-term national government bonds from all European countries (with maturities of more than ten years and the three-month Eurodollar interest rate.	(Drobetz and Wanzenried, 2006)
Short-term interest rate	–	The three-month Eurodollar deposit rate.	
Default Spread	–	DEF is the difference between the yields on US low-grade (BAA) and high-grade (AAA) corporate bonds. It is assumed that this variable is a legitimate proxy for global default risk. Specifically, it can be taken as an indicator of current of the current health of the economy.	
TED Spread	–	TED is calculated as the spread between 3-Month LIBOR based on US dollars and 3-Month Treasury bill. The series is lagged by one week because the LIBOR series is lagged by one week due to an agreement with the source.	
Bank Concentration	–	Share of three largest banks in all banks relative to total assets	(González and González, 2008)

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