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30123 Venezia

Evaluating theories of capital structure in different financial systems: an empirical analysis

Relatore
Chiar.ma Prof.ssa Elisa Cavezzali

Laureando
Júlio Pan
Matricola 835567

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INTRODUCTION

This dissertation has two core objectives: *(1)* to analyse the validity of current theories of capital structure, as well as *(2)* to understand if there are important dissimilarities in the way financial managers choose their firm's capital structure in different financial systems.

Prior to introducing the major theories of capital structure, Chapter 1 identifies the main factors affecting a firm's capital structure: corporate and personal taxation, government and other regulation, bankruptcy, agency costs, corporate governance, signalling, ownership structure, macroeconomic variables and flotation costs. These variables delineate a framework and the boundaries to the capital structure problem, where theories and models attempt to answer Myers' (1984, p. 575) classic question: how do firms choose their capital structure?

In 1958, Professor Franco Modigliani and Professor Merton Miller pioneered the application of economic analytical tools to the study of corporate finance. The Modigliani-Miller (MM) theorem is the direct outcome of such study, demonstrating the relative irrelevance of financial policy in a complete and efficient market. Despite its less than solid results, the MM theorem quickly became the basis of modern thinking on capital structure, demonstrating that a company's capital structure *is* actually relevant – as the theorem is based on assumptions which are violated in the real world.

A few years later, Miller and Modigliani (1963) presented a tax correction to the MM theorem, analysing the tax advantage of debt to the market value of the firm. They stated that, once taxes are taken into consideration, an optimal capital structure does exist, consisting in 100% debt. However, this is ultimately perceived as an illogical structure and unlikely to be observed outside the theoretical world. This is further strengthened by the authors themselves (Miller and Modigliani 1963, p.442) who conclude their reviewed study noting that "it may be useful to remind readers once again that the existence of a tax advantage for debt financing – even the larger advantage of the corrected version – does not necessarily mean that corporations should at all times seek to use the maximum possible amount of debt in their capital structures".

The reason for the discrepancy between theoretical and pragmatic worlds stems for the complete omission of market imprecations, also ignoring the disadvantages of debt and its actual cost. Although debt is tax-advantaged in comparison to equity, it increases the firm's liquidity risk and the probability that the firm will be unable to pay its bondholders what was promised to them.

In 1973, Kraus and Litzenberger formally introduced corporate taxes and bankruptcy penalties into a single-period valuation model in a complete capital market, affirming that "the taxation of corporate profits and the existence of bankruptcy penalties are market imperfections that are central to a positive theory of the effect of capital structure on valuation" (1973, p.911). Their study is referred as the static theory of capital structure, also known as the *trade-off theory*, stating that firms borrow up to the point where the tax benefit from an extra dollar in debt is exactly equal to the cost that comes from the increased probability of financial distress. It is called the static theory because it assumes that the firm is fixed in terms of its assets and operations and it only considers possible changes in the debt-equity ratio.

To determine the amount of debt a firm should issue in order to maximize its market value, it is necessary to combine and balance both the tax benefits and the bankruptcy costs deriving from the debt. In other words, the trade-off theory claims that every firm has a target optimal capital structure which maximizes the firm's value.

In both MM theorem and the trade-off theory, it is assumed that managers, shareholders and bondholders have access to the equal information, and benefit from a fair share price (i.e. it represents the firm's true value). However, these assumptions are not met in the real world, as managers probably know much more about the company and its future cash flows than the firm's shareholders and bondholders. If that is indeed the case, managers and external investors operate in a situation of *information asymmetry*.

George Akerlof (1970) was one of the first researchers to formalize the information asymmetry problem. His study was based on the American automobile market and the large price difference between new and used cars to described the relationship between quality and uncertainty. The result – known in the literature as the *market for lemons* – describes perfectly one of the consequences of information asymmetry: *adverse selection*.

It is possible to apply the adverse selection principle to the stock market. Majluf and Myers (1984), in their notable study which gave birth to the *pecking-order theory,* explain that "if managers have inside information there must be some cases in which that information is so favourable that management, if it acts in the interest of the old stockholders, will refuse to issue shares even if it means passing up a good investment opportunity. That is, the cost to old shareholders of issuing shares at a bargain price may outweigh the project's NPV. This possibility makes this an attractive problem: investors, aware of their relative ignorance, will reason that a decision not to issue shares signals 'good news'. The news conveyed by an issue is bad or at least less good. This affects the price investors are willing to pay for the issue, which in turn affects the issue-invest decision."

Although debt issuing can also be affected by the adverse selection, the price underestimation tends to be lower for debt than it is for equity, as the debt value is determined by its interest rate thus it is not very sensitive to the private information held by the firm's managers. Naturally, a firm can also avoid its equity underpricing by financing investments with the firm's own liquidity (retained earnings) when possible.

In other words, *managers who believe the firm's equity is undervalued will prefer to finance their investments with the firm's retained earnings or through debt rather than with new equity*. This is the main driver of the pecking order theory, which does not have any notion of an optimal leverage ratio as a result of a constant variation in the financial structure of firms according to its profitability.

There are hundreds of papers which estimate the propositions dictated by the theories of capital structure. However, no consensus of the superiority of one of the theories has yet been achieved. The traditional emphasis on static models involving relatively stable target leverage ratios has led the profession to focus on factors that, while statistically significant determinants of leverage ratios, appear to be of second-order importance (Denis 2012, p. 632).

Taking a more in-depth view of this problematic, Chapter 2 confronts predictions of both the trade-off and pecking order theories of capital structure with the empirical results on the subject. The static trade-off theory states that:

a) more profitable firms have more book leverage;
b) firms with more variable earnings have less book leverage;
c) larger, more mature firms have relatively more debt;
d) firms with higher expected tax rates have more book leverage;
e) controlling for profitability, firms with more non-debt tax shields have less book leverage;
f) controlling for profitability, firms with larger profitable investments have lower dividend payouts and less book and market leverage.

On the other hand, the pecking order theory predicts that:

a) controlling for investment opportunities, firms with more profitable assets in place have less book and market leverage;
b) firms with more tangible assets in place have less book and market leverage;
c) given the profitability of assets in place, firms with more investments have more leverage.

Given the amount of papers on this subject, mixed results for each of the predictions

analysed are available. As a result, in some cases it is difficult to determine whether hypothesis are strictly true or false. The conclusions drawn in this study represent the prevalent suggestions currently given by the scientific literature.

Chapter 2 also introduces some important enhancements to the theories, describing the development that both the static trade-off theory and the pecking order theory have been facing in recent years – this includes the *dynamic models of capital structure*, first introduced by Fischer et al. (1989).

Dynamic models help understanding why companies move from their target capital structure. Following the static trade-off, firms would rebalance to their target leverage ratio, where the marginal benefit of debt equals its marginal cost. However, if transaction costs are considered, rebalancing is not a costless option, thus firms allow its capital structure to fluctuate much of the time. Fischer et al. (1989) simulations suggest that even small transaction costs can lead to delay in rebalancing and wide variations in the debt ratio.

Classical analysis of capital structure usually do not consider the *endogeneity of investment*, following Miller and Modigliani (1958) and Kraus and Litzenberger (1973) assumption of exogenous cash flows. However, it is very likely that the firm's cash flows, including investment, influence and somehow depend on how the firm finances its operations. Considering investment as an endogenous part of financing decision models is probably the most important contribution of the so-called dynamic models of capital structure.

A significant contribution to the literature on dynamic models was recently given by DeAngelo et al. (2011), whose model yields a rich set of predictions that link capital structure to variation in the volatility of shocks to investment policy, the serial correlation of such shocks, and to the marginal profitability of investment. In considering the effects of *transitory debt*, i.e. extra debt issued to fund investment which represents a deliberate – but temporarily – deviation from the target leverage, the model provides a refreshing deviation from associated previous studies. Since firms will move away from target to fund new investment, it is very likely that the *speed of adjustment* (SOA) to the leverage target will be slow. In fact, there is a broad literature supporting slow SOA.

Another important enhancement in the capital structure literature is the valuation of the *opportunity cost of financing decisions*. Fundamentally, there is a trade-off between borrowing today and tomorrow, as "the option to issue debt is a scarce resource whose optimal intertemporal utilization depends on both current and prospective shocks" (DeAngelo et al. 2011, p.235). If a firm decides to use debt today, it should consider the cost of its inability to use new debt tomorrow. Therefore, the opportunity cost of financing decisions

implies more conservative targets than those predicted by trade-off theories of capital structure, as the firm loses the option to borrow at equivalent terms in the future. Lastly, Chapter 2 analyses capital structure dynamics in an international perspective.

Chapter 3, Formulating and Testing a Simple Model of Capital Structure, addresses and attempts to provide plausible answers the two main questions of this dissertation: *(1)* to analyse the validity of current theories of capital structure, as well as *(2)* to understand if there are important dissimilarities in the way financial managers choose their firm's capital structure in different financial systems. In order to do so, financial systems and the sharp distinctions between market-based and bank-based economies are defined within this chapter.

An important and recurrent discussion topic among scholars is the optimal configuration of a country's financial system in order to sustain the competitiveness and the growth of an economy. Since the 19th century, several studies demonstrated the merits of bank-based and market-based financial systems in promoting long-run economic growth. However, Antoniou et al. (2008) claim that there are virtually no studies dedicated to the analysis of the implications of the financial orientation of the economy on a firm's capital structure.

A financial system is said to be *market-oriented* when financial markets (also known as securities exchanges or stock markets) are the primary source of capital. This financial system is often referred to as *arm's length market*, i.e. a financial market consisting of parties that have no relationship or contact with one another aside from the transaction at hand. Conversely, *bank-oriented* financial systems are focused on banking and the long-term relationship between banks and firms. The main source of funding for firms operating in these economies is, consequently, bank loans.

While market-oriented systems offer the possibility to finance an activity with a variety of liquid financial instruments, bank-oriented economies promote long-term relationships between financial institutions and firms, making it easier and cheaper to operate corporate control. Consequently, the two systems might represent a better financing choice for different firms. Banks may be a better choice for new entrepreneurs, while public markets are usually the preferred choice of mature and less-riskier firms.

Subsequent to analyzing the differences between market- and bank-based financial systems, Chapter 3 formalizes the hypothesis set for the model being developed. Several studies have already examined the role of firm-specific factors on a firm's capital structure, as noted earlier in Chapter 2. In this dissertation, however, many of the variables which according to the literature can potentially affect a firm's financial structure are observed in more than one country, allowing important dissimilarities in financial management behaviour

across different financial systems to emerge.

The effect of firm-specific variables into a firm's debt ratio is closely related to – sometimes even dependant on – the macroeconomic environment in which the firm operates. Studying different financial systems may be helpful to understand how managers behave when the sources of credit vary considerably. However, to fully understand the net impact of a country's financial orientation into a firm's leverage ratio, it is necessary to identify other market-related factors which can potentially alter a firm's capital structure. This is one of the main improvements of this study, which includes the following market-related variables to evaluate firms' capital structures: equity risk premium, term structure of interest rate, ownership concentration, strength of legal rights index and antidirector rights.

The choice of the sample countries is motivated by several factors. First, it endeavours to understand if there are any considerable differences in the way managers choose their firm's capital structure according to the country in which they operate. Second, most capital structure studies are tested in the American market, and just a few percentage of them is applied to European countries. Third, there are important differences in the legal systems of European countries, even between those economies with the same financial orientation. The role of legal system may be as important as the financial orientation of the economy, thus analysing countries with different law and order tradition may result in some interesting findings.

Considering all these aspects, the sample includes three European countries, which are among the largest economies on the planet: Germany, Italy and the United Kingdom. Based on their financial and institutional traditions, they can be divided into two categories: *(1)* Germany and Italy, which – as basically all countries in the Continental Europe area – are known for having a bank-oriented financial system; and *(2)* the United Kingdom, which is one of the most developed market-based economies.

This division also corresponds to the split between code-law (Germany and Italy) and common law (U.K.) countries. Despite having the same financial orientation, Germany and Italy feature significant dissimilarities in their legal system, thus a comparison between these two countries may help shedding light on the discrepancies in managerial behaviour that can be associated with the country's legal provenance.

Once variables and sample are defined, the chapter develops a simple model of capital structure in order to test all the hypothesis developed earlier. The model is also able to verify the existence of a target level of debt ratio, as well as to indentify a way to measure how quickly firms will adjust their capital structure towards their stipulated target. This model is

estimated with pooled data from all countries, so that the effect of corporate governance factors and country-specific factors can be evaluated. Additionally, there is a cross-country comparison of firm-specific factors, which identifies the main variables affecting a firm's capital structure in each nation from the sample. Finally and most importantly, the model estimates the speed of adjustment in Germany, Italy and in the U.K.

CHAPTER ONE

THEORIES OF CAPITAL STRUCTURE

1.1. Overview

Fifty-five years and hundreds of papers after Modigliani and Miller's capital structure irrelevance principle (1958) – generally perceived as the milestone of capital structure studies – there is still much to understand about how corporate executives make their financing decisions. Despite the fact that theory has clearly made a considerable progress on the subject, empirical relevance of the different theories can be confusing and sometimes inconsistent. Denis (2012) claims that the standard models of capital structure do a remarkably poor job of explaining observed capital structures and the marginal financing decisions of corporations. Moreover, Barclay and Smith (1999) say that although corporate finance has been taught in business schools for almost a century, the academic finance profession has found it remarkably difficult to provide definitive answers that can guide practicing corporate executives in making their financing decisions.

Nevertheless, much was learnt from the numerous studies and theories of capital structure, each of them addressing different aspects of this complex issue. Among the several theories of capital structure which have been proposed over the years, only a few seem to have many advocates. Notably, the most important of them are the ***trade-off theory*** of Kraus and Litzenberger (1973) and the ***pecking order theory*** of Majluf and Myers (1984).

In the trade-off model, firms identify their optimal leverage by weighing the costs and benefits of an additional dollar of debt. The benefits of debt include, for example, the tax deductibility of interest and the reduction of free cash flow problems. The costs of debt include potential bankruptcy costs and agency conflicts between stockholders and bondholders. At the leverage optimum, the benefit of the last dollar of debt just offsets the cost (Fama and French 2002).

In the pecking order theory, there is no notion of an optimal leverage ratio. Frank and Goyal (2009) explain that, according to this theory, retained earnings are a better source of funds than outside financing. If retained earnings are inadequate, debt financing will be used. Equity is used only as a last resort. The reason is that firms financing choices are driven by the costs of adverse selection that arise as a result of information asymmetry between better-informed managers and less-informed investors. These costs are incurred only when firms

issue securities, and they are lower for debt than for equity (Hovakimian et al., 2004).

Basically, what scholars have been trying to understand for half a century is *if* and *how* a firm's ***capital structure*** may affect its intrinsic value. This is a very complex process. Indeed, Myers' (1984, p. 575) classic question "how do firms choose their capital structure?" remains unanswered.

The chapter is organized as follows. First, the main factors affecting a firm's capital structure are identified, developing a sort of framework to the capital structure problem. Then, the main theories of capital structure are introduced: *(1)* the Modigliani-Miller theorem, the basis of modern thinking on capital structure; *(2)* the trade-off theory; and *(3)* the pecking order theory.

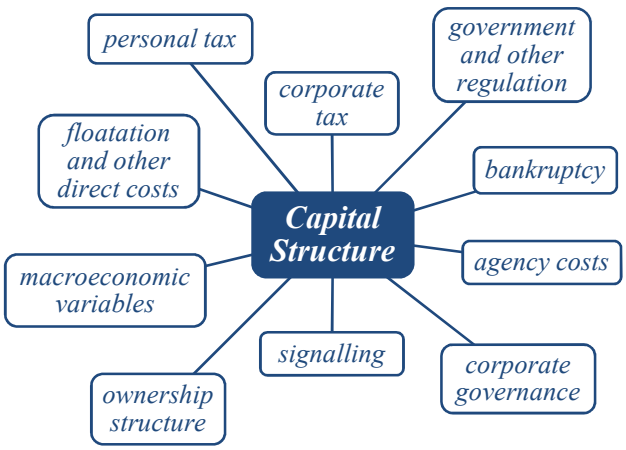
1.2. Factors affecting a firm's capital structure

It is known that a firm's capital structure is determined by the set of securities issued by the company to finance its projects and activities. However, according to Seetharaman et al. (2003, p.10), there are several other factors which may have a direct impact on it. The most significant factors are displayed in Figure 1.

The *corporate tax* is the combined tax burden paid by the company to the various government agencies, while the *personal tax* refers to the taxes paid by individuals (including individual investors). There are two personal tax components: *(1)* personal taxes paid on corporate debt returns (i.e. ordinary income); and *(2)* personal taxes paid on equity returns (e.g. capital gains).

Overesch and Voeller (2010) have empirically analysed the tax effects of both personal capital income and corporate profit taxation on capital structure choices using a comprehensive panel of firm-level data from 23 European countries. For each country and year during the period 2000 until 2005, they have collected detailed tax rates for the corporate profit tax, dividend tax and taxes on interest income, and then

Figure 1.
Factors affecting a firm's capital structure



calculated the tax benefit of using debt relative to equity financing. The results identify a positive effect of the relative tax benefit of debt on the companies' capital structure, suggesting that differences in the tax levels of the return on equity relative to the tax on the return on debt do in fact play a significant role.

Bankruptcy concerns the issues of default costs on debt, which may be direct (e.g., filing costs) or indirect (e.g., lost executive time and market share). Bankruptcy costs is one of the centre pieces of the trade-off theory.

Agency costs are hidden effects arising from conflicts between stakeholder groups. A notable study from Jensen and Meckling (1976) define them as a sum of *(1)* the monitoring expenditures by the principal, *(2)* the bonding expenditures by the agent, and *(3)* the residual loss, i.e. the dollar equivalent of the reduction in welfare experienced by the principal as a result of this divergence. The study identifies agency costs associated with both equity and debt, as well as demonstrates the relation between capital structure, agency costs and firm's value. More specifically, a firm's capital structure determines the level of agency costs of equity and debt which, in turn, directly affect the firm's intrinsic value.

Several studies have provided theories and empirical evidence supporting a complementary perspective on capital structure based on *corporate governance* and *corporate ownership structure*. According to de la Torre and Pindado (2011), capital structure is partly determined by the incentives and the goals of those who are in control of the firm. Gleason and Jiraporn (2007) also demonstrate how capital structure is influenced by the strength of shareholder rights. Their empirical evidence shows an inverse relation between leverage and shareholder rights, suggesting that firms adopt higher debt ratios where shareholder rights are more restricted. This is consistent with the agency theory, which predicts that leverage helps alleviate agency problems.

The *signalling* impact on capital structure is often associated with the firm's dividend policy. A stable dividend policy may provide investors with important information regarding managers expectations on the firm's future earnings. Managers, for instance, will increase dividends to send a positive sign to the market, as it indicates the management's optimistic expectations concerning the firm's future earnings (it is important to notice that an increase in dividend payouts does not necessarily mean the market will react positively). It is quite obvious that dividends have a direct impact on a firm's capital structure: higher the dividends, lower the liquidity available to finance new projects and higher the need of further external financing. There is a considerable amount of studies regarding this matter, and the empirical results seem to support the idea that a firm's dividend policy reflects its future prospects.

Government regulations have a strong influence on firm behaviour. Disclosure regulations, for instance, may have a big impact on capital structure, as they can decrease or increase information asymmetry according to the market in which firms operate. On a related issue, *macroeconomic variables* can also impact capital structure. When interest rates are low, firms have incentives to finance with debt so as to minimize the weighted average cost of capital to presumably maximize firm value. On the other hand, when economic conditions are volatile, there is a higher risk of default, hence firms are influenced to reduce their debt ratio.

Finally, *floatation and other direct costs* refer to issuance expenses when a firm sells securities to the public. If such expenses are substantial, there may be an incentive to finance firm's projects with debt, shaping as a result a different capital structure.

1.3. The Modigliani-Miller theorem

1.3.1. Theorem propositions

In 1958, Professor Franco Modigliani and Professor Merton Miller applied for the first time economic analytical tools to the study of corporate finance. The outcome was the Modigliani-Miller theorem (hereafter MM), which is, more precisely, a set of results demonstrating the irrelevance of financial policy in a complete and efficient market.

The MM theorem quickly became – in contrast to its results – the basis of modern thinking on capital structure for demonstrating that a company's capital structure *is* actually relevant, as the theorem is based on assumptions which are violated in the real world. The main propositions of the MM theorem are:

- ***Proposition I:*** the market value of any firm is independent of its capital structure.
- ***Proposition II:*** the rate of return on equity grows linearly with the debt ratio.
- ***Proposition III:*** the market value of any firm is independent of its dividend policy.

1.3.2. Proposition I: the irrelevance of capital structure

The MM theorem demonstrates that in a perfect market firms cannot benefit from changes in their capital structure. It is assumed that:

1) two identical companies choose a different capital structure;
2) there are only two ways of financing the business: either through equity or bond issuance;

3) the cost of borrowing money is the same for individual investors and companies;
4) profits are perpetuities, as firms do not invest;
5) information is perfect and costless;
6) there are no transaction costs nor income taxes;
7) agency costs are not considered, thus there is no conflict of interest between management and shareholders.

To better understand the theorem, the following demonstration assumes that the firm pays a proportional τ income tax. In fact, corporate taxation was introduced in a second version of the theorem, which was published in 1963.

To obtain the market value of the *unlevered firm* (U) – i.e. the firm which finances itself with equity only – one of the alternatives is to start from its net income, which is:

$$EBIT\ (1-\tau) \tag{1}$$

From equation *(1)* it is possible to determine the firm's cash flow by adding the depreciation (*Dep*) accumulated in the same accounting period. According to the hypotheses, the firm does not make any new investment other than replacing the consumed assets, thus the investment (*I*) is equal to the depreciation. The free cash flow of the unlevered company (FCF_U) will then be:

$$FCF_U = EBIT\ (1-\tau) + Dep - I = EBIT\ (1-\tau) \tag{2}$$

This result demonstrates that when considering cash flows as perpetuities, the FCF_U is equal to the firm's *EBIT* after taxes. If the cost of capital of the unlevered firm is defined as k_o, the company's present value will be:

$$V_U = \frac{FCF_U}{k_o} = \frac{EBIT\ (1-\tau)}{k_o} \tag{3}$$

To calculate the value of the *levered firm* (L) – i.e. the firm which uses both debt and equity to finance its operations – it is necessary to identify the remuneration of both shareholders and bondholders. The cash flow attributable to the first group consists on the net profit (*NP*) plus depreciation (*Dep*) minus the investments (*I*), while the remuneration to the second group is the bonds' interest rate (k_d). The total free cash flow for the levered company (FCF_L) is:

$$FCF_L = NP + Dep - I + k_d D = (EBIT - k_d D)(1 - \tau) + Dep - I + k_d D$$

$$FCF_L = EBIT(1 - \tau) + \tau k_d D \qquad (4)$$

The first addendum of equation *(4)* is the cash flow generated by the unlevered firm. It is assumed that the risk for this component is the same for both companies (levered and unlevered) so its cost of capital will be equal to k_o. The second addendum embodies the tax shield which arises from the use of debt. As long as the company's profits remain constant over the years, it is possible to assume that the tax shield has the same risk as bonds' interest rate (k_d). The levered company's present value will then be:

$$V_L = \frac{EBIT\ (1 - \tau)}{k_o} + \frac{\tau k_d D}{k_d} = \frac{EBIT\ (1 - \tau)}{k_o} + \tau D$$

$$V_L = V_U + \tau D \qquad (5)$$

The levered firm's value is equal to the unlevered firm's value plus the present value of the tax shield. However, the original MM theorem does not include any market imperfections nor taxes ($\tau = 0$), therefore the proposition I of MM states that:

$$V_L = V_U \qquad (6)$$

1.3.3. Proposition II: the rate of return on equity

The proposition II of MM states that the rate of return on equity grows linearly with the debt ratio, as the equity risk increases with the increase of debt. According to the proposition I (when taxes are considered), it is possible to write the levered firm's balance sheet as:

V_U *(unlevered firm's value)* ***τD*** *(tax shield)*	***D*** *(debt / bonds)*
	E *(equity)*

The unlevered firm's value does not include the benefit of financial leverage. When debt is increased to D, the firm value increases by τD. The expected cash flow from the left part of the balance sheet can be written as:

$$V_U k_o + \tau k_d D \qquad (7)$$

As there is a risk connected to the firm's real activities, their expected return is k_o. The

tax shield has the same risk as the debt, thus its expected return is k_d.

The expected cash flow for the bondholders and shareholders together is:

$$k_d D + k_e E \tag{8}$$

Equation *(8)* demonstrates that the expected return on equity is k_e, whereas the expected return on debt is equal to k_d. Since the model assumes that earnings are perpetuities and that there is no growth, flow to equity is entirely distributed as dividends. Consequently, *(7)* is equal to *(8)*.

$$k_d D + k_e E = V_U k_o + \tau k_d D \tag{9}$$

Dividing both sides of equation *(9)* by E, subtracting $k_d D$ from both sides and reorganizing, the result is:

$$k_e = \frac{V_U}{E} k_o - (1 - \tau) \frac{D}{E} k_d \tag{10}$$

Since the levered firm's value (V_L) is equal to $V_U + \tau D = D + E$, the unlevered firm's value is equal to $V_U = E + (1 - \tau) D$. As a result, the equation *(10)* can be written as:

$$k_e = \frac{E + (1 - \tau) D}{E} k_o - (1 - \tau) \frac{D}{E} k_d \tag{11}$$

Collecting the terms with $(1 - \tau) \times (D / E)$, we obtain the equation *(12)*, which is the proposition II of MM theorem:

$$k_e = k_o + \frac{D}{E} (1 - \tau)(k_o - k_d) \tag{12}$$

When $\tau = 0$, the rate of return on equity of a levered company is equal to the rate of return on an unlevered firm's equity (k_o) plus a risk premium which depends on the company's debt ratio. Higher the debt ratio, higher the risk to the firm's shareholders, as their residual rights on the company's assets are subordinated to the right of debt owners to be paid before everybody else. Hence, the k_e required by the shareholders will also be higher.

If taxation is considered, there are some interesting implications. To understand them better, it is necessary to define the *wacc* (weighted average cost of capital), i.e. the rate that the firm is expected to pay on average to all its security holders to finance its assets. If $\tau = 0$, the *wacc* will be:

$$wacc = \frac{D}{D+E}k_d + \frac{E}{D+E}k_e \qquad (13)$$

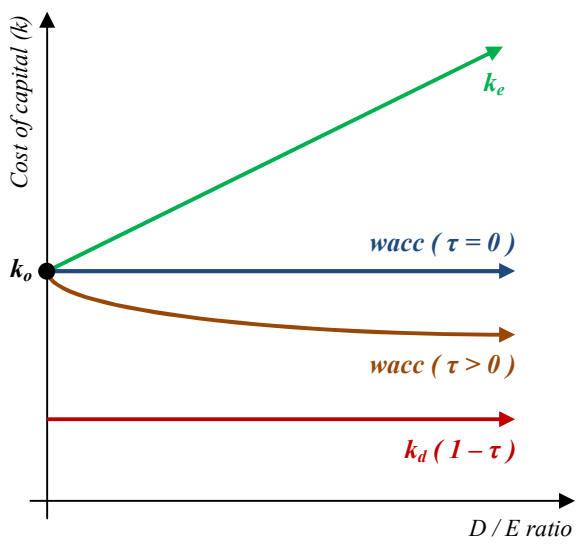
In a perfect market, the *wacc* is constant, and it is always equal to k_o. The equation *(13)* therefore confirms what said so far: the rate of return on the investment k_o does not change after an alteration of the capital structure. This result does not hold when taxation is included. As the debt is tax-advantaged if compared to equity, it is possible to demonstrate that the *wacc* of a levered firm declines with the increase of the debt ratio in a world with corporate taxation.

$$wacc = \frac{D}{D+E}k_d(1-\tau) + \frac{E}{D+E}k_e \qquad (14)$$

As debt is usually cheaper than equity, the theorem states that in a world with corporate taxation, an optimal capital structure does exist, and it is made by 100% of debt (and consequently 0% of equity).

Figure 2 summarizes the results of MM theorem's proposition II. The financial leverage increases the risk for the shareholders, thus the cost of equity (k_e) increases to compensate the higher risk. If taxation is not considered, the *wacc* is not affected by the financial leverage, and it is equal to the cost of capital of the unlevered firm (k_o). However, if taxes are included, the firm can benefit from the tax shield when increasing its debt to equity ratio, and the *wacc* decreases as a result. While the *wacc* is a continuous line, the k_o is represented by a single dot in the graph.

Figure 2.
Cost of capital according to the MM theorem



1.4. The trade-off theory of capital structure

1.4.1. Theory's outline

The tax correction of the MM theorem (Miller and Modigliani, 1963) analyses the tax

advantage of debt to the market value of the firm. It claims that, once taxes are included, an optimal capital structure does exist, and it consists of 100% debt.

However, it is unlikely to observe in the real world a company with such an illogical structure. Even Miller and Modigliani (1963, p.442) conclude their study stating that "it may be useful to remind readers once again that the existence of a tax advantage for debt financing – even the larger advantage of the corrected version – does not necessarily mean that corporations should at all times seek to use the maximum possible amount of debt in their capital structures".

The reason for this discrepancy is that the MM theorem completely ignores market imperfections, including the disadvantages of debt (or cost of debt). Although debt is tax-advantaged in comparison to equity, it increases the firm's liquidity risk and the probability that the firm will be unable to pay its bondholders what was promised to them.

In 1973, Kraus and Litzenberger formally introduced corporate taxes and bankruptcy penalties into a single-period valuation model in a complete capital market, describing that "the taxation of corporate profits and the existence of bankruptcy penalties are market imperfections that are central to a positive theory of the effect of capital structure on valuation" (1973, p.911). Their study is referred as the static theory of capital structure, also known as the *trade-off theory*, stating that firms borrow up to the point where the tax benefit from an extra dollar in debt is exactly equal to the cost that comes from the increased probability of financial distress. It is called the static theory because it assumes that the firm is fixed in terms of its assets and operations and it only considers possible changes in the debt-equity ratio.

1.4.2. Bankruptcy costs

A firm which uses debt financing has the obligation to pay the principal back within a certain date, in addition to an agreed-upon level of interest. If a company fails to do so, it can be forced into bankruptcy, and its debt holders will have claim to repayment before any equity investors.

In a perfect market, the risk of bankruptcy is not a disadvantage which derives from leverage; it simply transfers the ownership of the company from the shareholders to the bondholders. There are no costs associated with this transfer of ownership, and the bondholders do not lose anything.

Bankruptcy is rarely this simple in the real world. It is usually a long and complex process, with direct and indirect costs for both shareholders and investors. These costs –

which are completely ignored in the hypothesis of perfect markets – are usually significant, and may eventually offset the tax-related gains from leverage.

According to Damodaran (2006), the probability of bankruptcy represents the chance that the firm's cash flows would be insufficient to meet all the obligations connected with debt (payment of principal and interests). It is a function of the following variables:

1) ***Relation between operating cash flow and the cash flow associated with debt obligations:*** higher the operating cash flow in comparison to the cash flow associated with the debt obligations, lower the probability of bankruptcy, *ceteris paribus*. Consequently, the probability of bankruptcy increases – even if only marginally – for all firms who take on more debt, regardless of their size or the stability of their cash flows.
2) ***Variability of operating cash flows:*** for a given level of cash flow associated with the debt obligations, a firm with stable and predictable operating cash flows will have a lower probability of bankruptcy in comparison to another firm with equal but more variable operating cash flows.

It is not easy to quantify the bankruptcy costs. Other than the cost for all investors involved (generally debt investors recover a small portion of the invested capital, while shareholders recuperate basically nothing), it is necessary to consider indirect costs that arise when a firm is perceived as a potential defaulter, even before bankruptcy.

Direct bankruptcy costs

When the value of a firm's assets equals the value of its debt, then the firm is economically bankrupt in the sense that the equity has no value. However, the formal turning over of the assets to the bondholders is a *legal* process, not an economic one. There are legal and administrative costs to bankruptcy, as several external professionals have to be hired: consultants, lawyers, accountants, a trustee in bankruptcy and other skilled individuals.

Their services are usually very expensive. It has been remarked that bankruptcies are to lawyers what blood is to sharks (Ross et al. 2012, p.482). Berk and DeMarzo (2008) say that since energy products giant Enron applied for Chapter 11, the company was spending around US$30 million per month just to cover accounting and legal fees, and that the overall cost of its bankruptcy operation was over US$750 million. WorldCom Inc. – the third largest U.S. bankruptcy to date – paid to its consultants US$657 million to become MCI Inc.

In addition to the costs to the firm, the creditors may face further costs during the

bankruptcy process. In case of reorganization through Chapter 11, bondholders and creditors in general might have to wait several years before closing their position with the company, and eventually will have to hire private lawyers and consultants to protect their rights.

Therefore, irrespective of whether these costs will be paid by the company or the creditors, the direct costs of bankruptcy reduce the value of the assets which will be redistributed in the end of the process. White, Altman and Weiss (Ross et al. 2012, p.483) estimate that the bankruptcy direct costs represent around 3% of the firm's market value. Warner (Damodaran 2006, p.320) estimated the legal and administrative fees for 11 railway companies, fixing them, on average, at 5,3% of the total assets value. It is likely that bankruptcy costs are higher for companies with more complex assets and with a higher number of creditors, since it might be more difficult to reach an agreement on the final assets distribution.

The costs for smaller companies tend to be higher in relative terms, as many aspects of the bankruptcy process are independent from the firm's dimension. According to Lawless and Ferris (Berk and DeMarzo 2008, p.512) the bankruptcy direct costs to small companies correspond to 12% of their market value.

Usually the companies that go bankrupt do not become insolvent. Consequently, the above estimates should be multiplied by the probability of insolvency in order to obtain the *expected bankruptcy cost*. For example, a company with a 5% per year probability of default and – should it declare bankruptcy – with direct costs that correspond to 8% of the firm's total value, has an expected bankruptcy cost of: $0.05 \times 0.08 = 0.4\%$ (Ross et al. 2012, p.483).

Indirect bankruptcy costs

There are several other indirect costs which can be associated with the bankruptcy process, regardless of whether the company becomes insolvent or not. Although these costs are difficult to estimate and measure in an accurate way, they are likely to be higher than the bankruptcy direct costs.

Loss of customers. Since the firm will probably not maintain future obligations with its customers in case it goes bankrupt, the latter may not want to buy products which would require future assistance. This problem particularly affects technology companies, as customers would not be willing to acquire, for instance, a software which could not be updated in the future. Airlines are also a good example of this phenomenon: tickets are sold beforehand, thus clients will be reluctant to buy them if there are rumours of service disruption or cessation, as well as if there is some evidence that accumulated miles in its

frequent-flyer programme will became worthless. Durable goods manufacturers could lose potential clients if the latter believe warranties will not be honoured or that replacement parts will not be available. On the other hand, it is likely that the loss of customers for raw material producers will be lower, since the value of such items does not depend on the future of the manufacturer.

Loss of suppliers. Clients are not the only ones to abandon an almost insolvent company. Suppliers may be hesitant to provide goods if they believe they will not get paid.

Loss of employees. Since companies in the bankruptcy process cannot guarantee to its employees a job in the near future, it may be difficult to hire new workers, and the current personnel can leave the company and search for a new job elsewhere. To keep the key employees might be very expensive, especially for companies which value strongly depends on its own human resources.

Loss of receivables. Credit recovery may be quite complicated for bankrupt firms. Debtors, assuming that the company assets are already limited, might try to avoid paying their obligations. Hays (Ross et al. 2008, p.514) reported that Enron's debtors – especially the ones with a relatively small liability – were trying to hide themselves, hoping that the firm would not take any legal action against them.

Selling off assets. Companies in crisis could be forced to quickly sell their assets to raise liquidity. Unsurprisingly, the necessity to hurriedly sell goods forces the vendor to accept a price lower than its fair value.

Delayed filing for insolvency. The management can decide to use the bankruptcy process as a way to delay the liquidation of a company which should be already dissolved. They can also take advantage of this situation to make an "all-out attempt", accepting very risky projects – even the ones with a negative NPV – in order to minimize their losses in the event of a liquidation.

Additional costs to creditors. In addition to legal fees that creditors may have to face to protect their rights, the non-payment from the insolvent firm's obligations might have terrible consequences to its creditors, including bankruptcy. For example, the 1998 Russian default led to the collapse of Long Term Capital Management (LTCM), spreading in the markets worldwide the fear that other creditors would have had the same end.

According to Shapiro (Damodaran 2006, p.321) the indirect bankruptcy costs are usually higher for the following businesses:

- *Firms that sell durable goods which require replacement parts:* a PC manufacturer

will have higher indirect bankruptcy costs than a supermarket.

- *Suppliers of goods and services for which quality is an essential attribute:* if quality is vital but difficult to certify in advance, the firm's reputation plays an important role in the customer's decision of buying the product. For example, the perception that an airline is facing turbulent times may alienate customers, who will be concerned about the firm's fleet maintenance and consequently for their own safety.
- *Manufacturers of goods whose the value for the client strongly depends on the additional products and services provided by independent companies:* a PC is useful only if there are some applications to make it work. If the PC manufacturer is about to go bankrupt, it is likely that independent software suppliers will cease the development of new programs compatible with the insolvent firm's standards.
- *Producers of goods which require continuous support and maintenance:* a photocopiers manufacturer will be more affected by the risk of bankruptcy than a furniture producer.

1.4.3. The tax benefits of debt

Debt roughly has two advantages in comparison with equity. First, interest expenses on the debt outstanding are fiscally deductible, unlike cash flows to equity. This is commonly known as the *tax advantage of debt*. Second, firms have to pay interests and the principal on its corporate bonds following a very precise schedule. If managers fail to do so, the firm may go bankrupt, thus debt automatically impose a *greater management discipline* in order to avoid insolvency.

Tax advantage of debt

Each year in which a levered firm pays interests on its debt, the cash flow to investors[1] – in comparison with the unlevered firm – will be higher by an amount equal to the tax shield.

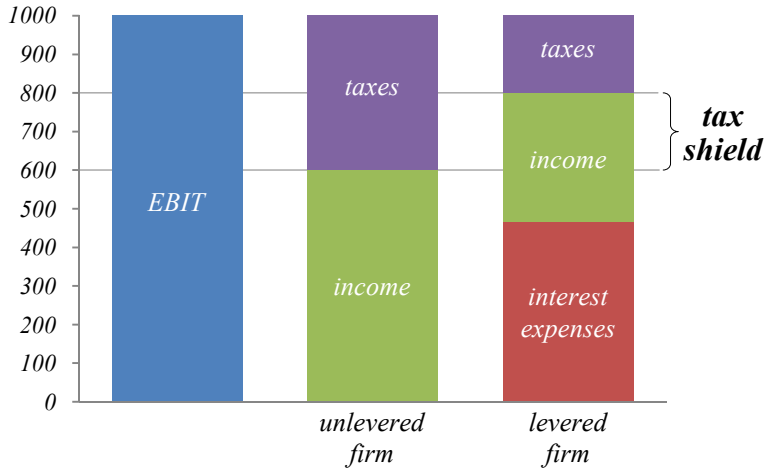
$$cash\ flow\ with\ debt = cash\ flow\ without\ debt + tax\ shield \qquad (15)$$

Figure 3 illustrates this relation, showing how the firm's EBIT is divided (in this example the corporate tax rate is 40%). Based on international accounting standards, taxes represent a cost to companies. As a result, firms will have to reduce tax payments if they want to increase cash flows to investors. Since interest expenses on the debt outstanding are fiscally

1. In this simple example, net income is entirely distributed as dividends.

deductible, it is evident that the higher the interests, the lower the taxes that will be incurred. The difference between the taxes paid by the unlevered company with those paid by the levered company is the tax advantage of debt, also known as the tax shied of debt.

Figure 3.
The tax shield



The Proposition I of MM theorem with taxes (paragraph 1.3.2) already described how to calculate the tax shield (formula number 5). Basically, assuming that a firm issues a particular amount of debt expecting to keep it unchanged ad infinitum, the tax shield is obtained by multiplying the firm's tax rate by its debt ($\tau \times D$). However, in the real world this rarely happens. The amount of future interests on debt depends on several factors: *(1)* the amount of debt, *(2)* the market interest rate, *(3)* the insolvency risk, and *(4)* the tax rate. Fluctuations in these factors are very likely to occur, therefore it is virtually impossible to calculate the exact amount of the tax shield.

Debt as a disciplinary mechanism

According to Jensen (1986), debt induces the company to a more cautious use of the *free cash flow*, i.e. the "cash flow in excess of that required to fund all projects that have positive net present values when discounted at the relevant cost of capital" (1986, p.323). Jensen claims that in firms with a relatively low amount of debt, a high free cash flow represents such a significant protective shield against mismanagement that managers will not be encouraged to operate efficiently.

A way to impose some discipline on managers is increasing the amount of debt. In fact, the necessity to meet debt obligations increases the probability of bankruptcy if managers choose to invest in mediocre projects. This line of argument is based on the assumption that there is a division between firm's property rights and control, and that managers will not try hard to maximize the equity value if there is no inducement to do so (in this case debt).

The control function of debt is more important in organizations that generate large cash flows but have low growth prospects, and even more important in organizations that must shrink. In these organizations the pressures to waste cash flows by investing them in

uneconomic projects is most serious. (Jensen 1986, p.324).

1.4.4. The optimal capital structure

To determine the amount of debt a firm should issue in order to maximize its market value, it is necessary to combine and balance both the tax benefits and the bankruptcy costs deriving from the debt. The trade-off theory claims that the firm's total value is equal to the unlevered firm's value plus the present value of the tax savings minus the present value of the bankruptcy costs.

$$V_L = V_U + PV\ (\ tax\ shield\ ) - PV\ (\ bankruptcy\ costs\ ) \qquad (16)$$

The formula *(16)* shows that firms have an incentive to increase debt to take advantage of the tax savings deriving from it. However, higher the debt ratio, higher the probability of becoming insolvent and incurring bankruptcy costs.

Figure 4.
Trade-off theory's optimal capital structure

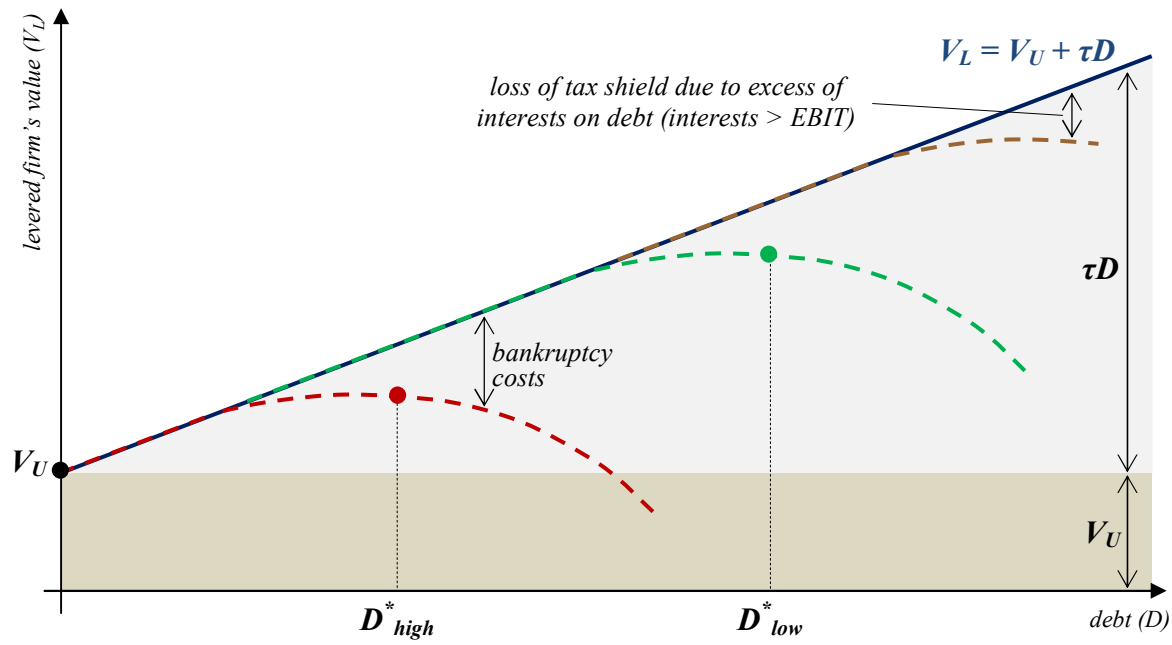


Figure 4 demonstrates this relation, revealing how the levered firm's value V_L changes when the total amount of debt D varies. For low levels of debt, bankruptcy risk is rather small, and the main consequence of an increase of the debt ratio is a higher tax shield (τD). If there are no bankruptcy costs, V_L will continue to grow at a τD rate as long as the interests on the debt will be lower than the *EBIT*.

The bankruptcy costs reduce the V_L. The amount of the reduction increases with the

probability of bankruptcy which in turn increases with the debt ratio. The trade-off theory shows that firms should increase their debt D until they reach the amount of debt D^* which maximizes V_L. At this point the tax benefit obtained from the increase of debt is entirely offset by the higher probability of incurring bankruptcy costs.

Figure 4 also shows the optimal capital structure for two different firms. The optimal choice for a company with low bankruptcy costs is indicated by D_{low}, whereas the choice for a company with high bankruptcy costs by D_{high}. Unsurprisingly, for companies with higher bankruptcy costs, the best choice is to have a lower level of debt.

The final thing to notice in figure 4 is the difference between the value of the firm according to the trade-off theory and the MM theorem:

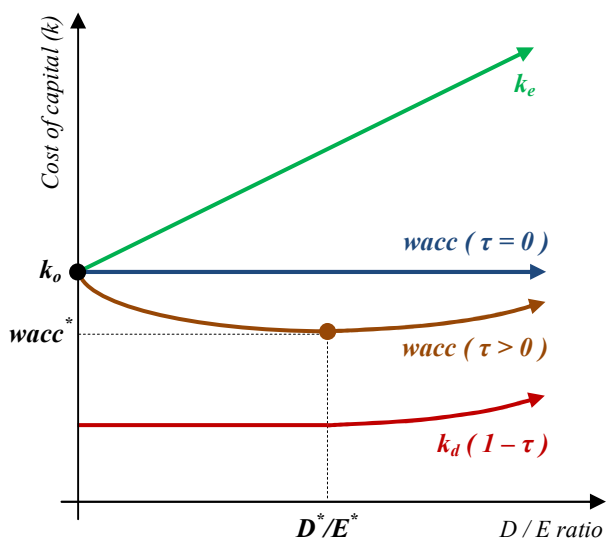
- In the MM with no taxes, the firm's value is unaffected by its capital structure, i.e. $V_U = V_L$. The trade-off theory instead considers the additional gain from leverage, net of financial distress costs.
- In the MM with taxes, the tax shield is fully exploited, and the value of the firm is represented by the upward-sloping straight line. On the contrary, there is a value loss in the trade-off theory from the possibility of financial distress.

The trade-off theory does a good job in explaining why firms do not choose the MM theorem optimal capital structure made of 100% debt. Moreover, it explains why different industry sectors have dissimilar debt ratios, as bankruptcy costs change according to the business in which the company operates. The trade-off theory can also be easily expanded to include other effects of debt.

According to Ross et al. (2012), the capital structure that maximizes the value of the firm is also the one that minimizes the cost of capital. Figure 4 illustrates the trade-off theory in terms of the weighted average cost of capital and the costs of debt and equity.

Figure 5 derives from figure 2 and includes the financial distress costs. The *wacc* declines at first because the after-tax cost of debt is cheaper than equity, so, at least initially, the overall cost of capital

Figure 5.
Optimal capital structure and the cost of capital



declines.

At some point, the cost of debt begins to rise, and the fact that debt is cheaper than equity is more than offset by the financial distress costs. From this point, further increases in debt actually increase the *wacc*. As illustrated, the minimum $wacc^*$ occurs at the point D^*/E^*.

1.5. The pecking order theory

1.5.1. The information asymmetry problem

In both MM theorem and the trade-off theory, it is assumed that managers, shareholders and bondholders have access to the same information, and the share price is supposed to be fair (i.e. it represents the firm's true value). However, these assumptions are not met in the real world, as managers probably know much more about the company and its future cash flows than the firm's shareholders and bondholders. If that is the case, managers and external investors are in a situation of ***information asymmetry***.

George Akerlof (1970) was one of the first researchers to formalize the information asymmetry problem. His study was based on the American automobile market and the large price difference between new and used cars to described the relationship between quality and uncertainty. The result – known in the literature as the *market for lemons* – describes perfectly one of the consequences of information asymmetry: ***adverse selection***.

In the used cars market, it is known that – even when identical brands and models are compared – some cars are in really good condition, while others require continuous maintenance work (in America the latter are known as *lemons*). It is very difficult to understand if a car is a lemon without having driven it for a while.

It is not surprising at all if a buyer assumes that owners of a lemon are more encouraged to sell their cars than owners of a good car. Consequently, the buyer will suppose that, on average, the quality of the cars available in the used market is relatively low, and the price he will be willing to pay will also be low. However, if the price of an used car is low, it is likely that owners of good cars will be reluctant to sell them, giving rise to a vicious circle where the average quality of the cars available will be increasingly poor. This downward spiral will cause a slump in the cars quality and prices, causing in the worst case scenario the disappearance of the market for second-hand cars.

According to Katz and Rosen (2007), the peculiar aspect of markets similar to the second-hand cars market is that the less informed agent finds himself negotiating with the

wrong people. That is why the expression *adverse selection* is used to describe this particular type of market failure, where the more informed agents self-select themselves in a way which results harmful to the less informed individuals. In the used cars market, for instance, there is an adverse selection of sellers, and this phenomenon can be observed in several other markets (the insurance market is maybe the best example in this matter).

1.5.2. Stock issuance and adverse selection

It is possible to apply the adverse selection principle to the stock market. If the owner of a start-up, for instance, announces that the firm has a not-to-be-missed investment opportunity and for this reason decides to sell 70% of his participation into the firm, it is likely that the market reaction will be negative. Even if the shareholder insists that his decision is just part of a portfolio diversification plan, the market will assume that the shareholder holds some negative information regarding the firm's future, and that he is consequently trying to liquidate his position before the hypothetical negative information becomes public.

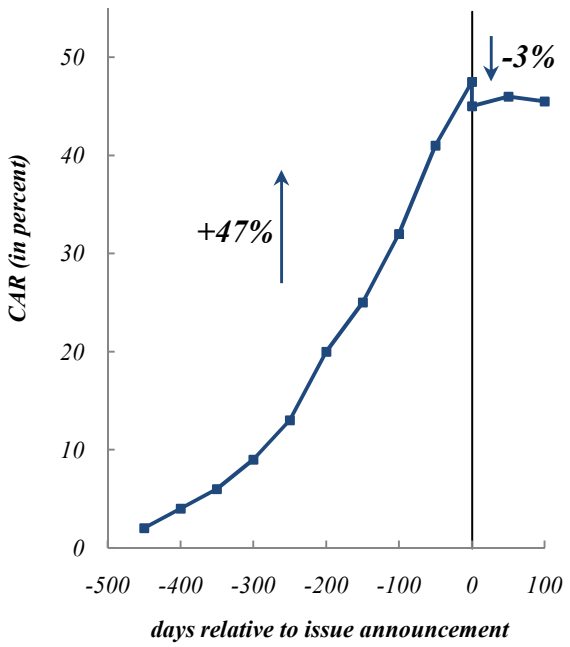
As in the example of the second-hand cars market, the will of a firm's owner to sell his participation may induce market agents to believe it is not a good investment opportunity. Consequently, the price investors will be willing to pay will decrease. This share price reduction caused by the adverse selection is a potential cost of share issuance, which may hold back shareholders who have good information regarding the firm's future results from issuing new equity.

Majluf and Myers (1984), in their notable study which gave birth to the pecking-order theory, explain that "if managers have inside information there must be some cases in which that information is so favourable that management, if it acts in the interest of the old stockholders, will refuse to issue shares even if it means passing up a good investment opportunity. That is, the cost to old shareholders of issuing shares at a bargain price may outweigh the project's NPV. This possibility makes the problem interesting: investors, aware of their relative ignorance, will reason that a decision not to issue shares signals 'good news'. The news conveyed by an issue is bad or at least less good. This affects the price investors are willing to pay for the issue, which in turn affects the issue-invest decision."

Consistently with what has been said by Majluf and Myers, Berk and DeMarzo (2008) say that the adverse selection has some important implications on the decision of managers to issue new equity.

1) Share price drops when a share issuance is announced.

Figure 6.
Stock return before and after an equity issue



When a firm issues new equity, it is signalling to investors that shares are overpriced. As a result, investors will be willing to pay less for the firm's equity, and the share price will fall. Lucas and McDonald (1990) found out that the share price of an American listed company will be reduced, on average, by 3% following the share issuance announcement, as shown in Figure 6.

Generally, managers are encouraged to delay the issuance of shares until good news regarding the firm's future will be released, positively influencing the share price. On the other hand, there is no incentive to delay the issuance if managers are expecting bad news. As a result:

2) *Share price tends to increase before a share issuance is announced.*

Lucas and McDonald (1990) demonstrated that the cumulative abnormal return (CAR) over 500 trading days preceding an equity issue was 47% higher for the issuing firms in comparison with the market, as Figure 6 illustrates[2].

3) *Firms try to issue new equity when the information asymmetry is at its lowest level.*

Managers usually try to avoid the price reduction caused by the adverse selection issuing shares in a date when the information asymmetry between managers and investors is at its lowest level. For example, as a huge amount of information is given to investors in the day the firm's quarterly or yearly results are announced, it is likely that share issuance will follow these announcements.

1.5.3. Implications on the firm's capital structure

The adverse selection may transform a regular share issuance into a very costly

2. Average for 549 seasoned equity issues by NYSE/AMEX industrial firms over the period 1974 – 1983. Abnormal returns computed relative to an equally weighted portfolio of NYSE/AMEX and OTC stocks, with no adjustment for firm betas (Lucas and McDonald 1990, p.1033).

operation. Managers, therefore, will probably search for cheaper sources of funding.

Although debt issuing can also be affected by the adverse selection, the price underestimation tends to be lower for debt than it is for equity, as the debt value is determined by its interest rate thus it is not very sensitive to the private information held by the firm's managers. Naturally, a firm can also avoid its equity underpricing by financing investments with the firm's own liquidity (retained earnings) when possible.

In other words, *managers who believe the firm's equity is undervalued will prefer to finance their investments with the firm's retained earnings or through debt rather than with new equity*.

The opposite is also true: managers who perceive that the firm's equity is overvalued will prefer to finance their investments with new equity rather than with retained earnings or debt. However, because of the negative reaction in the share price which follows a share issuance, it is unlikely that the equity will be valued at a quite high price after the issuance announcement. In fact, if there are no other reasons for issuing equity other than its overvaluation, both managers and investors are going to behave rationally, and the share price decrease after the announcement could be enough to dissuade managers from issuing new stock except as a last resource.

The idea that managers prefer to use retained earnings and debt instead of issuing new equity is the main suggestion and implication of the pecking-order theory.

According to Frank and Goyal (2007, p.150), this definition can be interpreted in different ways. What does it mean to "prefer" internal financing? Does this mean that the firm uses all available sources of internal finance before using any debt or equity issues? Or does it mean that, *ceteris paribus*, the firm will mostly use internal financing before using external financing? If the verb "prefer" is interpreted strictly, the theory is more testable. If "prefer" is interpreted in the *ceteris paribus* way, then any test of the theory rests on the specification of "other things equal."

A second problem for the definition concerns the preference of debt over equity. Initial claims for the theory tended to rest on a strict interpretation in which equity is never issued if debt is feasible. As it has become increasingly clear that this strict interpretation is not only more refutable, but actually refuted, proponents of the pecking order theory have moved increasingly to the *ceteris paribus* interpretation.

Different papers invoke different empirical versions of *ceteris paribus*. Of course, the more a test depends on the other things, the less the data are explained by the pecking order itself.

At what point is equity introduced? The strict interpretation suggests that after the initial public offering (IPO), equity should never be issued unless debt has for some reason become infeasible. This leads to the notion of a "debt capacity." The debt capacity serves to limit the amount of debt within the pecking order and to allow for the use of equity.

The literature provides no agreed-upon definition of debt capacity. Several recent papers have used factors commonly employed in tests of the trade-off theory to define the debt capacity. Of course, this leads to difficulties in interpreting the results.

1.5.4. Other implications

Ross et al. (2012) described some implications associated with the pecking-order theory which are in clear conflict with those from the trade-off theory.

1) Firms do not have a target level of leverage.

According to the trade-off theory, every firm balances the advantages of debt (in particular the tax shield) with its disadvantages (i.e. bankruptcy costs). The optimal level of leverage corresponds to the point where the marginal benefit of debt equals its marginal cost. On the contrary, in the pecking-order theory there is not a target debt ratio. Instead, firms choose their debt ratio according to their financial needs. First, projects are going to be financed with retained earnings, which reduces the firm's debt ratio (assuming that the project is profitable and that it increases the company's book and market value). Once retained earnings are entirely invested, further projects will be financed through debt issuance, increasing the firm's debt ratio. However, debt capacity is finite, i.e. there will be a point where equity issuance will be necessary, and it will reduce the company's debt ratio.

It is quite evident at this point that the amount of debt depends on the quantity and the quality of the available projects, and that companies do not pursue a target level of leverage.

2) Profitable firms use less debt.

Profitable firms generate liquidity internally, hence they depend less on debt and external financing in general. The trade-off theory does not include this implication: profitable companies' substantial cash flow increases its debt capacity, which will be used to benefit from the tax shield and other advantages of leverage.

3) Firms desire financial slack for future investment.

The pecking-order theory is based on the difficulty to find sources of financing at a reasonable price. A sceptical investor believes a particular stock is overpriced if managers try to issue further shares, resulting in a decrease of its value. The scepticism regarding bond issuing is definitely lower (though not absent), so managers will rely on debt firstly as a result. Anyhow, firms cannot issue unlimited debt without considering the potential costs involved, mainly bankruptcy costs.

Financial slack would ease the problem. Since companies know they will have to finance profitable projects in the near future, they could start accumulating liquidity today. If that case, they would not have to rely on external financing when a good investment opportunity arises.

As described earlier in paragraph 1.4.3, there is a limit regarding the financial slack a company should keep. Jensen (1986, p.323) claims that conflicts of interest between shareholders and managers over payout policies are especially severe when the organization generates substantial free cash flow. The problem is how to motivate managers to disgorge the cash rather than investing it at below the cost of capital or wasting it on organization inefficiencies. According to his study, increasing the firm's debt ratio can significantly reduce agency costs of free cash flows.

CHAPTER TWO

CAPITAL STRUCTURE TESTS AND RELATED LITERATURE

2.1. Overview

There are hundreds of papers which estimate the propositions dictated by the theories of capital structure. However, there is still no consensus of the superiority of one of the theories. The traditional emphasis on static models involving relatively stable target leverage ratios has led the profession to focus on factors that, while statistically significant determinants of leverage ratios, appear to be of second-order importance (Denis 2012, p. 632).

The chapter is organized as follows. First, the predictions[3] of the trade-off theory regarding the effect of bankruptcy costs, taxes and the free-cash-flow agency problems are confronted with the empirical results on the subject. Then, the same procedure is followed to analyse the pecking order theory. Given the amount of papers on this subject, there are mixed results for each of the predictions analysed. As a result, in some cases it is difficult to determine whether hypothesis are strictly true or false. The conclusions drawn here represent the prevalent suggestions currently given by the scientific literature.

The chapter also introduces some important enhancements to the theories, describing the development that both the static trade-off theory and the pecking order theory have been facing in recent years. This includes the dynamic models of capital structure (which considers the endogeneity of investment policies), the speed of adjustment to capital structure targets and the opportunity cost of financing decisions. Finally, capital structure is analysed in an international perspective.

2.2. Testing the trade-off theory of capital structure

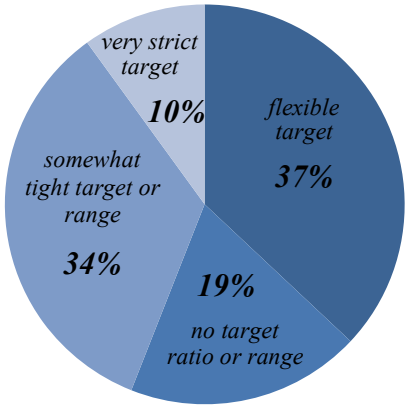
2.2.1. Target debt-to-equity ratio: a survey

Graham and Harvey (2001) conducted a comprehensive survey that describes the current practice of corporate finance. They sample a large cross-section of approximately

3. Most of the predictions considered were formulated by Fama and French (2002), who jointly examine target leverage, the mean reversion of leverage, and the short-term response of dividends and debt to variation in earnings and investment in annual samples that cover the 1965-1999 period and on average include more than 3,000 firms.

4,440 firms examining capital budgeting, cost of capital and capital structure. In total, 392 chief financial officers responded to the survey, for a response rate of 9% (they investigated for possible nonresponse bias and conclude that the sample is representative of the population).

Figure 7.
Survey evidence on target debt-equity ratio



They asked directly whether firms have an optimal or target debt-equity ratio. Nineteen percent of the firms do not have a target debt ratio or target range, as shown in Figure 7. Another 37% have a flexible target, and 34% have a somewhat tight target or range. The remaining 10% have a strict target debt ratio. These overall numbers provide mixed support for the notion that companies trade off costs and benefits to derive an optimal debt ratio.

However, untabulated analysis shows that large firms are more likely to have target debt ratios: 55% of large firms have at least somewhat strict target ratios, compared to 36% of small firms. Targets that are tight or somewhat strict are more common among investment-grade (64%) than speculative firms (41%), and among regulated (67%) than unregulated firms (43%). Targets are important if the CEO has short tenure or is young, and when the top three officers own less than 5% of the firm.

Finally, the CFOs answered that their companies issue equity to maintain a target debt-equity ratio (rating of 2.26 on a scale from 0 to 4, with 0 meaning not important and 4 meaning very important), especially if their firm is highly levered (2.68), firm ownership is widely dispersed (2.64), or the CEO is young (2.41). Overall, the survey evidence provides moderate support for the trade-off theory.

The trade-off theory provides accounts for many other factors such as industry leverage, firm size, tangibility, and market-to-book. The main empirical weakness of the trade-off theory is commonly thought to be the fact that more profitable firms generally have lower leverage.

2.2.2. Bankruptcy costs

The trade-off theory explains that expected bankruptcy costs rise when profitability declines, and the threat of these costs pushes less profitable firms toward lower leverage targets. Similarly, expected bankruptcy costs are higher for firms with more volatile earnings,

which should drive smaller, less-diversified firms toward less target leverage (Fama and French 2002, p.6). Several studies tested these suppositions, obtaining conflicting results.

1) More profitable firms have more book leverage.

Profitable firms face lower expected costs of financial distress and find interest tax shields more valuable. Thus, the tax and the bankruptcy costs perspective predicts that profitable firms use more debt (Frank and Goyal 2009, p.7).

Empirical evidence refutes this assumption. Huang and Ritter (2009) developed a nested logit model[4] with several explanatory variables – including both firm characteristics and market conditions – applying it to a sample of firms from 1963 to 2001. Their nested logit model includes two decision levels: the first-level alternatives are security issuance versus no security issuance, while the second-level alternatives are equity versus debt issuance.

With regard to profitability – measured as operating income before depreciation – in the first decision level results demonstrate that profitable companies are not encouraged to issue any kind of security, but instead prefer to finance their projects and operations with their financial slack. The results are statistically significant, with a t-statistic for the profitability variable equal to −7.15.

In the second decision level, results show that profitable companies will issue debt rather than equity, with a t-statistic of −10.50. The evidence shows that profitable companies seem not to use the tax-advantage of debt as much as the trade-off theory assumes, following instead (at least the firms in this sample) a behaviour which is much closer to the pecking-order theory assumptions.

Also Frank and Goyal (2009) reached the same conclusion. In their study, which analyzes US firms on Compustat for the period from 1950 to 2003, found out that profitability is one of the six core factors which explain movements in the leverage ratio. Profitability's negative coefficient in the model suggests that there is a negative correlation between profits and leverage ratios, especially when the latter is calculated considering the book value of assets.

These results are generally consistent with other results in the literature. Therefore, it is possible to affirm with a considerable level of confidence that the assumption of a higher book leverage for more profitable firms is generally *false*.

4. A nested logit model is similar to a multinomial logit model. However, a multinomial logit model assumes that choices between any two alternatives are independent of the other alternatives, while a nested logit model only assumes that the choices are independent within a group or "nest" of alternatives (Huang and Ritter 2009, p.251).

However, according to Frank and Goyal (2007, p.175) the theory is not quite so simple, as profitability can also proxy for growth opportunities. If profitability is a less noisy proxy for growth than the market-to-book ratio, the negative sign on profitability is consistent with the predictions of the static trade-off theory. This evidence is consistent with a dynamic version of the trade-off theory, which is described in detail in paragraph 2.4.3.

2) Firms with more variable earnings have less book leverage.

The trade-off model predicts that firms with less variable earnings have more leverage. Harris and Raviv (1991) named several studies which demonstrates that leverage decreases with return volatility. Moreover, Fama and French (2002) hypothesize that larger firms have less volatile earnings and net cash flows. Their estimation finds a positive relation between size and leverage, as slopes are all positive and more than 11 standard errors from zero.

Empirical evidence therefore supports this assumption, usually framing it into a broader, similar prediction:

3) Larger, more mature firms have relatively more debt.

Static trade-off theory is generally interpreted as predicting that large firms will have more debt since larger firms are more diversified and have lower default risk. Larger firms are also typically more mature firms. These firms have a reputation in debt markets and consequently face lower agency costs of debt. Hence, the trade-off theory predicts that leverage and firm size should be positively related.

Cross-sectional tests of the relation between leverage and firm size find the relation to be robustly positive (Frank and Goyal 2007, p.174). De Jong et al. (2011, p.1305) say that this relation is usually explained by bankruptcy considerations: larger firms are generally more diversified and therefore less prone to bankruptcy. Also, the direct bankruptcy costs will generally be a smaller portion of the firm's assets. Firms are generally believed to use their tangible assets as collateral, which decreases the costs of debt. Firms with more intangible assets in the form of R&D expenses have lower leverage, which is in line with the trade-off theory as intangible assets are more difficult for outsiders to value and increase expected distress costs.

However, this positive relation between size and leverage may also be the result of factors other than volatility. For example, it seem likely that large firms access the debt market at lower cost than small firms. Still, prediction *3)* is considered to be *true*.

2.2.3. Taxes

Taxes have two offsetting effects on optimal capital structures. The deductibility of corporate interest payments pushes firms towards more target leverage, while the higher personal tax rate on debt, relative to equity, pushes them towards less leverage (Fama and French 2002, p.6).

4) Firms with higher expected tax rates have more book leverage.

High tax rates increase the interest tax benefits of debt. The trade-off theory predicts that to take advantage of higher interest tax shields, firms will issue more debt when tax rates are higher. Graham and Harvey's (2001) survey shows that the corporate tax advantage of debt is moderately important in capital structure decisions, as the mean response is 2.07 on a scale from 0 to 4. The tax advantage is most important for large, regulated, and dividend-paying firms, i.e. for companies that probably have high corporate tax rates and therefore large tax incentives to use debt.

It is relatively hard to clearly identify the tax effects on a firm's capital structure. Huang and Ritter (2009, p.255) say that, inconsistently with the static trade-off theory that views the tax rate as a major factor in the decision to issue debt, the tax rate has only a secondary effect on the propensity to issue debt or equity. Moreover, their model indicates that firms are likely to increase equity – not debt – following an increase in tax rates.

On the contrary, Overesch and Voeller (2010) clearly suggest that a higher tax benefit of debt has the expected significant positive impact on companies' financial leverage. Their empirical analysis considered a rich panel of firm-level financial accounting data of companies located in 23 European countries for the period from 2000 to 2005, taken from the AMADEUS data base.

Such discrepancies in empirical results make it difficult to define whether prediction *4)* is true or false. Theory suggests that both corporate profit tax and personal capital income taxes should be considered in order to analyze the full impact of taxes on capital structure choices. Another problem for tests of taxes is, according to Frank and Goyal (2007), the important element of corporate taxes known as tax shelters. Information about these is very hard to find since the U.S. Internal Revenue Service (IRS) treats tax investigations confidentially. Graham and Tucker (see Frank and Goyal 2007, p.178) studied the results of an exhaustive search of tax court records and financial news stories and identified 44 tax-sheltering cases involving in 43 firms between 1975 and 2000. They found that firms with tax

shelters use less debt as predicted by the static trade-off theory. Many scholars suspect that Graham and Tucker are only observing the "tip of the iceberg." Unfortunately, there is no direct way of knowing the actual significance of such tax shelters.

5) *Controlling for profitability, firms with more non-debt tax shields have less book leverage.*

The interests on debt are not the only tax shield of a company. There are many other allocations which imply tax credits and deductions such as depreciation, capital loss carryover and R&D expenses. As long as a firm has other types of tax shields, its taxable income will be reduced thus there will be a reduce reliance on the tax benefits of debt. As a result, non-debt tax shield proxies should be negatively related to leverage.

Fama and French (2002) regressions provide some support for this prediction. The ratio of R&D expenses to assets (RD_t/A_t) slopes in the book and market leverage regressions are all strongly negative. However, it may be inappropriate to treat the RD_t/A_t as an evidence about non-debt tax shields given Graham's (see Fama and French 2002, p.23) evidence that non-debt tax shields have at best a weak role in determining the expected tax rates of firms.

Similarly, proposition *5)* was shown to be *true* by Armada et al. (2011) and Overesch and Voeller (2010), among others. On the contrary, some studies claim that the non-debt tax shield is positively related to leverage, such as Harris and Raviv (1991) and Antoniou et al. (2008). However, it is important to notice that they consider the ratio of depreciation to total assets as the only proxy to non-debt tax shied, which is a quite narrow assumption.

2.2.4. Free-cash-flow agency problems

Although agency theories are usually linked with the pecking order theory of capital structure, it shares a common prediction with the static trade-off theory:

6) *Controlling for profitability, firms with larger profitable investments have lower dividend payouts and less book and market leverage.*

One of the reasons for the inverse relation between investments and leverage is the fact that the underinvestment problem is more severe for growth firms, leading them to prefer less debt. The underinvestment problem arises because firms with risky debt have an incentive to underinvest in positive net present value projects, since shareholders bear the entire cost of the project but receive only a fraction of the increase in firm value (part of it goes to debtholders).

As growth options increase, asset substitution problems also become more severe. In high-growth firms, it is easier for stockholders to increase project risk, and it is harder for debtholders to detect such changes. Thus, debt is more costly for firms with high-growth opportunities (Frank and Goyal 2007, p. 174).

Debt does mitigate agency costs of free cash flow, but it usually happens when firms have fewer growth opportunities. That means the discipline provided by debt is less valuable for firms with good growth opportunities. In fact, agency costs of free cash flow are less severe for growth firms (see Jensen, 1986), and this also leads to the prediction that high-growth firms should have less debt.

The study of Frank and Goyal (2007) is just one of several others which demonstrate that the assumption of a negative relation between leverage ratio and growth opportunities is in general *true*.

2.3. Testing the pecking order theory of capital structure

The pecking order theory is based on a difference of information between corporate insiders and the market, and the driving force is adverse selection. Accordingly, it is natural to examine firms that are commonly thought to be particularly subject to adverse selection problems, such as small firms and high growth firms.

Frank and Goyal (2003), based on data from the period 1971-1989, show that the smallest firms strongly rejects the pecking order hypothesis. On the other hand, largest firms seem to follow it, while the medium size categories are somewhat pecking order-like over this time period.

Also Gonenc and Seifert (2008) reach to the same conclusion. Pecking order hypothesis were tested in samples coming from four different countries: United States, United Kingdom, Germany and Japan. Results indicate that large firms in all four countries appear to adhere to the pecking order more than small firms, the opposite of what should occur. The authors also claim that the pecking order theory is not applicable in the US, UK, and Germany, while it seems to be valid in Japan.

Nevertheless, supporters of the pecking order theory are numerous. To better understand its validity, predictions of the theory's original version are confronted with the extensive empirical evidence in the literature. The following predictions are driven by financing costs – including transaction costs – and the asymmetric information problem that arises when

investment must be financed with new issues of risky securities (risky debt and especially new stock).

1) *Controlling for investment opportunities, firms with more profitable assets in place have less book and market leverage.*

Paragraph 2.2.2 already quoted some studies which demonstrate why this assumption is generally *true*. Regressions made by Fama and French (2002) further support this prediction. In their model, the proxy for profitability is EBIT divided by assets in place. For book and market leverage, the model estimates produce negative average slopes on profitability that are at least 12,5 standard errors below zero.

This seems to be the case also for small and medium-sized enterprises (SMEs), according to a study from Armada et al. (2011). They considered four research samples: *(1)* 610 service SMEs; *(2)* 126 service large firms; *(3)* 679 manufacturing and construction SMEs; and *(4)* 132 manufacturing and construction large firms. In their regressions, profitability is given by the ratio of earnings before interest and taxes to total assets. Their model estimates that greater profitability does not contribute to increased recourse to debt in SMEs nor in any other type of firm, outcome which is consistent with the negative relation between profitability and debt from the pecking order theory.

2) *Firms with more tangible assets in place have less book and market leverage.*

According to Harris and Raviv (1991, p.308), under the pecking order theory, firms with comparatively little tangible assets relative to firm value are more subject to information asymmetries. For such firms, then, the underinvestment problem will occur more often than for similar firms with less severe information asymmetries. These firms can be expected to accumulate more debt over time, other things equal.

In other words, low information asymmetry associated with tangible assets makes equity issuances less costly. Therefore, leverage ratios should be lower for firms with higher tangibility. However, if adverse selection is about assets in place, tangibility increases adverse selection and results in higher debt. This ambiguity under the pecking order theory stems from the fact that tangibility can be viewed as a proxy for different economic forces (Frank and Goyal 2009, p.9).

A more common idea is based on the hypothesis that collateral supports debt. Tangible assets (such as property, plant, and equipment) are easier to collateralize than intangibles

(such as the value of goodwill from an acquisition), as the former suffer a smaller loss of value when firms go into distress. In addition, tangibility makes it difficult for shareholders to substitute high-risk assets for low-risk ones. The lower expected costs of distress and fewer debt-related agency problems predict a positive relation between tangibility and leverage.

Thus, the pecking order hypothesis of a negative relation between tangibility and leverage is generally *false*. In fact, Frank and Goyal (2009) found out that such correlation was positive and significant at the 0.01 level in every period from 1950 to 2003. They considered tangibility as the ratio of net property, plant, and equipment, to assets, comparing it with four different leverage measures – total debt/market assets, total debt/book assets, long-term debt/market assets and long-term debt/book assets. The correlations are positive and statistically significant for all the leverage measures.

Both the static trade-off and agency theories predict a positive relation between leverage and tangibility of assets. Inventory is sometimes included and sometimes excluded in measures of tangibility. Empirically, inventory seems to help to explain the use of short-term debt much more than it helps to explain the use of long-term debt.

3) *Given the profitability of assets in place, firms with more investments have more leverage.*

In the pecking order model, firms with lots of profits and few investments have little debt. Standardizing by book assets, firms with high profitability, given their investments, have less book leverage. In the simple version of the pecking order, the level of debt is determined by accumulated differences between retained earnings and investment. Thus, scaling by assets, and assuming investment and earnings are persistent, the marginal relation between investment and book leverage is positive (Fama and French 2002, p.9).

This assumption is *refused* by several studies. According to Huang and Ritter (2009), firms with more growth opportunities – as measured by capital expenditure, Tobin's Q (market-to-book ratio of assets), R&D and preissue one-year market-adjusted return – are more likely to issue equity.

The market-to-book asset ratio is the most commonly used proxy for growth opportunities. Adam and Goyal (Frank and Goyal 2009, p.8) show that it is also the most reliable. A higher market-to-book ratio, however, may also be influenced by stock mispricing. If market timing drives capital structure decisions, a higher market-to-book ratio should reduce leverage as firms exploit equity mispricing through equity issuances. Furthermore, a mechanical negative relation may exist between a market-based definition of leverage and the

market-to book assets ratio.

Rajan and Zingales (1995) analysed the financing decisions of public firms in the G-7 countries for the period 1987-1991. The market-to-book ratio (book value of assets less the book value of equity plus the market value of equity all divided by the book value of assets) enters with a negative coefficient in all countries, and is always significant at conventional levels in the market leverage regressions. These results are apparently consistent with the trade-off theory predictions that firms with high market-to-book ratios have higher bankruptcy costs, which implies a lower leverage target. However, according to the authors, it is unlikely that financial distress is responsible for the observed correlation.

Similarly, powerful negative correlations between market-to-book ratio and leverage were also found, among others, by Antoniou et al. (2008), Barclay and Smith Jr. (1999), Fan et al. (2012), Frank and Goyal (2003, 2007 and 2009), Gonenc and Seifert (2008) and Hovakimian et al. (2004).

The empirical evidence is consistent with the trade-off theory (Frank and Goyal 2007, p.174) and with a more complex version of the pecking order theory, which is discussed in detail in paragraph 2.4.2.

Overall, the pecking order theory provides an intuitively pleasing explanation for the fact that more profitable firms tend to have lower leverage. However, there are some important factors which are not fully captured by this theory. For instance, the pecking order does not directly predict the importance of industry leverage. Moreover, the roles of tangibility and firm size do not easily and directly flow from the basic logic of the pecking order theory. Therefore, considerable theoretical development would be needed if a model within the basic pecking order approach is to completely account for the main robust evidence.

2.4. Development of capital structure theories

2.4.1. The persistent puzzle of capital structure

The conception and further development of both trade-off and pecking order theories has significantly helped scholars to understand the main factors considered – or that should be considered at least – by financial managers when choosing a firm's capital structure. Nonetheless, empirical evidence of both theories struggle to demonstrate their validity as stand-alone models.

Denis (2012) claims that perhaps the most significant challenge to the pecking order

hypothesis is the large number of firms who behave in a manner that is inconsistent with the most basic predictions of the theory. Recall that under the pecking order theory, firms issue equity only as a last resort. In practice, however, a strikingly large number of firms show a strong preference for equity financing over debt financing.

Strebulaec and Yang (2012) documents the puzzling evidence that zero-leverage behaviour is a highly persistent phenomenon among a substantial number of large public nonfinancial US firms. Using the Compustat data set they find that, over the 1962-2003 period, on average 10.2% of such firms have zero leverage and almost 22% have a less than 5% book leverage ratio.

According to their study, many firms use equity financing when they appear to have available debt capacity. Were these firms to lever up to the level of their proxies, zero-leverage dividend-paying firms would save about 7% of the market equity value in a conservative scenario. Nevertheless, zero-leverage policy is found to be persistent over the long term. For example, conditioning on survival for five years, 30% of zero-leverage firms do not raise any debt in the following four years. If the firm survives for 10 years, it does not have any debt over the ten-year period in 15% of cases.

The study says also that zero-leverage dividend-paying firms are more profitable, pay higher taxes, and have higher cash balances than their proxies chosen by industry and size. These firms also pay substantially higher dividends than their proxies and thus the total payout ratio is relatively independent of leverage. These are often precisely the firms for which the adverse selection costs of issuing equity should be the highest – for example, young, higher growth firms. Therefore, it is difficult to reconcile a zero-leverage behaviour with the pecking order hypothesis being a stand-alone model of capital structure.

Corporate finance scholars have also identified several pieces of evidence that are inconsistent with standard trade-off models. As seen in paragraph 2.2.2, because more profitable firms should have a lower probability of distress, trade-off models predict a positive association between leverage and profitability. In contrast to this prediction, however, one of the most robust findings in cross-sectional studies is the negative association between leverage and profitability.

Moreover, although trade-off models emphasize the primary role of the interest tax shield associated with debt financing, evidence in support of this role is tenuous. As noted earlier, Strebulaev and Yang (2012) report a strikingly high proportion of firms that appear to forego the tax advantages of debt financing by choosing to have zero leverage. More generally, the evidence in Graham (2000) implies that firms underutilize the tax shield

associated with debt financing. The importance of the interest tax shield in explaining observed leverage ratios is further undermined by the observation that firms used a substantial amount of debt financing before the existence of any corporate taxes.

The bottom line, therefore, is that the capital structure literature has identified significant challenges to the static trade-off and pecking order theories as stand-alone models of capital structure choice.

2.4.2. The modified pecking-order theory

The modified pecking-order theory was first introduced by Myers (1984). According to his study, it recognizes both asymmetric information (the centrepiece of pecking order theory's original version) and costs of financial distress (an important pillar of the trade-off theory). In that case, the firm faces two increasing costs as it climbs up the pecking order: it faces higher odds of incurring costs of financial distress, and also higher odds that future positive-NPV projects will be passed by because the firm will be unwilling to finance them by issuing common stock or other risky securities.

Myers (1984, p.590) say that the firm may choose to reduce theses costs by issuing stock now even if new equity is not needed immediately to finance real investment, just to move the firm *down* the pecking order. In other words, financial slack (liquid assets or reserve borrowing power) is valuable, and the firm *may* rationally issue stock to acquire it. Since the firm which issues equity to buy financial slack faces the same asymmetric information problems as a firm issuing equity to finance real investment, it will decide whether to issue new equity or not according to the net benefit of having some financial slack against the increased equity agency costs.

Bontempi (2002, p.2) incorporates both trade-off and pecking order theories of capital structure into a modified pecking order model, stating that, "on the contrary to what is usually believed, trade-off and pecking order theories are compatible and both necessary". Empirical evidence shows that this modified version of the pecking order theory performs quite well, whereas the pure versions of the incorporated theories are mis-specified. According to Bontempi, her model is well capable of explaining the financial behaviour of those companies operating in economic systems which can hardly be classified as being bank-based or market-based.

Fama and French (2002, p.31) claim that, in this more complex version of the pecking order model where firms balance current and expected future financing costs, dividend payers

with more volatile net cash flows have lower dividend payouts and less leverage. Moreover, firms (especially dividend payers) with more expected investments have less current leverage. The relation between leverage and the dividend payout ratio is also negative. Whether these leverage predictions apply to book or market leverage depends on whether low risk debt capacity is a function of the book or the market value of assets.

2.4.3. The dynamic trade-off theory of capital structure

Fischer et al. (1989) gave an extremely valuable input to the capital structure theories developing what they described as a "model of dynamic capital structure choice". According to their study, a limitation of the single-period capital structure models is that they ignore the firm's optimal restructuring choices in response to fluctuations in asset values over time. In particular, in the absence of transactions costs, firms could carry large amounts of debt and, by the appropriate repurchase strategy, capture large tax shields while keeping the debt essentially riskless.

Frank and Goyal (2007, p.145) say that constructing models that recognize the role of time requires specifying a number of aspects that are typically ignored in a single-period model. Of particular importance are the roles of expectations and adjustment costs. In a dynamic model, the correct financing decision typically depends on the financing margin that the firm anticipates in the next period. Some firms expect to pay out funds in the next period, whereas others expect to raise funds. If funds are to be raised, they may take the form of debt or equity. More generally, a firm undertakes a combination of these actions.

In other words, a firm's capital structure tends to vary over time. Following the static trade-off, firms would rebalance to their target leverage ratio, where the marginal benefit of debt equals its marginal cost. However, if transaction costs are considered, rebalancing is not a costless option, thus firms allow its capital structure to fluctuate much of the time. Fischer et al. (1989) simulations suggest that even small transaction costs can lead to delay in rebalancing and wide variations in the debt ratio.

A general idea of dynamic models is that today's optimal capital structure depends on expectations of what is going to be optimal in the future. In the next period, it may be optimal to pay out dividends or to raise funds; if the latter is the optimal, funds can be raised in the form of either new debt, new equity or both. In each case, what is expected to be optimal in the next period will help to pin down the relevant comparison for the firm in the current period.

By stressing different costs, different dynamic models lead to somewhat different conclusions. Nevertheless, they all seem to reach to a common prediction:

Profitability is negatively related to observed debt ratios.

According to Hovakimian et al. (2004), the dynamic version of the trade-off theory implies that firms passively accumulate earnings and losses, letting their debt ratios deviate from the target as long as the costs of adjusting the debt ratio exceed the costs of having a suboptimal capital structure. If so, firms that were highly profitable in the past are likely to be under-levered, while firms that experienced losses are likely to be over-levered. This implies that profitability will be negatively related to observed debt ratios.

The negative relation between profitability and observed leverage arises not because profitability affects target leverage, but because it affects the deviation from the target. Therefore, the negative relation should not hold for firms that offset the deviation from the target by resetting their capital structure.

This is an important enhancement of the trade-off theories of capital structure, especially if the vast empirical evidence on this subject is considered. As noted earlier, the negative relation between profitability and leverage was verified by many scholars, and it is consistent with the pecking order theory.

2.4.4. Endogeneity of investment and financial policies

Classical analysis of capital structure usually do not consider investment as an endogenous part of their models. Many scholars have followed Miller and Modigliani (1958) and Kraus and Litzenberger (1973) assumption of exogenous cash flows, such as Fisher et al. (1989), Goldstein et al. (2001) and Strebulaev (2007).

However, it is very likely that the firm's cash flows, including investment, influence and somehow depends on how the firm finances its operations. Considering investment as an endogenous part of financing decision models is probably the most important contribution of the so-called dynamic models of capital structure. Notably, this is done by Mauer and Triantis (1994), Hennessy and Whited (2005), Titman and Tsyplakov (2007) and DeAngelo et al. (2011).

If the firm's earnings are stochastic but unrelated to leverage, then one must decide how to model the excess cash in good times (Frank and Goyal 2007, p. 148). Most of the models assume that extra cash is distributed to shareholders in the form of dividends. Such hypothesis,

however, limits the model capacity to demonstrate the important role of retained earnings in a company's capital structure. That is why recent studies, such as Hennessy and Whited (2005) and DeAngelo et al. (2011), consider also this important aspect in their complex models.

Tserlukevich (2008) shows that real frictions – which generally explains the investment behaviour – present a much simpler explanation to observed financing decisions. The advantage of this kind of approach is that it can explain not only financing decisions, but also real investment decisions. Theories relying on transaction cost, in contrast, are not able to explain investment behaviour. More specifically, the transaction costs approach cannot clarify why technology has such an important impact on leverage, as well as the positive relation between debt-to-equity ratio and real investment.

The study clearly illustrates the necessity of incorporating real frictions and real investment decisions into dynamic structural models of capital structure. Tserlukevich (2008) considers two real frictions:

a) *irreversibility:* refers to the difference between the purchased price of a certain asset and the (generally lower) price it can be sold in the future;

b) *fixed costs of investment:* refers to the impact that new investments will have in the existing stock of capital.

According to Tserlukevich (2008, p. 234), "the effects of real frictions on leverage are complementary to the effect of financing frictions". To better understand this relation, it is possible to consider a firm which is facing an increase in profitability. As noted earlier in paragraph 2.2.2, financing frictions prevent the firm from adjusting their debt ratio in case of bigger profits. At the same time, real frictions ensure that the value of the firm's unexercised options increases, resulting in a large reduction of debt ratio. This effect is consistent with the negative relation between profitability and leverage predicted by the pecking order theory. In other words, Tserlukevich (2008) model obtains the same result as transaction cost models without imposing unrealistic large frictions on either the financing side or the real side.

Although Tserlukevich model is quite simple (it violates only one MM theorem assumption, i.e. the tax benefit of debt), it generates a broad set of predictions which are consistent with empirical results.

Mauer and Triantis (1994) also gave an important contribution to the literature on real options by considering dynamic capital budgeting and financing decisions as an endogenous part of a single model. They found that production flexibility has a major effect on capital structure decisions positive effect on the value of interest tax shields. Specifically, "the firm's

average leverage ratio is higher and the range over which the firm allows its leverage ratio to vary is narrower the smaller are operating adjustment costs. As a result, the present value of interest tax shields net of recapitalization costs increases as operating adjustment costs decrease. However, the increase in net tax shield value is smaller the lower are recapitalization costs. Intuitively, when the costs to dynamically manage capital structure are small, the hedging benefit of production flexibility has less of an impact on the net tax shield value of debt financing" (Mauer and Triantis 1994, p. 1272).

In other words, they found that production flexibility has a positive effect on the amount of the tax benefits. This effect can be explained by the firm's ability to reduce operating losses by shutting down certain production lines. The resulting decrease of operating adjustment costs causes an increase in firm value and a decrease in firm value variance, increasing the firm's debt capacity and the associated tax benefits. This implies that production flexibility and financial flexibility are, in a way, substitutes.

In contrast, Mauer and Triantis find that debt financing has a minor impact on a firm's investment policy. In fact, their model shows that if a levered firm uses the same investment pattern of a comparable unlevered firm, the loss in firm value is close to zero. As a levered firm can benefit from tax shields when operating, it has an incentive to invest earlier at the currently lower commodity prices than a comparable unlevered firm. However, the benefit from doing so is basically offset by a loss in the value of waiting to invest, thus the net benefit is not big enough to change the firm's investment pattern considerably. That clearly challenges the traditional capital structure theories and capital budgeting analyses where the tax benefits of debt are a major factor when deciding whether to start a new project or not.

Similarly, Mauer and Triantis (1994, p. 1255) claim that "any additional interest tax shields that a levered firm can earn by deviating from the optimal operating policy of an equivalent unlevered firm are counterbalanced by a loss in the value of its operating options. Thus a levered firm has little incentive to alter operating policy".

An excellent contribution to the literature on dynamic models was given by DeAngelo et al. (2011), whose model yields a rich set of predictions that link capital structure to variation in the volatility of shocks to investment policy, the serial correlation of such shocks, and the marginal profitability of investment. The model differs from earlier studies because it considers the effect of *transitory debt*, i.e. extra debt issued to fund investment which represents a deliberate – but temporarily – deviation from the target leverage. Since firms will move away from target to fund new investment, it is very likely that the *speed of adjustment* (SOA) to the leverage target will be slow, which is consistent with the literature.

2.4.5. The opportunity cost of financing decisions

Several scholars have been applying dynamic models of capital structure to evaluate the option of deferring debt financing. DeAngelo et al. (2011, p.235) claim that the option to issue debt is a scarce resource whose optimal intertemporal utilization depends on both current and prospective shocks. This reinforce the idea that having the option to issue debt to fund future investments is valuable, especially considering that investments are endogenous.

Basically, every source of capital is expensive:

a) *equity issuance* costs are related to the information asymmetry between managers and shareholders, as well as flotation costs;

b) *holding cash* incurs agency costs, and it can also reflect corporate taxes;

c) *debt capacity* is finite, thus increasing it to dangerous levels may represent a significant increase in bankruptcy costs and interest rates.

Consequently, there is a trade-off between borrowing today and tomorrow. If a firm decides to use debt today, it should consider the cost of its inability to use new debt tomorrow. Therefore, the opportunity cost of financing decisions implies more conservative targets than those predicted by trade-off theories of capital structure, as the firm loses the option to borrow at equivalent terms in the future.

Goldstein et al. (2001) also try to determine the optimal capital structure strategy of a firm when it has the option to increase debt levels in the future. According to their study, a firm's option to borrow in the future has two immediate consequences:

1) at first, financial managers will choose to rely less on debt in comparison to equivalent firms which follow a static capital structure strategy;

2) given an initial level of leverage, bonds from firms which have the option to issue new debt in the future are riskier than bonds from firms constrained to not issuing debt again.

These consequences may explain why traditional trade-off models predict higher target debt ratios from those empirically observed, as well as too low yield spreads. The intuition of these results are straightforward: since the firm has the option to increase its leverage in the future, it will wait until firm value rises to the point where it becomes optimal to exercise this option (Goldstein et al. 2001, p.505).

It is noteworthy that firms usually have the option to issue new debt regardless of the current bondholders' interests, even though there are covenants which can be stipulated to

protect the latter's rights. Moreover, in case of a bankruptcy, it is very likely that all unsecured debt will have the same recovery rate, whatever the bonds issuance date is. That is why the risk associated with these bonds are higher in comparison to firms which do not issue further debt.

Demonstrating these outstanding predictions is not an easy task. DeAngelo et al. (2011) represents a great example in this sense, as it manages to demonstrate that leverage targets are not a function of only bankruptcy costs and tax advantages of debt, but also of the probability distribution of investment opportunities, external equity financing costs, and the costs of holding cash. Considering that the opportunity cost of financing decisions is one of the most important findings in the capital structure research recently, investigating further its effects and formalizing its predictions should be the main objective of future studies.

2.5. An international perspective on capital structure

Capital structure theories have been mostly developed and tested in the single-country context. A large number of studies have been conducted to date investigating to what extent firm-specific factors affect capital structures of firms operating within a specific country.

De Jong et al. (2008) examined the role of these factors in a large sample of 42 countries, divided equally between developed and developing countries, for the period 1997-2001. Their main objective was to analyse the role of various country-specific factors in determining corporate capital structure. They distinguish two types of effects: the direct effect of country factors on corporate leverage and the indirect effect through their influence on firm-specific factors.

They found that the impact of several firm-specific factors like tangibility, firm size, risk, growth and profitability on cross-country capital structure is significant and consistent with the prediction of conventional capital structure theories. On the other hand, they also observe that in each country one or more firm-specific factors are not significantly related to leverage. For a very small number of countries, results are inconsistent with theoretical predictions.

Analyzing the direct impact of country-specific factors on leverage, the evidence suggests that creditor right protection, bond market development, and GDP growth rate have a significant influence on corporate capital structure. In measuring the impact indirectly, they found evidence for the importance of legal enforcement, creditor/shareholder right protection,

and macroeconomic measures such as capital formation and GDP growth rate. The finding implies that in countries with a better legal environment and more stable and healthier economic conditions, firms are not only likely to take more debt, but the effects of firm-level determinants of leverage are also reinforced.

Overall, the evidence provided in their study highlights the importance of country-specific factors in corporate capital structure decisions. Their conclusion is that country-specific factors do matter in determining and affecting the leverage choice around the world, and it is useful to take into account these factors appropriately in the analysis of corporate capital structure. If the limitations of data, especially the number of countries, can be overcome, one might find even more significant results with respect to the direct as well as indirect impact of country-specific factors.

Fan et al. (2012) analysed a sample consisting of 36,767 firms from 39 developed and developing countries for the period of 1991-2006, totalling 272,092 firm-years. Results show that a country's legal and tax system, the level of corruption and the preferences of capital suppliers explain a significant portion of the variation in leverage and debt maturity ratios. Their evidence indicates that firms in countries which are viewed as more corrupt tend to use less equity and more debt – especially short-term debt – while firms operating within legal systems that provide better protection for financial claimants tend to have capital structures with more equity, and relatively more long-term debt. In addition, the existence of an explicit bankruptcy code and/or deposit insurance is associated with higher leverage and more long-term debt.

They also claim that firms tend to use more debt in countries where there is a greater tax gain from leverage, while firms in countries with larger government bond markets have lower leverage, suggesting that government bonds tend to crowd out corporate debt. Countries with more extensive defined benefit pension funds have higher debt ratios and longer debt maturities, whereas those with more extensive defined contribution fund activities have lower debt ratios. In addition, debt ratios are lower in countries that limit the bond holdings of pension funds.

Another international comparison of capital structures was made by Desai et al. (2004), who analyse the capital structure of foreign affiliates and internal capital markets of multinational corporations. Their empirical work considers data collected by the Bureau of Economic Analysis (BEA) for its Benchmark Survey of U.S. Direct Investment Abroad in 1982, 1989 and 1994, which includes information on the financial and operating characteristics of U.S. firms operating abroad. As a result of confidentiality assurances and

penalties for noncompliance, BEA believes that coverage is close to complete and levels of accuracy are high.

Results show that 10% higher local tax rates are associated with 2.8% higher debt/asset ratios, with internal borrowing being particularly sensitive to taxes. Multinational affiliates are financed with less external debt in countries with underdeveloped capital markets or weak creditor rights, reflecting significantly higher local borrowing costs. Instrumental variable analysis indicates that greater borrowing from parent companies substitutes for three-quarters of reduced external borrowing induced by capital market conditions. Moreover, multinational firms appear to employ internal capital markets opportunistically to overcome imperfections in external capital markets.

Antoniou et al. (2008) say that there are virtually no studies dedicated to the analysis of the implications of the financial orientation of the economy. However, an understanding of the implications of the traditions of capital market-oriented and bank-oriented economies on the capital structure decision is important because they have direct implications on the sources of funds available to the corporate sector. It is particularly important in the light of the extant literature that shows the environment in which firms operate differs across countries.

Their paper tries to fill this gap. The selection of sample countries is motivated by the existence of distinct financial and institutional traditions prevailing in the five major economies of the world – France, Germany, Japan, the U.K., and the U.S. On the basis of their financial and institutional traditions, these countries can be categorized into two groups: *(1)* market-based economies (the U.S. and the U.K.); and *(2)* bank-based economies (Germany, Japan, and France). These two groups also coincide with the split between common law and code law countries, respectively. The sample comprises all non-financial firms, including dead firms, traded in the major stock exchanges of the sample countries. The choice of the sample period, from 1987 to 2000, is guided by the availability of data and the objective of maintaining the same time frame to allow for comparability. The final sample comprises 4,854 firms (244 French, 479 German, 1,442 Japanese, 1,562 English and 1,127 American) with 57,134 firm-year observations (2,513 for France, 5,744 for Germany, 18,963 for Japan, 16,363 for the U.K., and 13,551 for the U.S.).

Results reveal considerable similarities and differences in the determinants of capital structures of firms operating in capital market-oriented and bank-oriented economies. A positive effect of firm size and inverse impact of growth opportunities, term structure of interest rates, and share price performance on leverage is found in all the sample countries. However, the impacts of asset tangibility, equity premium, profitability, and the effective tax

rate vary across countries, suggesting that differences in the countries' institutional arrangements and traditions may contribute to the capital structure decisions of firms. The factors that were identified in earlier studies are found to be more relevant for firms operating in capital market-oriented economies than for firms operating in bank-oriented economies. These findings confirm that:

a) the lessons learned from the experience of a particular type of economy cannot necessarily be generalized to firms operating in other types of economies;

b) in deciding on a firm's financing mix, managers need to consider not only firm-specific factors but also general market conditions.

Finally, firms appear to have target leverage ratios but the speed at which they adjust their capital structure toward the target varies by country with French firms being the fastest and Japanese firms the slowest (considering only the G5 countries).

CHAPTER THREE

FORMULATING AND TESTING A SIMPLE MODEL OF CAPITAL STRUCTURE

3.1. Overview

An important and recurrent discussion topic among scholars is the optimal configuration of a country's financial system in order to sustain the competitiveness and the growth of an economy. Since the 19th century, several studies demonstrated the merits of bank-based and market-based financial systems in promoting long-run economic growth. However, as noted earlier, Antoniou et al. (2008) claim that there are virtually no studies dedicated to the analysis of the implications of the financial orientation of the economy on a firm's capital structure.

This dissertation tries to fill this gap. After analyzing the differences between market-oriented and bank-oriented financial systems, the chapter formalizes the hypothesis set to be tested. The final set includes the relation between firm-specific factors and leverage, as well as a number of market-related variables which can potentially alter a firm's capital structure.

The sample includes three European countries which, based on their financial and institutional traditions, can be divided into two categories: *(1)* Germany and Italy, which are known for having a bank-oriented financial system; and *(2)* the United Kingdom, one of the most developed market-based economies. This division also corresponds to the split between code-law (Germany and Italy) and common law (U.K.) countries.

Once variables and the sample are defined, the chapter develops a simple model of capital structure in order to reach the two main objectives of this dissertation: *(1)* to analyse the validity of current theories of capital structure, as well as *(2)* to understand if there are important dissimilarities in the way financial managers choose their firm's capital structure in different financial systems.

First, the model is estimated with pooled data from all countries, so that the effect of corporate governance factors and country-specific factors can be evaluated. Then, there is a cross-country comparison of firm-specific factors, which identifies the main variables affecting a firm's capital structure in each nation from the sample. Finally, the model estimates the speed of adjustment in Germany, Italy and in the U.K.

3.2. Implications of a country's financial orientation

3.2.1. Market-oriented financial system

A financial system is said to be market-based when financial markets (also known as securities exchanges or stock markets) are the primary source of capital. This financial system is often referred to as *arm's length market*, i.e. a financial market consisting of parties that have no relationship or contact with one another aside from the transaction at hand. An arm's length market is based on the principle that parties should have equal influence in transaction, consequently removing opportunities for deals derived from personal relationships which may manipulate the market.

Schmuckler and Vesperoni (2001) say that highly liquid security markets reduce incentives for traders to control the behaviour of managers. Corporate bonds, which usually do not contain provisions for inside monitoring, can be freely traded in liquid markets. Such liquidity allows bondholders to 'penalize' bad management, what saves resources allocated to exercise some control over corporations.

For bondholders, this is a great advantage, as it is widely known that the lenders' evaluation of managers and firm performance may be an expensive activity. Moreover, bonds are more liquid than bank loans because of the a trade-off between liquidity of financial instruments and control of debtors. In fact, unsecured business loans require banks to control the activities and management of borrowers, implying the costly collection of inside information. As a result, the presence of asymmetric information prevents the liquid trading of bank loans.

Given that banks spend resources to collect information, De Fiore and Uhlig (2005 and 2011) say that bond financing is generally a less costly choice in comparison with bank loans. However, according to their study, the former is also riskier than the latter, because "a situation of financial distress can only be resolved with liquidation and with the complete loss of the firm's initial net worth" (De Fiore and Uhlig 2005, p.7).

3.2.2. Bank-oriented financial system

Bank-oriented financial systems are focused on banking and the long-term relationship between banks and firms. The main source of funding for firms operating in these economies is, consequently, bank loans. The countries in the euro area and Japan, for instance, are notoriously known to be bank-oriented, even though this is slightly changing (especially in

the eurozone).

Lee (2012) claims that bank-oriented systems tend to accentuate the positive impact and role of banks in collecting funds, identifying feasible and profitable projects, managing risk and monitoring managers. As a result, banks tend to be more effective than markets in financing the economy's expansion in under-developed countries. Moreover, banks can also be more effective in providing resources to innovative start-ups that require staged financing, as they can realistically commit to further finance the activity as the project develops.

While market-oriented systems offer the possibility to finance an activity with a variety of liquid financial instruments, bank-oriented economies promote long-term relationships between financial institutions and firms, making it easier and cheaper to operate corporate control. Consequently, the two systems might represent a better financing choice for different firms. Banks may be a better choice for new entrepreneurs, while public markets are usually the preferred choice of mature and less-riskier firms.

One advantage of bank-oriented systems is that long-term relationships between intermediaries and firms can extend the debt maturity, generally at better rates in comparison with banks from market-oriented systems. Moreover, bank loans are usually easier to renegotiate than bonds.

Regarding firm's capital structure, empirical results show that debt-to-equity ratio is lower in market-oriented systems in comparison with bank-oriented systems. The model therefore should be able to demonstrate how firms in bank-oriented economies behave in case of investment shocks, considering that, at least theoretically, their debt capacity is generally lower than their peers' ones in market-based systems.

3.2.3. Related literature

Schmuckler and Vesperoni (2001) performed an interesting analysis of how global financial crises may affect economies from both systems, which turns to be quite useful nowadays considering the financial crisis the world has been living since 2007. Their sample contains data on firms from two bank-based countries (Argentina and Indonesia) and five market-based systems (Brazil, Mexico, Malaysia, South Korea, and Thailand). The countries in the sample are of particular interest, since they have undergone periods of financial repression, followed by financial liberalization and crises. After removing outliers and firms that are in the sample for less than three years, the final sample is left with around 800 firms, mostly large companies (given the availability of data).

During a crisis, banks are able to continue lending to healthy firms, as their enormous amount of inside information give them the possibility to choose the best borrowers. On the other hand, markets tend to be hardly affected when foreign shocks hit the domestic economy. Since the stock prices of most firms are likely to drop, it may be difficult to make a distinction between healthy and non-healthy firms.

These reasons suggest that firms from bank-based systems might suffer less from global financial crises than firms from market-based systems. However, if the financial crisis hits the banking sector, firms from bank-based economies will be subject to the difficulties faced by their financial intermediaries.

The study finds out that debt-to-equity ratios among the countries considered are consistently higher in market-based economies, and such relation holds both for short-term and long-term debt. This is a surprising fact, given that one would expect equity values (relative to debt) to be higher in market-based economies. Second, there are no significant differences in the maturity structure of debt in bank-based and market-based economies.

The results suggest that market-oriented systems' greater liquidity does not necessarily imply shorter debt maturity in comparison with bank-based economies. Moreover, access to international bond markets increases debt maturity in both types of systems, as well as increases debt-to-equity ratios in bank-oriented economies, suggesting that their domestic financial sector may be liquidity constrained.

Finally, it is important to notice that in this particular study from Schmuckler and Vesperoni (2001), the difference between developed and emerging markets is apparently more significant than the difference between financial systems themselves.

Beck and Levine (2002) don't find any significant evidence for both market-based and bank-based hypothesis (thus no potential impact on firm's capital structure other than the differences between both systems already mentioned by other scholars). Instead, their study mentions two other theories which can better answer some of their questions regarding industrial growth patterns and capital allocation efficiency.

The *financial services* view argues that the bank-oriented versus market-oriented debate is of second-order importance. This theory claims that the most important issue should be the system's ability to ameliorate transaction costs and information, not whether markets or banks provide such services. Moreover, markets and banks may act as complements when it comes to financial services.

On the other hand, the *law and finance view* stresses the role of a country's legal system in determining the level of financial development. This theory believes that it is more useful

to distinguish countries by the efficiency of their legal system in supporting financial transactions instead of distinguishing them by financial structure.

The cross-country regressions indicate that capital is more efficiently allocated in countries with well-developed financial systems and more efficient legal systems, which supports the financial services and law and finance views. Industries that are heavy users of external finance grow faster in countries with higher overall levels of financial development and in countries with efficient legal systems. Moreover, the findings show that the overall level of financial development along with effective contract enforcement mechanisms foster new establishment formation and more efficient capital allocation.

On the other hand, the study concludes that measuring whether a country is bank-based or market-based does not help explain industrial growth patterns nor the efficiency of capital allocation (Beck and Levine 2002, p.175).

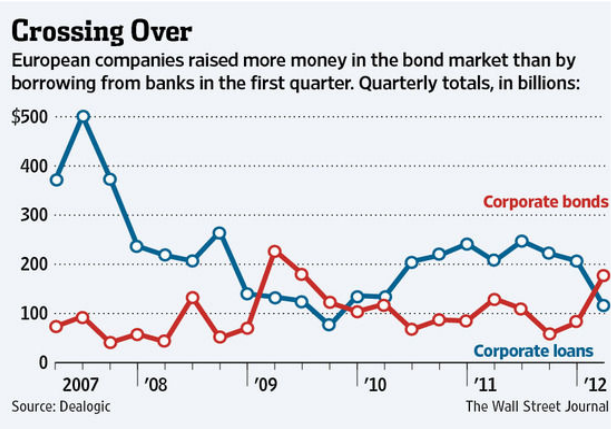
The importance of a country's legal system – thus the law and finance view – is also supported by De Fiore and Uhlig (2011), who say that countries with more effective legal protection of shareholders and creditors (e.g., common law countries such as the United Kingdom and the United States) are those where entrepreneurs have higher valuation of securities and broader access to capital markets relative to countries with lower legal protection (e.g., civil law countries, such as Italy, Germany, and most countries whose legal system is based on Roman law).

In other words, the law and finance view predicts that, *ceteris paribus*, there is a stronger role of market finance and an easier access to equity in common law countries. Moreover, according to this theory, firms in common law countries are able to obtain external finance at better terms in comparison to civil law countries.

De Fiore and Uhlig (2005, p.6) suggest that there are substantial differences in the financial structure across countries. For instance, investment of the corporate sector relies much more heavily on bank finance in the euro area than in the US. In 2001, bank loans to the corporate sector amounted to 42.6% of GDP in the euro area, and to 18.8% in the US. Conversely, outstanding debt securities of non-financial firms and stock market capitalization amounted respectively to 6.5% and 71.7% in the euro area, and to 28.9% and 137.1% in the US.

European firms' capital structure, however, seems to be radically changing in the recent years. According to The Wall Street Journal (Cimulluca and Muños, 2012), European companies are swarming to the corporate-bond market for financing and vastly reducing their reliance on banks, a move that could mark a significant change in the region's financial

Figure 8.
Bank finance versus bond finance in Europe



landscape. During the first quarter of 2012, European companies borrowed more from the bond market than they did from banks. That is a rare phenomenon in Europe, where banks have long dominated lending. The shift to borrowing in financial markets, while potentially only temporary, is important given European companies' history of borrowing from banks. In the first quarter of 2007, for example, loan volume was five times bond issuance.

The only other period in which bonds topped bank lending as a source of corporate funding in Europe in recent years came during the first three quarters of 2009, when global financial institutions were still reeling from the financial crisis. Bond markets recovered relatively quickly, while banks continued to curb lending for some time. This time around, Europe's banks are dealing with the fallout from the European sovereign-debt crisis. They also are facing more pressure from regulators to increase their capital and improve the quality of their assets. Those pressures have combined to reduce their willingness to lend.

Nevertheless, De Fiore and Uhlig's (2005 and 2011) empirical evidence – such as the lower debt-to-equity ratio and the lower share of bank loans in the US relative to the euro area – provides valuable support to the theory that a country's legal and institutional system is an important factor to define a firm's capital structure. An interesting result of De Fiore and Uhlig's model is that the interest rate spreads on bank loans are lower in the euro area, whereas there are no significant differences in spreads on bond markets in Europe and the US. One of the reasons why bank loans' interest rates are lower in Europe may be the long-term relationship between intermediaries and firms (and consequently bank's inside information) which characterises bank-oriented economies.

This is at odds with the lower cost implication of higher legal protection in the United States, but it is consistent with De Fiore and Uhlig's model which emphasizes differences in fundamentals. Their model explains these differences as due to relatively lower availability of public information about firms' credit worthiness and higher need for the flexibility and information acquisition role offered by banks in the euro area. De Fiore and Uhlig's model is therefore an important complement and addition to an explanation that is based entirely on legal determinants.

3.3. Hypotheses development

3.3.1. Relation between firm-specific factors and leverage

Several studies have already examine the role of firm-specific factors on a firm's capital structure, as noted earlier in chapter two. In this dissertation, however, many of the variables which, according to the literature, can potentially affect a firm's financial structure are observed in more than one country, in order to allow important dissimilarities in financial management behaviour across different financial systems to emerge.

Figure 9 illustrates the firm-specific variables used in this study. The theories of capital structure introduced in chapter one have clear predictions for most of this variables, as demonstrated in chapter two.

Figure 9.
Definition of firm-specific variables

Variables	*Definition*
Book leverage	*Ratio of book value of total debt to book value of total assets.*
Market leverage	*Ratio of book value of total debt to market value of equity plus book value of total debt.*
Profitability	*Ratio of operating profit to book value of total assets.*
Growth opportunities	*Market value to book value ratio.*
Tangibility of assets	*Ratio of net tangible assets to book value of total assets.*
Firm size	*Natural logarithm of total annual sales based on 2005 prices.*
Effective tax rate	*Ratio of total tax to total taxable income.*
Non-debt tax shield	*Ratio of annual depreciation to book value of total assets.*
Earnings volatility	*First difference of annual earnings (% change) minus average of the first differences.*
Share price performance	*Annual change in the share price. On average, a lag of six months is expected to cover the time required for decision making, preparing documents to raise debt or equity capital from the market, seeking approval from the stock exchanges, the issue to be subscribed by the investors, and the effect to appear in the annual books of accounts. Therefore, the change in share price is matched to the month of the firm's fiscal-year end with a six-month lag.*

Source: Antoniou et al. (2008)

A lot was already said to explain why *profitability* and *growth opportunities* are expected to be negatively related to leverage. Due to differences in the financial disclosure in market- and bank-based economies, the effect of growth opportunities is expected to change

according to the country in which the firm operates: the coefficient is very likely to be negative in all financial systems, but with a stronger effect in market-oriented economies in comparison to bank-oriented systems.

In the event of a bankruptcy, *tangible assets* will almost certainly have a market value. On the other hand, this is very unlikely to happen with intangible assets. As a result, firms with more tangible assets will be able to obtain debt financing at better prices, as the risk premium required by lenders is lower in that case. Therefore, it is possible to predict a positive relation between tangible assets and leverage. Since banks usually require collaterals in order to open a credit line, the positive effect of tangible assets is expected to be more pronounced in bank-based systems.

Firm size is an inverse proxy for the probability of bankruptcy. For this reason, large firms have a higher debt capacity, which means they can maximize their tax benefits with an increase in their debt ratio. Due to lower information asymmetry, large firms have easier access to credit markets, being able to finance their operations with lower-cost debt regardless of the economy's financial orientation. Therefore, a positive relation between firm size and leverage is expected in all countries.

In a trade-off approach, the benefits of debt are mainly connected with the tax shield deriving from the interest expenses on debt. Higher a country's *effective tax rate*, higher the chances a firm will finance its operations with new debt. As a result, it is possible to anticipate a positive relation between leverage and effective tax rate.

However, differences in a country's tax system may have an important effect on managers decisions regarding what to do with free cash flow. For example, if the tax system encourages retention (i.e. taxation on dividends are high), it is likely that firms will rely more on internal financing than on debt. The opposite is also true, as there are many tax systems which favours payout against retention. Consequently, the importance of effective tax rate should vary across nations.

There are some alternatives for the tax benefits of debt financing. For example, the tax deduction for depreciation and investment tax credits have the same "tax shield" effect of leverage. Consequently, if firms have significant *non-debt tax shield*, they will be less motivated to use debt.

Although interest on debt has the advantage of being tax-deductible, it represents an important liability to a company. Generally, debt financing comes with very strict contracts, so not being able to pay the principal nor interests back could represent a serious problem to the borrower. In other words, if a firm's earnings vary considerably, there is a greater chance

the firm will not have enough cash to repay its debt. For this reason, *earnings volatility* is anticipated to have a significant negative impact on leverage. The negative relation derives from the behaviour of both contract parties: lenders will consider earnings volatility when calculating the interest rate on the debt, while financial managers will try to reduce the firm's liquidity risk by relying less on debt.

The *share price performance* may also have a considerable effect on leverage. According to the pecking order theory, information asymmetry forces financial managers to sell equity at a discount. As long as the cost of the discount is lower than the benefits of issuing new shares, managers will still use equity financing. If shares are overvalued, this discount will not have any effect in the real wealth of shareholders, thus it can be assumed that managers will issue equity in times of overvaluation. The relation between share price performance and leverage is therefore expected to be negative.

However, it should be said that an inverse relation with market leverage could be an effect of statistical distortions. If there is an increase in share prices, there is evidently an increase in the market value of equity. Conversely, book leverage is independent of this effect.

3.3.2. Market-related variables

The effect of firm-specific variables into a firm's debt ratio is closely related to – sometimes even dependant of – the macroeconomic environment in which the firm operates. Studying different financial systems may be helpful to understand how managers behave when the sources of credit vary considerably, but to fully understand the net impact of a country's financial orientation into a firm's leverage ratio it is necessary to identify other market-related factors which can potentially alter a firm's capital structure. Figure 10 lists the market-related variables used in this study.

Figure 10.
Definition of market-related factors

Variables	*Definition*
Equity premium	*Annual equity risk premium. Source: Damodaran (2013).*
Term structure of interest rate	*Annualized difference between the yields on ten-year government bonds and three-month money market rates (annualized). This variable is matched to the month of the firm's fiscal year-end with a six-month lag for the reasons explained in the case of "share price performance" variable.*
Ownership concentration	*Mean percentage of common shares owned by the largest three shareholders in the 10 largest private non-financial firms.*

Variables	*Definition*
Strength of legal rights index	*Measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending. The index ranges from 0 to 10, with higher scores indicating that these laws are better designed to expand access to credit. Source: The World Bank[5].*
Antidirector rights	*Index showing the level of shareholders rights ranging from zero (weakest) to six (strongest). First introduced by La Porta et al. (1998), the index was revisited and corrected by Spamann (2010).*

If a firm needs to raise capital in a period of high *market equity premium*, it will probably choose to finance its operations with debt. If this is true, a positive relation between market equity premium and leverage is expected. However, the premium may be a sign of investors' overconfidence. In that case the relation between equity premium and debt ratio would be negative, as managers would issue debt to take advantage of the bullish momentum. Therefore, the precise effect of equity premium on equity depends on the premium's source of variation.

Similarly, when long-term interest rates are expected to increase, firms are not very keen on issuing debt. Consequently, it is reasonable to expect a negative relation between *term structure of interest rate* and a firm's debt ratio.

The *ownership concentration* is a decisive factor, as it determines most of the times the intensity with which other firm-specific factors will affect leverage. For instance, it is known that closely-held and family-owned companies will prefer not raising external new equity to avoid the dilution of their ownership structure. This could lead to a higher reliance on internal financing and/or debt, thus firm-specific variables like profitability are expected to have a stronger effect on leverage in companies with a higher ownership concentration.

An important factor when deciding the cost of debt financing (i.e. the interest rate charged by lenders) is the probability it will be paid back one day. For this reason, the *strength of legal rights index* is expected to have an important impact on leverage. If creditor rights are strongly protected and guaranteed by a solid legal system, it is likely that debt financing will increase. Thus, a positive relation between strength of legal rights and leverage is expected to be empirically observed.

Following the same reasoning, the level of shareholders' rights should also be considered, as it can also influence important capital structure decisions. Higher levels of a country's *antidirector rights index* may increase a firm's reliance on equity financing, thus it

5. Available at <data.worldbank.org/indicator/IC.LGL.CRED.XQ>.

is likely to observe a negative relation between this index and debt. The antidirector rights index was introduced by La Porta et al. (1998), and since then it has been used as a measure of shareholder protection in over a hundred articles.

However, a through re-examination of the legal data made by Spamann (2010) leads to corrections for thirty-three of the forty-six countries analysed. According to Spamann's study, the correlation between corrected and original values is only 0.53. As a result, many empirical results established using the original index may not be replicable with corrected values. In particular, the corrected index fails to support a widely influential claim: that shareholder protection is higher in common than in civil law countries.

Including Spamann's (2010) revisited antidirector rights index instead of the original values from La Porta et al. (2008) is an important improvement of this dissertation in comparison with other studies of capital structure.

Figure 11 summarizes the expected effect of all firm-specific and market-related factors on leverage according to the theories of capital structure analysed so far. It also reports the anticipated relation between the variables and debt ratio in the model being developed in this study.

Figure 11.
Anticipated relation between variables and leverage according to different theories of capital structure

	Model	***Trade-off theory***		***Pecking order theory***	
		Static	*Dynamic*	*Original*	*Modified*
Profitability	−	+	−	−	−
Growth opportunities	−	−	−	+	−
Tangibility of assets	+			−	−
Firm size	+	+	+	+	+
Effective tax rate	+/−	+	+		
Non-debt tax shield	−	−	−		
Earnings volatility	−	−	−	−	−
Share price performance	−				
Equity premium	+				
Term structure of interest rate	−				
Ownership concentration	+/−				
Strength of legal rights index	+				
Antidirector rights	−				

3.4. The sample

The choice of the sample countries is motivated by several factors. First, the main objective of this dissertation is to understand if there are any considerable differences in the way managers choose their firm's capital structure according to the country in which they operate. Second, most capital structure studies are tested in the American market, and just a few percentage of them is applied to European countries. Third, there are important differences in the legal systems of European countries, even between those economies with the same financial orientation. The role of legal system may be as important as the financial orientation of the economy, thus analysing countries with different law and order tradition may result in some interesting findings.

Considering all these aspects, the sample includes three European countries, which are among the biggest economies on the planet: Germany, Italy and the United Kingdom. Based on their financial and institutional traditions, they can be divided into two categories: *(1)* Germany and Italy, which – as basically all countries in the Continental Europe area – are known for having a bank-oriented financial system; and *(2)* the United Kingdom, which is one of the most developed market-based economies.

This division also corresponds to the split between code-law (Germany and Italy) and common law (U.K.) countries. Despite having the same financial orientation, Germany and Italy feature significant dissimilarities in their legal system, thus a comparison between these two countries may help shedding light on the discrepancies in managerial behaviour that can be associated with the country's legal origin.

Figure 12.
The structure of panel data

Number of firms			
Years	***Germany***	***Italy***	***U.K.***
3	*5*	*2*	*0*
4	*2*	*5*	*6*
5	*18*	*5*	*27*
6	*31*	*4*	*32*
7	*29*	*22*	*76*
8	*376*	*135*	*714*
Total	***461***	***173***	***855***
Total sample firms			***1,489***

Number of observations			
Year	***Germany***	***Italy***	***U.K.***
2004	*10*	*0*	*4*
2005	*428*	*131*	*509*
2006	*451*	*150*	*690*
2007	*452*	*157*	*749*
2008	*455*	*163*	*792*
2009	*458*	*169*	*814*
2010	*458*	*172*	*809*
2011	*449*	*171*	*817*
2012	*30*	*4*	*183*
Total	***3,191***	***1,117***	***5,367***
Total sample observations			***9,675***

Figure 12 summarizes the sample. It comprises nonfinancial firms – including dead firms – traded in the major stock exchanges of the sample countries. To select the sample, firms with less than three consecutive observations are excluded, as well as firms with missing data. Moreover, firms whose primary SIC code is between 4900 and 4999, between 6000 and 6999, or greater than 9000 are omitted, as the model does not apply to financial, regulated, nor quasi-public companies.

The final sample is made by 1,489 companies (461 German, 173 Italian and 855 English firms) with 9,675 firm-year observations (3,191 for Germany, 1,117 for Italy and 5,367 for the U.K.). The number of years considered reflect the availability of data for all countries. All data are obtained from ORBIS, unless otherwise stated.

Figure 13 summarizes the market-related factors in the sample countries.

Figure 13.
Market-related factors in the sample countries

Equity risk premium			
Year	**Germany**	**Italy**	**U.K.**
2003	4.82%	5.80%	4.82%
2004	4.84%	5.82%	4.84%
2005	4.80%	5.63%	4.80%
2006	4.91%	5.66%	4.91%
2007	4.79%	5.54%	4.79%
2008	5.00%	6.50%	5.00%
2009	4.50%	5.40%	4.50%
2010	5.00%	5.75%	5.00%
2011	6.00%	7.50%	6.00%
2012	5.80%	8.43%	5.80%

Term structure of interest rates			
Year	**Germany**	**Italy**	**U.K.**
2003	1.47%	1.67%	0.55%
2004	2.20%	2.43%	0.45%
2005	1.02%	1.29%	-0.53%
2006	0.97%	1.31%	-0.24%
2007	0.41%	0.62%	-0.39%
2008	-0.42%	0.17%	-0.77%
2009	2.24%	3.38%	2.28%
2010	1.81%	3.37%	2.41%
2011	1.40%	3.33%	2.29%
2012	0.64%	5.24%	0.65%

	Germany	**Italy**	**U.K.**
Ownership concentration	40.08%	47.07%	33.25%
Strength of legal rights index	7 out of 10	3 out of 10	10 out of 10
Antidirector rights	4 out of 6	4 out of 6	5 out of 6

The equity risk premium comes from Damodaran (2013). Germany and the U.K. present the same equity risk level, whereas Italy has a relatively higher risk premium. The spread between Italy and the other two countries vary from 0,75% (2006, 2007 and 2010) to a maximum of 2,63% (2012).

Data needed for calculating the term structure of interest rates was downloaded from Eurostat website. Considering that short-term interest rates have been diminishing since the

2007-2010 financial crisis, the yield curve presented a upward sloping shape in this period. From 2005 to 2008, the U.K. had an inverted yield curve, while Germany faced the same phenomenon in 2008. On the other hand, the recent European debt crisis caused a rapidly increase in the term structure of interest rates in Italy. Overall, the yield curve changed dramatically in the last decade, mostly as a result of the biggest financial crisis since the 1929 Great Depression.

The ownership concentration was calculated observing the data available at the firm's websites. One of the main differences from market- and bank-oriented financial systems is the differences in the shareholder structure. The much higher percentages in Italy and to some extent in Germany demonstrate that these economies still have a strong family business pattern. On the other hand, the U.K. has a much lower ownership concentration, as large-block shareholders are not as common as in bank-based economies.

The strength of legal rights index was obtained from the World Bank website. The differences among sample countries are huge. In the U.K., creditor rights are at the highest level (10 out of 10), while the Italian grade is one of the lowest in the world (3 out of 10). Germany stays in the middle (7 out of 10). Such a vast difference in legal rights system may shed light on the importance of a country's legal system to a firm's capital structure.

Finally, Spamann's (2010) antidirector rights index replaces the original index introduced by La Porta et al. in 1998. Germany and Italy have both a rate of 4 out of 6, whereas the U.K.'s legal system is again considered to better protect lenders (in this case shareholders) in comparison to bank-oriented economies.

Figure 14 has the sample's summary statistics. In this paper, some observations (lower and upper outer values) were hidden in order to improve the significance of the results. More specifically, a few observations were extremely far from the mean, which causes some significant distortions in many variables (for instance the mean itself). Therefore, the following intervals were considered:

a) *Book leverage:* all observations greater than 3 were not considered, for a total of 33 observations hidden (8 out of 3,688 in Germany, 1 out of 1,384 in Italy, and 24 out of 6,840 in the U.K.).

b) *Profitability:* all observations greater than 5 were not considered, for a total of 65 observations hidden (12 out of 3,688 in Germany, and 53 out of 6,840 in the U.K.).

c) *Market-to-book ratio:* all observations smaller than -20 and greater than +20 were not considered, for a total of 430 observations hidden (66 out of 3,688 in Germany,

13 out of 1,384 in Italy, and 351 out of 6,840 in the U.K.).

d) *Effective tax rate:* all observations smaller than -2 and greater than +2 were not considered, for a total of 571 observations hidden (291 out of 3,688 in Germany, 62 out of 1,384 in Italy, and 218 out of 6,840 in the U.K.).

e) *Earnings volatility:* all observations smaller than -2 and greater than +2 were not considered, for a total of 244 observations hidden (31 out of 3,688 in Germany, 16 out of 1,384 in Italy, and 197 out of 6,840 in the U.K.).

Although only a few observations were hidden, regressions were also run for the entire sample in order to demonstrate the impact of outer values. The results can be found in the appendix in the end of this dissertation.

Figure 14.
Summary statistics of firm-specific variables

Book leverage (BL) is the ratio of book value of total debt to book value of total assets. Market leverage (ML) is the ratio of book value of total debt to market value of equity plus book value of total debt. Profitability (PROF) is the ratio of operating profit to book value of total assets. Market-to-book value (MTB) is the ratio of market value to book value, a proxy for growth opportunities. Fixed asset ratio (FAR) is the ratio of net tangible assets to book value of total assets. Firm size (SIZE) is the natural logarithm of total annual sales based on 2005 prices. Effective tax rate (ETR) is the ratio of total tax to total taxable income. Earnings volatility (EV) is the first difference of annual earnings (% change) minus average of the first differences. Non-debt tax shield (NDTS) is the ratio of annual depreciation to book value of total assets. Share price performance (SPP) is the annual change in the share price, which is matched to the month of the firm's fiscal-year end with a six-month lag.

	BL	ML	PROF	MTB	FAR	SIZE	ETR	EV	NDTS	SPP
Germany										
Mean	0.550	0.452	1.187	1.831	0.216	18.731	0.218	0.009	0.034	0.051
Median	0.568	0.452	1.086	1.438	0.167	18.552	0.284	-0.024	0.026	-0.006
Min	0.003	0.002	0.000	-8.266	0.000	7.669	-2.000	-1.114	0.000	-0.995
Max	2.958	1.000	4.986	9.961	0.966	25.900	1.985	1.978	0.781	6.494
Std. dev.	0.242	0.236	0.684	1.633	0.200	2.333	0.433	0.288	0.037	0.499
Skewness	1.234	0.051	1.466	1.338	1.205	0.284	-0.861	1.719	6.248	2.937
Kurtosis	9.577	-0.925	3.780	6.533	1.086	0.481	5.626	9.443	82.344	22.359
Missing obs.	186	710	192	777	178	192	472	688	206	771
Total obs.	3,502	2,978	3,496	2,911	3,510	3,496	3,216	3,000	3,482	2,917
Italy										
Mean	0.653	0.577	0.801	1.685	0.222	19.432	0.293	0.005	0.034	-0.093
Median	0.667	0.595	0.758	1.344	0.170	19.282	0.358	-0.020	0.027	-0.143
Min	0.048	0.012	0.000	-9.176	0.000	14.260	-1.776	-1.108	-0.020	-0.982
Max	2.331	1.000	3.210	9.956	0.948	24.252	1.974	1.989	0.958	4.376
Std. dev.	0.204	0.220	0.441	1.624	0.187	1.684	0.422	0.290	0.042	0.448
Skewness	0.726	-0.371	1.152	0.165	1.264	0.217	-0.768	1.389	10.177	2.394
Kurtosis	7.010	-0.626	3.064	8.634	1.521	-0.184	4.280	9.679	195.747	14.458
Missing obs.	76	294	75	308	76	80	136	264	89	299
Total obs.	1,308	1,090	1,309	1,076	1,308	1,304	1,248	1,120	1,295	1,085
U.K.										
Mean	0.522	0.383	1.052	2.100	0.203	18.021	0.167	0.003	0.033	0.032

	BL	ML	PROF	MTB	FAR	SIZE	ETR	EV	NDTS	SPP
Median	0.499	0.363	0.896	1.591	0.120	18.036	0.206	-0.038	0.020	-0.040
Min	-0.060	-0.003	-0.007	-9.878	0.000	7.257	-1.985	-1.218	-0.048	-0.979
Max	2.984	1.000	4.968	9.945	0.989	26.798	1.955	1.997	9.466	18.720
Std. dev.	0.314	0.235	0.815	2.056	0.217	2.792	0.332	0.388	0.132	0.707
Skewness	1.897	0.354	1.291	0.626	1.354	-0.227	-0.815	1.149	58.078	6.693
Kurtosis	8.640	-0.702	2.085	3.577	1.218	0.267	10.137	4.963	4042.420	121.131
Missing obs.	273	1,185	378	1,540	279	421	463	1,463	289	1,673
Total obs.	6,567	5,655	6,462	5,300	6,561	6,419	6,377	5,377	6,551	5,167

Figure 14 reveals that, on average, German and Italian firms borrow more than firms in the U.K. This is not surprising, as firms in bank-based economies usually have relatively high leverage ratios because of the strong relationship with the banking system. Conversely, in market-based economies such as the U.K., access to equity is easier given the existence of a more mature and bigger market which reduces agency costs of equity.

The relatively low kurtosis for the variables with a fixed interval suggest that the choice of hiding outer values seems to be appropriate. In fact, variables which do not have a specific boundary where observations are considered (for example non-debt tax shield) have much fatter tails.

3.5. The model

To understand the effect of various firm-specific and market-related variables on a firm's debt ratio, it is necessary to model *leverage* as a function of those variables, as in the following equation:

$$Y_{it} = \alpha_0 + Y_{i,t-1}\beta + X_{k,it}\beta_k + \varepsilon_{it} \qquad (17)$$

where Y_{it} is a measure of leverage (book or market) of firm i in year t; α_0 is the constant; $Y_{i,t-1}$ is the leverage (book or market) of firm i in year $t-1$; $X_{k,it}$ is a vector of explanatory variables which includes k factors ($k = 1, ..., 10$) measuring *(1)* profitability, *(2)* growth opportunities, *(3)* tangibility of assets, *(4)* firm size, *(5)* effective tax rate, *(6)* earnings volatility, *(7)* non-debt tax shield, *(8)* share price performance, *(9)* equity risk premium, and *(10)* term structure of interest rates; β and β_k are the coefficients to be estimated, and ε_{it} is the time-varying disturbance term.

Given the multi-dimensional data available, panel data regressions are run. A panel data set contains repeated observations over the same units (individuals, households, firms), collected over a number of periods. The availability of repeated observations on the same

units allows scholars to specify and estimate more complicated and more realistic models than a single cross-section or a single time series would do.

The disadvantages are more of a practical nature: because the same units are repeatedly observed, it is usually no longer appropriate to assume that different observations are independent. This may complicate the analysis, particularly in nonlinear and dynamic models. Furthermore, panel data sets very often suffer from missing observations. Even if these observations are missing in a random way, the standard analysis has to be adjusted.

An important advantage of panel data compared to time series or cross-sectional data sets is that it allows identification of certain parameters or questions, without the need to make restrictive assumptions. In this way it is possible to test the effect of a single parameter movement while taking the others fixed.

In order to understand if there are country-specific determinants of leverage, two country dummy variables representing Germany and the U.K. are added to equation *(17)*. If a country dummy has a significant coefficient, it may be a sign of the existence of some particular country-specific factors which have an impact on firm's capital structure. Equation *(17)* assumes the following structure:

$$Y_{it} = \alpha_0 + Y_{i,t-1}\beta + X_{k,it}\beta_k + \delta_{ij}\beta_j + \varepsilon_{it} \qquad (18)$$

where δ takes the value of 1 if firm i is from country j, and 0 otherwise; and β_j is the coefficient to be estimated in addition to the other *β-type* coefficients.

Finally, to understand the effect of corporate governance factors which differ from country to country, equation *(17)* can be written as:

$$Y_{it} = \alpha_0 + Y_{i,t-1}\beta + X_{k,it}\beta_k + CG_{k,j}\delta_{ij} + \varepsilon_{it} \qquad (19)$$

where $CG_{k,j}$ is a vector of k corporate governance factors ($k = 1, 2, 3$) from country j: *(1)* ownership concentration, *(2)* strength of legal rights index, and *(3)* antidirector rights index.

To verify the existence of a target level of debt ratio, the model introduced by Antoniou et al. (2008, p. 71) is considered. Assuming that the desired leverage ratio, $Leverage^*_{it}$, is a function of k explanatory variables, as in equation *(17)*, then:

$$Leverage^*_{it} = \sum_{k=1} \psi_k X_{kit} + \omega_{it} \qquad (20)$$

where X is a vector of k explanatory variables; ω_{it} is a serially correlated disturbance term

with mean zero and possibly heteroskedastic; and ψ_k are unknown parameters to be estimated and common to all firms.

Equation *(20)* assumes the existence of a target capital structure to each firm, which is determined by several firm- and country-specific factors as in equations *(17)*, *(18)*, and *(19)*. However, given that there are transaction costs for moving a firm's capital structure towards its target, managers do not adjust their leverage ratio very often. This implies a trade-off between the leverage ratio adjustment costs and the cost of being off target. According to Antoniou et al. (2008), this model shows that firms adjust their current debt ratios, $Leverage_{it}$, with the degree of adjustment coefficient θ to attain the desired capital structure as follows:

$$Leverage_{it} - Leverage_{it-1} = \theta(Leverage_{it}^{*} - Leverage_{it-1}) \qquad (21)$$

If $\theta = 1$, the actual change in the debt ratio equals the desired leverage ratio, and there are no transaction costs associated with this adjustment. On the other hand, if $\theta = 0$, there is no adjustment in the debt ratio. This can happen when the adjustment cost is higher than the cost of being off target, or when transaction costs are extraordinarily high. Merging equations *(20)* and *(21)* the result is:

$$Leverage_{it} = (1-\theta)Leverage_{it-1} + \sum_{k=1} \theta\psi_k X_{kit} + \theta\omega_t \qquad (22)$$

In this model, the value of θ measures how quickly firms will adjust their capital structure towards their stipulated target.

3.6. Model estimation: the determinants of leverage

3.6.1. Pooled data for all countries

The data for the three countries – Germany, Italy and the U.K. – is estimated with two country dummy variables representing Germany and the U.K. The dummy variable for a given country takes a value of 1 if the firm operates in that particular country and 0 otherwise. A significant coefficient of a country dummy would suggest that there are country-specific determinants of leverage.

Figure 15 estimates the determinants of capital structure in the sample countries, considering both book leverage and market leverage as the dependent variable.

Figure 15.
Determinants of capital structure in Germany, Italy and the U.K.

	Book leverage		***Market leverage***	
	Coefficient (SE)	*t-statistic*	*Coefficient (SE)*	*t-statistic*
Constant	*0.07459 (0.02715)*	*2.7470 ****	*-0.08090 (0.01857)*	*-4.3559 ****
Dummy Germany	*-0.05144 (0.01022)*	*-5.0321 ****	*-0.03870 (0.00575)*	*-6.7333 ****
Dummy U.K.	*-0.05091 (0.00968)*	*-5.2594 ****	*-0.03917 (0.00551)*	*-7.1101 ****
Book / Market leverage -1	*0.66005 (0.00901)*	*73.2750 ****	*0.74288 (0.00743)*	*99.9780 ****
Profitability	*0.02308 (0.00361)*	*6.3843 ****	*0.00967 (0.00218)*	*4.4364 ****
Growth opportunities	*-0.00804 (0.00097)*	*-8.2941 ****	*-0.02526 (0.00082)*	*-30.9345 ****
Tangibility of assets	*0.01756 (0.01255)*	*1.3993*	*0.01951 (0.00724)*	*2.6935 ****
Firm size	*0.00621 (0.00118)*	*5.2594 ****	*0.00727 (0.00066)*	*10.9801 ****
Effective tax rate	*-0.00733 (0.00384)*	*-1.9101 **	*-0.00696 (0.00333)*	*-2.0921 ***
Earnings volatility	*0.00433 (0.00462)*	*0.9361*	*0.01076 (0.00405)*	*2.6558 ****
Non-debt tax shield	*0.34962 (0.03512)*	*9.9564 ****	*0.03248 (0.01041)*	*3.1204 ****
Share price performance	*-0.00223 (0.00247)*	*-0.9017*	*-0.04130 (0.00226)*	*-18.3118 ****
Equity premium	*0.42417 (0.25767)*	*1.6462 **	*3.36123 (0.23172)*	*14.5056 ****
Term structure of interest rate	*-0.44417 (0.11107)*	*-3.9990 ****	*-2.61671 (0.10474)*	*-24.9824 ****
Firms		*1,468*		*1,464*
Observations		*7,792*		*7,061*

, **, and * indicate that coefficients are significant at the 10%, 5% and 1% levels, respectively.*

A detailed description of firm-specific factors is made in the next paragraph, as the explanatory power of the model when considering those variables improves in the cross-country regressions. What is interesting to notice here is that the country dummy variables are both statistically significant, suggesting that there are some country-specific factors which affect capital structure decisions.

Taking Italy as a benchmark, it is possible to affirm that German and English firms have less debt in comparison to Italian companies. Coefficients also present high t-statistics, demonstrating that these findings are robust.

Figure 16 displays results from regressions including corporate governance factors.

Figure 16.
Determinants of capital structure in Germany, Italy and the U.K., including corporate governance factors

	Book leverage		***Market leverage***	
	Coefficient (SE)	*t-statistic*	*Coefficient (SE)*	*t-statistic*
Constant	1.40390 (0.40257)	3.4873 ***	0.89032 (0.21951)	4.0560 ***
Book / Market leverage -1	0.66005 (0.00901)	73.2750 ***	0.74288 (0.00743)	99.9780 ***
Profitability	0.02308 (0.00361)	6.3843 ***	0.00967 (0.00218)	4.4364 ***
Growth opportunities	-0.00804 (0.00097)	-8.2941 ***	-0.02526 (0.00082)	-30.9345 ***
Tangibility of assets	0.01756 (0.01255)	1.3993	0.01951 (0.00724)	2.6935 ***
Firm size	0.00621 (0.00118)	5.2594 ***	0.00727 (0.00066)	10.9801 ***
Effective tax rate	-0.00733 (0.00384)	-1.9101 *	-0.00696 (0.00333)	-2.0921 **
Earnings volatility	0.00433 (0.00462)	0.9361	0.01076 (0.00405)	2.6558 ***
Non-debt tax shield	0.34962 (0.03512)	9.9564 ***	0.03248 (0.01041)	3.1204 ***
Share price performance	-0.00223 (0.00247)	-0.9017	-0.04130 (0.00226)	-18.3118 ***
Equity premium	0.42417 (0.25767)	1.6462 *	3.36123 (0.23172)	14.5056 ***
Term structure of interest rate	-0.44417 (0.11107)	-3.9990 ***	-2.61671 (0.10474)	-24.9824 ***
Ownership concentration	-2.46734 (0.74249)	-3.3231 ***	-1.80111 (0.39973)	-4.5058 ***
Strength of legal rights index	-0.55988 (0.15246)	-3.6723 ***	-0.41156 (0.08268)	-4.9778 ***
Firms		1.468		1.464
Observations		7.792		7.061

, **, and * indicate that coefficients are significant at the 10%, 5% and 1% levels, respectively.*

The strength of legal rights index presents a surprising inverse relation with both book and market leverage. This may be the consequence of how the sample was organized. The U.K. is the country with the highest index (10 out of 10) and with the lowest leverage ratio. Italy, conversely, has the lowest index (3 out of 10) and the highest leverage ratio. Therefore, other measures of a country's legal system should be considered in order to better understand its implications in capital structure decisions.

3.6.2. Cross-country comparison of firm-specific factors

This paragraph presents a cross-country comparison of firm-specific factors in order to identify which variables are the determinants of a firm's capital structure. To better understand the effects of each variable, both book leverage and market leverage are considered.

Figure 17 shows the results for the regressions with *book leverage* as the dependent variable, while figure 18 considers the effect of the model variables on firms' *market leverage*.

Figure 17.
Determinants of book leverage: cross-country comparisons

	Germany		**Italy**		**U.K.**	
	Coefficient (SE)	t-statistic	Coefficient (SE)	t-statistic	Coefficient (SE)	t-statistic
Constant	-0.21513 (0.13491)	-1.5946	1.26959 (0.18121)	7.0063 ***	0.30562 (0.07830)	3.9032 ***
Book leverage -1	0.48405 (0.01889)	25.6297 ***	0.27835 (0.03410)	8.1631 ***	0.43841 (0.01479)	29.6507 ***
Profitability	-0.04023 (0.00860)	-4.6792 ***	-0.03454 (0.02565)	-1.3468	0.05459 (0.00777)	7.0226 ***
Growth opportunities	-0.00088 (0.00192)	-0.4569	-0.00013 (0.00330)	-0.0405	-0.00845 (0.00141)	-5.9982 ***
Tangibility of assets	0.01845 (0.04349)	0.4243	-0.08269 (0.04487)	-1.8429 *	0.12151 (0.03221)	3.7729 ***
Firm size	0.02723 (0.00742)	3.6686 ***	-0.04623 (0.00910)	-5.0784 ***	-0.00544 (0.00448)	-1.2148
Effective tax rate	-0.00753 (0.00531)	-1.4186	-0.01328 (0.00974)	-1.3627	-0.00036 (0.00596)	-0.0599
Earnings volatility	0.00808 (0.00833)	0.9700	-0.01954 (0.01561)	-1.2519	0.01369 (0.00647)	2.1153 **
Non-debt tax shield	0.91659 (0.08316)	11.0216 ***	0.99037 (0.10304)	9.6116 ***	0.11227 (0.04535)	2.4754 **
Share price performance	-0.00197 (0.00438)	-0.4488	-0.01439 (0.00905)	-1.5895	0.00479 (0.00316)	1.5153
Equity premium	0.03124 (0.42006)	0.0744	1.77786 (0.51031)	3.4839 ***	0.19316 (0.39539)	0.4885
Term structure of interest rate	-0.82471 (0.23529)	-3.5051 ***	0.45049 (0.27450)	1.6412	-0.37664 (0.14280)	-2.6376 ***
Firms		457		172		839
Observations		2,517		964		4,311
R^2		0.871573		0.797108		0.852155

, **, and * indicate that coefficients are significant at the 10%, 5% and 1% levels, respectively.*

Figure 18.
Determinants of market leverage: cross-country comparisons

	Germany		Italy		U.K.	
	Coefficient (SE)	t-statistic	Coefficient (SE)	t-statistic	Coefficient (SE)	t-statistic
Constant	-0.62107 (0.15090)	-4.1159 ***	0.42207 (0.16812)	2.5105 **	0.12416 (0.07523)	1.6503 *
Market leverage -1	0.39815 (0.02078)	19.1592 ***	0.38385 (0.03284)	11.6891 ***	0.35474 (0.01627)	21.8028 ***
Profitability	-0.05245 (0.00815)	-6.4395 ***	-0.10601 (0.02183)	-4.8568 ***	-0.00103 (0.00733)	-0.1405
Growth opportunities	-0.03401 (0.00190)	-17.9244 ***	-0.02731 (0.00270)	-10.1148 ***	-0.03701 (0.00135)	-27.4933 ***
Tangibility of assets	0.12192 (0.04338)	2.8109 ***	-0.02146 (0.03578)	-0.5997	0.04779 (0.03119)	1.5326
Firm size	0.05091 (0.00836)	6.0925 ***	-0.00912 (0.00843)	-1.0823	0.00714 (0.00427)	1.6736 *
Effective tax rate	-0.00435 (0.00500)	-0.8701	-0.00176 (0.00796)	-0.2213	-0.01193 (0.00545)	-2.1894 **
Earnings volatility	-0.00499 (0.00800)	-0.6239	0.05425 (0.01320)	4.1090 ***	-0.00489 (0.00600)	-0.8156
Non-debt tax shield	0.25920 (0.07773)	3.3346 ***	0.11728 (0.07926)	1.4797	0.04175 (0.01456)	2.8683 ***
Share price performance	-0.01837 (0.00434)	-4.2336 ***	-0.04364 (0.00738)	-5.9166 ***	-0.01729 (0.00302)	-5.7271 ***
Equity premium	1.07834 (0.38111)	2.8295 ***	4.56565 (0.38269)	11.9305 ***	1.85651 (0.35547)	5.2228 ***
Term structure of interest rate	-2.73173 (0.22288)	-12.2567 ***	-0.70265 (0.26008)	-2.7016 ***	-1.29957 (0.14415)	-9.0152 ***
Firms		456		172		836
Observations		2,208		837		4,016
R^2		0.907006		0.899600		0.849836

*, **, and *** indicate that coefficients are significant at the 10%, 5% and 1% levels, respectively.

The regressions run in this dissertation follow most of the predictions already made. First of all, it is now absolutely clear that *leverage from the previous year* has an important positive relation with today's leverage. This quite evident relation holds for both book and market leverage.

If market leverage is considered, a negative relation between *profitability* and leverage is verified. The results are consistent with the pecking order theory and with most empirical studies. There is however a curious result. In the U.K., there is an unexpected positive and statistically significant relation between profitability and book leverage. This results would demonstrate one of the main predictions of the trade-off theory, which was proven wrong by several empirical studies.

The positive relation between profitability and leverage, however, does not hold when market leverage is considered. According to many scholars, market leverage is a better proxy

for a firm's debt ratio, an assumption which is actually proven right by the higher R^2 obtained when market leverage is the dependent variable in all regressions in this study.

Although results in Italy when book leverage is considered and in the U.K. when market leverage is considered are not statistically significant, it is likely that profitability does have a negative effect on leverage. To demonstrate that, if the full sample is considered (see figures 26 and 27 in the appendix), coefficients are negative and strongly significant in both cases.

The coefficients for *growth opportunities* are also in accordance with predictions from both the model and several studies on capital structure. The regressions find a negative relation between the variable and both book and market leverage in all countries. This is one of the failures of the original version of the pecking order theory, which predicts a positive relation between growth opportunities and leverage.

The literature suggests that the degree of significance and its relation with leverage changes according to each country, with a stronger effect of growth opportunities in market-oriented economies. That is exactly what the results demonstrate. Coefficients are always higher and with higher t-statistics in the U.K. in comparison to the other countries in the sample.

The cross-country comparison reveals a lower impact in Germany and Italy. This is consistent with the existing literature, which shows that in both countries the largest shareholders are able to closely control and monitor managers, thus reducing the chance of managers to pursue their own objectives at the expense of shareholders.

The results recall what was said by dynamic models of capital structure analysed earlier in paragraph 2.4. More specifically, they may be the proof of the existence of a valuable option to issue debt in the future to fund investments. To understand this effect even better, further regressions should be made considering different investment proxies. Still, results do suggest that high growth firms value the option to keep some extra debt capacity for future investment.

An alternative view says that the inverse relation between growth opportunities and leverage is a sign of higher agency problems. Generally, the cost of debt is higher to high growth firms, as they have higher agency costs and bankruptcy costs. Therefore, the relatively larger coefficient for the English firms would suggest that information asymmetry problems are higher in the U.K.

The *tangibility of assets*, following the model predictions, has a positive and significant relation with market leverage in Germany. In the U.K., on the other hand, the coefficient is much lower and it is not even statistically significant. This would demonstrate that in bank-

based economies tangibility has a more prominent effect in comparison to market-based financial systems, which is likely to be caused by banking practices such as requiring collaterals before issuing a loan.

In the U.K., it is possible that a weaker coefficient when considering market leverage is a result of its financial orientation, since the role of collaterals when raising debt is limited in market-based financial systems. The curious fact is that if book leverage is considered, the U.K. has the strongest positive coefficient. Again, it is preferable to consider market leverage as the proxy for debt ratio, thus results from book leverage regressions are usually the second best.

Results in Italy are somehow inconsistent with the model predictions. For some unknown reason coefficients are negative and not statistically significant when using both book and market leverage. This is quite surprising and some further evaluation should be made before drawing definitive conclusions.

Firm size coefficients are also as predicted in Germany – and to some extent in the United Kingdom – when market leverage is considered. According to figure 18, the effect of firm size on market leverage is much stronger in German firms than in English firms, and the strong t statistics demonstrate that results are statistically significant.

If book leverage is considered, there is a significant negative relation between firm size and leverage in Italy. The Italian case, again, remains a puzzle.

Findings regarding the tax benefit of debt refute one of the most important predictions from the trade-off theory. Apparently, the tax shield deriving from the debt is not as significant as the theory predicts. In the sample considered in this dissertation, there is not a clear relation between *expected tax rate* and book or market leverage. This is a major – maybe the biggest – failure of the trade-off theory.

The only statistically significant result in the sample is obtained in the U.K. when market leverage is considered. In that case, a sort of relation between taxes and leverage does exist, but with a surprising negative sign. Such results – which are in line with other studies analysed earlier in paragraph 2.2.3 – suggest that new models and theories of capital structure should concentrate in other, more important factors to describe a firm's financing decisions.

Non-debt tax shield do not follow the model predictions. The positive relation between this firm-specific factor and leverage is valid in all countries from the sample, with large coefficients in Germany and Italy. According to MacKie-Mason (Antoniou et al. 2008, p. 80), a positive effect is possible when the depreciation of tangible assets is the major component of non-debt tax shields. Moreover, it is also possible that the non-debt tax shield is endogenously

determined since it is a function of investment decisions, which is clearly endogenously determined. An effective tax rate may be a function of non-debt tax shields and including both variables at the same time may raise some concerns.

To test for the implications of this possibility, the model is reestimated in three other forms: first, effective tax rate are excluded but non-debt tax shields are retained; second, non-debt tax shields are excluded but effective tax rate is retained; finally, both the non-debt tax shield and the effective tax rate are excluded from the model. The estimates of these alternative specifications remain qualitatively similar to the estimates of the main model confirming that results from the full version of the model are robust.

Conversely to what was predicted by the model, *earnings volatility* doesn't seem to have a considerable effect on leverage. However, if the whole sample is considered (see figures 26 and 27 in the appendix), it is actually possible to verify the conventional wisdom in Italy. Coefficients (−0.01 for both book and market leverage) demonstrate the expected negative relation between earnings volatility and leverage, with a t-statistic of −4.04 if book leverage is considered and −2.74 if market leverage is the dependent variable. On the other hand, if market leverage and the whole sample is considered (see figure 27 in the appendix) there is a positive relation between this variable and leverage in the U.K., but the coefficient (0.0001) is basically irrelevant.

The effect of *share price performance* on market leverage is negative, as predicted, in all countries from the sample. Such results would suggest that managers, when share prices are overvalued, do issue equity instead of debt, regardless of the information asymmetry problems which result from an equity issuance. However, as noted earlier, an inverse relation with market leverage could be an effect of statistical distortions. To support this, no significant relation between share price performance and book leverage was found. Therefore, it is difficult to know whether the negative relation with market leverage really exists for some intrinsic reasons or if it is just the effect of the mathematical relation underneath the two variables (share price performance and market leverage).

Figure 19.
Determinants of book leverage: bank-oriented vs. market-oriented financial systems

	Bank-oriented		***Market-oriented***	
	Coefficient (SE)	*t-statistics*	*Coefficient (SE)*	*t-statistics*
Constant	*0.42873 (0.10530)*	*4.0714* ***	*0.30562 (0.07830)*	*3.9032* ***

	Bank-oriented		Market-oriented	
	Coefficient (SE)	t-statistics	Coefficient (SE)	t-statistics
Book leverage −1	0.42809 (0.01675)	25.5514 ***	0.43841 (0.01479)	29.6507 ***
Profitability	-0.02344 (0.00826)	-2.8363 ***	0.05459 (0.00777)	7.0226 ***
Growth opportunities	-0.00183 (0.00167)	-1.0921	-0.00845 (0.00141)	-5.9982 ***
Tangibility of assets	-0.03012 (0.03029)	-0.9943	0.12151 (0.03221)	3.7729 ***
Firm size	-0.00778 (0.00563)	-1.3831	-0.00544 (0.00448)	-1.2148
Effective tax rate	-0.00734 (0.00476)	-1.5413	-0.00036 (0.00596)	-0.0599
Earnings volatility	0.00456 (0.00742)	0.6144	0.01369 (0.00647)	2.1153 **
Non-debt tax shield	0.94393 (0.06385)	14.7833 ***	0.11227 (0.04535)	2.4754 **
Share price performance	-0.00639 (0.00398)	-1.6044	0.00479 (0.00316)	1.5153
Equity premium	1.07502 (0.31567)	3.4056 ***	0.19316 (0.39539)	0.4885
Term structure of interest rate	-0.12451 (0.17277)	-0.7207	-0.37664 (0.14280)	-2.6376 ***
Firms		629		839
Observations		3,481		4,311
R^2		0,854796		0.852155

*, **, and *** indicate that coefficients are significant at the 10%, 5% and 1% levels, respectively.

Figure 20.
Determinants of market leverage: bank-oriented vs. market-oriented financial systems

	Bank-oriented		Market-oriented	
	Coefficient (SE)	t-statistics	Coefficient (SE)	t-statistics
Constant	-0,04355 (0,11093)	-0,3926	0.12416 (0.07523)	1.6503 *
Market leverage -1	0,42124 (0,01775)	23,7314 ***	0.35474 (0.01627)	21.8028 ***
Profitability	-0,04996 (0,00759)	-6,5766 ***	-0.00103 (0.00733)	-0.1405
Growth opportunities	-0,03355 (0,00158)	-21,2471 ***	-0.03701 (0.00135)	-27.4933 ***
Tangibility of assets	0,02856 (0,02818)	1,0135	0.04779 (0.03119)	1.5326
Firm size	0,01593 (0,00595)	2,6764 ***	0.00714 (0.00427)	1.6736 *
Effective tax rate	-0,00412 (0,00433)	-0,9514	-0.01193 (0.00545)	-2.1894 **

	Bank-oriented		***Market-oriented***	
	Coefficient (SE)	*t-statistics*	*Coefficient (SE)*	*t-statistics*
Earnings volatility	*0,01790 (0,00688)*	*2,6016 ****	*-0.00489 (0.00600)*	*-0.8156*
Non-debt tax shield	*0,16877 (0,05623)*	*3,0014 ****	*0.04175 (0.01456)*	*2.8683 ****
Share price performance	*-0,03156 (0,00375)*	*-8,4233 ****	*-0.01729 (0.00302)*	*-5.7271 ****
Equity premium	*3,01915 (0,27084)*	*11,1476 ****	*1.85651 (0.35547)*	*5.2228 ****
Term structure of interest rate	*-1,64587 (0,16689)*	*-9,8618 ****	*-1.29957 (0.14415)*	*-9.0152 ****
Firms		*628*		*836*
Observations		*3,045*		*4,016*
R^2		*0,905921*		*0.849836*

, **, and * indicate that coefficients are significant at the 10%, 5% and 1% levels, respectively.*

Some interesting conclusions can be drawn from figures 19 and 20. For example, *profitability* seems to have a stronger effect in bank-oriented financial systems in comparison to market-based economies. One of the causes for this discrepancy in results could be that access to equity financing is easier and "cheaper" in market-based economies (since agency costs of equity are lower in those countries), thus firms in the U.K. probably rely less on internal financing than firms from bank-based financial systems.

For the rest, most variables follow the predictions made earlier, apart from the fact that *tangibility of assets* is not as important as predicted, which is quite surprising. Also, the positive and statistically significant relation between *earnings volatility* and market leverage in bank-oriented financial systems remains a puzzle.

Finally, results reinforce the idea that market leverage is the first best proxy to a firm's debt-to-equity ratio, as the model explanatory power increases considerably in comparison to the model that considers book leverage as the dependent variable.

3.6.3. Cross-country comparison of market-related factors

Results show that predictions about the effect of *equity risk premium* on both book and market leverage were absolutely right. The coefficients are always positive in all sample countries, although they are statistically significant only when market leverage is considered (exept Italy where coefficients are always significant). Therefore, it is possible to assume that firms do consider moving to debt financing when equity financing costs increase in both bank-based and market-based economies.

The *term structure of interest rates* also has a considerable impact on a firm's capital structure. In fact, the inverse relation with leverage is proven to be true in all countries (except in Italy when book leverage is considered but, again, that is the second best result), which means that an upward sloping yield curve tends to reduce leverage ratios in all nations.

3.7. Target leverage and speed of adjustment

The panel data regressions displayed in figures 17, 18, 19 and 20 have all a positive and strongly significant coefficient for the one-period lagged measure of leverage (both book and market leverage). According to Antoniou et al. (2008), if the coefficient β from equation *(17)* is between zero and one, it is possible to affirm that estimates are stable and that the leverage ratio converges to its desired level over time. Such behaviour is consistent with the survey made by Graham and Harvey (2001) about target debt-to-equity ratios shown in paragraph 2.2.1.

Equation *(17)* is, to some extent, a dynamic model of capital structure, as it includes the one-year lagged variable $Y_{i,1\text{-}t}$. Figure 21 displays the results of a regression run with the following static model of capital structure, which does not include the lagged variable $Y_{i,1\text{-}t}$:

$$Y_{it} = \alpha_0 + X_{k,it}\beta_k + \varepsilon_{it} \qquad (23)$$

Figure 21.
Determinants of market leverage measured with a static model of capital structure

	Germany		***Italy***		***U.K.***	
	Coefficient (SE)	*t-statistic*	*Coefficient (SE)*	*t-statistic*	*Coefficient (SE)*	*t-statistic*
Constant	*-0,65673 (0,13433)*	*-4,8891 ****	*0,33732 (0,16254)*	*2,0753 ***	*0,17753 (0,07535)*	*2,3562 ***
Profitability	*-0,03882 (0,00836)*	*-4,6410 ****	*-0,08555 (0,02283)*	*-3,7464 ****	*0,02619 (0,00730)*	*3,5864 ****
Growth opportunities	*-0,04024 (0,00192)*	*-21,0013 ****	*-0,03842 (0,00297)*	*-12,9197 ****	*-0,04127 (0,00135)*	*-30,5273 ****
Tangibility of assets	*0,20627 (0,04335)*	*4,7581 ****	*-0,05701 (0,04041)*	*-1,4109*	*0,06766 (0,03082)*	*2,1956 ***
Firm size	*0,06179 (0,00741)*	*8,3376 ****	*0,00261 (0,00820)*	*0,3177*	*0,01324 (0,00433)*	*3,0617 ****
Effective tax rate	*-0,00084 (0,00531)*	*-0,1585*	*-0,01231 (0,00877)*	*-1,4035*	*-0,00989 (0,00577)*	*-1,7124 **
Earnings volatility	*-0,02853 (0,00824)*	*-3,4618 ****	*0,00123 (0,01406)*	*0,0878*	*-0,02490 (0,00622)*	*-4,0045 ****
Non-debt tax shield	*0,37287 (0,08264)*	*4,5123 ****	*0,07265 (0,09246)*	*0,7858*	*0,05615 (0,01595)*	*3,5208 ****

	Germany		Italy		U.K.	
	Coefficient (SE)	t-statistic	Coefficient (SE)	t-statistic	Coefficient (SE)	t-statistic
Share price performance	0,00739 (0,00434)	1,7024 *	-0,01951 (0,00815)	-2,3927 **	-0,00554 (0,00306)	-1,8094 *
Equity premium	0,35732 (0,41986)	0,8510	5,09932 (0,45838)	11,1246 ***	0,46538 (0,38102)	1,2214
Term structure of interest rate	-1,28494 (0,23527)	-5,4616 ***	1,41471 (0,24518)	5,7701 ***	0,18716 (0,13815)	1,3547
Firms		457		172		839
Observations		2,523		965		4,323
R^2		0,845774		0,815245		0,767504

*, **, and *** indicate that coefficients are significant at the 10%, 5% and 1% levels, respectively.*

The lower R^2 from static model regressions suggests that dynamic models are more powerful in explaining capital structure decisions in all sample countries. The explanatory power of the one-year lagged variable $Y_{i,1-t}$, therefore, could be a sign that firms in the sample countries do have *leverage targets*. Such conclusion suggests that there is a sort of dynamism in the capital structure decision, as firms apparently adjust their leverage in order to reach their target debt ratio.

According to equation *(22)*, the coefficient β from equation *(17)* is equal to $(1 - \theta)$. Therefore, the speed of adjustment to leverage targets θ can be calculated as:

$$\theta = 1 - \beta \tag{24}$$

Figure 22 shows the speed of adjustment for Germany, Italy and the U.K. for both book and market leverage.

Figure 22.
Speed of adjustment for the sample countries

	Germany	Italy	U.K.
Book leverage	0,51595	0,72165	0,56159
Market leverage	0,60185	0,61615	0,64526

Germany has the slowest speed of adjustment among the countries considered. Apparently, German firms can slowly adjust towards their target debt ratio without incurring substantial agency costs, as they have a strong relationship with their lenders. Moreover, it is likely that the cost of being off target relative to adjustment costs is lower in Germany than in

other countries.

If market leverage is considered (market leverage is always the first best proxy), Italy has a very similar speed of adjustment to Germany. This is not surprising, as Italian firms also have close ties with their creditors. Conversely, the U.K. has the highest SOA. Therefore, it is possible to say that bank-oriented financial systems generally have a slower SOA in comparison to marked-oriented economies, which is justified by their financial system's structure and traditions.

CONCLUSIONS

A thorough analysis of the main capital structure theories and the empirical tests run in three different countries gave an important contribution to reaching the main objectives of this dissertation: *(1)* to analyse the validity of current theories of capital structure, and *(2)* to understand if there are important dissimilarities in the way financial managers choose their firm's capital structure in different financial systems.

The empirical evidence displayed in this study finds it difficult to demonstrate the validity of trade-off and pecking order theories as stand-alone models. Denis (2012) claims that perhaps the most significant challenge to the pecking order hypothesis is the large number of firms who behave in a manner that is inconsistent with the most basic predictions of the theory. It is important to recall that under the pecking order theory, firms issue equity only as a last resort. In practice, however, a strikingly large number of firms show a strong preference for equity financing over debt financing.

Corporate finance scholars have also identified several pieces of evidence that are inconsistent with standard trade-off models. Because more profitable firms should have a lower probability of distress, trade-off models predict a positive association between leverage and profitability. In contrast to this prediction, however, one of the most robust findings in cross-sectional studies is the negative association between leverage and profitability.

Considering this dissertation's sample countries, results regarding the tax benefit of debt refute one of the most important predictions from the trade-off theory. Based on this model, it would appear that the tax shield deriving from the debt is not as significant as the theory predicts, as the model does not find a clear and significant relation between *expected tax rate* and book or market leverage. This is a major – maybe the biggest – failure of the trade-off theory. Such results, which are in line with other studies analysed in paragraph 2.2.3, suggest that new models and theories of capital structure should concentrate in other, more important factors to describe a firm's financing decisions.

The regressions run in this dissertation follow most of the predictions made when the hypothesis set was determined. All panel data regressions in this paper reinforce the idea that *market leverage* is the first best proxy for a firm's debt-to-equity ratio, as the model explanatory power increases considerably when market leverage is used as the dependent variable instead of book leverage.

Figure 23 summarizes the findings.

Figure 23.
Verified relation between variables and market leverage

	Predicted	Germany		Italy		U.K.	
Profitability	–	–	***	–	***	–	***
Growth opportunities	–	–	***	–	***	–	***
Tangibility of assets	+	+	***	–		+	***
Firm size	+	+	***	–		+	**
Effective tax rate	+/–	–		–		–	
Non-debt tax shield	–	+	***	+	***	+	***
Earnings volatility	–	–		–	***	–	
Share price performance	–	–	***	–	***	–	***
Equity premium	+	+	***	+	***	+	***
Term structure of interest rate	–	–	***	–	***	–	***
Ownership concentration	+/–						
Strength of legal rights index	+						
Antidirector rights	–						

, **, and * indicate that coefficients are significant at the 10%, 5% and 1% levels, respectively.*

Moreover, the literature suggests an inverse relation between growth opportunities and market leverage, with a stronger effect of growth opportunities in market-oriented economies. That is exactly what happens, as the cross-country comparison reveals that coefficients are always higher and with higher t-statistics in the U.K. in comparison to the other countries in the sample. The lower impact of market-to-book ratio in Germany and Italy is consistent with the financial orientation of both countries, where the largest shareholders are able to closely control and monitor managers thus reducing the chance of managers to pursue their own objectives at the expense of shareholders.

The empirical evidence recall, in a way, what was said by dynamic models of capital structure. More specifically, it confirms (apparently at least) the existence of a valuable option to issue debt in the future to fund investments. To understand this effect even better, further regressions should be made considering different investment proxies. Still, results do suggest that high growth firms value the option to keep some extra debt capacity for future investment.

For tangibility of assets and firm size, however, results in Italy are somehow inconsistent with the model predictions. For a reason unknown to this model coefficients are negative and not statistically significant when using both book and market leverage. This is quite surprising and some further evaluation should be made before drawing definitive

conclusions.

The only statistically significant result in the sample is obtained in the U.K. when market leverage is considered. In that case, relationship between taxes and leverage does exist, but with a surprising negative sign.

Results show that predictions about the effect of *equity risk premium* on both book and market leverage would appear to be correct. The coefficients are always positive in all sample countries. Therefore, it is possible to assume that firms do consider moving to debt financing when equity financing costs increase in both bank-based and market-based economies.

The *term structure of interest rates* also has a considerable impact on a firm's capital structure. In fact, the inverse relation with leverage is proven to be true in the sampled countries (except in Italy when book leverage is considered but, again, that is the second best result), which means that an upward sloping yield curve tends to reduce leverage ratios in all nations.

The lower R^2 from static model regressions suggests that dynamic models are more powerful in explaining capital structure decisions in all sample countries. The explanatory power of the one-year lagged variable $Y_{i,1-t}$, therefore, could be a sign that firms in the sample countries do have *leverage targets*. Such conclusion suggests that there is a sort of dynamism in the capital structure decision, as firms apparently adjust their leverage in order to reach their target debt ratio.

Germany has the slowest speed of adjustment among the countries considered. Based on this model, it would appear that German firms can slowly adjust towards their target debt ratio without incurring substantial agency costs, as they have a strong relationship with their lenders. Moreover, it is likely that the cost of being off target relative to adjustment costs is lower in Germany than in other countries.

If market leverage is considered (market leverage is always the first best proxy), Italy has a very similar speed of adjustment to Germany. This is not surprising, as Italian firms also have close ties with their creditors. Conversely, the U.K. has the highest SOA. Therefore, it is possible to say that bank-oriented financial systems generally have a slower SOA in comparison to marked-oriented economies, which is justified by their financial system's structure and traditions.

APPENDIX

In this section the same regressions analysed in the paper are run for the entire set of observations available, including therefore the outer values.

Figure 24.
Determinants of capital structure (entire sample) in Germany, Italy and the U.K.

	Book leverage		***Market leverage***	
	Coefficient (SE)	*t-statistic*	*Coefficient (SE)*	*t-statistic*
Constant	0.07282 (0.03357)	2.1690 **	-0.15282 (0.01803)	-8.4744 ***
Dummy Germany	-0.04789 (0.00965)	-4.9622 ***	-0.02137 (0.00522)	-4.0940 ***
Dummy U.K.	-0.05403 (0.00925)	-5.8387 ***	-0.02632 (0.00504)	-5.2242 ***
Book / Market leverage -1	0.62228 (0.00708)	87.8961 ***	0.86007 (0.00608)	141.4931 ***
Profitability	0.01261 (0.00166)	7.5869 ***	0.00086 (0.00083)	1.0351
Growth opportunities	-0.00007 (0.00010)	-0.6385	-0.00015 (0.00005)	-2.8183 ***
Tangibility of assets	0.01645 (0.01195)	1.3763	0.01922 (0.00634)	3.0308 ***
Firm size	0.00833 (0.00102)	8.1934 ***	0.00396 (0.00055)	7.1994 ***
Effective tax rate	0.00038 (0.00016)	2.4573 **	-0.00012 (0.00009)	-1.3442
Earnings volatility	-0.00007 (0.00006)	-1.1912	0.00013 (0.00003)	4.1548 ***
Non-debt tax shield	0.39037 (0.02119)	18.4218 ***	0.03181 (0.01111)	2.8637 ***
Share price performance	-0.01282 (0.00387)	-3.3112 ***	-0.04984 (0.00214)	-23.2735 ***
Equity premium	0.04802 (0.45841)	0.1048	4.01320 (0.24572)	16.3323 ***
Term structure of interest rate	-0.41999 (0.19337)	-2.1720 **	-2.86312 (0.10837)	-26.4192 ***
Firms		1,488		1,486
Observations		8,814		7,975

, **, and * indicate that coefficients are significant at the 10%, 5% and 1% levels, respectively.*

Figure 25.
Determinants of capital structure (entire sample) in Germany, Italy and the U.K., including corporate governance factors

	Book leverage		**Market leverage**	
	Coefficient (SE)	t-statistic	Coefficient (SE)	t-statistic
Constant	1.09115 (0.36626)	2.9792 ***	0.22854 (0.19520)	1.1708
Book / Market leverage -1	0.62228 (0.00708)	87.8961 ***	0.86007 (0.00608)	141.493 *** 1
Profitability	0.01261 (0.00166)	7.5869 ***	0.00086 (0.00083)	1.0351
Growth opportunities	-0.00007 (0.00010)	-0.6385	-0.00015 (0.00005)	-2.8183 ***
Tangibility of assets	0.01645 (0.01195)	1.3763	0.01922 (0.00634)	3.0308 ***
Firm size	0.00833 (0.00102)	8.1934 ***	0.00396 (0.00055)	7.1994 ***
Effective tax rate	0.00038 (0.00016)	2.4573 **	-0.00012 (0.00009)	-1.3442
Earnings volatility	-0.00007 (0.00006)	-1.1912	0.00013 (0.00003)	4.1548 ***
Non-debt tax shield	0.39037 (0.02119)	18.4218 ***	0.03181 (0.01111)	2.8637 ***
Share price performance	-0.01282 (0.00387)	-3.3112 ***	-0.04984 (0.00214)	-23.2735 ***
Equity premium	0.04802 (0.45841)	0.1048	4.01320 (0.24572)	16.3323 ***
Term structure of interest rate	-0.41999 (0.19337)	-2.1720 **	-2.86312 (0.10837)	-26.4192 ***
Ownership concentration	-1.87798 (0.66134)	-2.8397 ***	-0.69837 (0.35190)	-1.9845 **
Strength of legal rights index	-0.44797 (0.13718)	-3.2655 ***	-0.17549 (0.07320)	-2.3974 **
Firms		1,488		1,486
Observations		8,814		7,975

*, **, and *** indicate that coefficients are significant at the 10%, 5% and 1% levels, respectively.

Figure 26.
Determinants of book leverage (entire sample): cross-country comparisons

	Germany		**Italy**		**U.K.**	
	Coefficient (SE)	t-statistic	Coefficient (SE)	t-statistic	Coefficient (SE)	t-statistic
Constant	0.20063 (0.16331)	1.2285	1.18483 (0.20901)	5.6688 ***	0.58259 (0.10435)	5.5830 ***
Book leverage -1	0.35958 (0.01763)	20.3917 ***	0.46028 (0.03776)	12.1900 ***	0.18234 (0.01095)	16.6581 ***
Profitability	0.03767 (0.01032)	3.6503 ***	-0.07937 (0.02859)	-2.7758 ***	0.05944 (0.00632)	9.4057 ***
Growth opportunities	0.00019 (0.00009)	2.0187 **	-0.00364 (0.00129)	-2.8289 ***	-0.00045 (0.00019)	-2.3907 **

	Germany		Italy		U.K.	
	Coefficient (SE)	t-statistic	Coefficient (SE)	t-statistic	Coefficient (SE)	t-statistic
Tangibility of assets	0.14606 (0.05925)	2.4653 **	-0.09601 (0.05210)	-1.8428 *	0.21275 (0.05103)	4.1687 ***
Firm size	0.00218 (0.00902)	0.2417	-0.04585 (0.01058)	-4.3353 ***	-0.01293 (0.00590)	-2.1932 **
Effective tax rate	0.00042 (0.00013)	3.2908 ***	0.00025 (0.00057)	0.4349	-0.00021 (0.00038)	-0.5372
Earnings volatility	-0.00027 (0.00232)	-0.1173	-0.01320 (0.00319)	-4.1427 ***	-0.00007 (0.00006)	-1.1332
Non-debt tax shield	0.71113 (0.11348)	6.2666 ***	0.83638 (0.11965)	6.9901 ***	0.39018 (0.02535)	15.3908 ***
Share price performance	0.00077 (0.00624)	0.1226	-0.00735 (0.00999)	-0.7357	0.00507 (0.00466)	1.0877
Equity premium	0.40561 (0.61199)	0.6628	2.07837 (0.56430)	3.6831 ***	-0.73119 (0.64530)	-1.1331
Term structure of interest rate	-0.55156 (0.33878)	-1.6281	0.24407 (0.31051)	0.7860	-0.24435 (0.22983)	-1.0632
Firms		461		172		855
Observations		2,836		1,031		4,948
R^2		0.828063		0.758119		0.707827

*, **, and *** indicate that coefficients are significant at the 10%, 5% and 1% levels, respectively.

Figure 27.
Determinants of market leverage (entire sample): cross-country comparisons

	Germany		Italy		U.K.	
	Coefficient (SE)	t-statistic	Coefficient (SE)	t-statistic	Coefficient (SE)	t-statistic
Constant	-0.49470 (0.12153)	-4.0705 ***	0.13037 (0.17703)	0.7364	-0.04203 (0.06414)	-0.6552
Market leverage -1	0.43293 (0.02089)	20.7200 ***	0.42205 (0.03319)	12.7155 ***	0.41733 (0.01637)	25.4869 ***
Profitability	-0.05063 (0.00689)	-7.3442 ***	-0.08814 (0.02292)	-3.8463 ***	-0.01189 (0.00369)	-3.2234 ***
Growth opportunities	-0.00004 (0.00006)	-0.6543	-0.00363 (0.00091)	-4.0122 ***	-0.00050 (0.00011)	-4.3620 ***
Tangibility of assets	0.18452 (0.04078)	4.5243 ***	-0.02190 (0.03857)	-0.5678	0.08281 (0.03201)	2.5872 ***
Firm size	0.03845 (0.00674)	5.7009 ***	-0.00030 (0.00896)	-0.0336	0.00939 (0.00359)	2.6161 ***
Effective tax rate	-0.00006 (0.00008)	-0.6846	0.00038 (0.00040)	0.9536	-0.00013 (0.00022)	-0.5922
Earnings volatility	-0.00251 (0.00214)	-1.1751	-0.00951 (0.00348)	-2.7350 ***	0.00011 (0.00004)	2.9645 ***
Non-debt tax shield	0.20283 (0.07420)	2.7336 ***	0.12520 (0.08636)	1.4498	0.06065 (0.01450)	4.1842 ***
Share price performance	-0.02115 (0.00436)	-4.8481 ***	-0.03522 (0.00758)	-4.6494 ***	-0.02844 (0.00282)	-10.0756 ***

	Germany		Italy		U.K.	
	Coefficient (SE)	t-statistic	Coefficient (SE)	t-statistic	Coefficient (SE)	t-statistic
Equity premium	1.67601 (0.39319)	4.2626 ***	5.37102 (0.39552)	13.5797 ***	2.37182 (0.37488)	6.3268 ***
Term structure of interest rate	-2.95714 (0.22865)	-12.9333 ***	-0.74660 (0.27177)	-2.7471 ***	-1.19077 (0.15060)	-7.9068 ***
Firms		461		172		853
Observations		2,489		897		4,589
R^2		0.880808		0.873526		0.800217

*, **, and *** indicate that coefficients are significant at the 10%, 5% and 1% levels, respectively.

Figure 28.
Determinants of book leverage (entire sample): bank-oriented vs. market-oriented financial systems

	Bank-oriented		Market-oriented	
	Coefficient (SE)	t-statistics	Coefficient (SE)	t-statistics
Constant	0.46796 (0.12848)	3.6422 ***	0.58259 (0.10435)	5.5830 ***
Book leverage −1	0.36300 (0.01576)	23.0393 ***	0.18234 (0.01095)	16.6581 ***
Profitability	0.01263 (0.00944)	1.3371	0.05944 (0.00632)	9.4057 ***
Growth opportunities	0.00017 (0.00009)	1.9508 *	-0.00045 (0.00019)	-2.3907 **
Tangibility of assets	0.02372 (0.04008)	0.5919	0.21275 (0.05103)	4.1687 ***
Firm size	-0.01133 (0.00692)	-1.6362	-0.01293 (0.00590)	-2.1932 **
Effective tax rate	0.00038 (0.00013)	2.9932 ***	-0.00021 (0.00038)	-0.5372
Earnings volatility	-0.00474 (0.00187)	-2.5386 **	-0.00007 (0.00006)	-1.1332
Non-debt tax shield	0.77581 (0.08305)	9.3411 ***	0.39018 (0.02535)	15.3908 ***
Share price performance	-0.00386 (0.00517)	-0.7458	0.00507 (0.00466)	1.0877
Equity premium	1.42020 (0.41961)	3.3846 ***	-0.73119 (0.64530)	-1.1331
Term structure of interest rate	0.10618 (0.23065)	0.4603	-0.24435 (0.22983)	-1.0632
Firms		633		855
Observations		3,844		4,948
R^2		0.824229		0.707827

*, **, and *** indicate that coefficients are significant at the 10%, 5% and 1% levels, respectively.

Figure 29.
Determinants of market leverage (entire sample): bank-oriented vs. market-oriented financial systems

	Bank-oriented		**Market-oriented**	
	Coefficient (SE)	t-statistics	Coefficient (SE)	t-statistics
Constant	-0.25285 (0.10142)	-2.4932 **	-0.04203 (0.06414)	-0.6552 ***
Market leverage −1	0.45874 (0.01792)	25.6055 ***	0.41733 (0.01637)	25.4869 ***
Profitability	-0.05176 (0.00663)	-7.8082 ***	-0.01189 (0.00369)	-3.2234 ***
Growth opportunities	-0.00006 (0.00006)	-1.0145	-0.00050 (0.00011)	-4.3620 ***
Tangibility of assets	0.06480 (0.02883)	2.2482 **	0.08281 (0.03201)	2.5872 ***
Firm size	0.02066 (0.00548)	3.7729 ***	0.00939 (0.00359)	2.6161 ***
Effective tax rate	-0.00005 (0.00008)	-0.6071	-0.00013 (0.00022)	-0.5922
Earnings volatility	-0.00418 (0.00186)	-2.2455 **	0.00011 (0.00004)	2.9645 ***
Non-debt tax shield	0.18979 (0.05747)	3.3024 ***	0.06065 (0.01450)	4.1842 ***
Share price performance	-0.03013 (0.00380)	-7.9324 ***	-0.02844 (0.00282)	-10.0756 ***
Equity premium	3.76200 (0.28363)	13.2636 ***	2.37182 (0.37488)	6.3268 ***
Term structure of interest rate	-1.80272 (0.17439)	-10.3376 ***	-1.19077 (0.15060)	-7.9068 ***
Firms		633		853
Observations		3,383		4,589
R^2		0.880916		0.800217

*, **, and *** indicate that coefficients are significant at the 10%, 5% and 1% levels, respectively.

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