The Impact of Stock Prices on Capital Structures

A Study on the German Stock Market

Master Thesis

by

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ABSTRACT

This thesis analyzes the corporate rebalancing behavior of German publicly listed firms subsequent to equity price shocks. The examined period (1990-2012) includes a total sample of 2,154 firm-years. It is found that German firms do not counteract stock induced changes in market-based capital ratios in the short run; whereas managerial rebalancing activity gradually gains importance in the long-term perspective. This behavior is largely in accordance with referential studies on the U.S. and the European stock markets. Further, a life-cycle extension of the applied research model has identified diverging rebalancing intensities across dissimilar corporate maturity classes. It was found, that those differences may be partly explained by respective adjustment cost levels.

Keywords: Stock Returns; Capital Structure Dynamics; Life-Cycle; Fama-MacBeth; Germany

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LIST OF SYMBOLS

A	Total Accounting Assets
ADR	Actual Corporate Debt Ratio
d	Dummy Variable
D	Book Value of Debt (Proxy for Market Value)
$D\tau_c$	Value of Debt Tax Shields
DIV	Dividends
E	Market Value of Equity
$EBIT$	Earnings Before Interest and Taxes
ENI	Equity Net Issuing
G_L	Gain Due to Leverage
IDR	Implied Corporate Debt Ratio
k	Time Horizon
m	Number of Regressors in a Regression Specification
N	Number of Observations
P	Operating Income
r	Gross Stock Return
r_{LE}	Expected Return on Levered Equity
R^2	Coefficient of Determination
RE	Book Value of Retained Earnings
S	Net Sales
t	Observation Period
T	Number of Observed Time Periods
t_c	Corporate Tax Rate
t_{PB}	Personal Tax Rate on Interest Income
t_{PS}	Personal Tax Rate on Capital Gains
$TDNI$	Total Debt Net Issuing Activity
TE	Book Value of Total Equity
V_L	Value of a Levered Firm
V_U	Value of an Unlevered Firm
WC	Working Capital
x	Net Stock Return
Z	Modified Altman Z-Score
α	Regression Coefficient of a Regression Specification
ϵ	Residual of a Regression Specification
σ	Standard Deviation

All monetary values are expressed in EUR 1,000,000.

1 INTRODUCTION

1.1 Background

Each and every corporation is confronted with the decision of how to finance its business activity by finding a specific mix of debt and equity capital. Because this decision is of high practical relevance, capital structure theories have gained popularity among financial academia in the last five decades. Scholars have developed a wide array of research on the determinants of optimal capital structures and on the question if such optimal design exists at all. Financial managers and corporate finance departments are interested in how the overall cost of capital is affected by changes in the firm's capital structure and, accordingly, how the value of the firm will be impacted (Bierman 2003, 1f). Additionally, the globalization of capital markets – involving a large heterogeneity of sources and design of financing – as well as the recent global financial and credit crises gave rise to an enhanced interest in corporate leverage decisions and further complicated the above considerations regarding corporate capital structures.

The discussion, which continues ever since the middle of the last century, is built upon the defining work by Modigliani and Miller (1958), who succeeded – under very restrictive perfect market assumptions – to show that the value of a firm is not dependent of its capital structure. Following this initial contribution, the corporate finance literature saw the emergence of a vast number of new theories and concepts – such as the trade-off theory and the pecking order theory, to name the two most renowned ones – which dropped the stringent assumptions made in the initial irrelevance proposition. Nonetheless, until today, only little agreement could be reached with regard to the fundamental drivers behind observable corporate capital structures and the related managerial decision-making process. The underlying reasons for the prevailing theoretical contradictions may be derived from, for example the high complexity of the issue (causes difficulties to determine cause-and-effect relationships) and low consistency of existing empirical studies.

1.2 Problem Formulation

Following a widespread perception in the corporate finance literature, companies aim at maintaining a target capital structure that weights the costs and benefits related to different levels of indebtedness. Once the actual debt level diverges from the target, rational firms would be expected to readjust their debt ratio towards the target level accordingly (Myers 1984). However, the dynamic rebalancing argument is questioned by empirical research (i.a. Baker and Wurgler 2002). On the other hand, Graham and Harvey (2001) find in their large scale survey that more than two thirds of U.S. financial executives implicitly have a target debt level.

Market-based capital structures can be seen to be subject to a variety of exogenous impacting factors. Specifically, this thesis emphasizes on the idea that a change in a company´s stock price implies an equivalent change of the market value of equity of the firm. This change, in turn, affects the market-value based leverage ratio. If a company targets a specific leverage ratio, this stock return-induced change in the capital structure had to be rebalanced with issuing activity in order to return to the set target level.

Thus far, empirical knowledge on managerial rebalancing behavior of stock return-induced capital structure changes is only available for the U.S. market (Welch 2004) and the consolidated European stock market (Drobetz and Pensa 2007). In this context, this thesis aims at extending the available research by studying the German capital market, which is chosen as a proxy for an opposing governance system as compared to the Anglo-Saxon U.S.-system and, also, has different features than the consolidated European market.

La Porta et al. (1996) identify Germanic civil-law countries to be among the most creditor-friendly regimes. Owing to this fact, banks play a crucial role in the German capital market in two ways: first, in many companies banks are shareholders and, second, companies use bank credits as a frequented source of financing and long-term relationships between companies and banks (so called *Hausbanks*) can be observed. Thus, German companies rely to a greater extend on credit markets as opposed to U.S. companies where equity markets play a vital role. Furthermore, German capital markets present a more concentrated ownership structure of companies as opposed to the widely dispersed shareholder structure of Anglo-Saxon U.S. firms. Also, the proportion of

publicly listed companies in the so called market-based U.S. system is larger and stock markets are considered to be more liquid. In this context, an additional distinguishing aspect of the German bank-based system is the lack of an active market for corporate control (as a disciplining mechanism for managers to ensure shareholder value orientation and to mitigate principle-agent conflicts), which is also due to the concentrated ownership structure in German firms (Allen and Gale 1995; La Porta et al. 1996).

With regard to Drobetz and Pensa´s (2007) European study, it can be observed that the European market is not homogeneous due to the heritage of different judicial, financial and economic systems (La Porta et al. 1996). Hence, aggregated results on a European basis will offset the specific German capital market characteristics outlined above and will not emphasize on differing behavior in particular institutional settings. Confirmation can be found in Fan, Titman and Twite´s (2011) paper: they conclude that institutional factors as, for example, a country´s legal and tax system explain a significant portion of the variation in debt-to-equity balances and debt maturities. Accordingly, assimilating those factors in an overarching European context would relativize or even neglect country-specific capital market manifestations. In addition, Rajan and Zingales (1995) and Wald (1999) study the efficiency of the financial system of a country and argue that a country´s financial system affects capital structure decisions.

1.3 Purpose and Research Objective

Departing from the work conducted by Welch (2004), the *first research objective* of the thesis is to test whether companies in the German stock market adjust debt ratios targeting a specific level or if they allow their market-value based leverage ratio to change with stock prices.[1] The degree to which firms rebalance their debt level towards a target subsequent to a deviation is of interest as it reveals information about the managerial behavior in accordance with differing prevailing theoretical concepts. In view of the fact that the German and U.S. American financial systems can be considered as “two polar extremes” (Allen and Gale 1995, 179), it is worthwhile to examine whether German companies follow the same capital structure mechanisms as their U.S.

[1] Subchapter 2.4 deals with Welch´s (2004) work in detail.

peer companies. Thus, relevant knowledge can be gained on the question if managerial adjustment behavior depends on the institutional context and, therefore, the robustness of existing empirical research on this issue can be verified.

The *second research objective* of this thesis is a life-cycle extension of the existing research on the dynamic rebalancing behavior of return-induced leverage changes. Conducted research in the field of corporate financing with respect to different degrees of corporate maturity provides several – yet inconsistent – argumentations on how firms change their debt-to-equity balance with regard to their degree of maturity. This thesis opts to broaden the theoretical understanding by investigating empirically if firms in the German stock market with diverging comparative maturities adopt different managerial rebalancing activity if their leverage ratios change due to fluctuations of the market value of equity. This is – to the knowledge of the authors – a so far unstudied dimension of research on the dynamic rebalancing decisions taken by firms.

Clustering of the entire German sample according to the relative maturity of firms appears particularly relevant in view of the fact that corporate maturity correlates with several of the pivotal firm-specific determining factors of capital structures that have been identified in the relevant literature; e.g. asset tangibility, growth, firm size, profitability and price-to-book valuations (i.a. Titman and Wessels 1988; Rajan and Zingales 1995; Wald 1999; Hovakimian, Opler, and Titman 2001; Fama and French 2005; Damodaran 2001, 511ff).

1.4 Disposition

This thesis is organized as follows: the *second chapter* lays the theoretical foundation for the consequent analysis and discussions. The chapter consists of four parts: first, the approach of measuring corporate leverage pursued in this thesis is discussed. Second, it provides a broad overview of the main acknowledged theories on corporate capital structures. Third, relevant considerations regard the connection between corporate life-cycles and capital structures are presented. Fourth, it gives a compilation of referential studies and, thus, existing research on the impact of stock returns on capital structures is outlined.

The *third chapter* presents the methodological approach of this thesis. It describes the data base for the German sample and further introduces the variables employed in the

regression model. Additionally, the Fama and MacBeth (1973) regression procedure that is used to obtain the empirical results is outlined. Finally, the empirical model specifications of the life-cycle extension are clarified and the validity, reliability and data quality of this thesis are discussed.

The *fourth chapter* comprises of a presentation of the empirical findings on the German managerial rebalancing behavior as well as in terms of the life-cycle analysis. In detail, the chapter provides descriptive statistics and the obtained regression results. In addition, it contrasts the findings from the German market to the U.S. (Welch 2004) and European market (Drobetz and Pensa 2007).

The *fifth chapter* provides a twofold discussion of the empirical results. It outlines implications of the attained results and links them to existing corporate finance literature.

The *sixth chapter* summarizes the findings of this thesis, discusses limiting factors of the empirical results and outlines the scope for further research in consecutive studies.

1.5 Target Audience

This thesis is addressed to an audience with an understanding of finance and corporate finance; such as academia and researchers as well as corporate finance practitioners. Consequently, it is assumed that general financial terms and statistical mechanisms are commonly understood by the target audience and, hence, in-depth explanations will be disregarded.

2 THEORETICAL FRAMEWORKS

2.1 Measurement of Corporate Leverage

Before the main theories in the field of corporate capital structures are introduced, the basis for measuring leverage ratios has to be clarified, which is also essential for understanding the underlying idea of this thesis. In this conext, Rajan and Zingales (1995) suggest that the correct measure of leverage depends on the objective of a study and, also, discuss different measures of leverage.

Corporate leverage (i.e. the mix of debt and equity to fund business activity) may be measured both based on book-values or market-values of debt and equity. Harris and Raviv (1991) point out that some studies measure leverage as a ratio of book value of debt to book value of equity and others as book value of debt to market value of equity. Evidently, valid arguments can be put forward for the utilization of either. For instance, Thies and Clock (1992) argue that book values better reflect a firm´s target debt ratios, since market-based ratios are exposed to exogenous factors which are not under the management´s control.

However, using book-value based measures of leverage has some significant limitations: first, book value of equity can be seen as a sheer "*plug number*" which merely represents the difference between the uses and sources of funds on the balance sheet (Welch 2004, 125). Second, book value-based leverage measures are, by definition, backward-looking while market-based ratios are forward-looking in the sense that they represent how investors value the company and its ability to generate future cash flows. Here, the market-based leverage ratio – among others – also determines the Weighted Average Cost of Capital (WACC) which sets the hurdle rates for future investments (Baker and Martin 2011, 30f). Third, Shyam-Sunder and Myers (1999) argue that profitability and valuation of assets have a strong explanatory power of book value-based debt ratios. However, these factors are significantly dependent on applicable accounting rules which, consequently, can defer the real economic picture of a company and result in varying capital structures for different national accounting regimes and low cross-national comparability. Thus, this thesis studies corporate capital structures based on a market-based measurement of leverage.

With regard to the valuation of debt, Bowman (1980) showed that, because the firm-specific correlation between the market and book values of debt is strong, the difference between using either of the two values is rather small. Furthermore, data limitations on market values of liabilities also lead to the fact that debt is measured in terms of book values as the best available proxy for the market value of debt.[2]

2.2 Capital Structure Theories

2.2.1 Modigliani & Miller Theorem

The genesis of business financing in a modern sense was created by Modigliani and Miller (1958). Before their findings, there was no generally recognized theory on corporate capital structure. The Modigliani-Miller theorem is often referred as to the capital structure irrelevance principle: the value of a firm is unaffected by the choice of financing given complete and perfect capital markets. Complete and perfect capital markets imply that markets are frictionless, investors have homogenous expectations and all participants are atomistic (Modigliani and Miller 1958).[3]

More specifically, Modigliani and Miller (1958) base their theory on the fact that a firm has a determined amount of future expected cash flows. Consequently, if a firm assesses whether to finance a particular quantity of assets with either debt or equity, it is merely the decision of how to split financing streams across capital providers. Those investors have the same access to capital markets and, therefore, the opportunity to set their own leverage which means that investors can create homemade leverage if it is not provided by firms or they can easily abdicate leverage that a firm offered but was not appreciated by the investor (Frank and Goyal 2008, 140).

In their work, Modigliani and Miller (1958) set forth two propositions:

M-M Proposition I: $V_U = V_L$

The market value of a company is constant irrespective of the amount of debt that the company makes use of to fund its assets.

[2] This approach is in line with the referential studies (i.e. Welch 2004; Drobetz and Pensa 2007) which leads to a high degree of comparability of results from this thesis.

[3] No frictions is referred as to the inexistence of transaction costs such as taxes, bankruptcy costs, contracting costs. Homogenous expectations indicate that all market participants share the same information and that atomistic market participants – corporations and individuals – are price takers.

Following Modigliani and Miller (1958), proposition one will hold because of arbitrage opportunities: if two firms – one levered (V_L) and one unlevered (V_U) – with identical operations had different values, investors could buy and sell stocks and bonds in such a way as to replace one income stream for another income stream at a lower price, which would be beneficiary to the investors regardless of their risk tolerance. If investors exploited these arbitrage opportunities, the values of both firms would converge and finally eliminate the discrepancy in market values (Modigliani and Miller 1958).

A crucial extension of the arbitrage-based theorem was made by Stiglitz (1969). He concluded in his extended model that the Modigliani-Miller theorem holds under much more general conditions than those assumed in the original version. The significance of the theorem is not subject to, for instance, the existence of competitiveness in financial markets or risk classes (Stiglitz 1969).

Despite the conclusion from the first proposition (leverage has no impact on firm value), the second proposition shows that leverage has an effect on risk and the expected return on a firm´s equity:

M-M Proposition II: $\frac{\partial r_{LE}}{\partial(\frac{D}{E})} > 0$

The expected return on a company´s equity is an increasing function of the company´s leverage.

Put differently, if a company adds debt to its corporate financial structure, equity holders will require more return due to the fact that additional debt increases the company´s risk owing to higher financial distress (Modigliani and Miller 1958).

Modigliani and Miller (1963) added corporate income taxes to their former proposition (M-M I) and, owing to debt tax shields ($D\tau_c$), the value of the levered firm is

(1) $$V_L = V_U + D\tau_c.$$

Taking debt tax shields in isolation, the optimal capital structure would consist completely of debt. Miller (1977) shows that the gain due to leverage (G_L) can be expressed as:

(2) $$G_L = \left[1 - \frac{(1-t_c)(1-t_{PS})}{1-t_{PB}}\right] D$$, where

t_c = corporate tax rate;

t_{PS} = personal tax rate on capital gains;

t_{PB} = personal tax rate on interest income and

D = debt.

Miller (1977) argues that even with differing taxes no optimal debt-equity ratio exists for an individual firm, but that an equilibrium aggregate leverage ratio prevails which equals the relative wealth levels of those with a tax preference for debt as opposed to equity. Auerbach and King (1983) refer to Miller (1977) and state that in a world in which investors face different tax rates, no equilibrium between debt and equity exists if no constraints are put in place. Since those constraints (e.g. personal borrowing constraints, short-sell constraints) represent a critical factor of the equilibrium they have to be modeled explicitly.

However, conducted research after the publication of the Modigliani-Miller Theorem has shown that this theory fails under the consideration of additional aspects such as transaction costs, bankruptcy costs, agency conflicts and adverse selection (i.a. Fischer, Heinkel, and Zechner 1989; Jensen and Meckling 1976; Myers and Majluf 1984). From this starting point, several alternatives have been proposed aiming at the identification of key determinants of corporate financing decisions. Finally, the Modigliani-Miller theorem explains why financing decisions matter rather than giving a realistic reasoning of how firms finance their business. Accordingly, Modigliani and Miller (1958, 296) themselves state that “drastic simplifications have been necessary in order to come to grips with the problem at all” and, consequently, successive financial theories were based on the violation of the perfect markets assumptions by Modigliani and Miller.

2.2.2 Trade-Off Theory

Kraus and Litzenberger (1973) initially shaped the expression of the trade-off theory. In the broad financial literature the term trade-off theory is applied to different issues of related financial theories. In general, following the trade-off theory, a firm has to assess the costs and benefits of financing alternatives and find the right balance between them.

The original trade-off theory was based on the debate of the Modigliani-Miller theorems after the authors added corporate income taxes to their original work (Modigliani and Miller 1963). As discussed, in this changed setting, debt had a clear advantage over equity due to its tax shield effect. However, bankruptcy costs (or costs of expected financial distress) are clear counterweights of the tax benefits of debt. According to Myers (1984), as illustrated in Figure 1, companies gradually move towards previously set target leverage ratios while the aim is to balance marginal tax shield benefits and marginal costs of financial distress. However, Frank and Goyal (2008) emphasized some important aspects regarding this definition: the tax structures are much more sophisticated in reality than in theory and different tax assumptions might consequently lead to varying target ratios. Further, the nature of bankruptcy costs has to be analyzed and identified. More specifically, it has to be determined if those costs are one-time costs (or permanent such as a damaged reputation), fixed or increasing proportionally with the size of bankruptcy.

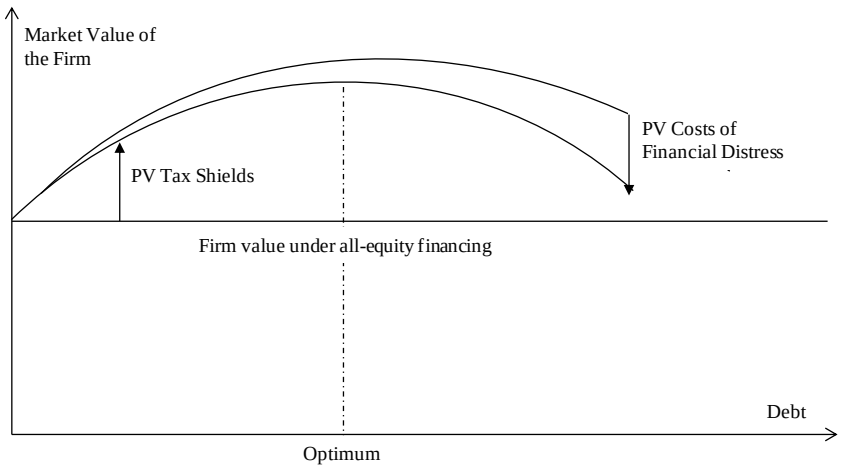

Figure 1: The Static Trade-Off Theory of Capital Structures[4]

The trade-off theory can be viewed under static and dynamic considerations: the *static trade-off theory* describes a firm whose leverage is defined by a single period trade-off between tax shield benefits of debt and costs of expected financial distress. Additionally, there are other costs and benefits connected with the use of debt and equity as, for instance, agency costs that arise due to conflicts between owner and

[4] Own illustration, taken from Myers (1984, 577).

mangers as well as among different investor classes (Jensen and Meckling 1976).[5] To summarize, it can be stated that the static trade-off theory describes that firms target a particular capital structure and if the current leverage ratio differs from the optimal one then firms will adjust their financing activities in such a way to adapt to the optimal leverage ratio level.

The *dynamic trade-off theory* considers the time factor which is not taken into account in the static approach. Accordingly, a firm demonstrates a target adjustment behavior if the company has a target level of indebtedness and if deviations were adjusted over time (multi-period consideration). In the dynamic setting, the financing decision takes into account the financing need in the next period. If a firm will have to raise funds in the next period for new investments, it will either issue debt or equity or a combination of both (Frank and Goyal 2008).

Since Stiglitz (1973), the dynamic trade-off theory research has been developed further and extended.[6] Brennan and Schwartz (1984) were the first to study continuous period models that take into consideration uncertainty in decision-making, cost of financial distress and taxes. However, transaction costs were neglected. They state that firms retain high debt levels to take advantage of tax savings since they can react promptly to unfavorable shocks by readjustment without transaction costs. Fischer, Heinkel, and Zechner (1989) proposed a dynamic model which depends on the benefits of debt financing (e.g. tax advantages), potential costs of debt financing (e.g. bankruptcy costs), underlying asset variability, the riskless interest rate, and the size of the costs of recapitalizing. By taking into consideration transaction costs, the authors identified why firms will deviate from the optimal leverage ratio most of the time.[7] Consequently, in the short term the firm´s leverage ratio will less likely respond to equity variations whereas in the long term the leverage ratio will be adjusted towards a firm-specific optimum capital structure.

[5] Agency cost comprise of monitoring and bonding cost (Jensen and Meckling 1976).

[6] Stiglitz (1973), being a pioneer to modern dynamic trade-off theories, assessed the effects of taxation from a public finance perspective, whereas he assumed the non-existence of uncertainty.

[7] Fischer, Heinkel, and Zechner (1989) identify a range of an optimal capital structure with an upper and a lower bound instead of a particular optimal point. The firm only counterbalances its capital structure when the leverage transcends the predetermined limits.

When examining corporate financial rebalancing behavior, it can be argued that the trade-off theory plays a vital role. The theory predicts that firms – when engaging in financial rebalancing – opt to pursue a target capital structure.

2.2.3 Pecking Order Theory

Even before Myers (1984) published his article "The Capital Structure Puzzle" and provided his modified pecking order theory, the basic idea that firms display a particular pattern in the choice of financing alternatives was known. Already Donaldson (1961) studied a sample of large corporations and observed that management favored internal financing as a source of new funds and would only use external financing if it is unavoidable. However, Myers (1984) recognized that actual debt ratios varied widely across comparable firms. The explanatory power the static trade-off theory (measured by R^2) was found to be unacceptably low and, thus, Myers (1984) concluded that this is either because firms deliberately deviate extensively from targets ratios or the targets themselves depend on factors which were not yet recognized or understood. Consequently, he extended the idea of a financing theory based on asymmetric information and adverse selection in financial markets – namely the modified pecking order theory. Myers (1984, 581) puts forward four empirical observations in the context of the pecking order theory:

1. Internal financing is the preferred financing source by companies.
2. Dividends are sticky, meaning that target payout ratios are only gradually adjusted in accordance with investment opportunities.
3. If generated cash flows are smaller than investment requirements, companies first utilize existing cash balances.
4. If external funding is necessary, then companies prefer to issue safe securities: first debt, then potentially convertible bonds (hybrids) and, as a means of last resort, equity.

Myers´ (1984) modified pecking order theory was intended to represent a competitive model to static trade-off models, yet it does not define an optimal target debt-equity mix as each firm´s observed debt ratio represents its aggregate requirements for external finance. However, the pecking order theory, according to Myers (1984), has two caveats: first, it does not explain why dividends are sticky and second it only provides at

last a blurred idea when and why firms issue common equity. Myers (1984) himself gives an explanation to the latter: firms will issue equity at a certain point of time since firms face higher information asymmetry costs and higher financial distress costs as they climb up the pecking order. In order to reduce those costs, firms will periodically issue equity to generate financial slack (liquid assets or reserve debt capacity) to be enabled to pursue future positive net present value (NPV) projects as they arise.

An important aspect in the context of pecking order theory is the adverse selection issue proposed by Myers and Majluf (1984). According to their model, managers have an informational advantage over external investors about the firms´ opportunities and the real value of the venture. If internal funds are insufficient to finance investment opportunities, firms will choose external finance sources while focusing on minimizing additional costs of asymmetric information. The problem addressed by Myers and Majluf (1984) is based on Akerlof´s (1970) “lemon” problem, who demonstrated how markets can fail when potential buyers cannot testify the quality of the good they are offered. Akerlof (1970) stated that buyers will demand a discount when facing the risk of purchasing a lemon (product of bad quality), which in turn discourages the potential sellers of non-lemon products to remain in the market. Transferring this logic to equity markets would mean that, since outside investors cannot estimate the true value of a firm, they will expect that only overvalued firms will issue equity and, hence, investors will demand a higher return on their investment. This imposes unattractive conditions to both high and low performing firms and consequently equity will be prohibitively expensive and firms will favor internal financing sources.

Another perspective to the pecking order theory was added by Jensen and Meckling (1976) with the introduction of the agency theory. As already recognized by Butters (1945), executives prefer internal funding since external financing induces investor monitoring on the management. This preference bears the risk that available internal cash or securities are misused for negative-NPV projects (free cash flow hypothesis or overinvestment). On the other hand, the risk-shifting hypothesis and the debt overhang problem give further explanations on when and why firms will tend to raise equity and debt respectively. Specifically, the idea of the risk-shifting hypothesis is that shareholders are only interested in cash flows in non-bankrupt states and, hence, if the firm operates on their behalf, it will tend to accept projects that are too risky but have

large payoffs in good states of the world (Jensen and Meckling 1976). This behavior will shift the risk from shareholders to creditors, particularly if the firm is in desperate circumstances. The debt overhang problem arises because firms with risky outstanding debt tend to underinvest in positive-NPV projects since shareholders capture the entire cost of the project but receive only the fraction of increase in firm value after creditors have been satisfied (Miller 1977).

Analyzing the pecking order theory in light of the corporate rebalancing behavior examined in this thesis, certain predications may be drawn. The theory indicates why firms are not willing to rebalance their market-based capital structure by equity infusions when their stock prices decline. However, it would not be able to explain why firms should abstain from debt issues in case of increasing stock prices since debt is assumed to be superior to equity. In addition, the pecking order theory highlights one aspect which is not explicitly considered in Welch´s (2004) study, namely internal financing. Hence, firms may not only be enabled to expand their capital base to finance their business venture by capital issuances, but can also use internal funds.

2.2.4 Market Timing Theory

The general tendency of firms to issue equity after a period during which the stock outperformed the broad market has long been recognized. For instance, both Brau and Fawcett (2006), who focus on the timing of Initial Public Offerings (IPO), as well as Graham and Harvey (2001) find in their survey-based research that financial executives state to aim at timing the market when making financing decisions in order to benefit from "windows of opportunities". This – so called – equity market timing behavior, which had already been described by Asquith and Mullins (1986) in their paper on the signaling effects connected with equity financing, can generally be classified into two categories: first, being based on the pecking order theory, rational managers adapt their equity issuing activity based on time-varying adverse selection costs.[8] Second, irrational managers (or investors giving room for exploitation by management) adapt to temporal mispricing in markets (Baker and Wurgler 2002).

[8] Chang, Dasgupta, and Hilary (2006) connect corporate financing choices with the degree of analyst coverage, which is a method of information asymmetry reduction. They find that worse analyst coverage increases the probability of large and rare equity emissions. On the other hand, companies with superior financial reporting are seen to have improved flexibility to issue capital.

In efficient markets (i.e. market prices adequately mirror corporate opportunities and risks), companies need not be concerned with the timing of equity issues, since a company´s stock is always correctly priced in such markets where the cost of different sources of financing do not fluctuate independently (Modigliani and Miller 1958). If, however, markets are not entirely efficient, a firm may aim at minimizing its cost of capital by exploiting market inefficiencies in their corporate finance decisions.[9] In this context, the market timing theory provides an alternative explanation, which includes behavioral considerations, to the classical theories on capital structures. The theory anticipates that firms time their equity issues in a way that new stock is floated when the stock prices are perceived to be overvalued, and buy back own shares *vice versa*. In case managers are incentivized to increase existing shareholders´ wealth, they can be expected to do so even at the expense of future owners (Stein 1996).

The market timing theory does not necessarily differentiate between the two abovementioned forms of equity market timing: both market mispricings and dynamic asymmetric information (causing adverse selection costs) can be an incentive for market timing (Baker and Wurgler 2002). For instance, Chang, Dasgupta, and Hilary (2006) show that firms followed by less analysts (causes greater information asymmetry) have greater incentive to time the capital markets, which is in accordance with Myers and Majluf (1984) who argue that companies with larger information asymmetry are more easily misvalued by the market.

Baker and Wurgler (2002) study the long-term effects of the – intuitively logical – equity market timing behavior on corporate capital structures. They find that observed capital structures are the cumulative result of past managerial efforts to time the equity market. Thus, past market-to-book values are found to persistently and significantly impact capital structure over at least a ten-year horizon. A target (or optimal) capital structure is not seen to exist, but capital structures are rather the result of accumulated past decisions to time the market.

[9] However, market timing does not necessarily require markets to be inefficient, but manager´s to believe to be able to time the market is assumed to be sufficient by Baker and Wurgler (2002).

2.2.5 Summary

Table 1 provides a brief comparison regarding the main dimensions of the three core capital structure theories available in the literature. With the abovementioned theories of capital structure in mind, this subchapter opts to present a brief conclusion of the implications of those theories for corporate capital structures.

The trade-off theory determines that optimal firm and industry-specific (also time-specific in dynamic trade-off) debt ratios exist due to the balance between varying tax shields and costs of financial distress. In contrast, the pecking order theory claims that observed debt ratios merely represent cumulative past decisions for different financing sources according to the hierarchy suggested by the pecking order. Ultimately, the market timing theory concludes that a firm´s debt ratio reflects the cumulative outcome of past efforts to time the equity market ("windows of opportunity"). Managers are seen to intend to exploit market inefficiencies in the timing of security issues rather than aiming for a target debt ratio. Here, the market valuation of a company implicitly impacts the capital structure decisions of a firm.

With respect to equity issuances, the pecking order theory outlines that firms issue equity to investors only when no other sources of funds are available, whereas the market timing theory does not necessarily predict equity issues to be more expensive than debt. In contrast, the feasibility of equity (relative debt) depends on market conditions and resulting varying costs of equity.

	Trade-Off Theory	**Pecking Order Theory**	**Market Timing Theory**
Originator	Kraus and Litzenberger (1973)	Myers (1984)	Baker and Wurgler (2002)
Focal point	Trade-off between financing costs and benefits	Hierarchy of financing alternatives	Market-oriented perspective on financing choice
Empirical / Theoretical Foundation	Theoretical	Empirical	Empirical
Violation of Modigliani-Miller Theorem	No frictionless markets (e.g. taxes, bankruptcy costs)	No homogenous expectations (information asymmetry)	No homogenous expectations (information asymmetry)
Existence of Optimal/Target Capital Structure	Yes	No	No
Empirically tested	Fama and French (2002); Shyam-sunder and Myers (1999)	Fama and French (2002); Shyam-Sunder and Myers (1999)	Hovakimian (2006); Kayhan and Titman (2007)

Table 1: Comparison of Main Capital Structure Theories[10]

All three theories have been tested empirically: Fama and French (2002) as well as Shyam-Sunder and Myers (1999) assessed which of the pecking order and the trade-off theory is the more appropriate predictor of observed capital structures. Both studies find certain empirical support for both theories. Moreover, the empirical findings by Baker and Wurgler (2002) with regard to the market timing theory have been challenged by other research. For example, Hovakimian (2006) finds that the effects of equity market timing behavior on capital structure are small and temporary. While he generally agrees with the fact that equity issues are timed to phases of high market-to-book values (i.e. equity market timing), the negative effect of market-to-book values on a firms´ leverage and choices between debt and equity are attributed to variations in growth opportunities rather than market timing.[11] Kayhan and Titman (2007) generally confirm the notion of corporate market timing, but state that the market timing effects on capital structure captured by Baker and Wurgler (2002) disappear after few years.

[10] Own illustration, based on the preceding subchapters.

[11] As suggested by Myers (1977), companies with valuable growth opportunities (implies high market-to-book value) can be expected to have lower leverage ratios to avoid underinvestment due to the debt overhang problem (see subchapter 2.2.3).

2.3 Corporate Life-Cycles and Capital Structures

With reference to the second research objective of this thesis, relevant considerations regarding the relationship of corporate maturity and capital structures are presented in this subchapter.

The corporate life-cycle can be viewed as an adaption of the product life-cycle concept frequently referred to in the marketing literature.[12] Here, increasing maturity of a company does not necessarily equal increasing firm size, although a positive correlation can be assumed. As discussed in subchapter 1.3, multiple firm characteristics – such as profitability and growth options – can be expected to vary with changing maturity. In addition, while a corporation is progressing in its life-cycle, the idiosyncratic risk and cash flows will change accordingly: cash flows increase in size and predictability and the firm-specific risk approaches the average risk of all firms which both impacts corporate finance alternatives and consequent decisions (Damodaran 2001, 511ff; Hovakimian, Opler, and Titman 2001). For example, the increased business risk at early life-cycle stages may imply that companies use less debt and, thus, reduce financial risk in order to even out the larger business risk. Furthermore, in accordance with Myers (1977), the total value of a firm equals the sum of the value of assets in place and the present value of growth opportunities. In this context, Hovakimian, Opler, and Titman (2001) put forward the argument that target leverage ratios can be seen to be determined as a function of the changing relative importance of these two components of corporate value. Firms are expected to rather utilize debt to finance assets in place and equity to fund growth opportunities. Assuming that a company has comparatively less growth opportunities in a more mature life-cycle stage, the leverage ratio can be assumed to increase with maturity. This is also in accordance with the static trade-off theory: increasing maturity implies increasing profitability and reduced business risk which favors higher debt levels due to higher tax shield gains and lower bankruptcy cost, respectively.

[12] Miller and Friesen (1984) provide a review of relevant research on corporate life-cycles and recognize five commonly identified life-cycle stages: birth, growth, maturity, revival and decline which are principally in line with Damodaran´s (2001, 511ff) conceptualization. From their corporate management perspective, Miller and Friesen (1984) argue firms located in differing stages to vary in terms of their strategy, organizational structure and decision-making style.

If this Capital Structure Life-Stage Theory put forward by Damodaran (2001, 511ff) as well as Hovakimian, Opler, and Titman (2001) would hold, a firm´s capital structure was predictable at any given point it in its life-cycle. However, this theoretical argumentation is incompletely and infrequently directly empirically studied and proven. Frielinghaus, Mostert, and Firer (2005) find empirical support for a connection between life-cycles and capital structure. However, as depicted in Table 2, in contrast to the prediction by the Capital Structure Life-Stage Theory, they find that infant firms rely on debt instead of equity. More mature firms are observed to have sufficient internal funds and, thus, rely less on debt because sufficient cash flows are generated. Thus, business risk is implicitly argued not to be a major determinant of financing decisions.

In some support of the Capital Structure Life Stage Theory, Kim and Suh (2009) as well as La Rocca, La Rocca, and Cariola (2011) find an inverted U-shaped relation between leverage and corporate life-cycle stages. Infant companies are less levered because of their dependency on external equity due to the lack of available debt financing (high riskiness of venture). More established firms have, on average, the highest debt ratio because of a reduced business risk and strong cash flows. Mature firms then have a reduced leverage because internally generated cash flows are larger than funding requirements for new projects. In a sense, this behavior can be argued to be in compliance with the predications derived from the pecking order theory: from the available financing sources, a firm is observed to choose the respective mode of financing that is most appropriate (according to the pecking order) at each point of its life-cycle.

	Early	**Prime**	**Late**
Frielinghaus, Mostert, and Firer (2005)	High Leverage	Low Leverage	High Leverage
Kim and Suh (2009); La Rocca, La Rocca, and Cariola (2011)	Low Leverage	High Leverage	Low Leverage

Table 2: Empirical Findings on Leverage over Corporate Life-Cycle Phases[13]

[13] Own illustration, based on the preceding explications. The definition of the three life-cycle stages has been adapted from Frielinghaus, Mostert and Firer (2005).

2.4 Referential Studies

This subchapter outlines prior research progress on the particular topic covered in this thesis. There is a multitude of factors that can cause corporate capital structures to fluctuate. In particular when measuring leverage based on market values of securities, exogenous factors can cause capital structure volatility and, as afore-mentioned, this thesis in concerned with the impacts of stock returns (i.e. appreciations or depreciations in stock prices over a period of time) on market-based indebtedness. The degree to which companies rebalance stock return-induced capital structure changes may give important insight as to whether managers aim for target capital structures.

The originating research on the impact of stock returns on capital structures was conducted by Welch (2004), who concludes that stock returns are the most significant determinant of market-based capital structures: the variations in capital structures due to fluctuating market capitalizations are largely tolerated by corporate managers. Welch (2004, 115), however, argues that "in principle, there is more than enough capital structure–relevant corporate issuing activity to counteract stock return-induced equity growth. Firms are not inactive: they just do not choose to counteract their stock returns". The passivity with regard to promptly rebalancing stock return impacts on indebtedness caused this approach to be termed as the *managerial inertia theory*.

In his seminal study on the U.S. American stock market Welch (2004) finds that, over a horizon of one year, firms do not take actions to offset stock return-induced debt ratio changes and allow the ratio to fluctuate "one to one" with stock prices.[14] Over an increasing time frame of five years, initial debt ratios become more important in explaining future actual debt ratios, implying that companies take measures to make up for changes in market capitalizations. However, stock return-induced capital structures (implied debt ratio) remain the dominant factor – even over a horizon of ten years. When a constant term is added to Welch´s (2004) basic regression model, which is included to represent a potential constant target debt ratio, the economic significance of the impact of initial debt ratios on future debt ratios is negligibly small. The importance of the constant term (in terms of its coefficient) increases with model horizon. Welch´s

[14] The study Welch (2004) included all listed firms that had at least 10% of the market capitalization required to be listed in the Standard & Poor´s 500 index in the respective year between 1964 and 2000. In total, 2,679 firms where studied.

(2004) basic findings were by and large supported by Kayhan and Titman (2007) who find that past stock returns have a decisive and lasting impact on observable corporate indebtedness.

Welch´s (2004) research has been complemented by the study by Drobetz and Pensa (2007) on the total European stock market in which, by and large, the empirical results from the U.S. American referential study are confirmed.[15] However, certain discrepancies can be pointed out. In the short run (1 to 3 years), the results from both studies generally concur. However, the impact of stock return-induced debt ratios on future capital structures is slightly lower in the European sample. In the long run (10 years), the coefficient of the initial actual debt ratio is larger than the coefficient of the stock return-induced capital structures, which is not the case in the U.S. sample. When the regression model is extended with a constant term, the effect is the same as in the U.S.: the coefficients for stock returns remain the approximately same, while initial actual debt ratios lose any importance in explaining future actual debt ratios, which implies that target debt ratios are important over long horizons (firms do not adjust period by period, but care about debt ratios in the very long run). However, the constant coefficient in the European sample is twice as large as in the U.S. sample and, thus, a greater importance of target debt levels in Europe may be concluded.

To some extent, Baker and Wurgler´s (2002) research verifies the notion of the lasting impact of changing stock prices on corporate leverage ratios. However, they take an entirely different approach to the issue: while Welch (2004) studies managerial *passivity* (inertia) in adjusting for stock return-induced changes in debt ratios, Baker and Wurgler (2002) argue for managers that *actively* take advantage of favorable market valuations by issuing corresponding securities. Thus, although taking entirely different starting points, the managerial inertia of rebalancing and market timing concepts can even be argued to be supportive of eachother: active exploitation of appreciating stock prices by issuing equity concurrently implies the inability to counterbalance return-induced reductions in leverage.

The managerial inertia and market timing frameworks have been complemented with the issue of adjustment costs by Leary and Roberts (2005) who criticize that many

[15] The study by Drobetz and Pensa (2007) included all firms listed in the Dow Jones STOXX 600 benchmark index between 1990 and 2005. In total, 425 European firms were studied.

studies on capital structure adjustment implicitly assume costless financing activity. They argue that adjustment costs can cause rebalancing activity to be infrequently if managers wait for the advantages of rebalancing to become sufficiently large to outweigh the costs. Thus, despite the fact that adjustment costs can be seen to impact the speed of adjustment after deviations from target leverage ratios, Leary and Roberts (2005) argue that firms gradually respond to equity shocks in the years subsequent to the event and suggest that equity shock effects persist in the short-term while, in the long-term, firms engage in rebalancing activities towards target leverage ratios. Also the total adjustment costs are tried to be reduced by only rebalancing significant deviations away from a target range, which is in line with Fischer, Heinkel, and Zechner (1989). In contrast to the conclusion drawn by Welch (2004), managers are not expected to be indifferent towards the market-based leverage ratio, but the permanence of stock return-induced changes of leverage is argued to be due to efforts to increase efficiency of financing. Yet, the empirical findings of both studies correspond; only the interpretation differs. Drobetz and Pensa (2007) also query Welch´s (2004) one-sided interpretation of managerial indifference towards short-term fluctuations in market-based capital structures.

3 METHODOLOGY

3.1 Research Approach and Methodology

In general, two very distinct *approaches* to research studies and the relationship between empirics and theory exist: first, inductive research where theories are generated from empirical observations. Second, deductive research where hypothesis and predictions derived from existing theories are tested for their correctness (Bryman and Bell 2007, 11ff). The research objectives covered in this thesis follow the deductive approach since the predictions derived from Welch´s (2004) theory are, on the one hand, tested in the German institutional setting and, on the other hand, examined for its generalizability in explaining diverging readjustment behavior of firms at different life-cycle stages.

A quantitative *research methodology* is used in this study in order to investigate the two research questions of this thesis empirically. The specifications of the quantitative analysis will be set out in the subsequent subchapters.

3.2 Sample

The referential U.S. data set used by Welch (2004) comprised an extensive scope of 54,211 qualifying firm-years in total (from 1962-2000). In order to replicate this broad data sample across firm sizes and industries, this thesis does not only consider the most capital intense German stock index DAX (Deutscher Aktien Index), but additionally the TecDAX, SDAX and MDAX indices that comprise German technology as well as small and medium capitalization companies, respectively. The data set was created using the Thomson Reuters Datastream database for the period from 1990 to 2012.[16] Only firms with two or more consecutive years in one of the indices were included in the data set because capital structure dynamics are the subject of this thesis. Twelve firms did not comply with this precondition and, consequently, had to be excluded from the sample. Additionally, only firm years were included in the sample during their presence in either of the indices, meaning that firms were disregarded as soon as they were delisted. [17]

[16] See Appendix I for a description of the data obtained from Thomson Reuters Datastream. Despite the fact that the DAX was established in 1987, the specific observation period from 1990 to 2012 was selected in order to represent a broad picture of the companies of the stock market after the German reunification.

[17] The removal of delisted firms from the sample may cause a survivorship bias. However, the observed German sample represents a wide range of firm performances in terms of stock returns, as it can be observed in Table 4.

The number of sample firms grows from 21 in 1990 to 135 in 2011 and decreases to 45 in 2012. Due to German accounting standards (Art. 267 and 325-327, German Commercial Code), in particular small and medium-sized listed companies have not yet disclosed their annual reports for the financial year 2012 and, consequently, 80 firm years had to be excluded in 2012.The average amount of sample firms per year is 106. The significant difference in the number of firms can be explained by the fact that only the main DAX existed in 1990 and the MDAX, SDAX and TecDAX were only established in 1994, 1999 and 2003 respectively.[18] Furthermore, firms were excluded from the sample if not all required data was available for the periods of being listed on either of the indices. Neglecting firm-years with incomplete data is not anticipated to bias the empirical findings since the incompleteness of market data is not expected to be notably correlated with the studied managerial readjustment behavior. In addition, since firms from the financial sector (banks, insurances and financial services providers) have to comply with specific rules and regulations, their capital structure is significantly predetermined and influenced by exogenous factors unrelated to direct financing activities (i.a. Rajan and Zingales 1995; Fama and French 2002). Hence, this thesis excludes 41 financial firms.

Finally, the data is arranged into an unbalanced panel where the number of annual observations is not the same across individual firms. For that reason, the amount of observations (N_t) per time period (t) differ: 2,154 firm-years qualify in total and have data in at least two consecutive years; 1,591 over three years; 1,158 over five years; and 455 over 10 years.

3.3 Variables

This thesis analyzes whether firms counteract fluctuations in their capital structure that exist due to changes in stock prices in order to maintain a constant target debt ratio or whether companies tolerate to let their debt ratios fluctuate with their respective stock prices. The following analysis of capital structure is based on a market-based measurement of leverage for the reasons outlined in subchapter 2.1.

[18] The results presented later in this thesis were checked for potential biases caused by the fact that the number of firms and, accordingly, the total number of observations differs dramatically between the early and late time periods of the sample. However, no systematic trend in the results of the time-series of cross-sectional regressions could be identified.

In accordance with Welch (2004), this thesis estimates the following basic regression specification:

(3) $$ADR_{t+k} = [\alpha_0 +]\ \alpha_1 \cdot ADR_t + \alpha_2 \cdot IDR_{t,t+k} + \epsilon_t.$$

Equations (4) to (10) explain the components and subcomponents of equation (3) in detail. The term ADR denotes the Actual Corporate Debt Ratio and IDR is the Implied Corporate Debt Ratio. ADR is defined as the quotient of the book value of debt (D) and the market value of equity (E) plus the book value of debt (as a proxy for the market value of debt)

(4) $$ADR_t = \frac{D_t}{E_t + D_t}.$$

Furthermore, IDR is the debt ratio that results if the company neither issues any (net) debt nor equity and permits its capital structure to completely capture any stock return effects between period t and $t + k$,

(5) $$IDR_{t,t+k} = \frac{D_t}{E_t \cdot (1 + x_{t,t+k}) + D_t}.$$

Here, the term x denotes stock returns net of dividends from time t to time $t + k$. However, according to Welch (2004) in this setting it is not of any relevance if dividends are included or not.[19] Net stock return could not be obtained directly from the database used for this thesis (Thomson Reuters Data Stream). Consequently, net stock returns were estimated as follows,

(6) $$x_{t,t+k} = \frac{E_{t+k} - E_t}{E_t}.$$

Equation (3) depends on the dynamics of capital structure as, for instance, changes in debt or equity. Specifically, the amount of debt changes with new debt security issues, retirements and changes in the value of debt,

(7) $$D_{t+k} = D_t + TDNI_{t,t+k}.$$

[19] Welch (2004) argues that, due to the fact that this type of study analyses debt ratio dynamics mainly in cross-section, a low cross-sectional dispersion of dividends leads to fact that to the fact that conducting the analysis based on gross or net stock returns has no significant impact on the achieved results. In view of the fact, that dividends from the German sample have a very low cross-firm standard deviation (1.2% over one year, see Table 3), results of any subsequent analyses will not be affected when either using gross (i.e. capital gains) or net stock returns.

$TDNI$ represents the Total Debt Net Issuing activity. When $TDNI$ is positive (negative) this indicates a net debt issue (retirement) from time t to time $t+k$,

(8) $$TDNI_{t,t+k} = D_{t+k} - D_t.$$

Accordingly, the same logic can be applied to equity changes,

(9) $$E_{t+k} = E_t \cdot (1 + x_{t,t+k}) + ENI_{t,t+k},$$

where ENI represents the total Equity Net Issuing activity. Again, ENI cannot be identified directly from the given database and, therefore, it is determined as,

(10) $$ENI_{t,t+k} = E_{t+k} - E_t \cdot (1 + x_{t,t+k}).$$

Subchapter 4.1.3 will add an additional perspective on the dynamics of capital structure by identifying the explanatory power of individual components of debt ratios and dynamics for a firm´s actual debt ratio. In addition to equations (4) and (5), equations (12) to (15) will be utilized for decomposing debt ratios.

Both Drobetz and Pensa (2007) and Welch (2004) use equation (11) in order to find more distinguishing explanatory power of how capital structure is determined when only corporate issuing activity is taken into consideration.

(11) $$ADR_{t+k} = \frac{D_t + TDNI_{t,t+k}}{D_t + TDNI_{t,t+k} + E_t \cdot (1 + x_{t,t+k}) + ENI_{t,t+k}}$$

All issuing and dividend activity can be described as:

(12) $$\frac{D_t + TDNI_{t,t+k}}{D_t + TDNI_{t,t+k} + E_t + ENI_{t,t+k} - DIV_{t,t+k}}.$$

In the same vein, the formula can be adopted when dividends (DIV) are disregarded,

(13) $$\frac{D_t + TDNI_{t,t+k}}{D_t + TDNI_{t,t+k} + E_t + ENI_{t,t+k}}.$$

Similarly, the effects for (net) equity issuing activity are

(14) $$\frac{D_t}{D_t + E_t + ENI_{t,t+k} - DIV_{t,t+k}},$$

and the effects for (net) debt issuing activity

(15) $$\frac{D_t + TDNI_{t,t+k}}{D_t + TDNI_{t,t+k} + E_t}$$

respectively.

3.4 Empirical Model

In accordance with both Welch (2004) as well as Drobetz and Pensa (2007), the Fama-MacBeth procedure is utilized in this thesis to estimate the impact of changes in market capitalization on capital structures. The data typically observed in corporate finance (also in this thesis) have cross-sectional and time-series elements (i.e. financial data over many firms as well as time-series observations for each firm). The main reason utilizing the Fama-MacBeth procedure as opposed to a conventional Ordinary Least Square (OLS) panel regression is because it does account for standard errors, corrected for cross-sectional correlation.[20] The same correction could be achieved by estimating time-series averages first, and then running pure cross-sectional regressions (Cochrane 2005, 244ff). However, this thesis follows the first approach in order to achieve a higher comparability to referential studies who also pursued the Fama-MacBeth procedure (Welch 2004; Drobetz and Pensa 2007).

Originally, Fama and MacBeth (1973) developed the regression approach to test the validity of asset pricing models such as the Capital Asset Pricing Model (CAPM).[21] The method estimates the beta and risk premium for any risk factor that can be expected to determine asset prices. The parameters are estimated in three main steps (three pass technique)[22]: first, time-series regressions are run to determine the asset´s beta (i.e. regressing asset returns against market returns). Second, cross-sectional OLS regressions are performed for each period to obtain the risk premium for every factor (i.e. regress asset returns of a period on the estimated betas from step one). Third, the final coefficients are derived from the time series arithmetic means of periodical cross-sectional regression parameter estimates and standard errors are estimated from time-series the standard deviation of cross sectional regression coefficients (Fama and MacBeth 1973; Cochrane 2005, 244ff).

The Fama-MacBeth procedure is a standard approach in financial empirics when performing regressions on sample data with panel structure (i.e. the sample comprises of cross-sectional as well as time-series elements). The approach has been frequently

[20] Cross-sectional correlation in financial data appears to be suggestive: for instance, if one firm's stock return is remarkably high in a particular month, another firm's stock return is also likely to be very high in the same month (Cochrane 2005, 247ff).

[21] Thereafter, the Fama-MacBeth approach has been deployed in a wide array of academic research.

[22] The Fama-MacBeth approach is frequently referred as to a two-step procedure. The authors of this thesis, however, identify three distinct steps.

applied because it accounts for cross-sectional correlation of residuals across firms within panels (Cochrane 2005, 244ff).[23]

One of the main shortcomings of the three-step Fama-MacBeth procedure is that the first step estimates asset betas with errors. If, then, the estimated results from the first step are deployed as independent variables in the second step, the model is performed under the assumption that values derived from the first step equal the true market values, which cannot be expected to be the case. This complication causes the "error-in-the-variable" problem, which predicts that the estimations from the second step of the procedure will be biased in the sense that estimated values from the first step carry errors which will translate into erroneous estimations from the second step (Fama and MacBeth 1973; Cochrane 2005, 247f). Fama and MacBeth (1973) deal with this issue by grouping stocks into twenty portfolios. Assuming that errors from the first step are not perfectly correlated across securities, they can be expected to counterbalance one another within the portfolio and, therefore, reducing portfolio-wide measurement errors (diversification effect). Moreover, Shanken (1992) proposed an approach to (upward) adjust standard errors for the "error-in-the-variable" problem, which will affect t-statistics accordingly. This procedure would be an alternative to the original Fama-MacBeth approach of making use of portfolios in order to correct for the errors in variable estimations.

Following Welch (2004), the Fama-MacBeth procedure deployed in this thesis is a variation of the original approach and has been adjusted to the specific needs of the research question. The initial three-step approach is reduced to a two-step procedure: the time-series regressions from the initial first step need not be performed because, as depicted in subchapter 3.3, the regressors (ADR_t and $IDR_{t,t+k}$) for the subsequent step can be computed from readily observable capital market data. For this reason, an aggregation of companies in portfolios of companies in order to avoid the above-mentioned "error-in-the-variable" problem is not necessary because the input values represent true market values and do not carry estimation errors. Also, the Shanken (1992) correction of standard errors does not have to be performed for the same reason.

[23] Furthermore, specification tests have been conducted in order to test for normal distribution, heteroscedasticity, multicollinearity, cross-sectional correlation and serial correlation. The test results, which have been incorporate in the conducted analysis, can be viewed in Appendix III.

The first step (second step of the original Fama-MacBeth approach) of the regression model follows the regression specification stated in equation (3) and the cross-sectional coefficients α_0, α_1 and α_2 are estimated with the OLS method for every annual period t = 1, 2, ... T. In the second step (third step of Fama-MacBeth), the mean of the time-series of estimated cross-sectional coefficients of the first step is computed as

(16) $$\bar{\alpha} = \frac{1}{T} \sum_{t=1}^{T} \alpha_t.$$

Standard errors are derived from the time-series standard deviation of the cross-sectional coefficients

(17) $$\sigma(\bar{\alpha}) = \sqrt{\frac{1}{T^2} \sum_{t=1}^{T} (\alpha_t - \bar{\alpha})^2}.$$

The R^2 values are time series means of cross-sectional coefficients of determination

(18) $$\overline{R^2} = \frac{1}{T} \sum_{t=1}^{T} R^2{}_t$$

and the Fama-MacBeth t-statistic is derived from the quotient of equation (16) and (17) (Fama and MacBeth 1973; Cochrane 2005, 247 f; Welch 2004).

With the regression specification outlined in equation (3), Welch´s (2004) managerial inertia theory, which incorporates behavioral aspects of managers, can be tested quantitatively: the respective coefficients of the independent variables ADR_t and $IDR_{t,t+k}$ indicate the relative importance in impacting future actual debt ratios ADR_{t+k}. From this fact, Welch (2004) derives two extreme hypotheses: first, if $\alpha_1 = 1$ and $\alpha_2 = 0$, a perfect rebalancing of market-based capital structures after stock return-induced changes can be expected and a strong impact of historical capital structures on current debt ratios may be concluded (perfect readjustment). Second, if $\alpha_1 = 0$ and $\alpha_2 = 1$, firms can be expected to completely accept fluctuations in capital structures due to changing market capitalizations (perfect non-readjustment or managerial inertia).

The basic regression model is run with as well as without a constant term (α_0), which can be seen as accounting for the importance of a constant target leverage ratio. The specification without an intercept is set up to estimate the direct competition of ADR_t and $IDR_{t,t+k}$ in explaining ADR_{t+k} (Welch 2004).

3.5 Life-Cycle Extension

Following the approach of DeAngelo, DeAngelo, and Stulz (2006), the ratio of retained earnings to total accounting equity (RE/TE) is used as a proxy for the degree of maturity of a specific company.[24] Following this logic, firms with little retained earnings as compared to the total amount of equity are assumed to be comparatively immature ventures (growth firms), while companies which have accumulated extensive retained earnings are likely to be mature (value firms with reduced growth opportunities). As the RE/TE ratio indicates the earned proportion (as opposed to contributed fraction) of the book value of equity, it describes the self-financing ability of a company: mature firms can use accumulated past profits for funding and, on the other hand, immature firms are expected to be in a capital infusion phase of the corporate life-cycle. Moreover, Altman (1968) made use of a similar ratio (RE/A) as a proxy for bankruptcy risk, arguing that the ratio captures the maturity of a firm and that the bankruptcy risk decreases with increasing maturity.

In order to cluster the entire sample according to the comparative intra-annual maturity of the respective company, firm-years are allocated to the relatively mature (immature) subsample depending on whether the company´s RE/TE ratio is above (below) the median firm´s ratio of the respective sample year. Thus, the total sample is divided into two equally sized subsamples.[25]

The empirical analysis of the subsamples is accomplished by setting up a dummy variable ($d_{\mathrm{RE/TE}}$) that assumes the value 1 (0) if the concerned RE/TE ratio is above (below) the respective median value of the year. Then, the basic regression specification (equation 3) is performed for both subsamples; i.e. the entire Fama-MacBeth regression procedure is executed two times separately on the total subsample over all time horizons subject to the condition that the dummy variable equals 0 (for the immature subsample) and 1 (for the mature subsample), respectively:

[24] DeAngelo, DeAngelo, and Stulz (2006) used the RE/TE proxy ratio to study the changing dividend payout behavior over the corporate life-cycle and discover that the RE/TE ratio is a major determining factor of the probability of a firm to grant dividends. Thereafter, this proxy has been frequently employed in other studies (i.a. Kim and Suh 2009; Owen and Yawson 2010).

[25] In this process, 18 firm-years had to be excluded in total due to missing data on retained earnings.

(19) $ADR_{t+k} = [\alpha_0+]\ \alpha_1 \cdot ADR_t + \alpha_2 \cdot IDR_{t,t+k} + \epsilon_t$ with $d_{\mathrm{RE/TE}} = 1$

or

(20) $ADR_{t+k} = [\alpha_0+]\ \alpha_1 \cdot ADR_t + \alpha_2 \cdot IDR_{t,t+k} + \epsilon_t$ with $d_{\mathrm{RE/TE}} = 0$

In this context, it is explicitly pointed out that the above clustering process according to corporate maturity only allows for an analysis of comparative maturity within the German sample of this thesis; not absolute maturity in accordance with predetermined thresholds for respective life-cycle phases.

3.6 Validity, Reliability and Data Quality

The *validity* of a study refers to the accuracy of indicators to actually measure particular characteristic in a given problem setting and, therefore, directly impacts the relevance of a study (Bryman and Bell 2007, 164ff). The above-mentioned measures of corporate leverage as well as the approach of quantifying managerial readjustment behavior have been deployed in studies published in international scientific journals (i.a. Welch 2004) and can, for that reason, be considered sufficiently valid. Similarly, the approach of using the ratio of retained earnings to total book value equity as a proxy for the maturity of a company has been made use of in the relevant literature (i.a. DeAngelo, DeAngelo, and Stulz 2006; Kim and Suh 2009). It should, however, be considered that studying managerial decision-making on capital structures may involve certain behavioral aspects that are only limitedly quantifiable and may not be captured by this thesis.

The concept of *reliability* characterizes the repeatability of a study in the sense that consistent results can be reproduced in repeated tests with comparable methodologies. Also, including the aspect of subjective biases, if the study was to be repeated by other researchers (Bryman and Bell 2007, 162ff). In view of the fact that the methodological approach followed in this thesis has been presented transparently, a reproduction appears to be possible. In addition, the data base used in this thesis is directly based on the data from data from Thomson Reuters Datastream and, hence, all data used in thesis can be regarded as publicly accessible.

In order to test the robustness of the Fama-MacBeth regression type used in this thesis, an alternative statistical approach is applied. Appendix IV displays the results from the alternative approach and verifies the robustness of the obtained results.

In order to facilitate the large sample studied in this thesis, the required market and accounting data was retrieved from Thomson Reuters Datastream, which has to be considered as a *secondary source of data* because the data was not collected by the authors themselves. For that reason, the accuracy of the empirical results depends on the quality of secondary data (i.e. the consistency between the secondary data and the actual market data and account data as published in the financial reports of the respective companies) as obtained from Thomson Reuters Datastream.

4 EMPIRICAL RESULTS

4.1 Rebalancing in the German Stock Market

4.1.1 Descriptive Statistics

a) Standard Descriptives

Table 3 presents summary statistics of the basic variables. All capital structure dynamics are calculated according to equations (4), (7) and (9).

Panel A of Table 3 provides an overview of firm size and leverage characteristics in the German sample. Assuming that our sample is representative for the entire German stock market, the average listed German firm has a mean (median) market value of EUR 12,209 million (EUR 1,352 million). The mean (median) accounting value amounts to EUR 9,961 million (EUR 958 million). On average, the starting actual leverage is approx. 50%. By comparing this finding to existing research on the Anglo-Saxon institutional environment (i.a. Welch 2004), the initial hypothesis (subchapter 1.2) that banks play a more important role in the German bank-based corporate financing system U.S. market may be confirmed. Relative to the sample mean, the average deviation from the sample´s mean market value is substantially lower for the German sample of this thesis (variation coefficient of 2.7) as compared to the U.S. sample (4.3, unreported in Welch´s (2004) work). Interestingly, a similar relation holds for the accounting-based measure for the value of assets (2.9 in Germany; 4.6 in the U.S.). Put differently, the sample covered in this thesis appears to be less dispersed in terms of both book and market value than the referential U.S. sample (Welch 2004).

Table 3: Descriptive Statistics – Entire Sample

		One-Year				Three-Year				Five-Year				Ten-Year			
Description	Abreviation	Mean	Median	Standard Deviation	Variation Coefficient	Mean	Median	Standard Deviation	Variation Coefficient	Mean	Median	Standard Deviation	Variation Coefficient	Mean	Median	Standard Deviation	Variation Coefficient
Panel A: Capital Structure Ratios (%) and Firm Size (in million Euros)																	
1. Actual Debt Ratio	ADR_t	50.5	52.9	23.9	0.5												
2. Implied Debt Ratio	$IDR_{t,t+k}$	50.7	52.7	24.5	0.5	50.2	51.8	25.0	0.5	48.8	49.9	24.8	0.5	45.5	44.1	24.7	0.5
3. Market Value	E_t+D_t	12,209	1,352	33,010	2.7												
4. Total accounting assets	A_t	9,961	958	28,899	2.9												
Panel B: Issuing Activities (%), normalized by Market Value (D+E) and Winsorized (%)																	
1. Net debt issuing	$TDNI_{t,t+k}$	2.9	1.6	14.0	4.9	10.8	5.4	33.3	3.1	19.1	12.0	44.0	2.3	51.4	35.2	75.8	1.5
2. Net equity issuing before dividends	$ENI_{t,t+k}$	1.2	0.0	5.4	4.4	4.0	0.1	12.8	3.2	6.9	0.9	18.8	2.7	11.9	5.1	24.7	2.1
3. Debt and equity issuing	$TDNI_{t,t+k} + ENI_{t,t+k}$	4.2	1.8	16.6	4.0	15.2	7.2	40.4	2.7	26.9	15.2	57.5	2.1	63.5	42.7	89.1	1.4
4. Dividends	$DIV_{t,t+k}$	1.1	0.8	1.2	1.1	3.5	2.9	3.4	1.0	6.4	5.1	5.9	0.9	16.9	13.5	13.6	0.8
5. Activist equity expansion	$ENI_{t,t+k} - DIV_{t,t+k}$	0.1	-0.7	5.7	59.1	0.4	-2.0	13.6	32.5	0.4	-2.8	20.4	49.2	-4.4	-6.4	26.6	-6.1
6. Activist total expansion	$TDNI_{t,t+k} + ENI_{t,t+k} - DIV_{t,t+k}$	3.0	0.8	16.5	5.6	11.2	3.6	39.7	3.5	20.5	8.5	58.1	2.8	48.3	26.3	87.4	1.8
7. Total euro return	$r_{t,t+k} * E_t$	4.6	1.7	25.0	5.4	17.5	7.0	54.0	3.1	32.4	16.0	81.9	2.5	74.1	46.5	123.0	1.7
8. Induced equity growth	$x_{t,t+k} * E_t$	3.2	0.6	24.8	7.8	12.8	2.9	52.5	4.1	24.2	8.7	78.5	3.2	53.8	26.7	113.5	2.1
Observations		2,154				1,591				1,158				455			

Panel B presents an overview of the capital dynamics of German firms.[26] In the German sample, the mean firm issues approximately 2.9% debt and 1.2% in equity over a one-year period. It is readable from this fact that German firms prefer to issue debt as opposed to equity, which may indicate behavior in accordance with the pecking order theory. Compared to Welch´s (2004) U.S. sample, German firms, on average, issue less capital both in terms of equity and debt over all observed time horizons.[27] For instance, over the five-year period German firms issue only 19.1% debt and 6.9% equity, whereas the U.S. firms issue 27.4% in equity and 21.0% in debt respectively. In addition, German firms also deviate from the consolidated European sample (Drobetz and Pensa 2007).[28] German firms issue less debt than the average European firm (31.5% on European level, five-year period). Also, German firms issue significantly less equity than firms in the rest of Europe. On average, as indicated in row 7, German firms generate annual gross stock returns (i.e. including dividends) of 4.6%, of which they pay out 1.1% as dividends. Hence, they achieve a 3.2% net stock return-induced growth in equity. These figures are low compared to the U.S. and the European samples (U.S.: 7.0%; EU: 7.3%). Also, over a longer time horizon of, for instance, five years the normalized net stock returns of the German sample remains considerably below the U.S. and consolidated European reference sample. Underlying reasons for the lower German net stock returns may be the different observed time horizons of the studies (U.S: 1960-2000; EU: 1990-2005). The activist equity and total expansion figures explain if firms deliberately change their capital. Over all investigated time horizons, the actively managed expansion (i.e. activist total expansion) is as almost as large as the return-induced growth in equity. Here, a substantial proportion of the expansion stems from the net debt issuing activity. This finding implies that corporate issuing activity is potentially large enough to counterbalance a considerable part of the stock return influence on the market-based capital structure. This finding is largely in accordance with the evidence from the U.S. and consolidated European reference studies.

[26] In order to obtain more comparable results from data with different bases, all variables were normalized by the respective firm´s market value. Further, in order to reduce the effect from potential outliers, the results were winsorized at the upper and lower fifth percentile of each variable's distribution.

[27] Hereinafter, when referring to the U.S. sample, Welch (2004) is referenced.

[28] Hereinafter, when referring to the European sample, Drobetz and Pensa (2007) are referenced.

b) Grouped Data

As discussed in subchapter 3.4, the clustering of firms into portfolios as a first step of the Fama-MacBeth procedure is not required in this thesis. Nevertheless, following Welch´s (2004) approach, a clustering of firms according to their comparative stock market performance is performed so that observable capital structure relevant properties of firms with differing characteristics can be compared.[29]

As readable from Panel A in Table 4, the median firm in the weakest performance-decile has a median return of roughly -48% over the annual time horizon, whereas the highest quintile reaches a net stock return of 64%. This spread increased with the time horizon of the model. However, compared to the U.S. sample and, also, to the consolidated European sample this spread is rather small. For instance, over five years the median U.S. corporation in the highest performance-decile reaches a net stock return of 406% and the lowest decile has a return of -106%. Thus, the impact on market-based indebtedness by equity price shocks appears to be more pronounced in the U.S. market.

Row 1 and 2 indicate how much debt ($TDNI_{t,t+k}$) and, respectively, equity ($ENI_{t,t+k}$) firms issue across different performance-deciles. German firms correspond in their issuing activities to the European issuing behavior, but not to the U.S. issuing pattern. More specifically, unlike the U.S. where firms with higher (lower) stock returns issue more equity (debt) than debt (equity), German firms issue both more debt and equity with increasing stock returns, which is well-observable over the five-year horizon.

[29] In doing so, all firm-years from the sample were first sorted by calendar year and, in a second step, by sorted sales which as a proxy for firm size. Finally, firm-years from each size-decile are arranged into ten equally large performance-deciles by their respective net stock return in the relevant time frame (between time t and $t + k$). This procedure facilitates sorting firms into portfolios based on stock-performance relative to similarly sized peers and, also, year effects are controlled because stock-performance is only compared intra-annually. All figures in the Table 4 are medians of the respective bins in order to account for the large dispersion of values within bins.

Panel A: Sorted by Year, Sales and One-Year Net Stock Returns											
Sort Criterion: Net Stock Returns $x_{t,t+k}$ (with k=1)		-48%	-24%	-15%	-5%	4%	11%	19%	32%	45%	64%
1. Net debt issuing	$TDNI_{t,t+k}$	1.2%	1.1%	1.1%	1.8%	0.8%	1.7%	2.1%	1.6%	1.6%	2.4%
2. Net equity issuing	$ENI_{t,t+k}$	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3. Dividends	$DIV_{t,t+k}$	0.4%	0.7%	0.9%	0.9%	1.0%	1.0%	0.9%	0.9%	0.8%	0.8%
4. Activist equity expansion	$ENI_{t,t+k}$ - $DIV_{t,t+k}$	-0.3%	-0.6%	-0.6%	-0.8%	-0.9%	-0.9%	-0.9%	-0.8%	-0.7%	-0.4%
5. Activist total expansion	$TDNI_{t,t+k}$ + $ENI_{t,t+k}$ - $DIV_{t,t+k}$	1.4%	0.0%	0.5%	0.6%	-0.4%	0.3%	1.2%	1.2%	0.9%	2.7%
6. Induced equity growth	$x_{t,t+k}$ * E_t	-16.1%	-10.0%	-6.3%	-2.4%	1.4%	4.5%	6.6%	12.2%	15.6%	24.6%
7. Starting ADR	ADR_t	58.2%	54.1%	49.5%	50.4%	54.0%	48.3%	54.1%	50.5%	54.0%	55.5%
8. Ending ADR	ADR_{t+k}	72.9%	64.5%	55.0%	54.3%	55.5%	47.7%	52.3%	47.8%	46.7%	44.3%
9. Return-induced IDR	$IDR_{t,t+k}$	72.7%	61.9%	55.2%	52.2%	54.1%	47.3%	51.4%	46.8%	45.4%	44.3%
Firm-Years in Bin		216	215	216	215	216	215	215	216	215	215

Panel B: Sorted by Year, Sales and Three-Year Net Stock Returns											
Sort Criterion: Net Stock Returns $x_{t,t+k}$ (with k=3)		-67%	-44%	-28%	-13%	7%	23%	39%	60%	84%	132%
1. Net debt issuing	$TDNI_{t,t+k}$	0.7%	2.5%	4.2%	3.3%	4.4%	9.0%	5.3%	7.7%	6.7%	13.7%
2. Net equity issuing	$ENI_{t,t+k}$	0.2%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.6%	0.1%	0.6%
3. Dividends	$DIV_{t,t+k}$	1.5%	2.6%	2.5%	2.8%	3.1%	3.4%	3.2%	3.2%	3.3%	2.7%
4. Activist equity expansion	$ENI_{t,t+k}$ - $DIV_{t,t+k}$	-1.0%	-2.0%	-2.0%	-2.6%	-2.4%	-2.9%	-1.9%	-1.9%	-2.0%	-0.8%
5. Activist total expansion	$TDNI_{t,t+k}$ + $ENI_{t,t+k}$ - $DIV_{t,t+k}$	-0.7%	0.7%	1.6%	2.1%	2.4%	6.6%	5.5%	5.9%	5.2%	14.3%
6. Induced equity growth	$x_{t,t+k}$ * E_t	-26.6%	-18.4%	-11.5%	-4.3%	2.9%	9.8%	14.2%	21.2%	31.1%	49.5%
7. Starting ADR	ADR_t	54.0%	51.6%	53.1%	50.4%	53.0%	49.5%	53.8%	54.0%	54.1%	58.3%
8. Ending ADR	ADR_{t+k}	77.4%	65.6%	59.9%	55.1%	55.0%	50.0%	52.1%	45.1%	42.4%	42.6%
9. Return-induced IDR	$IDR_{t,t+k}$	79.0%	64.2%	59.3%	52.8%	53.0%	46.9%	46.8%	44.4%	40.3%	37.8%
Firm-Years in Bin		159	159	159	159	159	159	159	160	159	159

Panel C: Sorted by Year, Sales and Five-Year Net Stock Returns											
Sort Criterion: Net Stock Returns $x_{t,t+k}$ (with k=5)		-66%	-46%	-28%	-7%	11%	33%	60%	85%	113%	174%
1. Net debt issuing	$TDNI_{t,t+k}$	-0.6%	3.8%	4.8%	10.0%	15.5%	9.6%	14.6%	21.2%	19.9%	18.6%
2. Net equity issuing	$ENI_{t,t+k}$	0.8%	0.6%	0.1%	0.4%	0.1%	1.2%	1.2%	1.3%	4.1%	3.1%
3. Dividends	$DIV_{t,t+k}$	3.4%	4.0%	4.4%	5.1%	5.3%	5.3%	5.7%	6.4%	6.3%	5.7%
4. Activist equity expansion	$ENI_{t,t+k}$ - $DIV_{t,t+k}$	-1.2%	-2.5%	-3.1%	-3.7%	-4.8%	-2.8%	-2.8%	-3.6%	-1.7%	-1.9%
5. Activist total expansion	$TDNI_{t,t+k}$ + $ENI_{t,t+k}$ - $DIV_{t,t+k}$	-1.1%	2.3%	1.4%	7.2%	12.8%	8.5%	8.8%	20.3%	22.9%	15.6%
6. Induced equity growth	$x_{t,t+k}$ * E_t	-28.2%	-16.2%	-10.2%	-3.1%	5.7%	12.3%	21.8%	33.6%	48.8%	67.1%
7. Starting ADR	ADR_t	49.4%	57.6%	56.6%	48.5%	49.6%	55.0%	56.9%	60.3%	54.0%	57.3%
8. Ending ADR	ADR_{t+k}	74.8%	67.8%	61.9%	56.9%	53.7%	49.9%	47.6%	48.8%	43.5%	38.1%
9. Return-induced IDR	$IDR_{t,t+k}$	76.2%	66.8%	59.0%	52.7%	47.0%	42.5%	43.3%	44.5%	37.8%	33.7%
Firm-Years in Bin		115	116	115	116	116	116	116	116	116	116

Panel D: Sorted by Year, Sales and Ten-Year Net Stock Returns											
Sort Criterion: Net Stock Returns $x_{t,t+k}$ (with k=10)		-71%	-29%	2%	39%	53%	90%	95%	165%	181%	268%
1. Net debt issuing	$TDNI_{t,t+k}$	-5.0%	8.9%	11.9%	64.2%	39.7%	50.9%	38.2%	43.9%	47.7%	36.3%
2. Net equity issuing	$ENI_{t,t+k}$	2.4%	4.0%	3.2%	6.6%	1.2%	7.9%	5.5%	10.9%	10.6%	0.3%
3. Dividends	$DIV_{t,t+k}$	8.0%	10.0%	5.8%	15.5%	14.0%	13.1%	11.7%	16.1%	18.2%	20.0%
4. Activist equity expansion	$ENI_{t,t+k}$ - $DIV_{t,t+k}$	-4.4%	-6.5%	0.2%	-4.2%	-8.3%	-7.3%	-4.3%	-4.0%	-6.4%	-15.0%
5. Activist total expansion	$TDNI_{t,t+k}$ + $ENI_{t,t+k}$ - $DIV_{t,t+k}$	-10.7%	9.5%	29.0%	59.7%	21.7%	49.7%	47.9%	49.9%	41.5%	7.3%
6. Induced equity growth	$x_{t,t+k}$ * E_t	-23.0%	-11.4%	-3.4%	11.4%	19.4%	44.2%	39.0%	65.5%	80.6%	102.2%
7. Starting ADR	ADR_t	60.6%	55.8%	56.7%	53.4%	63.9%	53.4%	63.5%	53.0%	58.8%	58.6%
8. Ending ADR	ADR_{t+k}	78.4%	59.7%	63.2%	61.8%	57.9%	52.5%	52.4%	47.3%	45.1%	38.4%
9. Return-induced IDR	$IDR_{t,t+k}$	83.5%	62.4%	59.4%	44.3%	51.0%	33.1%	40.8%	28.3%	32.2%	25.6%
Firm-Years in Bin		45	46	45	45	45	45	46	46	46	46

Table 4: Descriptive Statistic – Performance-Portfolios

Row 4 shows the activist (or managed) equity expansion, meaning that equity issuing ($ENI_{t,t+k}$) is netted against dividends ($DIV_{t,t+k}$). Since the level of accumulated dividends paid to shareholders increases with longer time horizons and the net equity issuing activity is too low to offset the dividend payout, the value for activist equity expansion is negative across all observed performance-deciles and time horizons. Row 5 displays the total activist expansion corrected for dividends. Except for the annual horizon, German firms with higher stock returns engage in more capital expansion than

firms with lower returns. For instance, over the ten-year horizon firms in the upper return deciles expand their capital base approximately by 40%-50% (except for the best decile), whereas the weakest firms with regard to stock performance even contract their capital base by about 11%.

The above finding that the managed capital base expansion is potentially large enough to counterbalance stock return-induced changes in indebtedness can now be assessed more differentiated: for instance, over an annual horizon the market value of equity in the strongest decile grows by roughly 25% due to higher stock prices, whereas the managed expansion of funds amounts only to approx. 3%. This relationship holds for the five best performing bins, while the lower performing bins show higher activist expansion as compared to the return-induced change in equity value. Over a ten-year horizon, only the three best return deciles display a higher induced equity growth than managed expansion.

Rows 7 through 9 present different debt ratios and their capital structure relevance. Whereas starting actual debt ratios are comparatively constant across performance-deciles for all time frames, ending actual debt ratios (ADR_{t+k}), however, have a larger spread across the different stock return deciles. After one year, firms in the lowest decile terminate with an ADR_{t+k} of 72.9% and firms in the highest decile have a debt ratio of 44.3%. In other words, well performing firms have lower ending debt ratios than poorly performing firms. Over the three-, five- and ten-year horizons this behavior reoccurs with the difference that starting and ending debt levels are slightly lower for all performance-deciles. Most interestingly, it can be seen that the starting ADR_t does not observably correlate with either stock returns or ending ADR_{t+k}. On the other hand, the return-induced equity growth ($IDR_{t,t+k}$) is apparently a better predictor of the ending ADR_{t+k} than it is the starting ADR_t. For instance, the top-performing one-year decile shows a starting debt ratio of 55.5%, whereas both the ending ADR_{t+k} and $IDR_{t,t+k}$ amount to 44.3%. These interrelations will be further investigated by the subsequent regression analysis.

4.1.2 Regression Results

Table 5 presents the empirical results from the estimated basic regression and, as outlined in subchapters 3.3 and 3.4, an adopted variant of the Fama-MacBeth regression type was used to estimate the coefficients α_0, α_1 and α_2.[30]

Horizon *k*	c	$IDR_{t,t+k}$	ADR_t	R^2	T
		A. Without Intercept			
1-year		0.976 (0.096) ***	0.027 (0.095)	0.938	22
3-year		0.891 (0.101) ***	0.114 (0.098) ***	0.814	20
5-year		0.852 (0.105) ***	0.167 (0.101) ***	0.705	18
10-year		0.486 (0.175) ***	0.539 (0.146) ***	0.531	13
		B. With Intercept			
1-year	0.034 (0.016) ***	0.966 (0.096) ***	-0.016 (0.096)	0.943	22
3-year	0.098 (0.030) ***	0.861 (0.095) ***	-0.015 (0.099)	0.844	20
5-year	0.140 (0.040) ***	0.809 (0.095) ***	-0.021 (0.105)	0.765	18
10-year	0.163 (0.085) ***	0.535 (0.170) ***	0.235 (0.170) ***	0.619	13

Table 5: Results from the Basic Regressions[31]

Panel A displays the regression results without an intercept and, thus, the direct relative impact of past leverage ratios (ADR_t) and return-induced indebtedness ($IDR_{t,t+k}$) on future actual debt ratios (ADR_{t+k}) can be estimated. Over the annual horizon, the coefficient of $IDR_{t,t+k}$ amounts 0.976 which demonstrates that the average German firm lets its actual debt ratio float almost completely with the experienced annual stock returns. This implies that a substantial proportion of the variations of the market-based indebtedness of firms is due to stock returns. The coefficient of the past debt ratio ADR_t, representing managerial rebalancing of stock returns, is only 0.027. Statistically this estimation is insignificantly different from zero (even at a confidence level of 10%). Hence, it can be interpreted that over an annual horizon managers do not counterbalance stock-induced changes in leverage. With increasing time horizons, $IDR_{t,t+k}$ has a diminishing influence on the future actual debt ratio (0.891, 0.852 and 0.486, respectively). In contrast, managerial issuing behavior has an increasingly large impact on the future actual debt ratio with longer observation periods. Accordingly, $IDR_{t,t+k}$ (0.486) and ADR_t (0.536) both influence the future actual debt ratio equally over a ten-year horizon. Thus, both stock price changes as well as a tendency to revert to the previous debt ratios (induced by managerial issuing activity) determine the actual

[30] The robustness of the Fama-MacBeth procedure proposed by Welch (2004) could be confirmed by conducting a pooled regression on the same panel data as underlying basis. The results can be observed in Appendix IV.

[31] The regressions are estimated with equation (3). The values in parenthesis denote Fama-MacBeth standard errors. Asterisks denote statistical significance at 10% (*), 5% (**) and 1% (***) levels of confidence.

debt ratio. Over longer durations German firms show increasingly active financial management in terms of equity and debt issues, whereas in the short run the fluctuation in leverage can be explained to a large extent by stock price movements. In addition, it can be read from Table 5 that the regression model can explain roughly 94% of the variations of the actual debt ratio. However, the model loses its explanatory power over longer time periods. The coefficient of determination (R^2) is almost halved over the ten year period (53%) as opposed to the annual horizon (94%).

Panel B regresses $IDR_{t,t+k}$ and ADR_t against ADR_{t+k} with an additional constant term that is incorporated to represent the relative importance of a firm´s target debt ratio (Welch 2004; Drobetz and Pensa 2007). When including the implicit target debt ratio in the regression, it can be seen that $IDR_{t,t+k}$ does not lose its influence on the actual debt ratio. Similar to Panel A, the coefficient declines from the annual horizon of 0.966 to 0.535 in the ten-year perspective. In contrast, ADR_t forfeits both its economic and statistical significance (at a confidence level of 10%) except for the ten-year period coefficient (0.235). The constant´s influence on a firm´s actual leverage is increasing with a longer observed time horizon. However, its economic influence on the actual debt ratio is still relatively small in comparison the coefficient of $IDR_{t,t+k}$. It could be assumed, that when a constant target ratio is included in the regression model, both the economic and statistical significance of management-induced capital readjustments disappear in the short-term. When, however, analyzing the ten-year period it can be derived, that – besides having a target leverage ratio – firms show a higher readjustment behavior (ADR_{t} coefficient of 0.235). Regarding the coefficient of determination, it can be observed that adding a constant target ratio as a regression intercept slightly increases the explanatory power of the model. This observation holds for all examined time horizons.

To subsume, both panels of Table 5 indicate that $IDR_{t,t+k}$ is a superior predictor of ADR_{t+k} than the previous actual debt ratio (ADR_t). In particular over shorter time horizons, a larger proportion of changes in indebtedness are caused by stock returns rather than active managerial rebalancing towards former leverage ratios. Those findings are largely in line with results obtained in the descriptive statistics over grouped data (subchapter 4.1.1).

4.1.3 Decomposition of Capital Structure Determinants

The previous regressions have been conducted with the actual debt ratio (ADR_{t+k}) as dependent variable and the initial debt ratio (ADR_t) as well as the implied debt ratio ($IDR_{t,t+k}$) as explanatory variables.[32] In addition, following Welch´s (2004) approach, the subsequent regression can be viewed as a complement to the regressions performed in the preceding subchapter in two ways. First, it decomposes the dynamic capital structure elements by describing the respective power of explaining ADR_{t+k} by different variables: all issuing and dividend activity, all issuing activity, net equity issuing activity and net debt issuing activity in addition to the initial actual debt ratio and the implied debt ratio. Second, the complementary regression does not only focus on levels of different variables, but also describes the power of explaining changes in the future actual debt ratio (Welch 2004; Drobetz and Pensa 2007). All other variables are excluded so that only the linear relationship between ADR_{t+k} and the respective explaining variable is examined. For instance, it can be explained how a change in the actual debt ratio over a one year horizon can be explained by all issuing activity.

Table 6 reports the average coefficients of determination (R^2) which were obtained by using the previously described Fama-MacBeth regression procedure.[33] When contrasting the past actual debt ratio with the future actual debt ratio, it can be read from the first row that ADR_t has an explanatory power of roughly 85% over an annual horizon and R^2 significantly decreases to about 42% over a period of five years. In comparison, stock return influences ($IDR_{t,t+k}$) have a higher explanatory power over both horizons; though over five years $IDR_{t,t+k}$ wins the horse race against ADR_t since it remains at a R^2 of 76.2%. Moreover, the explanatory power of the implied debt ratio is higher than the remaining observed variables (row 3 to 6) over both time horizons (annual and five years). Nevertheless, over an annual horizon, all capital issuing-related variables have high levels of R^2 (between 84% and 88%).

[32] Additionally, for testing for an implicit target debt ratio, a constant has been added for one part of the regressions.

[33] Regression coefficients, standard errors and t-statistics are not reported since they are not the object of interest under the given circumstances.

	k = 1 Year Mean R^2		*k = 5 Years* Mean R^2	
	Levels (%)	Changes (%)	Levels (%)	Changes (%)
1. Past debt ratio	85.3	-	41.9	-
2. Implied debt ratio	94.1	62.7	76.2	17.6
3. All issuing and dividend activity	88.3	29.4	57.1	16.8
4. All issuing activity	88.4	32.9	55.9	21.0
5. Net equity issuing activity	84.4	5.6	48.2	7.2
6. Net debt issuing activity	89.7	30.4	50.6	14.5

Table 6: Explanatory Power of Capital Structure Determinants[34]

Additionally, the findings on capital structure dynamics can be examined from the changes of the actual debt ratio with regard to the listed variables. Annually, changes in a firm´s actual debt ratio can be explained to almost two thirds (62.7%) by changes in stock prices, whereas all issuing activity (excluding dividend payments) can only explain about one third of debt ratio changes (32.9%). This finding is in line with previous regression results that the return-induced changes dominate German firms´ capital structures in the short-term. Additionally, the change regression also confirms that managers increasingly engage in active financial management over a longer time frame (five years). Hence, the explanatory power of $IDR_{t,t+k}$ is strongly reduced to roughly 18%, while the mean R^2 for all issuing activities is reduced to a lesser extent. Put differently, over an annual horizon German firms could potentially offset half of the stock return-induced capital structure changes (32.9% versus 62.7%) and, within five years, they might be able to completely counterbalance any return-induced capital structure fluctuations (21.0% versus 17.6%). However, as analyzed in the previous basic regression, it is seen that, except for the ten year period, the coefficients of ADR_t have − at most − moderate magnitudes. Thus, even if corporate issuing activity has theoretically solid explanatory power of actual capital structures in Germany, the influence on the actual capital structure in negligible in the short-term.

Finally, if the overall issuing activity is distinguished by equity and debt issuing, a significant difference can be noticed: debt issues in the German sample can explain about six times (30.4%) more changes in capital structure than equity issues (5.6%). Over a five year horizon this finding is becoming less pronounced; net equity issuing

[34] The reported values are Fama-MacBeth coefficients of determination calculated in accordance with equation (18). For levels estimations, the dependent variable is ADR_{t+k} and independent variables are defined as follows: row 1: equation (4); row 2: equation (5); row 3: equation (12); row 4: equation (13); row 5: equation (14); row 6: equation (15). For changes estimations, the dependent variable is $ADR_{t+k} - ADR_t$ and ADR_t is deducted from the independent variables as defined for the levels estimations.

activity only increases slightly to 7.2%, whereas the explanatory power of debt issuances decreases to 14.5%.

4.1.4 Comparison to Referential Studies

The regression coefficients of the German sample can be put in contrast to the U.S. and European samples. Generally speaking, it can be stated that the empirical results on the German sample can be located between the ones from the U.S. and the European sample with regard to their readjustment behavior as follows:

First, in terms of stock return-induced capital structure changes (indicated by $IDR_{t,t+k}$), it is observed that leverage ratios of German firms are less influenced by changes in stock prices than U.S. corporations over all investigated time horizons. The spread increased over the ten-year period (0.486 in Germany; 0.683 in the U.S.). This pattern also holds for the models with and without intercepts. On the other hand, in comparison to the consolidated European sample, German public firms show a higher co-movement between stock prices and their respective capital structures across all analyzed time horizons and irrespective of the inclusion of a constant term.

Second, contrasting the active capital structure management (indicated by ADR_{t+k}) of the average German company to the U.S. and European samples, it is again observable that German firms represent a mingle between both referential samples. Across all considered time horizons (except three years without a constant), German firms are more engaged in active financial management than U.S. firms, which is most pronounced over the ten-year period. However, not only the isolated average German firm, but also the average European firm puts more attention on counterbalancing stock-induced capital structure changes by issuing activity than in the U.S.

Third, it can be observed that for the consolidated European as well as for the U.S. sample the explanatory power (R^2) of variances in leverage ratios by the regression model with the intercept is lower than by the one without the constant term. In contrast, the regression model of the German sample has a higher explanatory power with the intercept.

Fourth, in Welch´s (2004) analysis of the U.S. sample, changes in debt ratios can be explained to a larger extent by changes in net issuing activities than by changes in stock

returns. Therefore, he concludes that sufficient capital structure-relevant corporate issuing activity potentially exists to even out return-induced equity growth. Drobetz and Pensa (2007) follow the same argumentation for their European sample. However, in the European sample corporate issuing is only large enough to potentially counteract half of the return-induced changes in leverage. The same holds for the German sample over the annual horizon (see Table 6), whereas over a five year period the average German firm could potentially counteract 100% of debt ratio changes due to changes in market values of equity (as in the U.S. sample).

4.2 Life-Cycle Analysis

4.2.1 Descriptive Statistics on Subsamples

When clustering the German sample according to the comparative maturity of firms (as outlined in subchapter 3.5) it can be derived from Panel A1 and A2 of Table 7 that firms in the more mature subsample are on average (mean) approximately three times larger as their comparatively less mature German peers; both in terms of market and book values (i.e. total accounting assets). In respect of one-year sales and operating income, the mature subsample is roughly three and four times larger, respectively. With regard to market-based indebtedness (ADR_t), both maturity-related show about the same leverage (mature 49.0%, immature 51.8%) However, comparing Panel B1 and B2, firms in the immature subsample tend to issue more (less) equity (debt) than more mature firms over an annual horizon. This tendency is even more pronounced over the three, five year and ten-year horizons.[35]

[35] Results for the ten-year period are not reported since the small sample size (due to the clustering according to the degree of maturity) causes high standard errors and statistical insignificance in the subsequent regressions.

		One-Year				Three-Year				Five-Year			
Description	Abreviation	Mean	Median	Standard Deviation	Variation Coefficient	Mean	Median	Standard Deviation	Variation Coefficient	Mean	Median	Standard Deviation	Variation Coefficient
Panel A1: Mature Firm Capital Structure Ratios (%) and Firm Size, Sales and Operating Income													
1. Actual Debt Ratio	ADR_t	49.0	50.8	23.3	0.5								
2. Implied Debt Ratio	$IDR_{t,t+k}$	48.9	50.2	23.8	0.5	47.8	47.8	24.2	0.5	45.8	45.5	24.1	0.5
3. Market Value	E_t+D_t	18,289	2,178	41,460	2.3								
4. Total accounting assets	A_t	14,969	1,371	37,082	2.5								
5. Sales	S_t	11,659	1,646	26,664	2.3								
6. Operating Income	P_t	521	61	1,438	2.8								
7. Modified Altman Z-Score	Z_t	2.04	2.11	2.18	1.1								
Panel A2: Immature Firm Capital Structure Ratios (%) and Firm Size, Sales and Operating Income													
1. Actual Debt Ratio	ADR_t	51.8	54.8	24.4	0.5								
2. Implied Debt Ratio	$IDR_{t,t+k}$	52.4	54.9	25.1	0.5	52.6	54.6	25.5	0.5	51.9	54.1	25.2	0.5
3. Market Value	E_t+D_t	6,047	855	19,693	3.3								
4. Total accounting assets	A_t	4,854	652	15,627	3.2								
5. Sales	S_t	4,144	639	10,759	2.6								
6. Operating Income	P_t	128	9,041	771	6.0								
7. Modified Altman Z-Score	Z_t	1.54	1.58	1.25	0.8								
Panel B1: Mature Firm Issuing Activities (%), normalized by Market Value (D+E) and Winsorized (%)													
1. Net debt issuing	$TDNI_{t,t+k}$	3.3	1.9	12.9	3.9	11.2	6.5	28.7	2.6	19.8	12.9	41.3	2.1
2. Net equity issuing before dividends	$ENI_{t,t+k}$	0.7	0.0	4.4	6.7	2.0	0.0	8.8	4.4	4.0	0.3	15.1	3.7
3. Debt and equity issuing	$TDNI_{t,t+k} + ENI_{t,t+k}$	3.9	2.0	14.6	3.7	13.2	7.1	32.4	2.5	23.9	13.8	49.5	2.1
4. Dividends	$DIV_{t,t+k}$	1.3	1.0	1.2	0.9	4.1	3.3	3.4	0.8	7.3	5.8	6.2	0.8
5. Activist equity expansion	$ENI_{t,t+k} - DIV_{t,t+k}$	-0.6	-0.9	4.7	-7.3	-2.1	-2.8	9.7	-4.5	-3.2	-4.4	16.9	-5.2
6. Activist total expansion	$TDNI_{t,t+k} + ENI_{t,t+k} - DIV_{t,t}$	2.6	0.7	14.8	5.6	9.0	3.2	32.6	3.6	17.0	6.6	50.3	3.0
7. Total euro return	$r_{t,t+k} * E_t$	5.8	3.0	23.5	4.0	19.7	8.8	51.0	2.6	35.4	20.4	76.3	2.2
8. Induced equity growth	$x_{t,t+k} * E_t$	4.2	1.7	23.3	5.5	14.5	5.5	49.4	3.4	26.2	13.7	72.5	2.8
Panel B2: Immature Firm Issuing Activities (%), normalized by Market Value (D+E) and Winsorized (%)													
1. Net debt issuing	$TDNI_{t,t+k}$	2.4	1.1	15.0	6.3	10.4	3.7	37.7	27.5	18.4	10.4	47.0	2.6
2. Net equity issuing before dividends	$ENI_{t,t+k}$	1.8	0.0	6.2	3.5	6.1	0.2	15.7	39.0	10.0	1.5	21.9	2.2
3. Debt and equity issuing	$TDNI_{t,t+k} + ENI_{t,t+k}$	4.4	1.6	18.5	4.2	17.4	7.3	47.5	36.6	30.4	17.7	65.4	2.2
4. Dividends	$DIV_{t,t+k}$	0.9	0.5	1.3	1.4	2.9	2.3	3.3	89.6	5.4	4.4	5.4	1.0
5. Activist equity expansion	$ENI_{t,t+k} - DIV_{t,t+k}$	0.9	-0.3	6.5	7.6	3.2	-1.0	16.4	19.5	4.5	-1.4	23.1	5.2
6. Activist total expansion	$TDNI_{t,t+k} + ENI_{t,t+k} - DIV_{t,t}$	3.3	0.8	18.2	5.5	13.6	4.4	46.2	29.5	24.5	11.4	65.8	2.7
7. Total euro return	$r_{t,t+k} * E_t$	3.4	0.6	26.5	7.8	15.2	4.2	57.3	26.6	28.9	9.8	87.9	3.0
8. Induced equity growth	$x_{t,t+k} * E_t$	2.1	-0.5	26.3	12.5	11.2	0.7	55.9	20.0	21.8	4.7	84.9	3.9

Table 7: Descriptive Statistics – Life-Cycle Subsamples

Overall, firms in the immature subsample engage in higher managed expansion (one year: 3.3%; five years: 24.5%) than firms in the mature subsample (one year: 2.6%; five years: 17.0%). In addition, the mature subsample experiences a higher return-induced equity growth throughout all horizons with increasing significance in the long-term. For instance, the mean induced equity growth for the mature subsample amounts to 26.2% over the five year horizon, whereas the immature subsample only obtains an induced equity growth of 21.8%.

In addition, a modified Altman (1968) Z-score is reported in Table 7 as an indicator of the ex ante probability of financial distress.[36] As expected, the more mature subsample has a higher mean score (2.04) than the less mature subsample (1.54) which indicates a higher probability of bankruptcy for the latter.

[36] See Appendix II for an explanation regarding the modification of the original Altman (1968) Z-Score.

4.2.2 Regression Results

Table 8 presents the regression results for the two subsamples: Panel A1 and B1 depict the results for the mature subsample and Panel A2 and B2 outline the findings for relatively less mature firms without and including a constant term, respectively.

Panel A1 shows that the average German firm in the mature subsample engages in low readjustment over annual horizons (ADR_t coefficient of 0.085). With increasing time frames, the management-induced rebalancing activity of stock returns enhances and, consequently, considerable readjustment activity over three (0.201) and five-year (0.265) time frames can be observed. The amplification of adjustment activity is, however, more pronounced from annual to three-year time frames as compared to the increase from the three-year to the five-year horizon. Accordingly, the impact of return-induced changes of market-based leverage ($IDR_{t,t+k}$) reduces from 0.922 (one-year) to 0.765 (five-year).

Horizon *k*	c	$IDR_{t,t+k}$	ADR_t	R^2	T
Panel A1. Mature Subsample - Without Intercept					
1-year		0.922 (0.132) ***	0.085 (0.130) ***	0.942	22
3-year		0.812 (0.136) ***	0.201 (0.128) ***	0.874	20
5-year		0.765 (0.167) ***	0.265 (0.148) ***	0.780	18
Panel A2. Immature Subsample - Without Intercept					
1-year		1.007 (0.133) ***	-0.005 (0.133)	0.935	22
3-year		0.937 (0.152) ***	0.056 (0.153) *	0.758	20
5-year		0.915 (0.163) ***	0.087 (0.164) **	0.628	18
Panel B1. Mature Subsample - With Intercept					
1-year	0.026 (0.026) ***	0.924 (0.137) ***	0.039 (0.140)	0.947	22
3-year	0.043 (0.043) ***	0.789 (0.136) ***	0.148 (0.146) ***	0.888	20
5-year	0.064 (0.060) ***	0.733 (0.180) ***	0.179 (0.192) ***	0.807	18
Panel B2. Immature Subsample - With Intercept					
1-year	0.077 (0.024) ***	0.944 (0.136) ***	-0.039 (0.134)	0.941	22
3-year	0.128 (0.049) ***	0.868 (0.142) ***	-0.079 (0.150) **	0.815	20
5-year	0.190 (0.062) ***	0.848 (0.140) ***	-0.152 (0.160) ***	0.740	18

Table 8: Regressions Results on the Life-Cycle Subsamples[37]

Investigating the rebalancing behavior of comparatively immature German firms (Panel A2) yields that, over annual horizons, the average firm essentially fulfills Welch´s (2004) "perfect non-readjustment" hypothesis presented in subchapter 3.4: ADR_t has no significant impact on the debt ratio one year into the future (ADR_{t+1}). Despite the fact that the importance of past debt ratios increases over three and five-year time frames, in

[37] The regressions are estimated with equation (19) and equation (20), respectively. The values in parenthesis denote Fama-MacBeth standard errors. Asterisks denote statistical significance at 10% (*), 5% (**) and 1% (***) levels of confidence.

comparison to the mature subsample, the absolute importance remains on a low level (0.056 and 0.087, respectively). Consequently, return-induced changes retain a strong impact on the capital structures of immature companies as the corresponding coefficient remains above 0.90 and higher than the corresponding value in the mature subsample over all examined periods.

In accordance with the approach from subchapter 4.1.2, all regressions are also performed including a constant term to represent the importance of target debt ratios (Panel B1 and B2). The coefficient for the constant term ranges between 0.026 and 0.064 for the mature subsample. Moreover, both the impact of $IDR_{t,t+k}$ and ADR_t on ADR_{t+k} decrease, but retain economic and statistical significance (except for ADR_t over one year). In contrast, the inclusion of a constant term for immature firms (Panel B2) causes, on the one hand, ADR_t to lose any positive impact on future actual debt ratios.[38] On the other hand, the impact of stock returns is also reduced, but still has a considerable impact. As compared to the mature subsample, the constant term itself has a relatively large coefficient that, in addition, considerably increases over time (from 0.077 for one year to 0.19 for five years).

With regard to R^2 of the regression models, both the mature and the immature subsamples show that the model that includes a constant term has a somewhat higher explanatory power than the one without such term over all time horizons. In addition, the model on the mature subsample shows a higher explanatory power than the one for the immature subsample.

[38] In fact, ADR_t remains statistically significant and has a negative impact on ADR_{t+k}. However, Welch´s (2004) stark hypothesis only considers coefficients with values between 0 and 1.

5 DISCUSSION

5.1 General Discussion

By and large, the preceding empirical findings confirm Welch´s (2004) as well as Drobetz and Pensa´s (2007) findings of managerial inactivity to promptly and completely rebalance return-induced changes in the market-based capital structures. Correspondingly, Graham and Harvey (2001) find in their survey-based research that U.S. financial executives do not issue debt in accordance with changes in stock prices.

As outlined in subchapter 4.1.4, the results from the isolated German stock market can be located roughly halfway between, on the one side, the U.S. market and, on the other side, the averaged European market. This implies that Welch´s (2004) observations also hold for different institutional settings with different legal and economic backgrounds and, therefore, allows for a certain generalization of the findings. Thus, the initial statement, that the German and U.S. institutional settings were “two polar extremes” (Allen and Gale 1995, 179), does not appear to hold for corporate rebalancing activity which gives rise to the question on the underlying reasons for such similar results:

To begin with, the fact that German firms engage in a similar degree of (non-) rebalancing as compared to their American peers has to be put into perspective: in light of the fact that the mean stock returns in Germany are comparatively lower than in the U.S. (see subchapter 4.1.4), the return-induced deviations from starting capital structures are less pronounced in the German sample. For that reason, readjustment of the comparatively smaller deviations is easier for managers in German firms because equivalent readjustment activities have a higher impact on actual debt ratios (ADR_{t+k}) and, consistently, German firms issue less capital (both debt and equity) in comparison to the U.S. (as afore-mentioned in subchapter 4.1.4). In other words, managerial inactivity has lower impacts on market-based leverage ratios.

In addition, the possibility that the well-acknowledged diverging financial market features between the U.S. and Germany hardly have an impact on managerial readjustment behavior studied in this thesis has to be taken into consideration. Thus, for instance, the different degrees of dispersion of corporate ownership structures would be argued not to impact managerial rebalancing. A potential explanation for the similar

observations in two distinctly different institutional settings may also be that the counterbalancing of return-inducted changes in leverage can be seen to be impacted by individual behavioral aspects of corporate managers (Shefrin 2005, 92ff). Nevertheless, the differentiation between the German bank-based system on the one hand and the U.S. market-based system on the other hand still appears to be relevant (see subchapter 1.2). For instance, the relatively higher importance of debt issues compared to equity issues in the German market could be confirmed: debt issues can explain about six times (30.4%) more changes in capital structure than equity issues (5.6%) over the annual horizon (see Table 6). In addition, as stated in subchapter 4.1.1, the average German firm is considerably more levered than the mean U.S. firm from Welch´s (2004) sample (ADR_t equals 50% versus 30%).

Having placed the obtained results in an institutional framework, the empirical findings from this thesis can be reconciled with the standard capital structure theories (as presented in subchapter 2.2):

Trade-off theory: The observation that, in particular over short time horizons, German firms allow their market-based capital structures to significantly fluctuate with stock returns may imply that optimal leverage ratios, as indicated by the trade-off theory, are not followed by German corporate managers. In addition, the comparatively weak coefficient of the constant term of 0.163 over the ten-year time frame (see Table 5) does not necessarily correspond with the predictions from the trade-off theory and, neither, with the afore-mentioned finding by Graham and Harvey (2001) that more than two thirds of U.S. American CFOs aim for, to some extent, fixed target debt ratios. Moreover, in line with the observations by Fama and French (2002), no direct linear relationship between firm performance and leverage (ADR_t) can be observed (see Table 4). This conflicts with the trade-off theory prediction of a positive relation between firm performance and leverage.[39]

Pecking order theory: German firms are identified to issue both less equity and debt compared to U.S. firms and the European average. Assuming that German firms experience a similar degree of capital expansion as their international peers, funding from internal funds could be presumed. Accordingly, German firms can be observed to

[39] Here, a positive relation between profitability, which facilitates tax shield gains, and stock return performance is assumed.

grant lower dividends than their U.S. peer (average over five years: Germany 6.4%, U.S. 11.9%). In addition to the described potential internal financing policy, as also indicated in Table 3, German corporations apparently prefer debt over equity financing. Both of these behaviors can be seen to be in accordance with Myers´ (1984) pecking order theory. In addition, low dividend payments may be correlated with the fact that banks – which are often major shareholders of German firms – do not appreciate dividend payouts since they may diminish cash debt servicing capacities. Furthermore, the fact that German firms show a low dispersion of shareholders may promote the assumed higher internal financing activity (La Porta et al. 1996).

Market timing theory: As depicted in Table 4, increasing (decreasing) stock returns trigger higher (lower) stock issuing and, thus, German managers do not react counteractively to stock price developments in their issuing policy in order to maintain a target leverage ratio, which is supported in the basic regression model (see Table 5). These observations, on the one hand, may imply managerial inertia in readjusting to initial leverage ratios. On the other hand, it may as well suggest that managers try to time the equity market as proposed by Baker and Wurgler (2002). This underlines the earlier argument that managerial inertia towards rebalancing activity and market timing efforts are not necessarily mutually exclusive, but can even support each other (see subchapter 2.2.4 and 2.4).

Finally, the inevitable question remains why, after all, managers engage in such little rebalancing activity: Graham and Harvey (2001) detect that executives attach the highest importance to credit rating implications and future financial flexibility when taking debt issue decisions. In this context, it appears rational that executives refrain from debt-based rebalancing in case of stock price increases if this would put these two factors at risk. In addition, they find that share price increases are strongly considered for equity issues which supports the idea of market-timing.

Interestingly, Graham and Harvey (2001) also find that financial executives affirm the idea of a value-based assessment of projects (e.g. capital budgeting), but are less probable to deem academically determined theories on corporate capital structures as meaningful. In view of the fact that the WACC, which is a main driver behind any value-based approach, is strongly impacted by the market-based leverage ratio of a firm,

the potential argument that executives are rather concerned with book value indebtedness appears to be contradictory.

In addition, changes in the composition of corporate value (assets in place as opposed to growth opportunities; see subchapter 2.3) can be related to managerial rebalancing: assuming that, on the one hand, growth opportunities and idiosyncratic risk and, on the other hand, growth opportunities and stock market valuations are positively correlated, it may be argued that a lower leverage ratio goes along with increasing stock prices in order to balance the enhanced firm-specific risk (Myers 1977; Hovakimian 2006). From this perspective, a low degree of management-induced rebalancing may appear rational as well.

Moreover, the impact of adjustment costs on corporate readjustment decisions has to be considered in this respect. As discussed in subchapter 2.4, Leary and Roberts (2005) contend that market-based indebtedness is strongly impacted by preceding stock returns due to managerial optimization efforts of adjustment costs; rather than managerial inertia. This result can be argued to match the findings in this thesis in the sense that companies do engage in readjustment activity in the long-term, but short-term actual debt ratio volatilities are largely accepted. However, Welch´s (2004) standard model does not allow for a differentiation between inertia (or indifference towards leverage fluctuations) and optimization efforts due to costly adjustment transactions. Consequently, a supplementary model is set up in order to test the readjustment behavior of firms that can be assumed to face higher adjustment costs caused by the issuance of debt.[40] In some support of Leary and Roberts´ (2005) findings, Table A2 (see Appendix II) depicts that firms with comparatively lower adjustment costs engage in higher rebalancing (systematically higher coefficient for ADR_t and lower coefficient for $IDR_{t,t+k}$) of return-induced changes in leverage than firms with more costly adjustment efforts. However, the results are less pronounced than the ones by Leary and Roberts (2005) and the differences between the two subsamples (sorted by differing adjustment costs) are not substantial. Because the German sample firms rather rely on debt issuances (see Table 3), the fact that the model on adjustment costs covered in this thesis does not include equity-related costs can be expected to have diminished impact

[40] See Appendix II for a presentation of the complementary model on the relationship of rebalancing activity and adjustment cost. In view of the fact that this model goes beyond the initial research objectives of this thesis, no additional subchapters were devoted to an in-depth presentation of the empirical results.

on the results. It may be concluded from the findings in Appendix II that the managerial passivity regarding leverage readjustment cannot entirely be explained by adjustment cost implications. In this context, Graham and Harvey´s (2001) findings that American financial executives typically do not judge transaction costs to be decisive when taking debt-financing decisions seems to be matching. Interestingly, target debt ratios appear to be more important for companies with higher debt adjustment costs (see Table A2; higher coefficient for the constant term over all time horizons), which may be attributed to stricter covenants in debt contracts for less credit-worthy firms.

5.2 Life-Cycle Discussion

The aforementioned theories on corporate life-cycles (see subchapter 2.3) postulated different financing patterns with regard to a firm´s respective maturity. According to the obtained results (see Table 7), it can be observed that comparatively immature firms tend to issue more equity, whereas firms in the mature subsample are more likely to issue debt. An underlying reason for this finding may be the fact that more mature firms have lower business risk and, therefore, those companies can use more debt, as opposed to younger firms that reduce financial risk associated with debt in order to offset the relatively larger business risk (Damodaran 2001, 511ff; Hovakimian, Opler, and Titman 2001). This reasoning is also supported by the fact that the more mature subsample has a higher average Z-score (see Table 7).[41] Yet, the diverging financing behavior is not reflected in observed actual debt ratios (ADR_t)

The regression findings show that for more mature firms target debt ratios are less pronounced (see Table 8). This result can be argued to contradict empirical findings by Graham and Harvey (2001, 211) who claim 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." However, these authors base their clustering pattern on size, which is only one of various determinants of a firm´s degree of maturity which was used to cluster firms in this thesis. A potential explanation for the opposing observation in this study might be the fact that more mature firms have a stronger financial base and do not face the same external pressure on their financing policies (i.e.

[41] The fact, that a company's credit quality impacts its financings decisions is also reflected in Table A1(Appendix II): firms that have a comparatively inferior (superior) credit quality tend to issue more equity (debt) than the reference firms.

credit agencies). Immature firms may have higher external financial obligations and, hence, comply more intensively to target debt ratios.

Moreover, this thesis has identified that immature firms show a lower tendency to adjust capital structure changes caused by stock price shocks with managerial issuing activity (i.e. lower coefficient for ADR_t over all time horizons, see Table 8).[42] This is observed despite the fact that the less mature firms face lower stock returns that have to be counterbalanced (see Table 7). Accordingly, it was also found that immature firms tend to let their market-based capital ratios float more with stock price changes (i.e. higher coefficient for $IDR_{t,t+k}$) than firms in the comparatively more established subsample. This is in line with Fischer, Heinkel, and Zechner´s (1989) finding that riskier and smaller firms experience comparatively larger fluctuations in their leverage ratios.

Assuming a positive correlation between firm size and maturity (also indicated in Table 7, Panel A1 and A2), different degrees of adjustment costs may explain why immature firms display less adjustment behavior: Huang and Ritter (2009) refer to Leary and Roberts´ (2005) classification of adjustment costs into fixed, proportional, and fixed cost plus a convex cost components and put forward that due to the fixed component (e.g. fixed costs per bond issue) it can be argued that larger firms face relatively lower adjustment costs when rebalancing their leverage ratio than smaller firms.

Using a modified Altman (1968) Z-score as a proxy for debt issuance cost, it can be stated that the mature subsample has on average lower adjustment costs in this sense (see Table 7; mean Z-score: 2.04); whereas the immature subsample seems to have higher adjustment costs when issuing debt (mean Z-score: 1.54). In accordance with the previous discussion on Leary and Roberts´ (2005) findings on the impact of adjustment costs (see subchapter 2.4), it appears reasonable that firms from the relatively immature subsample are likely to engage in less adjustment behavior due to higher adjustment costs (debt issuing costs). However, as above-mentioned, a strong impact of adjustment costs could not be confirmed in the German sample (see Appendix II). Thus, differing cost implications of adjustment certainly play a role in explaining the differing behavior between the two maturity-related subsamples, but additional unidentified determinants

[42] It can be observed that more immature firms tend to issue more equity than mature firms (Table 7). However, since the average stock return are positive across all samples, equity appears not to be an appropriate measure of rebalancing, and instead, a means of growth realization for comparatively immature firms.

can be expected to also cause comparatively lesser adjustment behavior by relatively immature companies.

With reference to the agency theory (see Jensen and Meckling 1976; Myers 1977), another argument can be brought forward to explain why immature firms engage in less rebalancing: immature firms experience higher growth opportunities and, therefore, they can be expected to be increasingly confronted with debt overhang problems as opposed to their mature peers (which rather have assets in place than growth opportunities). Thus, large amounts of debt could prevent relatively immature firms from realizing valuable growth oppotunites (i.e. positive-NPV projects). Additionally, Rajan and Zingales (1995) argue that the existence of tangible assets reduces agency costs of debt. Consequently, in view of the fact that mature firms can be expected to have a larger capital base, they are enabled to pursue higher rebalancing activity of stock prices appreciations using debt.

Damodaran (2001, 511ff) as well as Hovakimian, Opler, and Titman (2001) argue that the higher business risk of less mature ventures at early stages results in lower debt capacity, which was also identified in the above discussion on the differing issuing activiy. Derived from this fact, comparatively immature firms have a lower ability to issue debt in order to counteract leverage reductions caused by increasing stock prices. In addition, it may be argued that less mature firms even appreciate declines in levergage due to stock price increases because the finacial risk is reduced accordingly, which can balance higher business risk.

Miller and Friesen (1984) put forward that firms with different maturities differ in their organizatinal structure, decision-making process and strategic focuses: less mature firms are found to have more centralized structures and decision authorities than their more mature peers. Thus, from an organizational perspective, more mature firms can be argued to have increased managerial resources to engage in corporate rebalancing, whereas executive managers of comparatively unestablished firms can be asssumed to rather be concerned with the development of a favourable strategic market position.

Finally, by clustering the German sample into the two subsamples focusing on corporate maturity, it can be observed that R^2 slightly loses its explanatory power when considering less mature firms. The question arises if Welch´s (2004) model holds better for considerably less mature than the ones observed in this thesis.

6 CONCLUSION

6.1 Main Findings

This thesis has been conducted in order to investigate in the empirical relationship between stock returns and market-based capital structures. Here, the research objectives have been twofold: first, it has been examined if German public companies adjust debt ratios manually in response to equity price shocks. Second, German firms were clustered according to their comparative maturity in order to analyse potentially different readjustment behaviours at diverging corporate life-cycle phases.

Generally, even if the German and U.S. financial corporations display different financing patterns derived from historical origins, this thesis found that corporate rebalancing behaviour is surprisingly similar in both markets. The obtained results imply that Welch´s (2004) finding of low managerial rebalancing also holds for entirely diverging institutional settings and, therefore, equity prices have a strong impact on German firms´ capital structures. In the long-run management-induced rebalancing activities increase. Interestingly, this thesis found that German firms´ rebalancing behaviour bridges the European and the U.S. markets. In other words, even if the German capital market presents somewhat an inverse of the U.S. peer, apparently it has more in common with the U.S. market than other European capital markets.

Nevertheless, it was argued that the finding of low managerial readjustment does not allow for explicit conclusions on the underlying motivations for this behaviour. *Inter alia*, managerial inertia (Welch 2004), equity market timing (Baker and Wurgler 2002) and adjustment costs (Leary and Roberts 2005) can be seen to cause the empirical findings. To further investigate this issue, it was tested if adjustment costs play a vital role as argued by Leary and Roberts (2005). Here, partial support for the argument that adjustment costs hinder immediate corporate rebalancing activity was found. However, other factors beyond adjustment costs must also have a restricting influence on managerial rebalancing of German corporations.

The life-cycle extension of Welch´s (2004) work could identify different corporate issuing behaviours when either mature or immature firms are analysed. It was found that more mature firms engage comparatively more in counterbalancing capital issuing

activities and similarly do not let their market-based capital structure co-move as much as immature firms do. To some extent this difference in issuing behaviour could be explained due to different levels of adjustment costs which mature and immature firms experience. However, again, as concluded for the first research objective, differences in adjustment costs can only explain part of the issuing behaviour differences between both maturity subsamples.

Myers (1984, 575) raised the question of "how […] firms choose their capital structures" and concluded that "we don't know". The results from this thesis suggest that, in the short run, German firms do not choose their capital structure deliberately, but accept return-induced capital structures. In the long run they gradually engage in rebalancing in order to revert to initial market-based capital structures.

6.2 Limitations

The sample data underlying this thesis is limited to companies that were listed in one of the main German stock indices DAX, MDAX, SDAX and TecDAX in the period between 1990 and 2012. Despite the fact that this large sample can be expected to cover a large variety of firms, any conclusions drawn in this thesis are based to this specific sample and may not directly be applied to the entirety of German companies (out-of-sample robustness). In particular, the vast amount of German small and medium-sized businesses, which are frequently not publicly listed, is not covered in this thesis.

With regard to the life-cycle extension of this thesis, it has to be pointed out that, although every firm is clustered into subsamples regarding their comparative maturity, all sample firms are public listed corporations from major stock indices. Therefore, a relatively high average level of maturity across the entire sample has to be assumed. Arguably, firms listed on the TecDAX may pose an exception from this assumption.

6.3 Further Research

The subject covered in this thesis appears to offer a variety of future research opportunities. For instance, the relationship between readjustment behavior, managerial inertia and adjustment costs could be analyzed in a more comprehensive way in order to reduce the ambiguity regarding the underlying reasons for managerial passivity about short-term rebalancing. Whereas this thesis used debt issuance costs as proxy for

adjustment costs, it would be worthwhile to examine whether other cost components (e.g. equity issuance related costs) have additional influence on corporate issuing behavior and hence, could explain the low readjustment policy German firms pursue at least in the short run.

In terms of the life-cycle extension, it will be relevant to analyze a larger company sample with more diverging degrees of maturity among the observed firms. As aforementioned, this thesis rather observed relatively mature firms and a larger heterogeneity of firms will allow a more differentiated analysis. Trends detected in the results from this thesis can be assumed to be more pronounced in such an analysis. In addition, the robustness of the results on the rebalancing behavior of firms at different life-cycle stages can be tested in different institutional settings.

APPENDIX

Appendix I – Variable Explanations

Datastream Item	Datastream Description	Variable
Common Dividends (WC05376)	Common Dividends represent the total cash common dividends paid on the company´s common stock during the fiscal year, including extra and special dividends.	DIV
Common Equity (WC03501)	Common Equity represents common shareholders´ investment in a company. It includes but is not restricted to: Common stock value, Retained earnings, Capital surplus, Capital stock premium	TE
Common Shares Outstanding (W05301)	Common Shares Outstanding represents the number of shares outstanding at the company´s year end. It is the difference between issued shares and treasury shares.	see E
Earnings Before Interest And Taxes (WC18191)	Earnings Before Interest And Taxes (EBIT) represent the earnings of a company before interest expense and income taxes. It is calculated by taking the pretax income and adding back interest expense on debt and subtracting interest capitalized	$EBIT$
Market Capitalization (WC08001)	Market Price-Year End times Common Shares Outstanding	E
Market Price Year End (W05001)	Market Price - Year End represents the closing price of the company´s stock at December 31 for U.S. Corporations. For non-U.S. corporations, this item represents the closing price of the company´s stock at their fiscal year end.	see E
Net Sales/ Revenues (WC01001)	Net Sales or Revenues represent gross sales and other operating revenue less discounts, returns and allowances.	S
Operating Income (WC01250)	Operating Income represents the difference between sales and total operating expenses	P
Retained Earnings (WC03495)	Retained Earnings represent the accumulated after tax earnings of the company which have not been distributed as dividends to shareholders or allocated to a reserve account.	RE
Total Liabilities (WC03351)	Total Liabilities represent all short and long term obligations expected to be satisfied by the company. It includes but is not restricted to: Current Liabilities, Long Term Debt, Provision for Risk and Charges (non-U.S. corporations), Deferred taxes, Deferred income, Other liabilities	D
Working capital (WC03151)	Working Capital represents the difference between current assets and current liabilities. It is a measure of liquidity and solvency.	WC

Source: Thomson Reuters Datastream via Lund University Finance Society (LINC).

Appendix II – Adjustment Costs

Following the approach by Leary and Roberts (2005), a modified Altman Z-score is utilized as a proxy for debt-related adjustment costs. The rationale behind this proxy is that firms with a lower Z-score (indicating a higher probability of financial distress) face higher costs of debt and, thus, may be less likely to immediately react to return-induced changes in leverage. In comparison to the standard score as proposed by Altman (1968), the fraction of market value of equity over accounting liabilities has been excluded from the modified Z-score and the weight of the sales-related value has been upward-adjusted to 1:

$$\text{(A1)} \quad Z = 1.2\,\frac{WC}{A} + 1.4\,\frac{RE}{A} + 3.3\,\frac{EBIT}{A} + \frac{S}{A}$$

In order to test the impact of differing adjustment costs on rebalancing behaviour, a similar approach to the one utilized to test the impact of maturity (see subchapter 3.5) is employed: the entire sample is clustered according to the comparative value of the Z-score of the respective company within a year. If a company´s Z-score is above/below the median firm´s score of the sample year, the firm is clustered into the respective subsample that represent differing degrees of adjustment costs.

Thereafter, the basic regression specification (equation 3) is run separately on the two subsamples utilizing the Fama-MacBeth procedure.

Description	Abreviation	One-Year Mean	One-Year Median	One-Year Standard Deviation	Three-Year Mean	Three-Year Median	Three-Year Standard Deviation	Five-Year Mean	Five-Year Median	Five-Year Standard Deviation
Panel A1: High Z-Score Firm Capital Structure Ratios (%) and Firm Characteristics										
1. Actual Debt Ratio	ADR_t	41.0	40.7	21.4						
2. Implied Debt Ratio	$IDR_{t,t+k}$	40.7	39.9	21.9	39.9	38.1	22.6	38.2	36.7	22.7
3. Market Value	E_t+D_t	5,410	971	15,123						
4. Total accounting assets	A_t	3,532	672	11,035						
5. Sales	S_t	5,043	958	14,490						
6. Modified Altman Z-Score	Z_t	2.63	2.45	0.73						
Panel A2: Low Z-ScoreFirm Capital Structure Ratios (%) and Firm Characteristics										
1. Actual Debt Ratio	ADR_t	59.0	62.5	22.4						
2. Implied Debt Ratio	$IDR_{t,t+k}$	59.7	62.8	22.8	59.5	62.5	23.1	58.4	60.2	22.8
3. Market Value	E_t+D_t	19,182	1,868	43,996						
4. Total accounting assets	A_t	16,380	1,419	38,988						
5. Sales	S_t	11,032	1,220	25,710						
6. Modified Altman Z-Score	Z_t	0.96	1.28	2.10						
Panel B1: High Z-Score Firm Issuing Activities (%), normalized by Market Value and Winsorized (%)										
1. Net debt issuing	$TDNI_{t,t+k}$	3.6	1.8	12.1	12.4	6.3	27.7	22.4	13.2	40.2
2. Net equity issuing before dividends	$ENI_{t,t+k}$	0.8	0.0	4.7	3.0	0.0	11.2	5.5	0.0	18.3
3. Debt and equity issuing	$TDNI_{t,t+k} + ENI_{t,t+k}$	4.4	1.9	14.7	15.3	7.1	33.6	27.9	14.2	52.8
4. Total euro return	$r_{t,t+k} * E_t$	6.4	3.4	26.7	21.8	9.9	57.8	42.2	23.4	88.8
5. Induced equity growth	$x_{t,t+k} * E_t$	4.5	1.6	26.6	15.8	5.4	56.6	31.4	14.6	85.5
Panel B2: Low Z-Score Firm Issuing Activities (%), normalized by Market Value and Winsorized (%)										
1. Net debt issuing	$TDNI_{t,t+k}$	1.7	0.9	15.2	7.9	2.9	37.6	13.6	7.7	47.3
2. Net equity issuing before dividends	$ENI_{t,t+k}$	1.6	0.0	5.9	5.3	0.4	14.5	8.8	2.2	19.7
3. Debt and equity issuing	$TDNI_{t,t+k} + ENI_{t,t+k}$	3.4	1.4	17.7	14.2	6.5	46.2	24.5	13.9	63.0
4. Total euro return	$r_{t,t+k} * E_t$	3.0	0.7	22.9	14.3	5.0	52.2	24.7	10.7	77.0
5. Induced equity growth	$x_{t,t+k} * E_t$	2.0	-0.1	22.7	11.2	1.8	50.8	19.2	5.0	74.4

Table A1: Descriptive Statistics – Adjustment Cost Subsamples

Horizon *k*	c	$IDR_{t,t+k}$	ADR_t	R^2	T
Panel A1. Low Adjustment Cost - Without Intercept					
1-year		0.945 (0.136) ***	0.070 (0.132) **	0.924	22
3-year		0.924 (0.144) ***	0.119 (0.136) ***	0.778	20
5-year		0.837 (0.147) ***	0.225 (0.136) ***	0.690	18
Panel A2. High Adjustment Cost - Without Intercept					
1-year		0.998 (0.131) ***	-0.003 (0.131)	0.921	22
3-year		0.866 (0.138) ***	0.117 (0.138) ***	0.783	20
5-year		0.848 (0.167) ***	0.129 (0.167) ***	0.654	18
Panel B1. Low Adjustment Cost - With Intercept					
1-year	0.031 (0.031) ***	0.920 (0.137) ***	0.035 (0.133)	0.932	22
3-year	0.092 (0.092) ***	0.881 (0.131) ***	-0.014 (0.137)	0.824	20
5-year	0.120 (0.049) ***	0.771 (0.145) ***	0.051 (0.155)	0.761	18
Panel B2. High Adjustment Cost - With Intercept					
1-year	0.039 (0.029) ***	0.987 (0.138) ***	-0.048 (0.140)	0.929	22
3-year	0.123 (0.056) ***	0.802 (0.134) ***	-0.003 (0.155)	0.836	20
5-year	0.165 (0.080) ***	0.837 (0.159) ***	-0.106 (0.191) **	0.726	18

Table A2: Regression Results on the Adjustment Cost Subsamples[43]

[43] The regressions are estimated in the style of equation and (19) and equation (20), respectively. The values in parenthesis denote Fama-MacBeth standard errors. Asterisks denote statistical significance at 10% (*), 5% (**) and 1% (***) levels of confidence.

Appendix III – Statistical Tests

First, it has to be stated that the performed statistics in this thesis were performed using Fama-MacBeth type regressions. However, since the handled data was panel data, the hereinafter results test the OLS assumptions using panel data as underlying basis (except for cross-sectional and serial correlations).

The tests reported below have also been completed for the maturity-related subsamples. In view of the fact that the obtained results were systematically the same, they remain unreported.

a) Normal Distribution

Normal distribution in a regression could be tested through a Bera-Jarque test (Brooks 2008, 161ff).The Bera-Jarque test can be described as follows:

$$\text{(A2)} \qquad W = N\left[\frac{b_1^2}{6} + \frac{(b_2-3)^2}{24}\right].$$

The Bera-Jarque test statistic follows a $\chi^2(2)$ under the null hypothesis which implies a symmetric and mesokurtic distribution of the series; when using the residuals from the OLS regression b_1 and b_2 can be determined (Brooks 2008, 161ff).

The null hypothesis describes the normality of disturbances. If rejected, it may be the case that residuals from the regression model are either skewed or leptokurtic/platykurtic (or both). Testing the null-hypothesis for the eight panel regressions (with/without intercept; one-, three-, five-, and ten-year horizon) it was found that the null hypothesis is rejected. This might imply that the interferences made about the coefficient estimates could be wrong. However, according to Brooks (2008, 163), large sample sizes can be assumed to alleviate this affect (central limit theorem). This thesis covers a large sample of 2154 firm-years across 22 years. Therefore, it is less likely that non-normality will affect inferences about coefficient estimates. In addition, an observation of the graphical distribution of values yielded that the distribution curve presents a bell shaped form.

b) Heteroscedasticity

The assumption of homoscedasticity can be tested with White´s test. In order to perform White´s test, it is required to construct an auxiliary regression. For the actual debt ratio (ADR_{t+k}) this regression is comprised as follows:

$$\text{(A3)} \quad \hat{\epsilon}_t^2 = \beta_0 + \beta_1 ADR_t + \beta_2 IDR_{t,t+k} + \beta_3 ADR_t^2 + \beta_4 IDR_{t,t+k}^2 + \beta_5 ADR_t \cdot IDR_{t,t+k} + u_t$$

where u_t is a disturbance term which is independent of ϵ_t (Brooks 2008, 134f). The following Lagrange Multiplier test uses the obtained R^2 from the auxiliary regressions and multiplies it by the number of the respective observations (for one-, three-, five-, and ten-year) so it can be demonstrated that

$$\text{(A4)} \qquad T \cdot R^2 \sim \chi^2(m)$$

where m denotes the number of regressors in the auxiliary regression (the constant term is not considered). The results of the White´s test are displayed in Table A3. For all considered time horizons the χ^2 does not exceed the respective critical values (CV). Hence, the null hypotheses that the errors are homoscedastic cannot be rejected at a confidence interval of 5%.

	Horizon							
	1 Year		3 Years		5 Years		10 Years	
	X^2	CV	X^2	CV	X^2	CV	X^2	CV
ADR_{t+k}	2.20	11.07	9.00	11.07	6.61	11.07	10.68	11.07

Table A3: White´s Test Results

c) Serial Correlation

As Fama and French (1998) recognize, the Fama-MacBeth type regression has the drawback that the sample autocorrelation of the slope is not precise. To correct for this caveat, the authors follow Fama and French´s (1998) less formal approach which suggests that a higher t-statistic of about 2.8 or 3.0 (rather than usually 2.0) is required to conclude reliable interferences. Consequently, special attention is given to the statistical significance of coefficient estimates as indicated by $p(t)$.

d) Cross-Sectional Correlation

The Fama-MacBeth procedure estimates standard errors that are corrected for cross-sectional correlation of the residuals (Cochrane 2005, 228ff; Fama and French 2002).

e) Multicollinearity

The linear correlation between the independent variables of the regression model (equation 3) can be examined with the aid of Variance Inflation Factors (VIF), which are calculated as

$$\text{(A5)} \quad VIF = \frac{1}{1-R^2}.$$

Here, VIF values above the standard cut-off value of 10 suggest a multicollinearity problem in the regression model (Bajpai 2010, 548). Table A4 indicates all VIF values are below the critical value. In addition, it should be noted that VIF values reduce with an increasing time horizon.

	Horizon			
	1 Year	3 Years	5 Years	10 Years
With Intercept	9.83	7.29	5.15	2.84
Witout Intercept	8.09	6.07	3.93	2.30

Table A4: Variance Inflation Factors

Appendix IV – Model Robustness

In order to test the obtained results by using the Fama-MacBeth regression approach a *pooled regression* is deployed (see Table A5). When pooling all firm-years the estimated Fama-MacBeth coefficient estimates can be largely confirmed. For instance, over an annual horizon the constant is 0.040 (Fama-MacBeth: 0.034), the lagged actual debt ratio is -0.031 (-0.016) and the implied debt ratio is 0.969 (0.966).

Horizon *k*	c		$IDR_{t,t+k}$		ADR_t		R^2	N
			A. Without Intercept					
1-year			0.989 (0.015)	***	0.013 (0.015)		0.935	2154
3-year			0.936 (0.018)	***	0.069 (0.018)	***	0.804	1591
5-year			0.869 (0.023)	***	0.138 (0.023)	***	0.665	1158
10-year			0.610 (0.042)	***	0.415 (0.038)	***	0.426	455
			B. With Intercept					
1-year	0.040 (0.003)	***	0.969 (0.014)	***	-0.031 (0.015)	*	0.940	2154
3-year	0.097 (0.006)	***	0.886 (0.016)	***	-0.041 (0.018)	**	0.834	1591
5-year	0.138 (0.009)	***	0.805 (0.021)	***	-0.028 (0.023)		0.724	1158
10-year	0.209 (0.019)	***	0.591 (0.037)	***	0.093 (0.044)	*	0.548	455

Table A5: Pooled Regression on the Entire Sample[44]

[44] The regressions are with a pooled OLS regression. The values in parenthesis denote standard errors. Asterisks denote statistical significance at 10% (*), 5% (**) and 1% (***) levels of confidence.

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