Capital Structure and Firm Growth

Investment Decisions and Financial Management in Listed Companies

Dissertation

zur Erlangung des Doktorgrades

„Dr. rer. pol.“

der Fakultät für Wirtschaftswissenschaften

der Universität Duisburg-Essen

vorgelegt

von

Laura Gerke-Teufel

aus

Viersen, Deutschland

Betreuer:

Prof. Dr. Rainer Elschen

Lehrstuhl für Finanzwirtschaft und Banken

Essen, 2018

Gutachter:

Prof. Dr. Rainer Elschen; Prof. Dr. Ansgar Belke

Tag der mündlichen Prüfung: 02.07.2019

Table of Contents

List of Figures

List of Tables

List of Abbreviations

AAGR	Average Annual Growth Rate
CAGR	Compound Annual Growth Rate
CEO	Chief Executive Officer
EBIT	Earnings before interest and taxes
GAAP	Generally Accepted Accounting Principles
IFRS	International Financial Reporting Standards
KfW	Kreditanstalt für Wiederaufbau
M&A	Mergers and Acquisitions
PIMS	Profit Impact of Market Strategy
PPE	Property, Plant, Equipment
R&D	Research and Development
RBV	Resource-Based View
ROA	Return on Assets
ROE	Return on Equity
ROIC	Return on invested capital
RQ	Research Question
SME	Small and Medium-sized Enterprise

Introduction

a) Problem Statement: Capital Structure Theory, Research Results and Research Gaps

Empirical research in the context of the capital structure theory has produced ambiguous results, despite a considerable set of empirical studies. Schneider's meta-analysis of 266 empirical studies in the field of the capital structure theory determines that there is still a lack of reliable knowledge on the precise impact even of the main determinants of capital structure (Schneider, 2010, pp. 1, 4). Therefore, Lemmon et al. (2008) conclude that there is still a "*gap in our understanding of what determines heterogeneity in capital structure*" (Lemmon et al., 2008, p. 1576).

The relatively new academic discipline of the *behavioral theory of corporate finance* challenges the conventional concepts of capital structure research (Hackbarth, 2008, p. 844) because of the same reason: "*Research on the cross-sectional determinants of capital structure […] shows that a large amount of variation remains unexplained after controlling for firm-level characteristics*" (Bertrand & Schoar, 2003, p. 1170). Therefore, behavioral corporate finance tries to examine financing and investing decisions of executives (Hackbarth, 2008, p. 846).

Bertrand and Schoar (2003) find in their questionnaire-based study a 'CEO effect' on capital structure. The capital structure of companies reflects more the CEO's personal style rather than the effect of regulations, agency costs, tax shields, etc. The authors find that 'financially aggressive' CEOs hold less cash, use a higher leverage and tend to grow through M&A. On the contrary, more conservative leaders grow more through internal investments for enlarging the firm's capacity and hold more cash. These different capital management and growth styles (attitudes) exert strong effects on firm performance and capital structure. Furthermore, the Bertrand/Schoar study proves that conservative CEOs show a lower return on assets, whereas aggressive CEOs show higher returns, except for the CEOs who make more acquisitions (Bertrand & Schoar, 2003, pp. 1172, 1174, 1194).

Baker et al. (2003) find that overconfident and optimistic attitudes of managers can predict a financing decisions pecking order, while Hackbarth (2008) discovers that managers with growth bias overestimate future earnings growth and, thus, consider

external finance as immoderately costly. Other studies indicate that more risk-tolerant CEOs initiate more M&A projects (Graham et al., 2013) and CEOs with individual failure experience are more debt averse and lean extremely on internal finance (Malmendier et al., 2012).

Non-financial-behavior studies challenge the classic capital structure theory as well. Volk (2013) notes that research in the field of capital structure theory is based almost exclusively on stock-listed companies and suppresses the identification of possible relations between growth behavior, risk attitude and capital structure differences, which became more visible in non-listed companies (Volk, 2013, pp. 2-5) because non-stock-market driven companies show significant differences in their capital structure compared to stock-listed companies. These differences can best be explained by the inclusion of corporate investment behavior as a proxy variable for growth attitude and risk attitude, which has been hardly carried out so far in mainstream research (Volk, 2013, pp. 2-4, 254; Schneider, 2010, p. 264). According to Volk (2013), the attitude of owners towards firm growth against the background of their ownership interests explains differences in investment decisions and, thus, in financing decisions and capital structure (Volk, 2013, pp. 249-253).

Wu and Yeung have analyzed all non-financial firms in the Thomson One database from 1965 to 2003 (117,000 observations on profitability, market-to-book ratio and leverage) and conclude that high-growth type firms prefer equity to debt financing (Wu & Yeung, 2012, p. 3441). Consequently, firm growth behavior may explain differences in capital structure with significant and strong correlations. Wu and Yeung (2012) also confirm the assumptions of Volk (2013) and Lemmon et al. (2008) as to the fact that the determinants of the heterogeneity in capital structure in cross-sectional studies cannot be explained by the ‘classic’ capital structure theory, at least not only. However, to sum up the state of research, it can be stated:

(1) There is still a lack of reliable knowledge on the precise impact of the main determinants of capital structure to explain heterogeneity in capital structure.

(2) Therefore, recent research includes firm growth behavior as explanatory factor, which was hardly taken into account so far in mainstream research.

Accordingly, the approach of this research is to examine the influence of firm growth behavior on capital structure. In the sense of this study, firm growth

behavior is not equal to CEO growth attitude or other personal characteristics. This study's approach is not to measure CEO attitudes towards firm growth. Instead, this study will use financials as indicators for growth behavior on the firm level and will not collect qualitative data by survey-based studies or other qualitative approaches.

b) Research Questions and Research Design

To sum up, it can be determined that growth behavior and investment behavior may be the missing link to fill the gap in understanding the heterogeneity in capital structure (Graham & Harvey, 2001). The question is whether the particular problems of the qualitative behavioral approach can be avoided. Most research in the field of behavioral corporate finance is primarily descriptive, as will be shown in chapter 2, using frequently hardly to reproduce research designs, with surveys based on small samples resulting from the problem of time-consuming data collection associated with qualitative interviews. Consequently, the results of corporate behavior research can be seen as qualitative snapshots but do not deliver quantitative evidence.

Yet, the question is whether the parallel observation of growth and investment behavior of firms as well as their capital structure presupposes a questionnaire-based approach, since management behavior can also be measured through changes in the company's financials, for example by accounting measures, such as M&A cash flow, property, plant and equipment growth or R&D expenditure changes, avoiding the problem of questionnaire-based studies, e.g. with small samples, arbitrary research constructs and measuring attitudes, personality traits and other qualitative factors.

The examination of capital structure differences and growth behavior can be conducted even on the level of firm characteristics by integrating the full spectrum of financial analysis instruments. Thus, firm growth behavior becomes measurable in terms of financials reflecting investment and growth decisions without the subjectivity problem of psychological research constructs on the level of individuals.

The research questions are:

RQ1: Can differences in firm growth behavior explain investment behavior and capital structure differences?

RQ2: How can capital structure differences be explained?

Since the research in capital structure and firm growth has resulted in a variety of factor models based on the evidence from empirical research identifying a variety of determinants (see chapter 2), this study pursues an explorative research approach including a wider set of potential predictors of firm growth. 37 variables, such as growth rates, key ratios and other firm characteristics, from 570 companies covering a ten-year observation period included in the variable set are selected based on an extended literature review in the fields of capital structure and firm performance research.

This study aims not at rejecting or confirming a selected factor model, develops no research model and, therefore, no hypotheses. Instead, both factor dimensions are examined in different steps of the research procedure. As a quantitative-explorative analysis examining numerical data in the form of standardized financial data, the research is structured into three different steps:

- Step 1: Descriptive analysis of different groups and the sample
- Step 2: Examination of group differences
- Step 3: Searching causal explanations for differences in capital structure in relationship to firm growth.

The research questions will be answered through analysing the financial data of Austrian, Swiss, and German companies provided by Thomson One, so that the data base of this study can be based on the largest possible database while excluding external intervening variables, as it is often the case in other cross-country studies. Companies from those three countries are affected by highly comparable exogenous determinants, such corporate governance regulations, interest rates, currency risks, and other regulations and macroeconomic determinants (Havlik et al., 2012, p. 219; Schmidt, 2014, p. 19).

The empirical business research has given the opportunity to analyse ever more extensive data sets on growing investigation periods due to the increasing availability of quantitative data, powerful computers and software since the 1980s (Spremann, 2008, p. 15). Yet, the founder of modern German business research, Erich Gutenberg, has already pointed out in the 1980s that this is not necessarily a knowledge progress. Detailed data from companies with very different organizational levels generate only less statistically significant results, because “good and bad companies” (Gutenberg, 1989, p. 179) are mixed. So the results are mostly weak and insignificant providing only a limited research contribution (Gutenberg, 1989, p. 179).

Therefore, this study executes, on the one hand, quantitative statistical analyses including the sample. On the other hand, the firm growth behaviour and capital structure variables are also used to group the sample to conduct tests for differences between groups concerning differences in investment behaviour, growth behaviour and capital structure (see Table 1). Thus, for example, the tests for differences use contrast groups such as the top-100 high-equity-financed companies and high-debt-financed companies instead of a mix of ‘good’ and ‘bad’ companies to determine whether both groups show clear differences in growth and investment behaviour.

Table 1. Overview of Data Analysis Methods

Test	Data Set	Aim
Multiple Regression Analysis	– Sample – High-Growth-Companies Groups – High-Equity-Companies Group – High-Debt-Companies Group	Cumulative Effects of multiple determinants on firm performance and capital structure
Logistic Regression	– High-Equity-Companies Group – High-Debt-Companies Group	Explaining group membership by determining predictors
Test for Differences (t-Test)	– High-Equity-Companies Group – High-Debt-Companies Group	Finding significant differences between both groups particularly concerning performance indicators

Source: Own presentation.

c) Thesis Structure and Research Contribution

This study is structured in five chapters. Chapter 1 discusses theories, models, and results of empirical research in both research areas. Furthermore, the chapter discusses research issues in both fields, such as research gaps and methodological issues, as they are important for this study's research questions and reasons for selecting data collection and the applied methods and metrics. Chapter 2 summarizes and discusses the result of prior empirical research in the fields of firm growth research and capital structure research particularly concerning applied indicators, results and research issues for deriving conclusions for this study's research design.

The first section of Chapter 3 defines the research philosophy framework and the general research approach. The deduction of the research model from the literature review follows, substantiates the selection of variables and discusses the reasons for the specific data preparation and the applied statistical analysis methods. Chapter 4 presents and discusses the quantitative data analysis findings focusing on firm performance and capital structure. Chapter 5 summarizes the results of the

data analyses, contextualizes them in the framework of prior research and develops recommendations for future research, management and supervisory boards.

1. Theories and Models

This chapter's first section discusses the capital structure theories and research, showing the evolution from a one-factor models to multi-factor models without providing a unified factor model explaining capital structure choices.

The second section discusses the state of firm growth theories and research. Seven groups of theories and models are identified and discussed resulting in the conclusion that research has not created a consistent firm growth model or theory. Section 1.3 considers methodological issues as reason for this issue. This section also provides a justification for selecting specific performance indicators included in the data set.

1.1 Capital Structure Theory

Any funding event a company is facing arises the question which specific financing instruments are available and what could be the best option. In general, the following instruments are possible (Schulz & Wasmeier, 2012, pp. 53-55):

(1) Internal financing: In the theory of capital structure, the term internal financing refers to the use of internal financial resources for new investment, such as retained earnings, hidden reserves or depreciation recoveries.

(2) External financing: In the theory of capital structure, the term external financing includes all forms of capital financing obtained from outside of the firm, such as corporate bonds, bank credit, supplier credit and other sources of capital that must be refunded in the short or long term.

The question of the factors affecting the capital structure is one of the most debated issues in corporate finance literature (Frank & Goyal, 2009; Harris & Raviv, 1991; Myers & Majluf, 1984; Rajan & Zingales, 1995; Titman & Wessels, 1988). The

following sections provide an overview of the different capital structure theories and their importance for this research. The choice of financial instruments for financing a business is discussed in a variety of theoretical models, in which funding decisions are mostly discussed with reference to the capital structure, which is the ratio of equity to debt capital.

Main financing cases in the corporate lifecycle are: (1) start-up financing, (2) growth financing and expansion financing, respectively (3) refinancing, (4) acquisition financing, (5) replacement financing, (6) turnaround/restructuring financing (Gurusamy, 2009, p. 323, Leleux et al., 2015, p. 30). Financing of the operating business is not an event-driven financing case, but a continuous financial management task based on the cash flow from operations and is, therefore, not a strategic financing decision but a day-to-day operation without capital structure effects, provided that the cash flow is positive (Sutton, 2004, p. 571). Instead, the abovementioned event-driven financing cases are the cases in which the firm's financial management has to take strategic financing decision effecting the capital structure more profoundly than day-to-day operations financing decisions (Schipporeit, 2001, pp. 442-444), leading to decision-making issues the capital structure theory seeks to optimize (Khan & Jain, 2007, p. 1.8-1.9).

A traditional and a modern approach to finance can be distinguished. According to the traditional approach, the company's operating activities are the foreground and the funding is only considered as a necessary means in the process of creating goods. It is also assumed that the real economic process (as a cause) determines the financing approach (as effect) (Rudolph, 2006). By contrast, the modern approach takes into account that different stakeholders and stakeholder groups of the firm influence financing decisions, such as the owners (shareholders), the firm's management and its debt suppliers, with all pursuing the maximization of their own interests influencing the actual financing decisions. The modern approaches can be further differentiated into two different schools of thought: the neo-classical and neo-institutional theory of finance. Both approaches will be discussed in more detail in the following sections.

1.1.1 Neo-Classical Financing Theory

The neo-classical financing theories arose mainly in the 1950s and 1960s and assume a perfect and complete capital market. Furthermore, these approaches are based on the assumption of rational action of the various agents. In the field of the neo-classical financing theory, mainly two theories determine the scientific research on the capital structure of companies: (1) the capital structure irrelevance theorem, which is based on the findings of Modigliani and Miller (1958) and (2) the trade-off theory of capital structure.

Modigliani and Miller (1958, pp. 295-296) assume that, under the assumption of an efficient market, the capital structure of a company does not affect the company's value. Similarly, the average cost of capital is independent of the degree of indebtedness selected by a company. Thus, the financing decision is, in accordance with this assumption, independent of the investment decision (Modigliani & Miller, 1958, pp. 295-296), whereas the listing of a company has a no advantage under the assumption of an efficient market, and also the ownership structure of a company is irrelevant for the financial decisions of the company.

Therefore, in line with Modigliani's and Miller's (1958, pp. 267, 288, 296) theorem, corporate financing has no impact on corporate value and capital costs of the firm when the following conditions are given: (1) a completely efficient capital market, (2) perfect information, (2) no corporate taxes, (3) no transaction costs, (4) no economic externalities. Then, the capital structure, which is the ratio of debt and equity, is irrelevant for a firm's value. Since the 1980s, empirical research has tested the hypotheses of Modigliani–Miller's capital structure theory, concluding that there is no optimal capital structure maximizing firm value (Lee & Lee, 2010, p. 9).

Furthermore, the full set of preconditions of the Modigliani/Miller theorem is not likely to exist in the real world. Therefore, subsequent studies differ from the assumptions of a perfect market and lay the foundation for the so-called static tradeoff theory (Mac an Bhaird, 2010, p. 139). This theory assumes that there is an optimum composition of the debt/equity ratio of a company. The optimum marks the equilibrium, where the marginal benefits and disadvantages of debt are balanced, and the weighted average capital costs are minimal. An advantage of debt financing is the tax deductibility of interest. A disadvantage of debt financing is

rising insolvency costs when a contractual obligation to interest payments and to repay the capital exists.

Even Modigliani and Miller (1963, p. 434) extended their theorem with tax as capital-structure determinant, because they found that tax shields influence the leverage ratio. Nevertheless, at least the question of why companies are not largely or even completely debt-financed remained. Research on this issue yielded a second determinant: Rising debt increases the insolvency risk, so that another determinant in the form of cost of risk was introduced because these costs also affects the capital structure and limits the debt ratio (Ferran & Ho, 2014, p. 57). This extension of the original capital structure theory is known as the tradeoff theory of capital.

This theory explains that companies choose the optimal capital structure (debt/equity ratio) that minimizes the cost of capital considering the risk of bankruptcy and the impact of corporate tax (Ehrhardt & Brigham, 2016, p. 619). According to Modigliani und Miller, the higher a company's debt ratio, the lower are its average capital costs under the condition that the company has enough options in terms of good investment opportunities that results in capital cost and opportunity cost excessing returns (Modigliani & Miller, 1958). The optimal debt ratio is the one that is associated with maximum corporate value. However, if the debt ratio increases, then also the bankruptcy risk increases, resulting in a higher risk premium in favor of the lenders (Arnold, 2008; Wohlenberg & Plagge, 2012, pp. 114-115).

Only Kraus and Litzenberger (1973, p. 911), however, presented a formal model of capital structure considering insolvency costs and taxes. According to the two authors, insolvency costs rise with the level of indebtedness, while tax advantages increase with a higher level of indebtedness due to the deductibility of interest on borrowed capital. This assumption is supported, for example, by the research of DeAngelo and Masulis (1980, p. 4). However, both the irrelevance theorem and the tradeoff theory can only explain possible differences in capital structure between companies if there is heterogeneity regarding tax burden, insolvency and transaction costs (DeAngelo & Masulis, 1980, p. 4; Bhabra & Yao, 2011, pp. 40-41).

The focus of this work is on German, Swiss and Austrian listed companies which are subject to a comparable tax system and interest rate level as well as a highly comparable regulatory environment (Schmitt, 2009, p. 123; Havlik et al., 2012, p. 219; Schmidt, 2014, p. 19). This makes it possible to assume that the sample of this research is subject to the same tax treatment and the rights and obligations that engage in the event of insolvency. In addition, only medium and large companies are examined and analyzed in the empirical part of this research, so that the transaction costs of funding are comparable, particularly due to the same financial market conditions. In this regard, also the irrelevance theorem and the tradeoff theory can be applied to develop hypotheses.

1.1.2 Neo-Institutional Theories of Finance

Neo-institutional financing theories are based broadly on the assumptions of a principal-agent perspective. The neo-institutional financing theories are, unlike the neo-classical theory, not based on the assumption of information-efficient market but on (1) the existence of information asymmetries between the different agents and (2) agents pursuing different plots and interests with different individual utility functions and, thus, different decisions and activities (Ross, 1977, p. 25). The since the 1970s-evolving debate on corporate governance in the framework of the new institutional economics also raises the question of transaction costs (agency costs) and information asymmetry costs (Akerlof, 1970, pp. 490, 500; Myers & Majluf, 1984, pp. 188-189) in the framework of the theory of financing because funding decisions and the capital structure policy are, so the assumption, subject also to the principal-agent problem (Arnold, 2008, p. 696).

The equilibrium models of the neo-classical approach assume that there is an optimal capital structure in the form of a balance between marginal benefit and marginal costs. Building on this basic idea of the optimal capital structure in a state of equilibrium, the principal-agent theory expands its research on the impact of conflicting interests on corporate finance decisions and the resulting capital structure. With regard to the use of leverage, for example, the following effects can be assumed in the context of the principal-agent theory (Loos, 2005, pp. 19-20):

(1) In a company where managers maximize their own benefit, debt financing may limit the freedom of decision of the manager. A high leverage reduces

the free financial resources (free cash flow) that are available to the management because of the associated interest and repayment obligations, the free financial resources (free cash flow) that are available to the management of investments. From the principal's (owner) perspective, the reduction in free funds may have a disciplining effect on the utility-maximizing managers suppressing management activities which do not maximize the equity value (Jensen, 1986, pp. 323-329). Thus, financing by debt capital instead of equity capital results in the benefit for the shareholders, the stronger the principal-agent conflict is.

(2) Another benefit of financing through debt results when managers borrow less debt capital than it would be necessary for maximizing the company's value. Such a situation may arise when managers hold shares in the company and would incorporate their human capital in the company, so it can be considered from a low diversified portfolio of managers, resulting in a stronger dependence on the company's success. Such managers may, therefore, tend to be more risk averse than diversified managers or shareholders. This risk aversion can cause the avoidance of higher insolvency costs associated with higher borrowings, so that value-maximizing investment opportunities may be missed, to the disadvantage of the principals (Finch, 2002, p. 541).

(3) Besides the advantages of borrowing, there are also disadvantages or costs associated with a high level of debts. For example, a high level of debt may lead to the loss of financial flexibility, assuming that the company's borrowing capacity (creditworthiness) is limited. If borrowing capacity is exhausted, for example, investments that increase the company's value, cannot be carried out. The higher the uncertainty about the future financing needs, the more likely this restriction may result in costs for the company and the shareholders (Pandey, 2015, p. 271).

Based on these assumptions, which form the framework for the neo-institutional approach, some capital structure theories have been developed. The first further development of the classical capital structure theory can be seen in the pecking-order theory going back to Myers and Majluf (Falahati, 2013, p. 181). It is based on the assumptions of the principal-agent theory, assuming that corporate insiders have better information than external investors. As a result of information

asymmetries, costs are arising due to adverse selection affecting the financing decision.

According to the pecking-order theory, companies fund investment first by retained earnings, followed by low-risk debt and risky debt and then, only as a last resort, by external equity capital (Myers & Majluf, 1984, p. 189). From the company insiders' viewpoint, debt is 'cheaper' than external equity capital, which is the reason for the pecking order. Cheap, in this context, means that transaction costs are lower: Companies prioritize their sources of finance according to the principle of the least effort and resistance, and prefer external equity capital as a funding source only as a last resort. Therefore, internal resources are used first. When these have seized, debt capital is preferred until it no longer makes sense to take on more debt due to rising debt capital costs, debt (bonds) or equity (shares) is issued. It can be concluded that control rights have an impact on financing decisions (Draho, 2004, pp. 93-94).

Through higher levels in the company's capital equity, investors can influence corporate decisions. Lenders, however, have no direct voting rights explaining managers tend to prefer external financing. Nevertheless, empirical studies on the pecking-order theory provide insufficient and partially contradictory results (Leary & Roberts, 2010, pp. 332-333). The pecking-order theory also contradicts the observation that many companies issue new shares, even if they can finance themselves through additional indebtedness (Fama & French, 2002, p. 29).

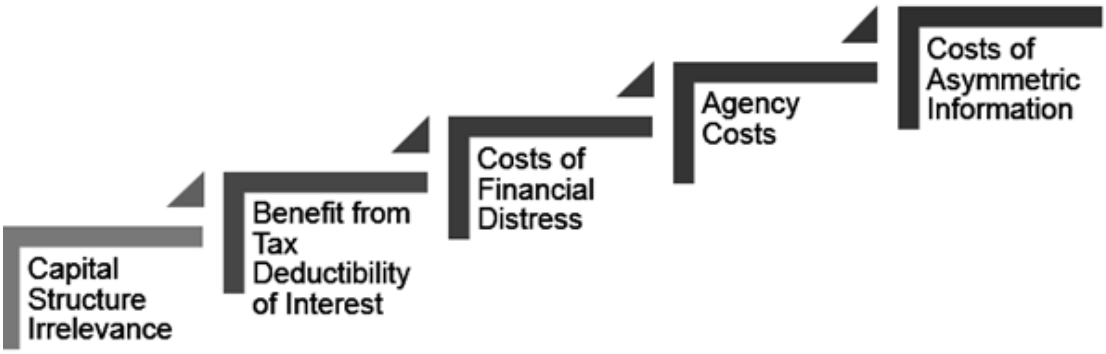
From these criticisms, recent finance theories have developed, such as the market-timing theory. For listed companies, an increase in the stock price changes the ratio of equity to liabilities, while the proportion of equity increases. According to the tradeoff theory, a company should return to its targeted capital structure and raise additional debt. However, empirical studies show a contrasting picture. Baker and Wurgler (2002, p. 1) explain this observation with the fact that companies receive equity via share issues depending on the market assessment intending to exploit price fluctuations. Based on the market-timing theory, companies issue shares only when they are evaluated by investors particularly high (Baker & Wurgler, 2002, p. 1). Accordingly, the market-timing theory introduces a different approach to the pecking order, which is not based on agency problems but on financially rational decisions.

To sum up, the operationalization of agency costs caused by insiders and information disadvantages of outsiders remain difficult, whereas determinants, such as tax relief effects or insolvency risks, are simply measurable or calculable, respectively. Yet, some studies tried to operationalize agency costs and information costs based on the signaling theory by including credit ratings to measure the effect of information costs on the capital structure. Here, the assumption is that the leverage-to-profitability ratio can be seen as a proxy measure for agency costs and costs of asymmetric information.

If a company's indebtedness increases with decreasing profitability, then the company's rating is downgraded (Langohr & Langohr, 2008, pp. 80-81). By contrast, with increasing indebtedness at rising profitability, a company signals that the managers profitably invest equity and debt capital. The level of indebtedness in relation to profitability has a ripple effect on the principals and reduces the agency costs and the costs of asymmetric information, resulting in an improving rating.

On the contrary, financing costs grow with increasing asymmetric information. Therefore, Gomes and Phillips (2012, p. 620) state that companies with incorrect revenue and earnings predictions signaling higher information asymmetries have difficulties to receive bond capital and tend to prefer unsecured subordinate liabilities or loans.

Figure 1. Development Stages of Capital Structure Theory



Source: Own presentation.

To sum up, the presented study applies the classical capital structure ratio in terms of the financial-debt-to-assets ratio but as well, for model test purposes, such ratios as total capital in % of assets, fixed assets in % of common equity, etc.

The different capital structure theories have some assumptions that are criticized in recent studies. Most theories assume that there are no restrictions on the supply of capital and that the capital structure is only determined by the company's demand for capital. However, companies wanting to raise capital are subject to diverse market restrictions and cannot absorb unlimited equity or debt.

Recent studies analyze the limiting factors on the capital supply side (e.g. Faulkender & Petersen, 2006; Leary, 2009; Lemmon & Zender, 2010). These limitations include information asymmetries at the firm level, which cause lenders to limit the availability of capital. Although an entity may take measures, such as applying for a credit rating to soften the financial restrictions, however, this is associated with a high expenditure of time and high costs. In addition, such measures are efficient only for companies whose financial stability and profitability are reflected in their key figures and, consequently, in the rating.

Empirical research indicates that capital market environment could also influence the firm's capital structure. Thus, for example, the recent financial crisis has led to an extremely lower supply of capital, decreasing the average leverage (Campello et al., 2010, pp. 6, 9-12). Similar to this effect, the introduction of regulatory requirements for lending banks, such as Basel III, too have had an impact on the supply of capital and, thus, on the capital structure (Kaserer, 2011, pp. 52, 67-71).

However, the capital structure of a company is mainly the result of its strategic decisions (Bromiley, 1991, p. 37), which is also indicated by the capital structure theory. However, Börner et al. (2010, pp. 227-250) find that capital structure is not just a strategic decision of the company's management or owners but sometimes the lender has influence. The lender decides about the amount of financial resources to give to a specific company and what conditions to offer. The influence of the lender depends on the size of a company. While a major pharma company would not have any difficulties finding a lender for additional cash resources, small enterprises could struggle to get reasonable conditions for the needed money.

Lewellen (1971, p. 521) already found evidence in the 1970s that M&A can possibly create value for shareholders without an operative economic activity of any involved companies, just from the financial conglomeration of former independent companies. These circumstances allow companies a higher leverage ratio without sending negative signals to the shareholders. These findings are also supported by Kim et al. (1979, pp. 83-84) who found that companies seem to have a significantly higher leverage after M&A transactions.

However, recent research indicates that acquiring companies tend to adjust their leverage before and after M&A activities to minimize the deviation from their optimal capital structure (Bessler et al., 2011, pp. 437-441). Furthermore, a recent study indicates that in some countries—such as the U.S., the United Kingdom or Japan—M&A influence capital structure decision, while in other countries—such as Germany or France—the capital structure does not change before and after an M&A (Cotei & Farhat, 2011, p. 113).

1.1.3 Research Gaps

As mentioned in the introduction, the empirical research in the context of the capital structure theory has produced only ambiguous results (Schneider, 2010, pp. 1, 4). Therefore, Lemmon et al. (2008, p. 1576) find an existing gap in understanding the determinants of capital structure heterogeneity in capital structure. Hackbarth (2008, p. 844) as well as Bertrand and Schoar (2003, p. 1170) state a large amount of unexplained variations in the capital structure after controlling for firm-level characteristics, leading to the search of additional factors through examining financing and investing decisions of executives in the context of behavioral finance (Hackbarth, 2008, p. 846). In this sense, Bertrand and Schoar (2003) find that the capital structure of companies reflects often the CEO's personal style rather than the effect of regulations, agency costs or tax shields. Thus, for example, conservative managers prefer the internal financing of firm growth holding more cash generating a lower return on assets (Bertrand & Schoar, 2003, 1172, 1174, 1194).

Other approaches than behavioral financing studies also challenge the capital structure theory identifying significant differences in the capital structure depending on ownership structure differences (Volk, 2013, pp. 2-5). Ownership structure

differences indicate ownership interest differences and, thus, differences in financing decisions and capital structure (Volk, 2013, pp. 249-253). Wu and Yeung find that private-held high-growth companies generally avoid debt funding (Wu & Yeung, 2012, 3441).

To sum up the state of research in the field of capital structure research, it can be stated that (1) there is still a lack of reliable knowledge on the determining factors causing capital structure heterogeneity, and (2) recent research shows that firm growth behavior should be considered as an, at least, additional determinant of capital structure heterogeneity.

1.2 Firm Growth Theories

The question of the success factors of growth companies regarding the differences between high-growth companies and no-growth companies has produced a variety of models, theories, and empirical research for around 80 years. According to Wach (2012, p. 44) and Gruenwald (2016, pp. 19-37) at least seven different concepts with specific methods, models, and research approaches can be distinguished in this research field (see table 2):

- Stochastic Models (econometric approach): Firm growth can be explained by many determinants, but none is dominant. Single key determinants of corporate success or causal relationships cannot be identified (e.g. Gibrat, 1931; Mowery, 1983; Evans, 1987; Botazzi & Secchi, 2003; Reichstein & Dahl, 2004). Stochastic models consider firm growth as determined by many components. None of them is dominant and, therefore, cannot be observed separated from each other.

- Deterministic Models (econometric models): Although the company's success depends of a multitude of determinantes, some can be identified explaining the variance of growth rates between companies (e.g. Buzzell & Gale, 1989; Davidsson et al., 2002; Barringer & Jones, 2004). Deterministic models explain firm growth as a result a few determinants that can be observed separated from non-relevant.

- Resource-Based View (RBV) (descriptive models): Growth is explained by the company-specific combination of internal resources (core competencies) enabling the company to find a unique market positioning (e.g. Penrose, 1959). Resource-based theories consider firm-specific resources as sources of excessive growth. Firm-specific resources such as, for example, specific skills, knowhow, firm-specific products, distinguishing one firm from another enables the company to achieve and hold a strong market position explaining excessive firm growth.

- Learning Models (descriptive and normative models): The development and procurement of success-relevant knowledge and internal learning processes are the essential determinants of corporate success (Nooteboom, 2000; Phelps et al., 2007). Learning models are specific resource-based theories reducing the set of possible firm-specific resources on the intangible assets, knowledge and skills a company includes and generates. Differences in this area result in excessive growth.

- Management Models (normative, descriptive and empirical models): Management models emphasize the relevance of management's corporate strategy (e.g. Ansoff, 1965; Porter, 1980; Simon, 1996; Simon, 2007). Managerial models consider strategy selection and positioning as the main determinants of firm growth. Some empirical research, particularly the PIMS research discussed below, has provided some empirical evidence that particularly market shares and product quality must be viewed as the main determinants of growth and profitability.

- Lifecycle Models (descriptive models): Lifecycle models consider companies as social organisms, which must cope with organizational challenges during the growth process. The main success factor is the management's capacity to reorganize the company's organization (e.g. Greiner, 1972; Dobbs & Hamilton, 2007). Corporate lifecycle models consider firm growth as a process of subsequent stage patterns, which can be observed but do not provide empirical evidence concerning the determinants of firm growth. Instead, they solely provide descriptive models.

- Evolutionary Models (descriptive models): Companies grow through optimal adaptation to their environment. Often, however, the findings are tautological, stating only those companies that are best adapted to market conditions are growing. It is not clearly defined how this adjustment is measured and what the key activities resulting in the optimal adjustment are (e.g. Alchian, 1950; Aldrich, 1999; Edelman et al., 2005). Evolutionary models consider growth as sequences of permanent adaptations of organization and strategy to market trends without providing empirical evidence. Evolutionary models expect that a better strategy-to-market fit enables companies to grow faster than others.

The theories and models discussed can be assigned to distinct groups regarding their presuppositions: (1) the firm is a simple input-output-machine shaped by external and internal forces (markets, shareholder, stakeholders, and others). However, activities and their results can be measured and can, therefore, be modelled in the form of cause-effect models so that cause–effect relationships can be detected and examined empirically; (2) the firm is the result of activities of different agents. Activities and decisions can be observed as patterns of behaviour resulting in descriptive models which cannot be reduced to cause-effect models.

Table 2: Firm Growth Models

Concept	Theory	Selected Empirical Research	Core Thesis
Stochastic Models	Gibrat, 1931	Mowery, 1983; Evans, 1987; Botazzi & Secchi, 2003; Reichenstein & Dahl, 2004; Coles & Mortensen, 2016	Econometric approach: Firm growth depends on many determinants, but none of them is dominant. They cannot be observed separately. Therefore, the cannot be modelled in the form of a cause-effect model.
Resource-based Models	Penrose, 1959; Wernerfelt, 1984; Hamel & Prahalad, 1990	Hmieleski & Baron, 2008; Kumar, 2009; Coad, 2010; Holt et al., 2010; Nath & Mahajan, 2011; Golovko & Valentini, 2011; Nason & Wiklund, 2015	Descriptive and econometric approach: Firm growth depends on the management's configuration and acquisition of firm-specific resources resulting in a competitive advantage.
Learning Models	Senge, 1990; Hamel &; Prahalad, 1990; Nooteboom, 2000; Phelps et al., 2007	Deakings & Freel, 1998; Dalley & Hamilton, 2000; Bessant et al., 2005; Wolf et al., 2015; Grillitsch et al., 2018	Descriptive approach: Knowledge and a continuous learning leads to a competitive advantage determining firm growth. The firm is grounded on firm-specific intangible assets, skills, and knowledge.
Lifecycle & Stage Models	Greiner, 1973; Greiner, 1998; Churchill & Lewis, 1983; Scott & Bruce, 1987	DeAngelo et al., 2006; Dobbs & Hamilton, 2007; Hasan et al., 2015; Arikan & Stulz, 2016	Descriptive approach: Firm growth shows cyclical patterns comparable to biological growth. Each lifecycle stage has its specific organizational challenges.

Concept	Theory	Selected Empirical Research	Core Thesis
Evolutionary Models	Alchian, 1950; Probst, 1987; Aldrich, 1999	Vinnell & Hamilton, 1999; Edelmann et al., 2005; Kaldasch, 2012; Koryak et al., 2015; Arrighetti et al., 2016.	Descriptive approach: Companies grow by adapting to the market environment. In contrast to lifecycle models, the environment dominates the internal structure of the firm.
Deterministic & Managerial Models	Schumpeter, 1934; Drucker, 1954; Ansoff, 1965; Buzzell & Gale, 1975; Porter; 1980; Buzzell & Gale, 1989; Mintzberg; 1994	Schoeffler, 1977; Barnes & Hershon, 1994; Davidsson, 1989; Davidson et al. 2002; Davidsson & Klofsten, 2003; Barringer & Jones; 2004; Davidsson & Wiklund; 2013; Colombelli et al., 2016	Econometric approach: Growth results from a few internal and external factors which can be observed and modelled as a cause-effect model. Descriptive approach: Managerial models emphasize the impact of strategy selection, positioning and managerial/entrepreneurial activities.

Source: Own presentation based on Gruenwald (2016, pp.21-22) and own research.

In recent years, an increased empirical research is to determine attempting to explain excessive growth (high growth) by large database analysis. The so-called high-growth firm research is strongly econometric, aiming at the identification of determinants explaing the phenomenon of excessive growth (e.g. Acs et al., 2008; López-Garcia & Puente, 2012; Daumfeldt et al., 2010).

It could be stated that high-growth company research shows a new level of research by using larger data sets than most of the research mentioned above. To this extent, one could notice a growing devotion to success factor research to quantitative-empirical research, while prior research focused much more on

qualitative observations, such as, for example, case studies. Instead, the recent success factor research is based on secondary data, such as annual reports, which are frequently derived from financial data databases like Thomson One, Datastream, and others. Thus, the findings of recent research are based on comparable data, a reproducible method and achieve a higher level of explanatory power due to statistical methods. Nevertheless, Bastesen and Vante, (2014, p. 159) state, that the firm growth sources are still very insufficiently explored.

1.2.1 Growth as a Stochastic Process

Size and age as determinants of firm growth have long been the focus of much empirical and theoretical work. Gibrat's "Les inegalites economiques", published in 1931, includes a first theoretical model aiming at explaining firm growth rate differences. His 'law of proportional effect' states that growth is a stochastic process and independent from the size of the company and the growth of previous years. Gibrat's Law was the basis of the decades-long conviction that small and large companies should have, on average, equal growth rates (e.g. Mowery, 1948; Evans, 1987; Botazzi & Secchi, 2003; Reichenstei & Dahl, 2004). Gibrat's law considers growth rates independent from size, concluding that growth is solely a random walk (e.g. Geroski et al., 1993; Sutton, 1997; Dosi, 2005). However, the findings of numerous empirical studies and theoretical approaches make this paradigm seem increasingly questionable and rather suggest a negative correlation between growth rates and company size (e.g. Evans, 1987; Reichstein & Dahl, 2004).

The stochastic view of firm growth assumes a large number of determinants explaining firm growth. None of them is dominant. Consequently, cause-effect models of firm growth or the emergence of a dominant theory of firm growth is not possible (McMahon, 1998). On the contrary, many determinants interfere and randomly influence firm growth. However, if firm growth is expected to be a stochastic process, then business success is a matter of chance, and strategic management must be viewed as irrelevant or ineffective. On the contrary, management theory must be replaced by microeconomics and operations management due to the absence and impossibility of a firm growth model based on empirical evidence and a set of a few major determinants.

Already earlier research has questioned Gibrat's law and the stochastic view of firm growth, finding that smaller firms grow faster than larger, or—vice versa—that larger companies do not generally grow slower than smaller companies (e.g. Evans, 1987; Hall, 1987; Laitinen, 1999). Recent empirical research including firm-level or industry-level data (e.g. Duschl et al., 2011; Bottazzi et al., 2011) rejects the assumption of normally distributed growth rates in general. Relander (2011, p. 65) states that, occasionally, firm growth can be considered as a stochastic process; however, firms make decisions to maximise profit, so that the underlying process is deterministic.

1.2.2. Growth as a Result of Firm-Specific Resources

Resource-based firm growth models consider firm-specific resources, such as the social and human capital of managers, entrepreneurs, employees as well as the firm's intangible and tangible assets, as determinants of firm growth rates. However, such models are usually descriptive in terms of them not being quantitative but qualitative (Jager, 2010, p. 49).

The resource-based view developed by Penrose (1959, p. 2) explains firm growth as a result of management activities creating and generating internal resources, which results—in the best case—in a competitive advantage. The growth process requires new additional input, particularly with regard to human capital, in order to match the increase in demand, while management aims at changing the terms and structure of operations to utilize the capacities and increasing the efficiency of operations. Consequently, one of management's main tasks is to keep the supply chain and production running.

The firm can be viewed as a portfolio of tangible and intangible resources used in a firm-specific way (Penrose, 1959, pp. 5, 25), whereas companies are not only distinct regarding firm-specific resources but also concerning the firm-specific use of generally available resources (Penrose, 1959, p. 25). Based on both firm-specific resources and the firm-specific use of general resources, the firm generates growth from self-created resources and the use of general resources in firm-specific form. In this view, management's main task is to capitalise unused firm resources and to acquire and deploy new resources on the supply markets or by M&A activities, or to recombine firm-specific resources for creating innovation (Penrose, 1959, pp. 85-

86, 144-146). However, despite its intuitive plausibility, the Penrosian view has not gained a wide influence (Petilis, 2010, pp. 1-3). However, Penrose's approach must be considered as the basis for several other firm growth concepts, such as the learning-based, the capabilities-based, the knowledge-based or the competence-based view of the firm (e.g. Hamel & Prahalad, 1990; Hamel & Prahalad, 1994; Nonaka & Takeuchi, 1995). To summarise, it can be noted that Penrose has developed a basic concept for several distinct managerial firm growth theories.

1.2.3 Growth as a Result of Microeconomics and Management

Deterministic models explain firm growth through several determinants (e.g. Schumpeter, 1934; Buzzell et al., 1975; Schoeffler, 1977; 2003; Barringer & Jones, 2004). However, contrary to the stochastic or resource-based view, these determinants can be observed and measured and can be reduced to a set of a few determinants with strong explanatory power. Determining variables can be found by qualitative and quantitative analysis (e.g. Barnes & Hershon, 1994; Davidsson & Klofsten, 2003; Barringer et al., 2004). Therefore, it is scarcely surprising that the number of studies based on the deterministic paradigm has grown particularly (Dobss & Hamilton, 2007, p. 299).

Determinist models are based mainly on the market share concept. Companies with higher market shares can benefit from lower unit costs resulting in a higher profitability. Porter (1980; 1991) has advanced this basic approach of Buzzell et al. (1975). According to him, not only cost advantages but also positioning advantages can be a source of excessive firm growth. Consequently, differences in firm growth rates among competing companies reflects differences in the efficiency in operations as well as the validity of strategic decisions concerning positioning and the creation of competencies and abilities to achieve and hold a strong position in the selected markets. Both leads to an increase in market shares and the entry to new markets with existing products or the launch of new products to open new markets. Both of these options allow the firm to increase returns or to keep returns constant even in downward market cycles or mature markets (Capon & Go, 2017, pp. 219-222).

The deterministic paradigm is obviously in line with neoclassical macroeconomics as well as with industrial economics derived from the neoclassical

macroeconomics, with both approaches stating that firms survive and grow through minimising costs. However, Schumpeter (1934) has criticised this over-simplifying approach based on marginal costs theorem by introducing the entrepreneur as a creative destructor and opportunity seeker. The entrepreneur seeks new high-growth markets and new business opportunities resulting in excessive firm growth (Schumpeter, 1934, pp. 60-66, 78, 132).

Thus, the pronunciation of market law determinism is transformed into a model that does not exclude the entrepreneur or the management as a strategic decision maker. In the pure deterministic model, firms grow only to a certain extent in line with market growth. The entrepreneur's or the manager's performance is not only determined by consistent and continuous application of microeconomic laws, such as, for example, the economies of scale and scope (Som, 2012, pp. 86-87).

On the contrary, Schumpeter's and Porter's approach introduces the concepts of new ventures and disruptive innovation in contrast to the manager as a market-signal recipient and microeconomic textbook operator. That becomes particularly apparent in such concepts as Ansoff's product-market matrix or the Boston Consulting Group matrix as a new concept in applying the market-based view in business practice (Morgan & Sturdy, 2000, p. 131) as the result of the end of the post-war long-term upward cycle in the 1970s and 1980s (Klug, 2006, pp. 7-8).

Here, the theoretical focus shifted to strategies for coping with saturated markets in which companies do not grow simply because markets grow. Firm growth was no longer possible by following the microeconomic approach of cost adjustments to market (price) signals, resulting in a paradigm shift from the resource-based paradigm to the market-based view (Morgan & Sturdy, 2000, p. 131; Klug, 2006, pp. 7-8; Schwenker & Spremann, 2009, pp. 91-94). The new research issue was no longer the explanation of differences in growth rates by qualitative determinants in the sense of the resource-based view or the mechanics of price signals and marginal costs; but grow in an environment of increasing competition in search of the sources of competitiveness in mature markets (Schwenker & Spremann, 2009, pp. 91-94).

Drucker (1954) and Ansoff (1965) developed the key concepts of the marked-based view already in the 1960s. Unlike resource-based concepts, Drucker (1954) defines the purpose of management not as coordinating activities concerning the allocation of resources to produce products for satisfying the shareholder's interest.

He states that companies have to ‘produce’ more and more satisfied customers, so that the business is determined outside-in by the customer (Drucker, 1954, p. 37), which is the basic concept of the market-based view.

This applies also to Ansoff’s strategy matrix resulting from his product–market matrix defining for four strategies of corporate growth (Ansoff, 1965, pp. 97-100): market trends, product development, market penetration and diversification. The Ansoff matrix can be considered as the primal methodological concept for rational strategic decision-making and the predominant strategic management paradigm until the 1970s and modified later by Kotler’s firm growth matrix (Kotler, 1999, p. 47). Based on its basic concept, additional complementing approaches occurred until the 1990s, such as the McKinsey matrix or Porter’s Five Forces model to explain not only growth paths but also the interrelationship between the supply and demand market and other effects (Morgan & Sturdy, 2000, p. 131). All these concepts provide management practice instruments but have also provided key concepts for business research.

An advanced supplement to Ansoff’s matrix was introduced in 1980s by Porter (Wöginger, 2004, p. 71). According to Porter (1980, pp. 34-46), competitive advantages as the key to growth derive from selecting the ‘right’ strategy from one of three ‘generic’ strategies, which are the niche strategy, the cost leadership strategy and the differentiation strategy. The concept of generic strategies has its origins in industrial economics considering the firm-specific combination of resources fitting best to market demand as the source of a strong positioning resulting from a competitive advantage. The targeted development of firm-specific resources, knowledge and skills (core competencies) enables to occupy a strong market position and to realise excessive firm growth due to the generated competitive advantage as a result of the ‘right’ strategy selection (Porter, 1980, pp. 34-46; Porter et al., 2006, p. 400).

Porter’s approach combines the resource-based and market-based view. While the core competencies concept is mainly based on the resource-based view, other determinants in the Five Forces model are originally market-based views (e.g. the supplier power or buyer power). This is also confirmed by the history of Porter’s concept, which was originally developed as an industry analysis instrument in the context of strategic decision making and the corporate planning process. Following the view of industrial economics, the basic idea of Porter’s model is that

opportunities for firm growth are resulting mainly from the market structure itself, influencing the growth behaviour and activities for generating growth, respectively (Porter, 1980, pp. 34-46).

However, the fit between market forces and competitive strategy determines the long-term market success beyond firm growth only within the dynamics of up- and downward market and business cycles. Moreover, business success depends, in contrast to the resource-based view, at least indirectly, on market structure and its dynamics (Porter, 1980, pp. 34-46, 75-87).

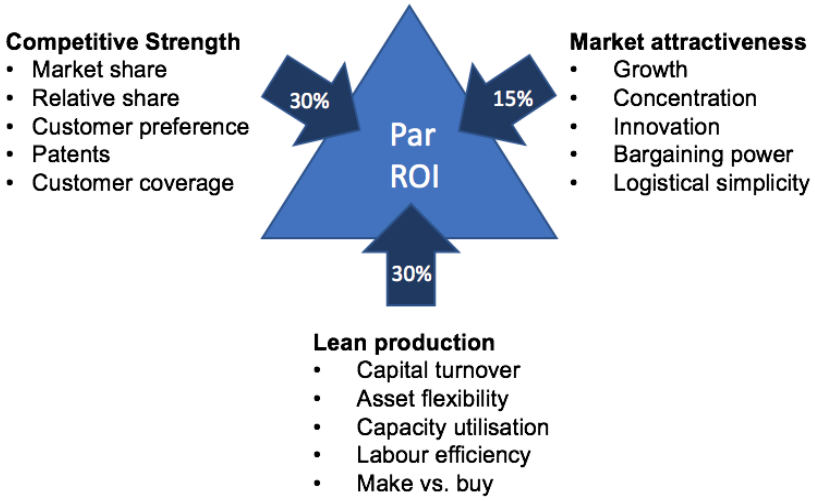
As mentioned, Porter must be seen in the microeconomic tradition. He added the concept of the competitive process in explaining excessive growth. In contrast to the microeconomic view of stochastic growth, Porter added the competitive process as an additional factor to the microeconomic firm growth model, which has its origin in PIMS approach. The PIMS research also originates from industrial economics, such as Porter's concept of generic strategies and the competitive advantage (Woywode, 2004, p. 16). But, in contrast to Porter's approach, the PIMS approach does not follow logical reasoning but explorative empirical research. The PIMS project was initiated by General Electrics (GE) in the 1960s as a cross-industry research project aiming at identifying the determinants of businesses success in terms of earnings growth and cash flow growth (Neubauer, 1997, p. 437).

GE has collected large amounts of accounting data of large corporations from different industries in mature markets providing the foundation of the PIMS database (Woywode, 2004, p. 16). The PIMS research has identified the increase in market shares as the source of profitable growth resulting in the 'market share doctrine' established as the key strategic management doctrine for several decades (Lahti, 2010, p. 43).

The PIMS originates from the structure–conduct–performance paradigm (Olderog, 2003, p. 82). Firm conduct and market structure are linked by feedback loops with firm growth resulting from the fit of both. The fit, in turn, is the management's task and the result of rational decision making and management activities (Olderog, 2003, pp. 81-82). The management's strategic objective is not simply the price–cost adjustment but to generate competitive advantages allowing to gain a dominant market position for benefiting from the economies of scale leading to outperformance by superior profitability and excessive growth. However, the PIMS approach does not follow, as mentioned, a theoretical concept but an explorative

database research approach. The data from strategic business units of U.S. enterprises was explored using the cash flow growth, return on sales (ROS) and return on investment (ROI) as firm performance indicators (Buzzell & Gale, 1989, p. 23; Malik, 2008, pp. 148-149). To control for year-over-year fluctuations in the performance indicators from business and market cycles, the averages of multi-year periods are calculated (Buzzell & Gale, 1989, p. 23) in order to determine the key determinants of profitability their interrelationships (Malik, 2008, pp. 148-149).

Figure 2. PIMS Growth Drivers



Source: Adopted from Malik (2008, p. 152) and revised.

Based on an extensive data analysis, it was found that three factor groups (see Figure 2) explain 75% of the ROI. However, this relatively strong explanatory power must be considered as biased in several respects with most criticism aiming at the size and industry bias of the sample, with small companies and service companies excluded (Homburg, 2000, p. 70). Furthermore, the main predictors are resulting from different sub-predictors (see Figure 2), whereby the effect of single internal and external and highly-aggregated predictors remains unclear and weak with 37 variables explaining 80% of the return on investment (Schoeffler, 1977, pp. 111-112; see also Figure 2).

Corresponding to these issues, the overall conclusions are modest. The main conclusions of the PIMS data analysis are that (1) high market shares and high

quality have the strongest effect on profitability; and that (2) investment intensity is strongly but negatively correlated to market strength (a strong market position) diminishing firm growth and profitability.

Finally, it can be said that the PIMS study follows the market share doctrine and has helped to establish the doctrine of the market share as management paradigm. The market share explains only 12% of the ROI (Luchs & Müller, 1985, p. 88; Buzzell et al., 1975, p. 98) because a higher market share allows to realise excessive return and income by supply market bargaining power and to realise a cost advantage through scale effects. Higher market shares allow steady capacity building and results in cost advantages as well as higher bargaining power in the supplier market, with both resulting in an investment return increase (Buzzell et al., 1975, p. 98; Homburg, 2000, p. 63). Product quality—measured as relative quality in comparison to the product quality of competitors—is found as a second most important firm growth factor (Buzzell & Gale, 1989, p. 7). The increase in the relative quality should have the same strong effect on the return in investment as the increase in the market share. Consequently, the effect of a lower relative quality should be entirely compensated by an increase in the market share and vice versa (Zaepfel, 2000, p. 56).

However, to summarize, deterministic and managerial firm growth theories can be considered as a synthesis of the research-based view, the microeconomic industrial economics approach and the market-based view. The interaction between shifts in the market signals, the adaptation of the resource allocation by the firm's management and the disposition on firm-specific resources explains growth rate differences, with market share or product quality as interchangeable key determinants. Based on this 'growth basics', the firm's management has to select one of the following different growth options (Schoppe et al., 1995, p. 23):

(1) Product-Market strategies with the options: (1) higher market penetration with existing products in existing markets, product development (new products for existing markets), (3) market trends (new markets with existing products) and (4) diversification (new markets with new products).

(2) Expansion Direction with the options: (1) extending the value chain vertically or horizontally, (2) concentration on specific market segments and step-by-

step market entry abroad, (3) conglomeration as diversification into new industries through M&A.

(3) Capacity Expansion with the options: (1) external growth through M&A, or (2) organic growth by creating additional capacities within the existing company.

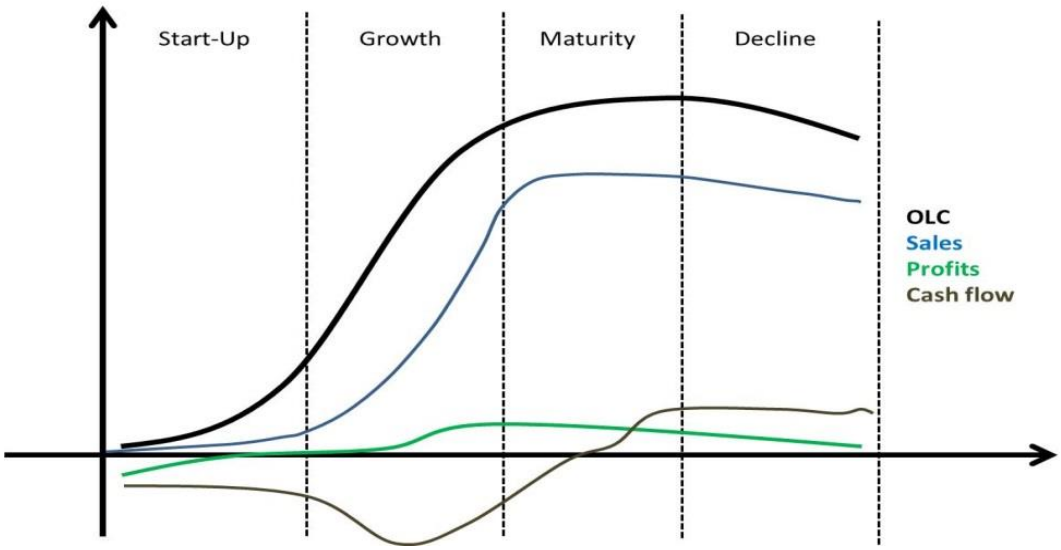
1.2.4 Lifecycle and Evolutionary Patterns of Growth

Lifecycle models are descriptive models (e.g. Steinmetz, 1969; Greiner, 1972; Scott & Bruce, 1987; Dobbs & Hamilton, 2007). Firm growth follows a lifecycle pattern of social organisations and organisms. Lifecycle models explain growth mainly by the growth of firm-specific resources. On the contrary, evolutionary growth models explain growth rate differences between companies as a result of the adaptation to environmental (market) determinants, such as, for example, demand shifts, intensity of competition and others. The growth process of companies follows a predictable stage sequence from start-up to growth and maturity ending in a decline (e.g. Greiner, 1972; Burns & Dewhurst, 1996). Sihler et al. (2004) have created a lifecycle model including not only the development of sales but also the development of profits and cash flow (see Figure 3).

According to Greiner (1972, pp. 7-8), the start-up stage is characterised as improvisation and the absence of routines and defines procedures and structures because the main focus is on sales in order to reduce the ‘cash-burn rate’. Business opportunities exceed the firm’s capacities and resources (Ward, 2003, pp. 6-7).

In the growth stage, the establishment of control and reporting systems, defined procedures and the recruitment of skilled staff become the main task of the founder or the founding team (Ward, 2003, p. 6-7). Moreover, it becomes necessary—for closing the financial gap resulting from increasing marketing and sales costs in the market entry phase—to raise additional equity or venture capital (Berger et al., 2006, p. 2963). The increase of financial resources is the key success factor for future growth by boosting profitability or the acquisition of equity or venture capital (Davidson et al., 2013).

Figure 3. Lifecycle Stages and Performance



Sources: Adapted from Churchill & Lewis (1983, p. 38) and Sihler et al. (2004, p. 4).

In contrast, the maturity stage is determined by consolidating profitability, while financing and keeping the growth process running becomes secondary (Lewis & Churchill, 1983, p. 38). The company should benefit from the developed management skills and firm-specific capabilities in order to size a strong market position allowing to profit from the company's product innovation and the consolidation of the financial situation to sustain further growth (Hall, 1987, p. 115). However, if management fails in increasing the competitive advantage, cost efficiency and strengthening firm-specific core competencies, sales and the return on investment will decrease with bankruptcy as a possible outcome (Ward, 2003, p. 15-16).

Lifecycle models are focusing mainly on qualitative determinants, provide ideal type descriptions of firm behaviour and management activities. Growth is considered as the adaptation of internal structures and resources to the rising challenges of firm growth (Dobbs & Hamilton, 2007, p. 299). However, lifecycle models are also criticized because they provide only a vague concept of stages and firm behaviour without providing empirical evidence and evidence-based management recommendations (e.g. Bessant et al., 2005; Phelps et al., 2007). Consequently, it can be noted that lifecycle models describe firm growth but do not provide evidence-based explanations.

Just as lifecycle models, evolutionary firm growth models are descriptive. However, contrary to the lifecycle models, some recent studies have applied an empirical econometric approach to evolutionary research models examining the distribution of firm size, growth rates and size variance (e.g. Kaldasch, 2012). Evolutionary models describe firm growth as an adaptation of internal resources supply and demand shifts and are, therefore, similar to microeconomic approaches (e.g. Alchian, 1950; Vinnell & Hamilton, 1999; Aldrich, 1999; Edelman et al., 2005).

However, while lifecycle models prefer the resource-based view on the firm and explain growth by developing skills, resources and capabilities, the evolutionary view describes the dynamics of the firm in its adaptation to activities of competitors and supply and demand market signals. Similar to lifecycle models, evolutionary models describe firm growth as lifecycle pattern but not as a standard sequence; rather, as a sequence of different stages, which is determined by the firm-specific circumstances.

The firm-specific growth sequence depends on the existing or procurable resources, managerial decisions, environmental changes and the fit between these components (Smallbone & Wyer, 2006, pp. 117-119). The firm is viewed as a dynamic social system adapting to the dynamic complexity of internal and external effects and causes (Smallbone & Wyer, 2006, pp. 114-117). This dynamic complexity cannot be modelled in the form and explored as a set of some cause–effect relationships. Therefore, strategic planning is almost impossible because the environment is changing constantly, making long-term planning more or less obsolete (Bea & Haas, 2005). Thus, growth must be considered rather as a process of spontaneous structuring and restructuring (Pitelis, 2013, p. 256) in which management can only increase the adaptivity of the organisational system, increasing is robustness towards external chocks by increasing the degrees of freedom allowing self-adaptation beyond hierarchies (Probst, 1987, p. 84). Therefore, evolutionary models can be viewed as a specific model of organisational learning and firm growth; but providing mainly descriptive and heuristic concepts, which cannot be verified (Nelson, 2005, p. 71).

1.2.5 Growth as a Result of Learning and Firm-Specific Knowledge

Learning theories of firm growth—applying the learning organization concept— can be viewed as a specific evolutionary model of firm growth based on the resource-based view. Learning processes of the organisation are considered as the key firm growth factor, particularly in the combination of increasing efficiency and incremental innovation and product innovation (Deakings & Freel, 1998; Forsmann, 2015, pp. 190-195).

The ability of organisational learning improves the adaptiveness strengthening the organisation's robustness and increases the firm's growth potential (Macpherson, 2005). Organisational learning should enable the firm and its members to continuously transform the structure and resources. The knowledge-based view applies the learning organisation paradigm considering the firm only as a knowledge system and knowledge management as management's priority aiming at developing intellectual and human capital as well as firm-specific technological knowhow (Teece, 2008, p. 218).

Drucker (1954) and Penrose (1959) already stated that knowledge is one of the most growth-relevant firm resources. Industrial economics has added the learning curve concept based on a microeconomic view on the firm (Solow, 1956). Nonaka and Takeuchi (1995) have formulated a knowledge-based view alternative to Porter's view of the 'industrial' view of the firm. According to them, managers should understand knowledge and learning as main growth sources because knowledge is the source of a competitive advantage and learning is the process of generating and accumulating knowledge. However, although also this descriptive model is, prima facie, convincing, it arises the question of which knowledge is relevant to strengthen the firm's competitiveness and which indicators allow to measure and control this knowledge. On the contrary, concepts like the accounting of human resource developed to measure the value of and economic effect of organisational knowledge have failed (Bontis, 1999). Therefore, it can be suggested that the learning theories show the same issues as knowledge-based, evolutionary and lifecycle firm growth models. They provide only a conceptual and descriptive approach but do not allow to develop a research design for empirical research and remain, therefore, mind models for managers rather than research approaches.

1.3 Growth Metrics Issues

Achtenhagen et al. (2010) note that researchers and managers have different firm growth and performance concepts. Managers prefer qualitative metrics to measure and manage performance and growth because they view both as an outcome of variety of processes (operations and interactions), while researchers, in general, apply solely quantitative metrics, such as financial analysis. Research following the resource-based or stochastic view on firm growth, for example, prefer indicators like net sales growth, while high-growth firm research prefers the growth in the number of employees as a result of its macroeconomic focus (see Table 3).

Research following the deterministic and management approach rather prefer indicators, such as market share, revenue and income growth, or profitability, revenue growth, and allow to distinguish quantitative and qualitative key determinants and to apply an extended concept of performance by including not only growth rates but also profitability ratios.

Table 3: Firm Growth Indicators of Selected Research

Indicators	Studies
Revenue **Net Sales** **Turnover** **Sales growth**	Mishina et al., 2004; Shaw et al., 2005; Gardner , 2005; Simsek et al., 2005; Zatzick & Iverson , 2006; Sine et al. , 2006; Arthaud-Day et al., 2006; Moreno & Casillas, 2007; Hölzl, 2009; Anaydike-Danes et al., 2009; Evangelista & Vezzani, 2010; Cassia & Minol , 2012; Murmann et al., 2014; Beers & Zand, 2014; Coad et al., 2014; Feng et al., 2017
EBITDA, Operating Income, Net Income, Earnings	Shaw et al., 2005, Bennnett et al., 2017; Gosh, 2017; Verriest et al., 2018
Employment Growth	Shaw et al., 2005; Hölzl , 2009; Murmann et al., 2014; Anaydike-Danes et al., 2009; Carznitzki & Delanote, 2013; Barbaro et al., 2014
Productivity	Boer & During , 2001; Rocchina-Barrachina et al. , 2010; Urgal et al. , 2013; Hasan et al., 2018
ROE, ROI, ROIC, ROA	Shaw et al. , 2005; Westphal & Bednnar , 2005; Luo & Chung , 2005; Tan & Tan , 2005; Goerzen & Beamish , 2005; Miller & Eden , 2006; Arthaud-Day, Certo et al., 2006; Sanders & Tuschke , 2007; Moussa, 2018
Stock Return, Total Shareholder Return, Price/Book Ratio	Kumar, 2005; Johnson et al., 2005; Skovoroda & Bruce, 2016; Wibbens & Siggelkow, 2017

Source: Own compilation.

According to a recent quantitative literature analysis, 42% of the studies included in the literature review of Achtenhagen et al. (2010) use revenue as a growth indicator, while 29% use the number of employees as an indicator (see Table 4). Another study has found that even 60% of empirical research in firm growth apply revenue-related growth indicator, 15% profitability indicators and 12% employee growth (Shepherd & Wiklund, 2009).

Table 4: Research Growth Indicators

Indicator	Frequency	Percent
Sales/Turnover	23	41.8
Employees	15	27.3
Growth Willingness/Intention	10	18.2
Profitability	4	7.3
Combined Measures	9	16.4
Growth Strategies	4	7.3
Others (e.g. Asset Growth, Valued Added Growth	4	7.3
Rest	5	9

Source: Achtenhagen et al. (2010, p. 293)

Thus, it can be concluded that academic research prefers quantitative indicators. In contrast, qualitative growth indicators are rarely used in academic research altogether. A few studies apply measures like innovativeness or the share of innovative products in sales in revenue as qualitative indicators (e.g. Beers & Zand, 2014; Frenz & Letto-Gilles, 2009; Beers & Zand, 2014), whereas the use of multi-dimensional indicators is not common, which is criticised amid the complexity of the growth process (Wach, 2012, p. 35; Kanji & Moura, 2015, p. 51).

However, the use of such multi-dimensional measures has not yielded any relationship between the applied indicator and firm growth (e.g. Acs et al., 2008; Coad et al., 2014). Instead, such indicators are criticised because of their possible measurement bias (Coal et al., 2014, p. 35), as innovation-based indicators may be applicable in examining companies in technology-driven industries but not generally in other less research-intense industries.

Instead, this research's data analysis as well as some studies discussed above show that high growth is not related to high innovativeness.

To summarize the research discussed so far, it can be noted that:

- Most of studies apply turnover, revenue or sales growth or employment growth as firm growth indicator.
- Profitability indicators are only marginally used.

This research applies, just as some others study, different indicators to cover the distinct dimensions of growth and performance: Revenue growth is applied as a quantitative indicator and operating income growth as a qualitative indicator for firm growth, while profitability ratios, such as ROE, ROA and ROIC, are used as efficiency indicators in the context of asset and capital employment.

2. Results of Prior Empirical Research

2.1 High-Growth Firm and Success Factors Research

Recent firm growth research is particularly interested in SME growth because small firms generate almost 90% of all radical innovations, whereas larger firms are considered as companies with less risky investments and returns, more predictable revenues and a low degree of innovation intensity (Robbins et al., 2000). Consequently, a rising number of studies is researching firm growth predicators (explanatory variables) among high-growth SMEs. However, these studies often apply only vaguely defined qualitative indicators collected within surveys (see Table 6).

In the following sections, the findings concerning quantitate and qualitative indicators to distinguish performing from non-performing companies are discussed and the findings of high-growth firm research are summarized. The second part of section 2.1 outlines the results of recent research in German strong-growth SMEs and larger enterprises finding qualitative growth determinants. Section 2.2 discusses the results of key factors research examining larger companies.

2.1.1 High-Growth Firm Research

High-growth firm research focuses on employment effects. According to Daunfeld et al. (2010) and Henrekson and Johansson (2010), 28 studies can be found. Based on their review articles, several determinants can be identified explaining high growth. For example, Almus (2000) states that high growth can be found mainly among technology-intensive companies. López-Garcia and Puente (2012) have found that high-growth firms show a higher long-term debt share.

Acs et al. (2008) and Hölzl (2009) found that fast growth is only a temporary anomaly in the lifecycle of the firm. Younger companies grow faster, benefiting from size-related advantages, such as operations efficiency. Therefore, both papers conclude that the assumption that younger companies were less productive than older ones due to learning and scale effects must be rejected. López-Garcia and Puente (2012) find that young fast-growing companies have an excessively higher productivity than other companies, supporting the findings of Acs et al. (2008) and Hölzl (2009).

To sum up, high-growth firms are, on average, not start-ups but younger companies: 70% of the examined high-growth firms show a firm age of more than four years (Acs et al., 2008), while companies with much higher growth rates, on average, show an average firm age of 25 years. Consequently, high-growth firms are usually not start-ups or technology firms (Acs et al., 2008; Hölzl, 2009; Coad et al., 2014). Other high-growth firm research (e.g. Henrekson & Johansson, 2009; López-Garcia & Puente, 2012) has found a significantly positive relationship between high-growth internationalisation as well as between the use of debt capital and growth rates.

Other effects, such as, for example, the flexibility of the organisation, are also investigated among the group of small high-growth firms. However, the conceptualisation of factors like ‘flexibility’ or ‘experience’ (e.g. O’Gorman, 2001; Kangasharju, 2000) should be considered as questionable, particularly when these data are collected by surveys based on self-assessments of respondents. Moreover, it is to criticise that many firm growth studies use different growth indicators. High growth is often defined as firm growth above the sample’s growth rate mean without using the OECD’s standard defining a firm growth rate of more than 20% year-over-year revenue growth in a three-years period (OECD, 2000). Furthermore, non-financial indicators are often used, such as the growth of the number of employees, while, in the view of the financial analysis, employees are accounted for as costs and not as indicators of firm performance (see Table 6).

Table 5. Results of Selected Recent High-Growth Studies

Author	Sample	Findings on Growth Determinants
Acs et al. (2008)	Companies persistent and liquidated during the observation period	75% of the surviving firms exhibits no decline. High-growth companies keep their expansion pace, while low growth starter remain low-growth companies in the subsequent lifecycle stages
Hölzl (2009)	18.000 EU-27 SME	Relative technological position of the country the company is headquartered has substantial influences on the success.
Amat & Perramon (2010)	Companies with revenue of higher EUR 2.4m,	Quality management, innovation focus and pro-active human resource management are key success factors, as well as conservative, long-term focused financial management.
Koski & Pajarinen (2011)	Top 10% of the fastest growing start-up companies from total population	R&D subsidies have a positive relationship with growth
López-Garcia & Puente (2012)	Active small- and medium-sized companies	High-growth companies have relatively more long-term debt.
Carznitzki & Delanote (2013)	Young and small fast-growing companies	High variation in growth rates without a dominant determinant.
Atio & Ranniko (2016)	Finnish startups in a subsidies program	Cluster effects are significant. Companies in certain regions perform better, sometimes leveraged by the higher availability of funding opportunities which are, in turn, also regionally different.
Zeitun & Tian (2014)	Longitudinal data from 167 companies of different industries (observation period: 24 years)	Capita. structure influence performance, low performance is linked to higher short-term debts, higher performance is linked to a higher long-term debt share
Coad et al. (2016)	Companies at the startup and growth stage across different industries	R&D investment in relation to age determines firm growth: The younger the company, the higher is the ratio of R&D investment in high-growth companies
Erhardt (2018)	Surviving firm in the 9-year period (longitudinal approach)	High-growth companies are on average of much larger than non-high-growth companies with the same age. Furthermore, their exit rates are lower.

Source: Own compilation.

Table 6. Indicators and Variables of Selected Recent High-Growth Studies

Author	Growth Measure	Explanatory Variables	Growth-irrelevant Variables
Acs et al. (2008)	Revenue, number of employees	Size, age, sector, year of foundation	Year of foundation
Hölzl (2009)	Revenue, number of employees	Activity in region close to technological frontiers,	R&D intensity, region of headquarter
Amat & Perramon (2010)	Net income, profitability	Internationalization, diversification, debt-capital ratio, long-term assets, R&D investment	Return on assets,
Koski & Pajarinen (2011)	Revenue, total capital, number of employees	R&D subsidies, size	Equity, age, R&D
López-Garcia & Puente (2012)	Revenue	capital structure, human capital, age	Size, region of headquarter, sector
Carznitzki & Delanote (2013)	Revenue, number of employees	-	Age, size, interna-tionalization, R&D intensity
Atio & Ranniko (2016)	Revenue	Financial access, region, industry	Growth orientation, growth self-confidence
Coad et al. (2016)	Number of employees, revenue, productivity	Age, number of new products	-
Zeitun & Tian (2014)	Return on equity, return on assets	Debt-to-capital ratio, long-term debt to total debt ratio, firm size	
Erhardt (2018)	Number of employees	Industry size, location, ownership structure, size, firm age	-

Source: Own compilation.

Beside these methodological issues, this raises the fundamental question of whether the long list of qualitative variables generated in empirical studies should be reproduced and integrated in an empirical research design. Fadahunsi (2012) finds more than 20 groups of variables in high-growth research, so that Dobbs and Hamilton (2007, p. 313) request not to develop even more qualitative indicators but to focus on 'hard facts' to accumulate knowledge instead of only diversifying research concepts. Therefore, this study collects solely accounting data and financial ratios.

However, the SME-focused research and the phenomenon of high growth among this group shows that innovation and technology are not predictors of excessive growth as well as the development of products for new markets (e.g. Gibb, 2000). On the contrary, recent high-growth firm studies identify labour intensity (Hopkins & Richmond, 2016), board diversity and ownership structure (Rasmusen & Ladegard, 2016), higher productivity rates and leverage (Bianchini et al., 2017) as high-growth determinants (see Table 6).

2.1.2 Findings of Success-Factors Research among Medium-Sized Larger Growth Companies

Simon (1990; 1996) has examined an extended sample of German middle-sized companies by means of qualitative and quantitative indicators, resulting in a definition of a specific type of companies, which he labels hidden champions. Simon has analysed 1,316 hidden champions in a panel study with several updates within a 20-years period. A hidden champion company is characterised by (1) its market leading position indicated by its revenue share in the total market volume, (2) generating less than EUR 3bn annual revenue, and (3) being an owner-managed company or dominated by only a few owners, so that the executives are not subject to shareholder activism and short-term return interests, such as listed companies. Hence, a hidden champion company is typically an entrepreneurial firm (Simon, 2007, p. 29). Simon (2012) identified five main growth drivers derived from analysing his panel:

(1) Hidden champions usually target only a single niche market segment or pursue a one-product strategy (Simon, 2012, pp. 128-135).

(2) The hidden champion strives for sustainable quality leadership, while their specific customer focus allows to realise a premium price and higher margins. Consequently, hidden champions can avoid price wars and benefit sustainably from higher margins for a longer time (Simon, 2012, pp. 143-144).

(3) High specialisation and market niche focus leads to a very 'narrow' market (in terms of market volume), forcing hidden champions to internationalise early in the firm lifecycle to escape from growth limits (Simon, 2012, pp. 187-190).

(4) Hidden champions often set up new markets or occupy market niches in existing markets that are ignored or even regarded as unattractive by larger companies mostly within low-involvement industries (Rasche, 2003, p. 220; Simon, 2012, pp. 160-165).

(5) Hidden champions are not a 'breakthrough innovator'. They are not necessarily product innovators but more often process innovators in areas like marketing, sales, design, logistics and distribution strategies (Simon, 2007, pp. 191-195).

Meffert and Klein (2007) have examined a sample of 1,250 leading German companies characterised by an annual average revenue growth of more than 5%. Their findings are entirely in line with research design and findings of Simon (2007; 2012). Meffert and Klein (2007, pp. 186-187) have found that firm performance cannot be explained by the 'right' market selection or the 'right' selection of entry strategy. Based on the survey data, they developed a specific business development path for leading companies, leading to a specific lifecycle pattern of long-term growing companies. Such companies start as specialisers, then transform into cost or innovation leaders. At a later corporate lifecycle stage, such companies transform into a competence leader. The strategy shift from being a specialiser to becoming a competence leader takes, on average, ten years and, compared to cost leadership, specialised companies, innovation and competence leaders show considerably higher margins (Meffert & Klein, 2007, p. 70).

However, hidden champions research differs significantly from the theories, models and research designs discussed so far. This is mainly the result of a selection and a performance bias. Neither of both studies examines samples including companies with heterogeneous growth rates or firm performance. On the contrary, hidden champions research exclusively examines market-leading companies or

companies with above-average growth rates. Consequently, both approaches show a strong view on internal resources, finding that successful companies develop their own market niche instead of entering existing and established markets. Firm performance is determined by internal resources only, such as, for example, a strong corporate culture, defined core competencies, and firm-specific mind sets of the management. Moreover, it can be expected that the basic advantage of the examined companies originates from targeting niche markets instead of mass markets, in which cost leadership is the main source of a competitive advantage. Instead, hidden champions are not focusing on advantages from scale and scope effects in mass markets, in which multinational companies are active to avoid permanent cost pressure and decreasing margins. On the contrary, hidden champions prefer B2B markets with a face-to-face customer relationship and customers are inclined to pay a premium price.

Another large-size panel analysis is carried out by the German Reconstruction Loan Corporation (KfW). The KfW is one of the largest banks in Germany and market leader in financing internationalisation, innovation and business development in the area of SMEs (Touché, 2013, pp. 7-13). Therefore, the KfW disposes of a large company database covering the entire corporate lifecycles of several thousand companies, providing the basis for panel studies.

Based on the KfW dataset, Bindewald (2004, pp. 57, 68-84) has found significant differences between surviving and failing companies as follows:

- Successful companies concentrate much stronger on quality management, leading to a significantly higher product quality.

- They focus much stronger on customer relationship management and customer loyalty, leading to longer customer lifecycles, higher customer satisfaction rates and closer customer relationships.

- 90% of the successful companies often use the services of external consultants to find solutions for specific issues in business development and operations management.

- Another important success factor is the depth of corporate planning. Successful companies show a higher quality of their business planning and

modelling at the start-up stage. Firm performance depends significantly on continuous strategy development and analysis of the company's weaknesses and strengths.

2.2 Empirical Findings in the Field of Leverage-Performance Research

Researchers have examined the capital structure to search for the optimal debt ratio for more than 60 years since Modigliani's and Miller's (1958) publication. Optimal debt ratio is generally defined as minimizing capital costs while maximizing company value. Consequently, the optimal debt ratio should maximize the company's profitability (Kebewar, 2013, p. 1). Therefore, the main focus of capital structure research should be on examining the effects of capital structure on profitability. However, only a few studies have examined the effects of capital structure on other firm performance indicators than on return indicators, such as ROA or ROE. The following section discusses prior research examining the relationship between capital structure indicators and firm performance which is the foundation of research design developed in chapter 3.

2.2.1 Negative or Neutral Relationship between Leverage and Firm Performance

Several studies have found a negative relationship between debt and profitability, such as, for example, Eriotis et al. (2002), Ngobo and Capiez (2004), Goddard et al. (2005), Yoon and Jang (2005), Rao et al. (2007), Ramachandra et al. (2008), Nunes et al. (2009), Ahmad et al. (2015) and Mwambuli (2015).

Majumdar and Chhibber (1999) examined the relationship between performance and debt levels among Indian firms. Their data reveal a significantly negative relationship for Indian firms. Eriotis et al. (2002) investigate the relationship between the debt-equity ratio and firm profitability including firm investment level and market power degree based on panel data for various industries. They criticize prior studies for using industry level data instead of firm-level data, concluding that inconsistencies in the results of prior research exist, which is why they have based their study on firm-level data. Their study's main result is that firms preferring self-

financing in investment activities show a higher return than firms preferring borrowed capital financing.

Ngobo and Capiez (2004) find that, generally, the debt level and ROA are negatively correlated. However, they state that the effect strength is different in different countries. Also, Goddard et al. (2005) investigate European manufacturing and service firms, finding a negative relationship between a firm's profitability and gearing ratio. They find also that firms showing a higher liquidity are more profitable.

Yoon and Jang (2005) examine the relationship between size, return on equity (ROE), and financial leverage in a one-industry sample of 369 companies for a five-year observation. Their results suggest that firm size has a more dominant effect on ROE of firms than higher leverage, whereas larger firms are earning significantly higher equity returns. Rao et al. (2007) examined 144 listed companies. The results of their regression analyses confirm the negative relationship between financial leverage and firm performance measured in terms of ROA und ROE. They find that liquidity, firm age and capital intensity affect significantly firm performance. Zeitun and Tian (2014) investigate a sample of 167 companies during the period from 1989 to 2003. Their results show that a firm's capital structure has a significantly negative impact on accounting and market performance measures, such as Tobin's Q, Price-Book-Ratio or revenue growth, debt-book value and liabilities-book value.

Rao and Ramachandra (2008) find that firms with a higher leverage show a lower revenue and earnings growth, confirming their hypothesis that highly leveraged firms become financially constrained during industry downturns slowing down growth, which is particularly valid for smaller firms with higher relative financial constraints. Nunes et al. (2009) examined profitability determinants of Portuguese service industries companies. They find that larger companies with higher growth, a lower debt level and lower fixed assets are more profitable. Mwambuli (2016) examines non-financial listed firms, finding that profitable firms measured in terms of ROA and ROE prefer to use internal financing sources supporting the results of the pecking order theory. Similarly, Karasahin & Kücüksarac (2016) and Kuhnhausen and Stieber (2014) find a negative relation between profitability and leverage.

Umar et al. (2012) find, in examining a cross-industry sample of 62 listed companies, that financial and market performance measures, such as return on equity (ROE), price-earnings ratio (P/E ratio), earnings before interest and taxes (EBIT) and net profit margin are negatively correlated to debt ratios. Capital structure, the ratios between current liabilities to total assets, long-term liabilities to total assets, and total liabilities to total assets are weakly negative or not correlated to financial and market performance.

Consequently, they conclude that capital structure choice is an important determinant of financial performance recommending that managers shall not use excessive leverage but shall finance their investment activities with retained earnings and use leverage as a last option. Finally, Kebewar (2013) examines a sample of 2,240 French unlisted service sector companies in the period from 1999 to 2006. He finds that leverage has no effect on profitability, which is consistent with the findings of Baum et al. (2006). Also, the examination of 422 listed manufacturing companies by Chadha and Sharma (2015) has shown no relationship between firm performance and leverage.

2.2.2 Positive Relationship between Leverage and Firm Performance

Other researchers, such as Frank and Goyal (2003), Baum et al. (2006), Berger and Bonaccorsi (2006), Nguyen and Rachandran (2006), Margaritis and Psillaki (2007), San & Hang (2011), Malanic et al. (2013) as well as Nirajini and Priya (2013) find positive effects. Accordingly, these studies support Fama and French's (2002) findings. They test pecking order theory assumptions according to which debt increases when the investment volume exceeds the company's retained earnings and decreases when the investment volume is below the retained earnings. Their regressions indicate that more profitable firms have more leverage, and, furthermore, that an increasing investment rate and firm size are positively related with the firm's leverage. The latter relationship will be discussed in the next section, while the direct positive relationship between firm growth and firm performance with the firm's leverage is discussed in the following section.

Frank and Goyal (2003) examined the tradeoff and pecking order theory based on a broad cross-section of US firms over an 18-year observation period. They find that none of the pecking order theory predictions are supported by their data

analysis. Instead, they find support to the tradeoff theory, whereas firm size in terms of revenue as well as the operating cash flow are strongly positively correlated with the book value of debt.

Baum et al. (2006) examine industrial firms' profitability and the ratio of short-term liabilities to total liabilities in a longer observation period (1988 to 2000), finding that firm growth is positively associated with short-term debt. Nguyen and Rachandran (2006) also find that firm growth is positively associated with short-term debt because high-growth firms have high demand for working capital. They state that firm profitability increases when they use short-term liabilities rather to a greater extent than long-term liabilities. Further, SMEs rather prefer short-term liabilities to finance operations.

Simerly and Li (2000) conclude on the basis of a large-scale empirical analysis including 700 listed larger U.S. companies across all industries. They exclude the ROE as performance measure because of the ROE can be influenced by a high leverage, whereas the ROA and the ROI capture better the performance of investment activities. Their main assumption is that the capital structure is influenced by dynamic environmental determinants. The match between such determinants and capital structure should be correlated with a superior firm performance. The regression results indicate that dynamic environmental determinants moderate the relationship between firm performance and capital structure. From this result, Simerly and Li (2000) conclude that the higher leverage limits the strategic options of managers when market dynamics increases. Also, the examination of a sample of 257 companies by Fosu (2013) demonstrates that leverage has a positive and significant effect on firm performance. He finds that market dynamics in terms of increasing competition enhances the effect of leverage on firm performance; but for a short period only. According to Fosu (2013), leverage has a complex interaction with market competition. He states that, on the one hand, leverage enables firms to compete more aggressively in the market but, on the other hand, the increasing competition leads to decreasing realized prices in a specific market, so that leverage could turn into a disadvantage. Accordingly, his conclusion is that leveraged aggressive market strategies leads to higher vulnerability in the long term.

A different approach to the structure-performance problem was chosen by Weill (2008). He finds that the relationship between firm performance and leverage varies across countries, concluding that institutional effects influence the debt-equity ratio, such as the access to bank credit and efficiency of the legal system. Thus, Weill (2008) opens up a new dimension by introducing macroeconomic context variables, which the mainstream of capital-structure/firm-performance research is neglecting, which is most relevant particularly in the case of Germany showing a completely different financing pattern compared to other European companies preferring significantly internal funding instead of external funding (Ziebarth, 2013, p. 29).

Tsuruta (2016) examines small firm performance after they became highly leveraged to test the Modigliani-Miller theorem. They find, on the one hand, that, for highly leveraged firms with sufficient valuable collaterals, the effect of leverage on firm performance is positive, concluding that companies with sufficient collateral assets with a high leverage perform better. This finding may be interpreted in line with the findings of Simerly and Li (2000) and Fosu (2013); that the leverage degree in general is irrelevant in terms of the Modigliani-Miller theorem but the size of collateral assets before the leverage increase. In terms of the Simerly and Li (2000) and Fosu (2013), leverage increase may be also leveraging firm performance in the short term as a strategic activity; but a generally higher financial leverage is also increasing the sensitivity towards external shocks or market cycle dynamics. It may be concluded that the Modigliani-Miller theorem is only relevant in the short but not in the long term. This may be in particular relevant concerning the firm size effect because smaller companies are more often exposed to scarce financial resources, which is seen as a primary cause of SME failure (Coleman, 2000; Smolarski & Kut, 2011). Accordingly, the results of studies finding positive relationships between firm performance and leverage provide several indications that firm size is at least a moderating factor in the relationship between firm performance and leverage, so that, in section 2.4, the research concerning firm size and leverage is discussed.

2.2.3 Non-Linear Relationship between Leverage and Firm Performance

Margaritis and Psillaki (2007) as well as Kebewar (2012) find a non-linear effect (inverse U-shaped relationship) between leverage and firm performance. Baum et al. (2007) as well as Kebewar (2013) confirmed this finding but found only non-significant correlations. Kebewar (2013) states that that the company's capital structure has no influence on profitability either in a linear way, or in a non-linear way (Kebewar, 2013, p. 15).

Berger and Bonaccorsi di Patti (2006) find a reverse causality from firm performance to leverage in the U.S. banking industry, stating that a higher leverage is associated with higher profitability. Their explanation is based on the efficiency-risk hypothesis based on the assumption that more efficient companies choose lower equity ratios because higher efficiency generates a higher expected return for a given capital structure and reduces the expected costs of financial distress and bankruptcy.

Margaritis and Psillaki (2007) examine a sample of 12,240 New Zealand companies considering both the effect of firm performance on leverage as well as the reverse causality relationship. They also recognize a non-monotonic effect: the reverse causality effect of efficiency on leverage is positive at low to mid-leverage levels and negative at high-leverage ratios. Additionally, they find that firm size also has a non-linear effect on leverage: the effect is positive at mid- to high-debt ratios and negative at low-debt ratios.

Kebewar (2012) examines a sample of 9,136 French companies and depicts that different industry classes show the same results, which can be summarized as follows:

- Profitability is negatively correlated with leverage up to a certain threshold behind which the correlation reverses.
- Therefore, for future research, he recommends the application of the quantile regression, as simple regression models are not appropriate to detect U-shaped relationships.

2.2.4 Other Factors explaining Capital Structure

Several other variables are identified in prior research explaining the capital structure choice. Therefore, the question arises whether moderating variables may exist. The following sections discuss different possibilities that should be included in the selection of variables in the empirical part of this study.

2.2.4.1 Firm Size and Profitability

It is apparent that the capital structure/firm performance research focuses mainly on profitability indicators. Here, the question arises if a moderating variable exists. Simon (1962) has performed one of the first studies investigating the relationship between firm size and profitability without finding a statistically significant effect. Subsequent studies show mixed results. Ozgulbas et al. (2006), Jonsson (2007), Serrasqueiro and Nunes (2008), Stierwald (2009), Lee (2009), and Saliha and Abdessatar (2011) find positive effects between profitability and firm size, whereas Schneider (1991) or Banchuenvijit (2012) find a negative effect, concluding that larger companies are less profitable. Other studies find that firm size does not have any profitability effect, such as, for example, Becker et al. (2010). Consequently, it must be stated that some studies show either weak negative effects or none, while others find positive effects between size and profitability.

Simon (1962), which can be seen as one of the first examining size effects of the firm, has taken a very general microeconomic approach, which becomes evident in his introductory statement noting that it "*has seemed almost axiomatic in America that the bigger something is, the better it is. There is a natural association of big with strong and of small with weak*" (Simon, 1962, p. 41). This view is directly linked to the microeconomic premise that size is strongly associated with efficiency as the main paradigm of industrial economics. Examining a sample of 180 companies, he concluded on the basis of a regression analysis that there exists no empirical evidence that size and profitability are causally related.

Özgülbaş et al. (2006) have investigated the relationship between profitability, revenue growth and size for a five-year observation period finding that larger listed companies have a higher performance. Jonsson (2007) has found the same relation between size and profitability and size among companies headquartered in Iceland. Nunes et al. (2009) have found, also statistically significant, positive

correlations between several profitability indicators and firm size, examining small- and big-scale firms in Portugal, as well as Lee (2009) examining U.S companies.

Akbaş and Karaduman (2012) have studied listed manufacturing companies operating in the years from 2005 to 2011, finding that firm size and profitability measured as ROA have a positive correlation. Becker-Blease et al. (2010) have studied the firm size effect on profitability examining U.S. manufacturing companies. Results of the study, in which the data of the years from 1987 to 2002 have been used, showed that negative and statistically significant relations exist between the total assets, total sales and number of employees of the firms and their profitability. However, they find no evidence that profitability is correlated to firm size. Instead, they concluded that factor intensity explains profitability.

2.2.4.2 Firm Size, Firm Growth and other Factors

Dilek et al. (2009) find that size and leverage are related statistically significant. De Vries and Erasmus (2010) find a negative correlation between leverage and profitability confirming the pecking-order theory according to which internal cash funds are used first in funding decision, while debt capital is added only in the case that internal funding opportunities are exhausted, for example, as a result of decreasing profitability.

Mary et al. (2011) find a lifecycle pattern in funding corporate financial requirements. Companies start with debt issuing as the ‘cheapest security’, tend then more to hybrid securities, such as convertible bonds, while equity remains only a last resort. Thus, the results of Mary et al. (2011) may be seen as a pecking-order theory of financial lifecycle, however, with a different stage sequence. Wu and Yeung (2012) examined a sample of 3,939 companies finding that companies with a higher leverage are growth companies, whereas mature companies show lower leverage. Furthermore, low-growth firms prefer to issue new debt than equity and vice versa.

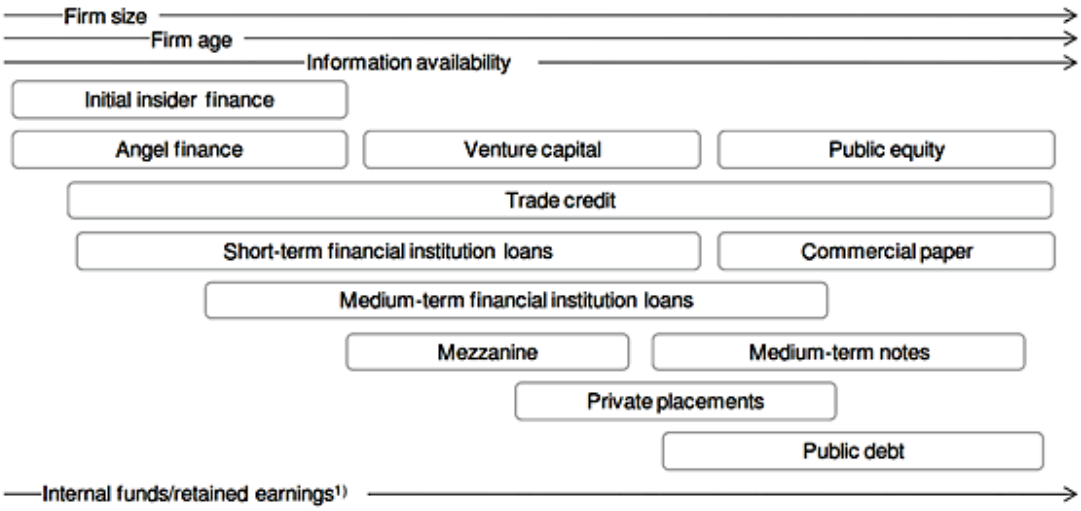
However, the findings of Mary et al. (2011) and Wu and Yeung (2012) refer strongly to the concept of lifecycle and growth types, respectively. Wu and Yeung (2012) apply a typology consisting of three different types of firm growth: (1) low-growth, (2) mixed-growth and (3) high-growth firms. According to Wu and Yeung (2012), low-growth companies tend to prefer debt financing, while high-growth firms prefer

equity financing. They explain this by a lifecycle view: As the economic conditions of growth companies improve in the lifecycle course, they accumulate sufficient capital (retained earnings), acquiring, thus, the means for equity financing, whereas low-growth companies and mixed-growth companies are much more opportunity-seeking in the sense that they prefer the form of financing that fits best to its rating resulting in different capital cost. Consequently, Wu and Yeung (2012) conclude that firms seek financing compatible with their growth types.

These findings lead to a growth patterns approach developed by Brush et al. (2009), distinguishing into (1) rapid growth, (2) incremental growth, (3) episodic growth and (4) plateau growth. Each growth pattern is a result of a specific configuration of management, market and money. Management must have the objective and ambition to grow. A management strategy that merely targets steady income generation, for example, will hardly generate sales growth and, therefore, will have no need for additional funding possibilities because the expansion of the sales organization or of production capacities is not necessary. By contrast, a high-growth company has a significantly higher need for funding possibilities and, thus, a higher need for debt capital. Lee (2014) examines 4,858 UK SMEs finding that the main high-growth firms' bottleneck is to acquire enough debt capital to finance their growth in markets with excessive growth rates.

Based on similar findings, Berger and Udell (1998) developed a financial growth cycle model, including determinants such as firm size, lifecycle stage, availability of different internal and external funding opportunities. According to this model, younger fast-growing companies initially do not have the possibilities to behave in the terms of pecking-order theory or the trade-off theory because of the limits in funding options depending on specific lifecycle conditions (see Figure 4).

Figure 4. Berger and Udell's Financial Growth Lifecycle Model



Source: Hoff (2012, p. 89).

Berger and Udell (1998) explain the dependence of financing options on the corporate lifecycle with the vulnerability of small fast-growing companies from the macroeconomic environment increasing the risk cost of outside creditors leading to strong restrictions in the availability of debt capital. Therefore, they opt for a capital structure theory that includes lifecycle characteristics rejecting the 'one optimal capital structure fits all' approach. Instead, they state that a specific capital structure may be optimal for a specific corporate lifecycle stage, but not in another lifecycle stage. Already in the 1980s, Stiglitz and Weiss (1981) explained this problem through market frictions: Financial options may be rationed by lenders leading to the problem that the availability of all forms debt capital depends on the lifecycle stage. However, their argument is information asymmetry. Start-ups or non-listed companies are not as transparent such as listed companies.

In line with this assumption, the findings of Faulkender and Petersen (2006), for example, suggests that firms having access to bond markets, due to their financial growth lifecycle stage, have a much higher leverage. Accordingly, the debt capital supply must be seen as determinant of growth. However, this variable is also determined not only by the financial growth lifecycle but also institutional issues, such as country-specific financing patterns resulting from a more or less irrational behaviour, such as in Germany, where banking debts are more widely accepted than capital market depts. (Ziebarth, 2013, p. 29) or from other institutional issues,

such as country-specific regulations of the banking or capital market sector (Booth et al., 2001). Also, Bancel and Mitoo (2004) find in their questionnaire-based survey of 710 managers in 16 countries no evidence that the country-specific legal environment is an important debt policy determinant. Instead, they find that the share price and the level of interest rate are important issues in selecting the timing of equity and debt issues. However, they examined only a sample of managers of larger listed companies, so that lifecycle characteristics are not included. Nevertheless, these findings imply another variable to be considered in this research, which is the interest rate. Additionally, the recent study of Karasahin & Kücüksarac (2016) indicates that inflation rates as a country-specific macroeconomic factor should also be included in this study.

2.3 Discussion of Prior Research Results

The discussed studies show that the results in the research concerning the relationship between capital structure and firm performance are inconsistent. The following paragraphs discusses the reasons for this and the implications for the empirical research of this study.

Several determinants may be reasons for contradicting or inconsistent results:

(1) The discussed empirical studies focus on different types of samples (sectors, countries and periods).

(2) Researchers apply various debt ratios as independent variable[1] and different profitability indicators as dependent variable.[2]

(3) Different statistical tests are applied.[3]

To mention only a few examples, Baum et al. (2006) examine 1,130 companies for the observation period from 1988 to 2000, whereas all companies are German manufacturing companies with the performance measure return on assets. Berger and Bonacorsi di Pati (2006) examine 7,548 banking companies for the period from

[1] Total debt ratio, short-term debt ratio (STDR), and long-term debt ratio (LTDR).
[2] Tobin's Q, ROE, ROA, PROF, ROI, profit on sales, revenue growth, and profit margin.
[3] DLS, GLS, OLS, weighted least squares, random effect, fixed effect, variance decomposition model, maximum likelihood, covariance model, quantile regression, method of simultaneous equations, and GMM.

1990 to 1995 with the ROE as performance metric. Margaritis and Psillaki (2007) examine 12,240 New Zealand companies for the period of one year (2004) with operational efficiency ratios and profit margin as performance indicators.

Consequently, the results are not comparable. As apparent in section 2.2.4 several other variables must be included in the research beside capital structure variables and performance variables, such as interest rates, country-specific financing patterns, lifecycle characteristics, other firm characteristics, such as firm size and growth types. Furthermore, the return on equity (ROE) should be valued as not appropriate as a performance indicator because of its sensitivity to the leverage level (Pratt, 2011, p. 201).

Moreover, it can be stated that some few studies apply an advanced definition of performance, such as Wu and Yeung (2012), distinguishing between low-growth, mixed-growth, and high-growth firms. Several other studies use only profitability ratios as performance indicators. Therefore, appropriate indicators suitable to the research question are outlined and discussed in the subsequent section.

Regarding the research design, it can be stated, as discussed in section 1.3, that a variety of growth indicators is applied in firm performance research, which are mainly revenue, net and operating income and employee growth as well as profitability indicators, with the latter also being applied in the capital structure research. As mentioned, this research distinguishes three firm performance areas: qualitative and quantitative growth measured as revenue and operating income growth.

Finally, also several control variables are included, such as firm size, interest rates, inflation rate, gross domestic product and other variables identified in section 2.2. Therefore, it is expected that this research is in line with the research design mainstream outlined in chapter 1 and 2, so that the results of this study's data analysis are considered not only as statistically robust, which is also ensured by several robustness checks, but also as advanced by including results and concepts from both research areas.

2.4 Summary of Theory and Empirical Research Results and Research Design Conclusions

In the field of the capital structure theory, two main approaches were discussed: (1) neo-classical financing theory and (2) neo-institutional theories of finance. The neo-classical financing theory was characterized based on the assumption of rational action resulting in the capital structure theory, which has generated different theorems, such as the capital structure irrelevance theorem, the pecking-order theory or the trade-off theory of capital structure. Five stages of the evolvement of the capital structure theory were identified (see Figure 1): (1) the capital structure irrelevance theorem, assuming that the company's capital structure does not affect the company's value, (2) the tax shield theorem, assuming that tax shields may influence financing decisions and thus the capital structure, (3) the theorem of the cost of financial distress, assuming that higher financial distress and bankruptcy risk increase financial cost and influence, thus, the capital structure from the outside, (4) the principal-agent approach, assuming that the capital structure also results from a compromise (trade-off) between the interests of capital suppliers (shareholders and creditors) and managers and (5) the pecking-order theory based on the costs of asymmetric information theorem, assuming that managers prefer internal sources of funding over equity financing to preserve and to profit from their information advantage mainly in terms of their return from stocks and dividends.

It was further stated that, despite all these approaches aiming at explaining capital structure heterogeneity, the considerable number of empirical studies based on these theorems and theories has generated only ambiguous results, which was identified as a research gap. This identified research gap is in line with the relatively new approach in the field of capital structure research. The behavioural theory of corporate finance has challenged the conventional concepts of the capital structure theory. The behavioural corporate finance tries to examine financing and investing decisions of executives finding on the basis of measuring management attitudes that the growth attitude has a significant effect on financing decisions and, thus, on the therefrom resulting capital structure. However, this kind of research follows a qualitative approach in examining behavioural characteristics and is, thus, based on qualitative methods, such as surveys or content analysis.

In contrast to this concept of operationalizing behaviour, this study uses a different concept of measuring and determining behaviour. This study has defined two research questions:

(1) Do differences exist between capital structure (dependent variable) and corporate growth behaviour (explaining variable) and corporate investment behaviour (moderating variable)?

(2) Can differences in firm growth behaviour (explaining variable) explain corporate investment behaviour (dependent variable) and capital structure differences (dependent variable)?

Accordingly, this study asks for behavioural differences; but through a different theoretical lens. The observation of growth behaviour focuses on corporate growth behaviour, so that not the individual behaviour of the CEO or top-management members is examined. Corporate behaviour is understood as the measurable behaviour of the firm, whereas measurable means that growth determinants can be observed and identified by examining financial performance measures. Therefore, the literature concerning firm growth research was also reviewed in this chapter's second part. Here, it was stated that growth is measured with several different indicators depending mainly on the research question and design. Thus, for example, high-growth firm research is mainly interested in the employment effect of firm growth the employee growth is the most common performance indicator of firm growth. Other research applies such metrics as ROIC, ROA and others.

Furthermore, it was noted that growth must be examined including size as control variable. It was further stated that the hidden-champions research has found evidence that growth companies significantly prefer internal funding to finance growth to avoid risks emerging from external stakeholders, which was seen as a success factor for excessive firm growth by some prior studies discussed.

In discussing the results of firm growth research, it was found that some studies have explicitly examined the relationship between leverage and firm growth, focusing mainly on profitability as performance indicator. However, several studies have not found a linear relationship between profitability and leverage, indicating that at least performance in terms of profitability is not affected by financing decisions affecting the capital structure decisions.

All these summarized results lead to the following conclusions concerning the research design:

(1) Firm growth indicators should reflect, on the one hand, the extension of a business in different dimensions. Consequently, growth should not be measured only in terms of revenue growth (quantitative growth) but also in term of operating income growth (qualitative growth). While revenue growth indicates market success, asset growth signals the decision of the company to grow and is, thus, describing corporate behaviour.

(2) Profitability in terms of ROA and ROIC must be included as independent variables as well as other firm performance indicators.

(3) Firm Size effects should be controled by including firm size as control variable.

(4) Due to country-specific determinants, the sampling should avoid a selection bias by focusing on a single country or on companies with highly comparable external effects.

Finally, the sample should be grouped by growth rate specifications such as high-growth to filter ‘bad’ from ‘good’ companies. The same should be applied to capital structure.

3. Research Design

This chapter defines in its first section (section 3.1) the research philosophy and the research perspective. Based on this general epistemological foundation in the form of positivism and constructionism. This research assumes that the reality of business can be observed objectively based on structured numerical data from annual reports and that this observed reality is socially constructed by multiple actors. However, this research does not observe actors but the results of their interaction becoming manifest in financial indicators. In this respect, not the motives, attitudes and values of the actors are examined, as it is done in behavioral research or social research. This study observes only the fluctuation of financials as the indicator for what is called corporate behavior here.

Section 3.2 characterizes this empirical research as a quantitative-exploratory approach. This research is quantitative because it has a positivist view and is, thus, searching for cause–effect relations between output (performance) indicators and corporate behavior variables, whereby all observed determinants are available as quantitative data for a multitude of observed entities (companies).

Section 3.3 explains the basic research model which is not a factor model. On the contrary, the general finance-based view of the firm is used implicating also the selection of variables which are mainly drawn from annual reports via the financial database provided by Thomson One.

3.1 Research Philosophy

The reflection of the researcher's research philosophy should be the initial point in the development of a research design presenting and discussing the researcher's self-perception of their preferences and choices in the context of theory of science (Gavigan, 2017, p. 427). A research philosophy is less the result of rational choice or decision-making, but a question of already existing attitudes and values accumulated during the academic and everyday life, which are more or less considered consciously and deliberately or reflected systematically.

A research philosophy can be defined as a system of beliefs and assumptions about scientific work and knowledge rather than an explicit, clearly and extensively defined set of key concepts of science, knowledge and the nature of research (Gavigan, 2017, pp. 426-430). Consequently, the research philosophy is comparable to the concept of emerging strategy in business research, stating that management activities and the evolvement of the firm are not the result of rational choice and decision marking but emerge from the interplay of managers, shareholder, stakeholders and market participants.

Based on the more or less deep awareness of their research philosophy, the researcher prefers a specific methodology over others (Saunders et al., 2016, p. 126). A researcher may prefer, for example, only a qualitative or quantitative approach instead of a mixed-methods design. Pragmatism, constructivism, positivism and realism can be viewed as main paradigms in the theory of science and research (Raatikainen, 2014, p. 144). However, the range of methodical

preferences reduces the more or less unintended choice of specific research strategies. Thus, a positivist, for example, tends rather to prefer a mono-methodical approach, such as collecting quantitative data and quantitative data analysis to examine larger datasets. They may perhaps even accept a qualitative approach in the exploration phase, it is rather impossible that they will select an ethnographical or another qualitative approach, and they may also have a critical attitude towards surveys. It can be expected that the positivist generally prefers the statistical data analysis to find evidence of cause–effect relationships, while a constructivist or pragmatist prefers qualitative surveys or expert interviews to collect data and a grounded-theory-based data analysis approach (McManus et al., 2017, p. 234). Consequently, the researcher's preference for a specific data collection and analysis method reduces the number of options given by methodological pluralism and by selecting a research strategy.

The main difference of the mentioned four approaches can be found in the attitude towards the possibility that objective knowledge exists. The concept of objectivity as the presupposition of the existence of objective knowledge assumes the independence of a research object from the description, judgment or attitudes of the observer. Positivism, for example, assumes that knowledge exists outside the human intellect (McManus et al., 2017, p. 234). Positivism assumes the existence of an objective, observer-independent reality beyond individual experience and judgment, which can be observed by measuring and collecting data, allowing to model parts of reality. In essence, positivism assumes an observer-independent (researcher-independent) reality, which can be observed separately, and which can be reproduced by other researchers finding at least comparable, if not equal, evidence (Webber, 2004).

Contrary to the positivist worldview, Kuhn (1970) has criticised the positivist concept of observer-independent reality. His criticism provides the foundation of social constructivism. According to this approach, knowledge and reality are rather a social convention or construction (Mattessich, 2014, pp. 98-100). Consequently, researchers are not exploring researcher-independent knowledge but are designing reality by interpreting the world of objects. Therefore, knowledge is not growing but changing in the form of paradigm shifts, always revolutionising the world view (Wolf, 2008, p. 19). Consequently, concepts and models solely represent worldview or paradigms (Kuhn, 1996, pp. 43-51). From this point of view, even positivist

research is constructionism. Qualities and characteristics of given objects are constructed by the scientific community in a social interaction of communication and have to be observed by researchers examining human attitudes, mind sets, worldviews and concepts (Teddie & Tashakkori, 2009; Easterby-Smith et al., 2012). The qualities and characteristics of research objects do not exist observer-independently but only as mind sets and paradigmatic assumptions of researchers. Consequently, constructionism rejects the concept of absolute truth (Vallack, 2017, p. 351).

The fundamental view of constructivism is that reality cannot be measured objectively (Easterby-Smith et al., 2012). Academic research designs models of reality and assigns meaning to components and determinants included in their model, so that, finally, their artefacts become quasi-natural objects. Constructionism claims that individuals, such as managers, consumers as well as researchers, design reality based on experience and more or less evidence-based assumptions (Andrews, 2012, p. 2). Therefore, constructionist research focuses on the understanding of acting people and their 'world knowledge' incorporating their mind-set, experience and concepts of 'their world' language. This knowledge can be shared with other people by communication and can be observed, for example, in the form of interviews and their analysis. According to that constructivist viewpoint, reality is determined by people's world view and, therefore, the objects in this worldview are not dependent on their views. Researchers should not and do not collect objective data but do and should collect data on worldviews and meanings assigned by actors in the field of interest to understand and examine the 'socially constructed world' because no other, objective reality exists (Easterby-Smith et al., 2012).

The constructivist's view is completely different from positivist's worldview. Constructivism dominated social sciences in the last decades (Moses & Knutsen, 2012). However, in business research in general and in this research in particular, the question emerges what kind of the reality can be observed, because in both firm growth and capital structure research can be based on linguistic data resulting from interviews and surveys as well as on numerical data provided by financial data. Capital structure and investment decisions are based on social constructs in the form of management philosophies, corporate strategies, emerging strategies as the result of activities of agents and the influence of principals and other artefacts

and activities. Thus, growth is socially constructed. However, the question emerges then whether all these artefacts or only the results of this network of actions, artefacts and activities must be observed, as the finance-based model of the firm—being an artefact itself—provides changing data reflecting human activities in the limits of the firm and beyond these limits, as the numerical results of activities and the influence of external determinants such as business cycles, market demand, and other determinants. Consequently, this research is based in general on a positivist approach; accounting data are observed and interpreted as reflections of human activities in general and management activities in particular.

Capital structure and firm growth management as well as research in this area are, by nature, an epistemological hybrid. Therefore, constructivism as well as positivism can be viewed as underlying philosophy for this research, particularly due to its explorative character. The effect of corporate behaviour on capital structure decisions can be measured in the form of quantitative data. From this definition and the choice of the research object, it is to note that this study pursues a quantitative approach including only standardized quantitative data in the form of financial data from the Thompson One database. These data are standardised following the requirement of publicly traded companies to collect accounting data and to publish accounting data in an internationally standardised process and form, as required by the IFRS and other regulations, making these data objective and comparable.

But although positivism is the fundamental approach of this study, assuming an observer-independent reality in which research objects can be quantified by objective measures, the interpretation of numerical facts can be viewed as constructivist approach because the given data are based on the conventions of accounting resulting from human interaction processes. However, such research does not explain how social institutions, such as the firm, emerges from principal considerations, interests, mind sets and worldviews of managers, employees, stakeholders and principals, which is the research purpose of constructivism. Instead, only the results of all these determinants are observed by examining capital structure and firm growth, investment and financing behaviour of the company based on capital structure indicators and performance indicators resulting from rule-based accounting. This means that both the collection of data as well as the results of the analysis can reproduced by other researchers, achieving

comparable, if not the same, results. The same applies to the data, as they are collected and reported rule-based, so that this study's data basis can also be considered as objective in the sense of observer-independent reality. However, the discussion of biases resulting from sampling, determining the part of reality and other structural preconditions and preconceptions is not completed by outlining the researcher's research philosophy but is continued in the concluding final chapter.

3.2 Research Methodology

The literature on methodology in social sciences distinguishes two major approaches: the quantitative and the qualitative approach, differing in the structure of given or available data. Quantitative methods require numerical data to perform statistical tests. The qualitative approach focuses and collects unstructured non-numerical data (Niglas, 2010, p. 220).

Both approaches could have an explanatory or a confirmative purpose, depending on the research aim and question as well as on the existence of research models or theories in prior research and literature (Clark & Badiee, 2010, pp. 278-279). In business research, three main groups of approaches can be distinguished: the explorative approach based on qualitative data, the exploratory approach based on quantitative data and the quantitative approach to confirm existing models. In the area of firm growth research, qualitative research is often based on a low number of case studies, with the cases being selected by quantitative filters or indicators, such as financial data, to find potential determinants explaining excessive firm growth (e.g. Ernst et al., 2005). Such studies are mainly a collection of detailed case studies, which are used to describe cases of excessive firm growth structured according the comparable firm characteristics (Klenke, 2016, p. 66) and, therefore, must be sometimes considered as a rather unsystematic data collection held together by the researcher's reasoning.

Moreover, such studies use qualitative data collection approaches, such as expert interviews generating non-reproducible findings. However, qualitative approaches allow to collect data on determinants that can be hardly examined by quantitative approaches (Herr, 2006, p. 83; Dömötör, 2011, p. 59; Sontag, 2012, p. 123). As a result, such studies cannot claim representativeness or generalisability of their findings, as this approach's main issue is subjectivity in the data collection and

preparation as well as in the presentation and interpretation of finding (Annacker, 2001, p. 8; Niglas, 2010, p. 220).

The aim of the quantitative-explorative studies is to discover relationship models by selecting from a large number of relevant variables; those that influence the dependent variable. However, quantitative exploratory studies are not based on a defined cause-and-effect model (Raab et al., 2009, p. 282; Sontag, 2012, p. 124). Instead, such studies collect and examine numerical data. However, contrary to quantitative-confirmatory studies, they do not assume a specific structure of relationships among the selected variables. Accordingly, in data analysis, they use structure determination methods, such as factor or path analysis (Hoyle & Duvall, 2004, pp. 301-302).

Quantitative-confirmatory studies aim at verifying existing cause-effect models provided by prior studies and the literature (Sontag, 2012, p. 124). In this case, new research can refer to existing theories and models that provide defined and tested sets of predictors (Haenecke, 2002, p. 175), which can be used for testing existing models with another sample or recent data by using hypotheses derived from prior research (Haenecke, 2002, p. 173). Here, data analysis is used to validate the theory-derived model that defines the suspected relationships. However, since quantitative-confirmatory research can be based on existing theories and cause-effect relationship models, such a research examines only a few very specific variables, as opposed to studies aiming at exploring relationships between a set of determinants (Raab et al., 2009, p. 282). Quantitative confirmation studies are, instead, aimed at verifying or falsifying existing models from prior research.

The decision for one of those approaches depends on two prerequisites: first, the state of research, and second, the nature of available data. If research aims at investigating hypotheses, a quantitative exploratory approach is preferable, while the quantitative confirmatory approach is used in existing models or to test hypotheses (Rupp, 2013, pp. 520-521). The case study as a qualitative approach allows the in-depth study of complex and difficult-to-define phenomena, as is not possible with a quantitative approach examining an extended data set; but it is not possible to investigate causal relationships (Annacker, 2001, p. 8). Moreover, case studies do not provide valid or generalisable findings.

This study aims at generalized statements about a specific research topic base on the analysis of a larger set of structured quantitative data in order to avoid subjectivity and reliability issues. The data are highly comparable since the included companies are listed, they are required to follow international standards of collecting and accounting business data. To that extent, the data quality of this research is to be assessed as high. Furthermore, the research model is developed from existing literature, so that this study is quantitative-confirmatory. However, this research also has quantitative-exploratory character, which will become apparent in the different statistical tests concerning different groups of companies from the sample. This study follows the recommendations of Trommsdorff (2006, p. 143) insofar that the grouping of the dataset by performance indicators and capital structure indicators provides answers to the research questions and hypotheses.

The interpretation of this study's data analysis results refers to the financial analysis research providing cumulated knowledge for interpreting financial indicators and the results out of statistical analysis of such data. Two research areas are the core of the financial analysis: the analysis of (1) growth and profitability, and (2) of the financing and capital structure of a company (Debarshi, 2011, pp. 18-19). For both areas of the financial analysis, data are provided by annual reports

Yet, the financial analysis reduces their observation range exclusively on quantitative data. Instead the financial reporting analysis examines a wider range of data collecting not only quantitative, but also qualitative data from annual reports. This allows to combine quantitative and qualitative data by applying the qualitative content analysis examining also annual report statements which can be coded by theoretical, intra-textual and other characteristics resulting from the research question an prior research (Golin & Delhaise, 2013, pp. 16-20).

The quantitative analysis of accounting data – which is the approach of this study– includes only financial number and can be considered therefore as an objective method (Debarshi, 2011, p. 18). According to (DeFusco et al., 2007, pp. 215-218), the quantitative analysis of financial data can be performed as (1) comparison over time, (1) comparison of indicators of companies in the same sector, industry, or sub-industry or country, or (3) target-performance comparison of targets defined by the company's management and the actual outcome from management activities reflected in the financial numbers. The comparison over time based on the time

series data examines the changes in accounting data in the given period for detecting trends in the time series data. On the contrary, the comparison of indicators includes other companies as benchmarks. However, here an issue is the selection of comparable companies due to extended differences even among companies of the same industry resulting from business model differences or portfolio diversity effects, because larger companies manage in general a more diverse portfolio of products in different markets and industries than smaller companies. Thus, the selection of a peer group depends on the researcher's interest and existing knowledge which leads always to a selection bias. Another problem arises in the case of the target-performance comparison. Companies are not required to communicate clearly defined targets and or to publish business plans. Therefore, the collection of such data is impossible in most cases.

Because this is a quantitative-confirmatory study pursuing an indirect approach, only accounting data are used. This allows to examine a larger set of variables, which are available in a standardized form due to international accounting rules, which all listed companies must implement. Thus, the values are comparable and not subject to researcher bias. The following variables are selected from the database, including approximately 310 variables representing the most common used financial metrics (Krause & Arora, 2010).

3.3 Basic Research Model

The general task of accounting is to meet the information needs of internal decision makers and external stakeholders. In business administration, information is viewed as purpose-oriented structured data. An information system is a set of elements that are grouped together to provide useful information for the user's decision-making behaviour (Tanski, 2013, p. 7). Three accounting information data models are relevant in this study: income statement, cash flow statement and balance sheet.

The income statement is an integral part of the annual financial statements in addition to the balance sheet and, thus, part of the external accounting (financial reporting) of a company. It represents income and expenses of a certain period, in particular of a financial year and, thus, shows the nature, amount and sources of business success from a financial perspective (Robinson et al., 2015, pp. 304-305).

The balance sheet is a systematic list of monetary rights (assets), liabilities and net assets, which is the balance of the total value of the monetary rights (gross assets) less liabilities. The rights include property rights (property and intellectual property, such as copyright and trademark rights and patents) and claims. Property rights are recorded on the asset side, obligations (liabilities) and net assets on the liability side (only insolvency-indicating negative net assets are recorded on the asset side for reasons of balance sheet identity). Net financial assets are calculated as cash and cash equivalents plus other receivables less liabilities, whereby net financial assets and property rights add up to the net assets or equity (Robinson et al., 2015, pp. 212, 304-305).

From an accounting point of view, the balance sheet is a summary comparison of use (assets, broken down into fixed and current assets) and the origin of the funds of a company (liabilities). The assets of a company can come from equity or debt (liabilities) (business capital concept). The balance sheet is part of the annual financial statements of a company and serves creditors, rating agencies, shareholders, employees, the reporting company and the state for guidance on the net assets, financial position and results of operations of the respective company (Robinson et al., 2015, pp. 304-305).

The cash flow statement aims at creating transparency about the cash flows of a company. The cash flow statement is intended to represent the source and use of cash and cash equivalents. The aim is to quantify the change in the liquidity potential over time and highlight the causes of changes. The classic income statement compares expenses (net asset reductions) and income (increases in net assets). However, to assess a company's solvency, it is important to analyse deposits and withdrawals as well as cash flows within the company. The inadequate liquidity orientation of the annual financial statements obscures the clear insight into the financial position of the company. In international accounting, the cash flow statement is a mandatory part of the annual financial statements.

All three elements of a financial report form a coherent data model (see Figure 5) established to inform various external stakeholders about the current business situation of the company. A data model is a model of the data consisting of defined elements and the relationships among them so that the financial report can be considered as the finance-based model of the firm (Tanski, 2013, p. 7). In this model, different kinds of variables are included. The income statement and the

cash flow statement include only flow variables, while the balance sheet includes stock or inventory variables (Robinson et al., 2015, pp. 304-305). Inventory variables represent an amount at a time, while flow variables represents an amount over a defined period (Dwivedi, 2010, p. 31). However, inventory variables are time-sensitive, so that their values may not be representative of a company's financial position over a longer period throughout a fiscal quarter or year (Trevino, 2008, pp. 76-78). Instead, a flow variable is mathematically a vector in a two-dimensional space. Consequently, a flow variable is a two-dimensional metric reflecting the change of the variable in a specified period. In contrast, a stock variable is one-dimensional. It is a measurement made at a specific time. Income statements are a collection of flow variables (Trevino, 2008, pp. 76-78).

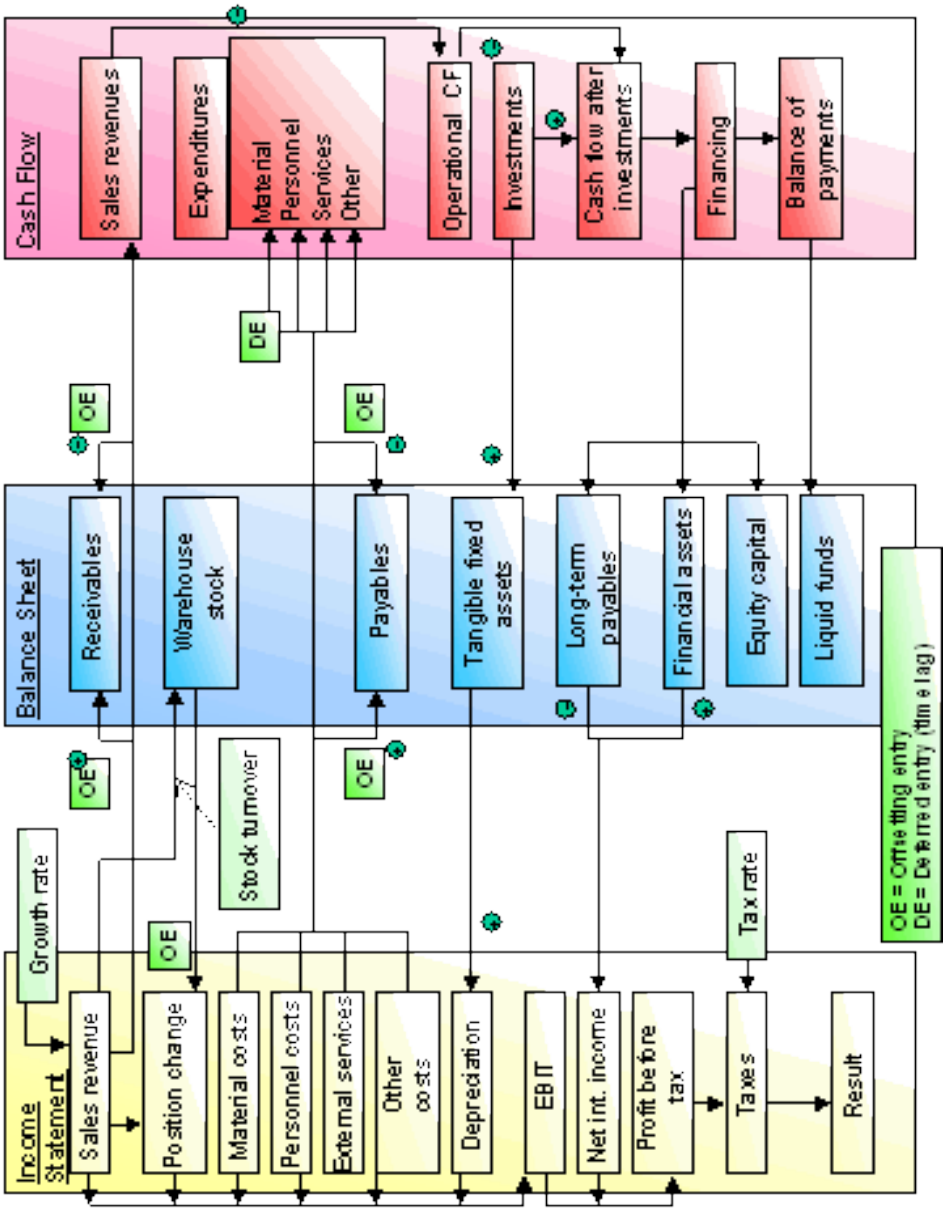
Some researchers state that the modern accounting model is a stand-alone frim model including a reduced set of components with clearly defined definitions and links representing the company's business activities and providing data to monitor management decision-making (Zambon, 2013, p. XVIII; Wehrmann, 2018, pp. 15, 90; see Figure 5). As mentioned above, this research focuses on differences in the behaviour of companies. The behavioural theory of the firm regards the company – following the intuitional economics approach –as a network of interest groups, such as managers, shareholders, suppliers, and employees, contributing to the business development by making decisions and interacting (Cyert & March, 1992). This study investigates the behaviour of companies by observing changes in accounting data reported in the cash flow statement, income statement and balance sheet, allowing to measure the results of management decisions, the interaction between management and employees and between the firm and the markets.

The income statement provides indicators of the company's activities at the level of operations (Stolowy & Lebas, 2013, p. 57) documenting all transactions related to servicing customers in each accounting period. Cash flow statement and balance sheet provide indicators on the investing and financing activities and decisions as well as on the pay-out decisions (Rohtak, 2004, p. 10; Samonas, 2015, p. 27).

In addition, the cash flow statement shows the company's cash flow and consumption in terms of operations, financing and investment activity (Stolowy & Lebas, 2013, p. 57). It should, therefore, be noted that accounting information form an implicit model for business and management activities (Stolowy & Lebas, 2013, p. 2). In this study, firm behaviour is considered to be the result of emerging

decisions that are observed as management and business activities indicated by accounting information. Accordingly, decision making is monitored by the fluctuations of the inventory and flow variables of the company's financial model or financial reporting data. From this data, activities in the area of operations, financing and investing can be monitored over a defined period of observation (McMenamin, 1999, pp. 29-30). Thus, business activities as the result of subsequent management decisions. Investing activities, for example, are indicated, for example, by cash outflow for the purchasing assets. And financing activities are indicated, for example, by cash inflows from the raising of capital by issuing long-term debt. This approach allows to quantify the activities and management decisions up to a certain degree, whereby such data are comparable due to regulatory requirements standardising the annual reports and the financial data included.

Figure 5. Finance-based View of the Firm



Source: SAP, 2016.

3.4 Data Set and Variables

This study examines numerical data (financial data) using a statistical test. Moreover, financial analysis research as a standardised tool for analysing the financial data is used to interpret the results of the data analysis. The quantitative financial analysis can be implemented as a comparison of performance indicators over time for detecting trends in accounting data, or the comparison of performance indicators (DeFusco et al., 2007, pp. 215-218). Both approaches are applied in this study. Growth rates and the change of ratios as well as long-term averages of balance sheet key figures are examined.

The database of this research is gathered through financial data provided by Thomson One database. Thus, this study uses a larger set of variables than behavioural corporate finance studies, avoiding subjectivity issues, as firm behaviour characteristics are deduced from financial data and not from a survey measuring management or owner attitudes. The Thomson One database provides data from 1,639 companies headquartered in Austria, Germany and Switzerland, which are active within the observation period.

The observation period is from 2003 to 2013. The data for this study were extracted in 2016. In the pre-2003 period, the dataset showed many missing values for the key variables of this study (performance indicators and capital structure). The same applies to the years following 2013, especially for smaller companies. Therefore, 2013 is set as the observation period's final year. A ten-year observation period can be considered as an extended period in the area of business research with most studies covering a shorter period (Blazejewski, 2011, p. 251). Moreover, the selected period includes two consecutive upward business cycles with the 2003 upward cycle following the Dotcom Bubble (2001) and the World Trade Center terrorist attack (2003 and another upwards cycle beginning after the 2008 financial crisis).

However, the number of companies decreases further because of other considerations. Due to differences in the accounting compared to all other industries, banks and financial services are excluded from the sample (Choudhry, 2011, pp. 11-12). Another reason for excluding the number of cases (companies) from the original data provided are incomplete time series of the selected performance indicators and the debt-related ratios. Thus, only companies with

complete time series in the area of key performance and capital structure indicators are included. Moreover, non-active companies, as a result of bankruptcy or M&A activities, are also excluded due to the time series not covering the observation period. Additionally, 17 companies were eliminated due to negative debt-to-equity ratios, which is specified in section 4.1.2 in more detail. After the data selection procedure, 570 companies were left from the original data set.

For all other companies, the data of 18 ratios and financial reporting items are collected from the Thomson One database, reflecting key performance indicators, capital structure and other firm characteristics and efficiency ratios. 15 variables selected from the Thomson One Database are (1) asset turnover, (2) capital expenditures, (3) debt in percent of capital, (4) intangible assets, (5) net assets from acquisitions, (4) operating expenses, (5) number of employees, (6) operating income, (7) property, plant & equipment (PPE), (8) R&D expenditures, (9) retained earnings, (10) ROA, (11) ROIC, (12) ROE, (13) revenue, (14) total assets, and (15) working capital.

Based on this set of raw data provided by the Thomson One database, 37 variables are generated based on own calculations or other ratios provided also by the database as pre-calculated (see Table 7). This set of variables can be divided into two groups of data. One group of data includes data extracted from the financial statements; the other group includes ratios (e.g. ROA, ROIC, ROE) computed by the data provider using the given financial statement data. Other ratios are determined by the researcher using the given financial statement, which is explained in further detail in the research design below.

Based on these raw data and the provided key figures, additional variables are calculated in line with previous research. This study covers three different types of variables: (1) average of absolute numbers for ten years, (2) growth rates for ten years and (3) ratios (average for ten years). The growth rates are calculated as the annual growth rate (AAGR) instead of the average growth rate (CAGR).

CAGR is frequently used in the financial analysis and growth research. However, the CAGR can generate extremely distorted data due to its sensitivity to random effects in the business history of companies. The reason for that is that the CAGR is not as a year-over-year growth rate but based on the beginning value and the ending value of the observation period. In the case of this research, for example,

this would be the revenue of 2003 and 2013. Thus, for example, it can be that a smaller company has shown high year-over-year growth rates, except for 2013, resulting in a negative or significantly lower growth rate.

Due to this reason, the AAGR is used in this research calculated as the sum of growth rates divided by the number of years (Morningstar, 2016, pp. 25, 30). Consequently, the AAGR represents the arithmetic mean of the year-over-year growth rates. Accordingly, the ten-year AAGR is calculated as the mean of ten year-over-year growth rates:

$$\text{AAGR (10 Years)} = \frac{\text{Growth Rate in Period A (Year 1/Year 2) + ... Growth Rate in Period J (Year 9/Year 10)}}{\text{10 (Number of Periods)}}$$

However, in the rare cases of incomplete time series data to calculate ten-year averages, the CAGR is used because its calculation requires only two data points. This is also advantageous in cases in which accounting data are not available for each year. Thus, for example, smaller companies or companies in certain industries are not requiring to constantly invest in R&D. Consequently, they do not account R&D expenditures every year. Approximately 20% of the final sample's companies have provided only two, three or four data points for the research period. In these cases, the CAGR is used to calculate a growth representing a trend for the ten-year research period, provided that data are available for the beginning and the end of the research period. The same is applied, for example, in the case of measuring acquisition activities. Here, almost every time series of each company included in the raw data set show incomplete cash flow time series because the majority of the included companies does not acquire another company or parts of it every year. Consequently, the net assets from acquisitions are calculated only as the average of the ten-year period.

In total, 37 variables are collected (see Table 7) based on the raw data drawn from Thomson One following the empirical research discussed (see chapter 2).

Table 7. Variable Set and Description

Name	Description
(1) Acquisition/Revenue	10-year average
(2) Asset Turnover	10-year average (EUR)
(3) Asset Turnover Growth	10-year average change rate
(4) Capital Expenditure	10-year average (EUR)
(5) Capital Expenditure Growth	10-year average growth rate
(6) Debt % Capital	10-years average
(7) Debt % Capital Growth	10-years average change rate
(8) Employees	10-year average
(9) Intangible. Assets	10-year average (EUR)
(10) Intangible Assets Growth	10-year average growth rate
(11) Net Acquisitions	10-year average (EUR)
(12) Operating Expenditure /Revenue	10-year average
(13) Operating Expenditure	10-year average (EUR)
(14) Operating Income	10-year average (EUR)
(15) Operating Income Growth	10-year average growth rate
(16) Operating Income/Capital	10-year average
(17) Operating Margin	10-years average
(18) PPE	10-year average (EUR)
(19) PPE Growth	10-year average growth rate
(20) R&D Expenditure	10-year average (EUR)
(21) R&D Expenditure in % Revenue	10-year average
(22) Retained Earnings	10-year average (EUR)
(23) Retained Earnings	10-year average growth rate
(24) Revenue 10y-Average (Firm Size)	10-year average (EUR)

Name	Description
(25) Revenue Growth	10-year average
(26) Revenue per Employee	10-year average (EUR)
(27) ROA	10-year average
(28) ROA Growth	10-year average change rate
(29) ROE	10-year average
(30) ROIC	10-year average
(31) ROIC Growth	10-year average change rate
(32) Total Assets	10-year average (EUR)
(33) Total Assets Growth	10-year average growth rate
(34) Total Assets/Revenue	10-year average change rate
(35) Working Capital	10-year average (EUR)
(36) Working Capital Growth	10-year average growth rate
(37) Acquisition/Capital Expenditures	10-year average

Source: Own presentation.

Additionally, the following grouping variables are introduced for (1) the high-debt-financed group, (2) the high-equity-financed group and (3) the high growth group. Furthermore, the variables' factor intensity in the form of knowledge intensity, labour Intensity and capital intensity are included as control variables, as will be argued in the following section.

3.4.1 Performance Indicators and other Related Firm Characteristics

To avoid overfitting in the statistical data analysis due to overcomplex models, some researchers recommend reducing the number of predictors included in the data analysis to the smallest possible subset of predictors (Quinn & Kenough, 2003, p. 137). Because this research follows an explorative approach, the variables selected from the data base are selected by following the research literature. The selected determinants of growth are included because prior research have found a relationship to firm performance. Moreover, recent research has applied a comparable variable set in examining high-growth small- and mid-cap companies

and the effect on internationalisation of firm growth (Gruenwald, 2016; Wehrmann, 2018).

Therefore, the following section describes the main predicators included and why they are included, providing also a detailed discussion and interpretation of variables indicating growth behaviour and variables used as control variables, such as firm size measured as the average revenue of a ten-year period. Additionally, some other accounting data are used in the analysis, representing additional firm characteristics being found relevant in the literature. All included variables are calculated as ten-year growth (change) rate or ten-year average.

3.4.1.1 Income Statement Indicators and Ratios

The ten-year revenue growth is used as a firm performance indicator reflecting quantitative growth. As a rule of thumb, a revenue growth of 5% can be considered as critical. Below this rate, the probability increases that further external capital is needed in the form of new debt or equity capital to maintain financial stability and/or to fund further growth. Below the 5% level, the threat exists that, in the near future, working capital will be no longer available to maintain business operations, whereby a 5% revenue growth is considered as a critical growth rate particularly in industries with low average margins (Koen & Oberholster, 1999, pp. 79-80).

As discussed, some studies question that revenue as a widely used performance indicator is an appropriate performance indicator. This study has addressed this issue arguing that revenue growth can occur in parallel to deteriorating or low profitability particularly in the case that companies face price wars in mature markets or seek to grow excessively at the cost of decreasing margins. Yet, a company cannot expand in the long term without profitability, particularly in the case of a ten-year period. Therefore, revenue growth is considered as an appropriate performance indicator, particularly in the context of this longitudinal study because (1) this study's results are comparable to the various studies using this firm performance indicator; (2) revenue growth is not the only firm performance indicator but only an indicator of quantitative growth (market performance). Moreover, other performance indicators are included, such as the ROIC and ROA, to control the quality of excessive firm growth.

Additionally, the operating income indicates the profit generated through business operations and is used as a complementary indicator to revenue growth calculated as revenues less business operations costs including the expense for administration sales and other general business activities (Stickney et al., 2010, p. 149). It can be expected that operating income growth enables the company to internally fund the expansion of production and sales capacities, increasing the number of distinct financing options and, thus, the likelihood of excessive growth. The operating income growth rate is used as an additional performance indicator reflecting qualitative growth.

Firm size is used as a control variable in the context of examining firm growth. While the ten-year revenue growth rate indicates the revenue change rate and, thus, the quantitative contraction or expansion of the company, the ten-year revenue average reflects the firm size average in this study's observation period.

As stated in the literature review, size is a relevant control variable for two reasons. First, growth research following the stochastic paradigm views growth rates as independent of size. However, second, as it was also discussed, capital structure research shows some evidence that firm size and capital structure are related and that larger companies have better access to capital markets and, therefore, lower capital costs to finance growth.

Beck et al. (2005), for example, have found that larger enterprises dispose on disproportionally more funding options and that they benefit disproportionally more from outside capital than smaller companies. Moreover, other research shows that size is positively linked to diversification. Larger enterprises show a higher degree of product and market portfolio diversification than smaller companies, reducing the market risks of small product portfolios (Impink, 2011). Consequently, size must be considered as a highly relevant control variable.

R&D is considered as a growth catalyst, particularly in the view of strategic management research. R&D expenditures are supposed to be a lever for increasing a firm's intangible assets and competitive advantage (Sandner, 2010, p. 51). Therefore, expenditures for research and development must be viewed as a relevant growth determinant, although some studies have challenged the effect of R&D expenditures on growth and other performance metrics (e.g. Hsiao & Li, 2012, p. 8). The same also applies to the operating expenses indicating the costs of

maintaining the business but not the investment costs for the increase in production capacity. Some research shows that growth and operating expenses show a positive correlation (e.g. Levine & Warusawitharana, 2014), which is intuitively plausible because, when companies react to growth demand, the expansion of operations is necessary. In this context, it also seems that the operating expenses to revenue ratio may be an appropriate indicator to assess the efficiency of a company's business operations (Stickney et al., 2010, pp. 164-165).

The total assets to revenue ratio is included as an indicator of the efficiency in utilizing the total assets of the firm (Stickney et al., 2010, pp. 18, 152). It applies that the lower the total assets to revenue ratio, the lower is the level of total assets required to generate the same revenue. The data for calculating this ratio are collected from the income statement data and the balance sheet data provided by Thomson One. Consequently, it is a mixed ratio referring a balance sheet item to a performance indicator.

3.4.1.2 Capital Allocation and Efficiency Indicators and Ratios

The debt in percent of total capital is applied once as a change rate and once as a ten-year average. Following the capital structure theory, among companies with comparably higher growth rates, a higher debt-to-capital ratio should be expected. Thus, Levine and Warusawitharana (2014), for example, provide evidence for this relationship, arguing that debt capital increase enables a company to fund disproportionally the expansion of production capacities and increase the productivity of the existing capacities, as long as the return for debt capital is higher than the capital costs. Therefore, the capital structure theory recommends to use leverage effects in funding, as long as the return on capital is higher than the costs for debt capital, which enables to grow stronger than competitors (Khan & Jain, 2007, p. 35). Another fund for financing firm growth are retained earnings, which is the share of income retained as a source for capital expenditure to sustain future growth (e.g. Stickney et al., 2010, p. 60). Some studies find that retained earnings are an appropriate firm growth predictor (Vandemaele & Vancauteren, 2015). From these findings, it can be deduced that an increase of retained earnings strengthens the company's position in the capital markets and opens up internal funding for financing expansion.

The operating income to total capital ratio, also called operating income return on investment, is applied as an indicator of the efficiency the company (management) employs the firm's debt and equity capital (total capital) in business operations, excluding effects from financing, such as interest expenses (capital costs), tax policy and other effects. The indicator allows to assess the efficiency of total capital employed in the company's operations, whereby a higher ratio means that more revenue is generated from the total capital (Petty et al., 2012, p. 152).

Another capital efficiency indicator is working capital, which is the difference between current assets and current liabilities. The result should be as positive as possible, which means that some of the current assets are financed with long-term capital. Working capital is calculated as a ten-year growth rate and ten-year average, indicating a change in time and the average efficiency in the ten-year period. Working capital reflects the cash available for current business operations and is a requirement for further growth (Palepu & Healy, 2007, p. 221). It applies that the lower the use of current assets, the lower is the cash inflow from business operations and vice versa. Working capital as an indicator allows to assess the company's operational efficiency and their financial health (Palepu & Healy, 2007, p. 221).

Asset turnover represents the ratio of revenue to total assets. The asset turnover ten-year growth indicates the change in the efficiency the total assets are used in business operations. Yet, the asset turnover ratio is very industry-specific and, therefore, not very appropriate for cross-industry comparisons (Petty et al., 2012, p. 156). Therefore, the ten-year asset turnover average has only a limited meaning reflecting rather business model characteristics than firm performance. However, asset turnover is a useful indicator to compare the efficiency of business models or the portfolio mix of business models and the ability to search and find new business models with a comparably higher return and the ability in managing the existing portfolio of business models and value chains.

Profitability Indicators are standard indicators in the financial statement analysis focusing on the return on capital or assets. The ROI as the ratio between the operation income and the book value of invested capital reflects the efficiency of capital utilisation (Hill, 2003, p. 378). The ROA indicates the efficiency of utilising total assets computed as the ratio between net income and total assets. The profit

is set into relation with the balance sheet total and indicates the efficiency total assets are transformed into net income (Dickie, 2006, p. 136). It applies as a general rule that multiple-segment firms generate a higher return on assets (Impink, 2011). Margins and asset turnover significantly affect the ROI (Dickie, 2006, p. 136).

Both indicators, the ROA and the ROIC, exclude the deprecations, taxes expenditures, costs, dividend pay-out, interest expenses and other deductibles by using the net income as a performance metric to determine the return (Hill, 2003, p. 378). Moreover, the ROIC is a good measure to assess the management's value creation ability (Corrado-Bravo, 2003, p. 259). As mentioned, quantitative growth measured as revenue growth does not generally imply value creation (increase in firm value). Furthermore, the ROIC can be considered as a control variable in examining revenue growth. As mentioned, revenue growth is considered in this research only as an indicator of quantitative growth. However, if companies show an excessive increase in revenue growth, the question arises whether the company is growing at the expense of firm value. In this context, a high ROIC (as ten-year average) and even more an increasing ROIC indicates quality of quantitative growth.

The operating margin is another efficiency indicator applied. To calculate the operating margin, the operating income of a company is set in relation to its revenue. From the microeconomic view, the operating margin represents the value added by the firm as the difference between unit price generated in the market and unit cost determined by internal costs and costs occurring in 'using' the supply market. As such, the operation margin is one of three ROI determinants (Mishra, 2015, p. 180). In addition, a higher operating margin is an indicator for a competitive advantage allowing to increase the range between price and cost per unit. This can be the result of a quality leader strategy or a cost leader strategy. In the case of the quality leader strategy, a company increases the unit price by taking a price premium due to higher brand reputation, higher product quality or other firm-specific resources, resulting in a unique selling proposition (consumer advantage). In the case of cost leadership, the company is highly efficient in its operations, allowing to reduce increasingly the cost of operations by steady revenues (Mishra, 2015, p. 177).

Concerning the issue of determining a competitive advantage, asset turnover, the ROA and the operating margin must be jointly interpreted. Extending Porter's concepts of generic strategy and competitive advantage, at least two types of sources for a competitive advantage can be defined:

- A production advantage enables to deliver products and services with lower costs than competitors (Carlisle, 2014, p. 72; Mauboussin & Callahan, 2015, p. 47). The sources of a production advantage are usually proprietary technologies or exclusive access to intermediate or primary products and materials difficult to imitate.
- A consumer advantage results from quality, high switching costs or searching costs for finding a superior product.

Though there is no common sense in research literature of how to determine a competitive advantage, a production advantage can be measured by low margins in combination with high asset turnover, also indicated by a low ROIC (Mauboussin & Callahan, 2013; 2015). Consequently, a low consumer advantage should be indicated by higher turnover and lower margins, while a consumer advantage should be indicated by higher margins due to premium prices and a lower turnover rate due to a smaller market segment.

3.4.1.3 Additional Indicators: Factor Intensity as Specialisation Indicator

Factor intensity is a concept of macroeconomic research. Recent studies in the area of firm growth research use factor intensity as an indicator for a company's specialisation (e.g. Croizet & Trionfetti, 2011), explaining the heterogeneity of firm growth rates among even one-industry samples. Therefore, the factor intensity was used also in this research to calculate a factor specialisation indicating knowledge intensity, labour intensity or capital intensity. All three variables are used as control variables in the regression analyses. Other researchers state that knowledge intensity is a strong determinant of high firm growth, though there is no consensus concerning the measuring of knowledge intensity (Gassmann et al., 2016, pp. 59-63). This study uses the R&D expenses to revenue ratio and ranks the sample according to that indication, with the top-50 companies being coded as knowledge-intensive companies.

Capital intensity is indicated by the total assets to revenue ratio. It applies that a lower ratio indicates a lower capital intensity. As in the case of both other factor intensity indicators, the sample was ranked by capital intensity, with the top-50 companies being coded as capital-intensive companies.

Labour intensity can be determined following a standard metric in the form of the reciprocal of the per capita productivity, which is the number of employees divided by the revenue (Erlen & Isaak, 2015, p. 103). It applies that a higher ratio determines a lower share of labour costs and vice versa. As in the case of coding knowledge intensity and capital intensity, the sample was ranked by labour intensity, with the top-50 companies characterised by the lowest productivity being coded as labour-intensive companies.

Other coding procedures have resulted in the problem that some companies could be assigned to more than one group. The described coding procedure based on the ranking and selecting of only the top-50 companies in each case allows to avoid that one company is assigned to more than one group, not indicating a clear specialisation.

3.4.2 Investment Activities Indicators

To better define the scope of data relevant for this research and its specific research question, it is necessary to review recent literature in the field of financial analysis and in the field of empirical research. The following section provides an overview of financial management indicators most relevant in the field of financial management indication, financial management activities or affecting financial management.

McMenamin (1999, p. 28) has pointed out that the financial analysis must necessarily differentiate between the accounting view and the financial management view providing the following differences:

(1) Financial management has to make decisions; the financial accounting's role is stewardship.

(2) Financial management focuses on value creation, financial accounting on costs.

(3) Financial management's key performance indicator is cash flow; financial accounting's key performance indicator is profitability.

(4) The financial management perspective is future-oriented; the financial accounting perspective is backward-looking.

The role of financial management can be best described from the activities for which the management is held responsible. On a very general level, the so-called finance function provides the link between the firm and the financial markets (bond markets and stock markets), in which funds are raised and company shares as well as other financial instruments are traded. The main goal of corporate finance as the field of activities of the financial manager is to maximise the value of the firm (Damodaran, 2015, p. V). Consequently, this objective is different from strategic management objectives, which is, according to Drucker, the maximisation of business success and performance (Drucker, 2007, p. 316), which depends on the interests of owners that are 'normally' the maximisation of earnings, dividends and firm value.

Decisions in financial management must be taken by the firm's financial management in the following areas (Kaen, 2005, p. 432):

(1) Investment: Investment can be made in tangible or intangible assets (capital budgeting) and in current assets (working capital management). The investment decision affects the current and future cash flow magnitude resulting from risk and return on investment affecting the future debt-equity mix.

(2) Financing (raising finance): decision for sources (short- and medium-term financing through different instruments), controlling the cost of financing, the return on capital and the capital structure (debt/equity). The financing decision affects the debt-equity mix.

(3) Dividend policy (disposal of surpluses): Decisions must be made concerning the use of retained earnings versus dividends to shareholders.

(4) Cash Flow Management: The supply for funding required for suppliers and wages/salaries must be secured.

Investment decisions concerning replacement or extension in the area of intangible or tangible assets affect the company's development considerably. Investment increases the fixed costs of the company and, thus, the financial risk, as investment decisions are forward-looking and, therefore, generally based on data that are subject to uncertainty. Consequently, investment decisions are long-term capital commitment under the conditions of uncertainty, which are usually correctable only at the expense of considerable financial disadvantages. Consequently, investment decisions are strategic decisions and, therefore, top-management decisions, because they can be taken only on the basis of the overview of the entire company.

The investment decision-making process is usually divided into the stages of decision-making, the implementation and the controlling phase. In the decision-making phase, the alternative investment options are valuated based on expected future investment returns followed by the selection process excluding less favourable alternatives. The decision-making phase is based mainly on strategic reasoning, financial planning and capital budgeting and is, therefore, the core process of strategic and the financial management.

Since the 1980s, the scientific discourse is debating the effect of investment decisions on firm performance in the scope of short-term- and long-term-oriented managerial behaviour (Woolridge & Snow, 1990). Short-term orientation aims at maximising short-term results at the expense of long-term firm performance as the contradiction to long-term behaviour and sustainable firm performance or survival, respectively. Some research assumes that CEOs have only few incentives to develop long-term orientation (Oxelheim & Whilborg, 2008, p. 83). CEOs face the dilemma between optimising their financial pay off within their own tenure and securing longer-term sustainable success of the firm. The issue is whether short-term managerial behaviour harms the financial performance in the short term of the CEOs' tenure, and whether CEOs have a chance of benefiting from long-term orientation in their tenure (Oxelheim & Whilborg, 2008, p. 83).

From the perspective of the value maximisation paradigm prescribing that the firm's management's objective should be the increase of firm value, the question of the effect of investment decision on firm value arises in the area of rational decision making. According to Wooldridge und Snow (1990, p. 354), three alternative hypotheses exist: (1) the shareholder value maximisation hypothesis, predicting a

positive reaction of the stock market price as a value metric on strategic investments, (2) the rational expectation hypothesis, predicting no stock price change and (3) the institutional investor hypothesis, predicting a negative price reaction. According to Wooldridge und Snow (1990), the shareholder value maximisation hypothesis assumes that stock market rewards strategic investments expecting future firm value increase, whereas rational expectation hypothesis assumes that investors expect managers to continually invest in the firm's future competitiveness; and the institutional investor hypothesis assumes a negative price reaction because institutional investors are interested in short-term return and not in long-term firm performance. Based on the collection of data on investment announcements and stock returns, Wooldridge and Snow (1990) find evidence that "*the stock market does not penalize managements for making well-conceived, long-run strategic decisions*" (p. 362). This result is also confirmed on firm-level parameters. Bauer (2004) finds, with longitudinal study examining medium-term performance implications of short-term and long-term orientation in Europe's largest listed companies, that short-term managerial behaviour has a negative effect on the medium-term firm performance, while long-term managerial behaviour is positively associated.

The following indicators provided by professional databases or annual reports are applied in in the academic financial analysis literature as indicators for investment behaviour:

- Property, Plant & Equipment calculated as ten-year average and ten-year average growth rate is used as an investment behaviour indicator although the accounting item has not been used widely in prior research. However, some evidence can be found indicating that PPE growth is also an appropriate growth predictor, which is intuitively plausible because revenue growth needs the expansion of production capacities as a precondition (Hsiao & Li, 2012, p. 9).

- Intangible Assets are computed as ten-year average; ten-year average growth rate is used as another indicator of investment behaviour. The IAS rule defines intangible assets as assets without physical substance, which can be marketed, such as rights and patents (International Accounting Standards Council, 2017, IAS 38). Some studies find evidence that there is

not necessarily a positive correlation between intangible assets and firm growth but that the absence of intangible assets growth can constrain firm growth (Chen, 2014).

- Total Assets, calculated as ten-year average and ten-year average growth rate, are the total amount of all receivables, cash and equivalents, gross investments and other assets. Both variables indicate changes and average level of resources owned by a company. Some studies in firm growth research have used total asset growth as a firm growth indicator (Impink, 2011).

- Capital expenditures (also known as CAPEX), are the expenditures for longer-term fixed assets, such as new factory and office equipment, machinery or real estate, incurred on acquisition. In contrast to the PPE, CAPEX indicates the effective investment volume in tangible assets. Prior research finds evidence that high growth requires excessively higher capital expenditures in relation to net income (Damodaran, 2012, p. 351).

- R&D expenses in percent of revenue calculated as ten-year average and ten-year average growth rate is applied to measure R&D intensity (Santarelli et al., 2006; Capasso et al., 2015). This indicator is widely used in research examining the reasons for excessive growth (Capasso et al., 2015).

- Net assets from acquisitions indicates the amount of the cash flow from operations used for purchasing tangible assets of other companies. Acquisitions as a growth strategy aims on benefiting from the takeover of operations and/or market segments of active firms or parts of them, such as business units or departments. M&A are identified in some research as a predictor of disproportionate growth (e.g. Burghardt & Helm, 2015). The indicator is also calculated as ten-year average and ten-year average growth rate, whereby the average growth rate reflects the change over time in the investment behaviour, while the ten-year average is considered as a control variable to control size effects, as in the case of all other investment behaviour indicators.

3.5 Statistical Analysis Methods

This study performs the bivariate and multiple regression analysis and the t-Test. Their requirements and application of both methods are explained in the subsequent sections.

3.5.1 Bivariate and Regression Analysis

Regression analysis is a statistical analysis method aiming at examining and modelling the relationship between a dependent and one or more determinants (Holtmann, 2010, pp. 13-17). They are especially used when relationships are to be described quantitatively or to predict the occurrence of the dependent variable. This study applies the bivariate correlation, the multiple regression and the logistic regression analysis.

The link of two variables can be analysed by the bivariate regression. Bivariate regression analysis is the most basic approach to examine the relationships, but this approach does not allow to determine the effect (Holtmann, 2010, pp. 13-17). It remains unclear whether A determines B or vice versa. Furthermore, bivariate regression analysis allows only to test for the relationship of two variables. The relationship between several independent and one dependent variable can be tested by the multiple regression requiring dichotomised or metrically scaled independent variables and a metric dependent variable. The multiple regression allows to determine total effect of several predictors (determinants) on the dependent variable.

This research applies the forward stepwise regression, which gradually adds all significant independent variables (predictors) in a stepwise procedure ranked by their explanatory power measured as ‘r square’ into the regression model (Holtmann, 2010, pp. 75-88). This procedure in combination with autocorrelation and multicollinearity tests allows a valid determination of cause-effect relationships, which may be also the reason why the multiple regression is potentially the most frequently used analysis enabling to test multi-factor models (Schulze & Porath, 2012, pp. 475-476).

The multiple regression is performed in this research in four steps (Rubin, 2013, pp. 231- 233; Bart et al., 2000, p. 173):

(1) The model of determinants is defined on a theoretical basis or, in the case of an explanatory study like this research, includes all variables identified as potential predicators. Both approaches result in the selection of explanatory variables, which are used as determinants of the dependent variable (here: several firm performance indicators).

(2) The explanatory power and the coefficients are calculated by the least squares method as forward stepwise regression, enabling to formulate the regression equation for the final regression model.

(3) The final model is selected by choosing the last model in which all included variables show tolerance (TOL) values higher than 0.8 in the multicollinearity statistics, so that multicollinearity effects among the determinant can be excluded (Rubin, 2013, p. 231).

(4) The final model's robustness and validity are controlled by the Durbin-Watson test, indicating multicollinearity issues and the analysis of variance (ANOVA) to control for the final model's significance.

Furthermore, the logistic regression is applied in the form of the binomial logistic regression for dichotomous dependent variable. Although the variable to be explained is binary coded, the logit model allows the determination of the likelihood that the research object belongs to a group. In this study, the logistic regression is used to explain the differences between the high-debt-financed group and the high-equity-financed group. The requirements to perform binomial logistic regression are that (1) the dependent variable is binary coded (0-1-encoded), (2) the predictors are coded metrically or as categorical variable, and that (3) each group includes more than 25 cases ($n \geq 25$) (Kuß et al., 2014, pp. 265-267).

3.5.2 T-Test

The t-test is applied to perform group comparisons by analysing mean differences between groups of one sample or a sample and its basic population. Two different approaches can be performed for this purpose: (1) the t-test with one sample and

(2) the t-test with two samples. The two-sample t-test compares averages of two distinct groups of the same sample, while the one-sample t-test allows to determine whether a sample is representative for the basic population (Sirkin, 2006, p. 272).

The question of the t-test for independent samples is: Are there differences between the means of basic population and a sample from this population and between two groups among one sample, respectively? (Sheskin, 2004, pp. 135, 140, 575) The t-test assumes that random samples of a basis population show similar or almost equal standard deviation, so that differences in the standard deviation express group differences (Sheskin, 2004, p. 135, 140; Sirkin, 2006, p. 201, 272). To compare a random sample with the basic population or two groups of a sample with a t-test, the dependent variable is scaled with the interval, allowing the mean and standard variance to be calculated from the average of each group or population, or the sample (Sheskin, 2004, p. 135, 140, 575). On this basis, the calculation of the statistical significance is possible.

The requirements for comparing groups of a sample or a random sample to the basic population or using a t-test are that the independent variables are interval- or ratio-scaled variables. This allows to compute the mean and standard variance for each of both groups or for the random sample and the basic population as the basis to calculate the likelihood of whether group differences are by accident or statistically significant (Sirkin, 2006, p. 272). Regarding the sometimes-submitted presumption that a valid t-test requires the Gaussian distribution of values among the independent variables, it can be stated that recent research does not provide any evidence for this requirement. On the contrary, the t-test is very robust against not normally distributed values, particularly when an equal group size is given (Wenzelburger et al., 2014, p. 58; Bortz & Schuster, 2010, p. 122). Moreover, Braunecker (2016, p. 287) points out that non-parametric tests are replaced by the t-test increasingly in recent times. Therefore, this research does not test for the standard (Gaussian) distribution of data and uses also the t-test in analysing non-parametric data.

4. Empirical Analysis

This chapter exposes the results of data analysis for different groups and samples. The first part considers the descriptive statistics of both the sample and different groups. Section 4.2 examines the differences between the different capital structure

groups (High Equity Group and High Debt Group). Section 4.3 and 4.4 provide causal explanations for differences in capital structure between the two groups. The overall results of the analysis in this section are summarized and discussed in the last chapter of this study (chapter 5).

4.1 Descriptive Statistics (Sample and Groups)

The following sections discuss the descriptive statistics of four data sets: (1) sample, (2) high growth group, (3) high equity group, and (4) high leverage group. Furthermore, the variables of the research focus are analyzed in detail, which are (1) the performance variables *revenue growth* and *operating income growth* as well as (2) the capital structure variable leverage ratio (total debt in % of total capital).

4.1.1 Sample Statistics

The average company of the sample (see table 8; see table 28 in the Annex for key indicators for all 570 companies)

- has a revenue (ten-year average) of EUR 3,2bn (firm size)
- shows a firm growth rate of 13% p.a. in the ten-year observation period
- invests 4% per annum (p.a.) of its revenue in R&D in the ten-year observation period
- increases the operating income by 14% p.a. in the ten-year observation period (10-year average: EUR 243m)
- records EUR 744m as intangible assets
- invests EUR 70m p.a. for M&A in the ten-year observation period, equating to 3% of revenue (acquisition-revenue ratio)
- exhibiting an ROA of 4% and an ROIC of 6%, whereby both profitability ratios have decreased steadily in the observation period
- has increased its asset turnover ratio in 10-year period generating EUR 1 in revenue for one EUR invested in assets each year
- has 11,098 employees (ten-year average) with EUR 464,000 revenue per employee (employee productivity in the ten-year average).

- shows a debt-to-capital ratio of 33% while the share of debt capital has doubled over the observation period.

It can be concluded from these results that the sample's average company is mainly financed internally, growing faster than the economy, also uses the option of external growth (MA), shows an acceptable ROIC, although the profitability is moderately inferior compared to U.S. companies, with an average of 9% (Brigham & Houston, 2017, p. 458). Even compared to the S&P 500, the difference is very small. The average company included in the S&P 500 achieves an ROIC of 6.7% (J.P. Morgan (2014, p. 1). Both comparisons suggested that this sample is at least comparable in terms of profitability to other samples of companies in other countries.

Moreover, the mean revenue growth is marginally higher than the average growth rate of companies included in the S&P 500. According to Standard & Poor's (2018), the revenue AAGR of S&P 500 in the research period (2002-2015) accounts for 3.04% p.a. and the operating income growth for 8.93%, which is four percentage points lower than the operating income growth average of the given sample (CIS Markets, 2016).

Table 8. Descriptive Statistics (Sample)

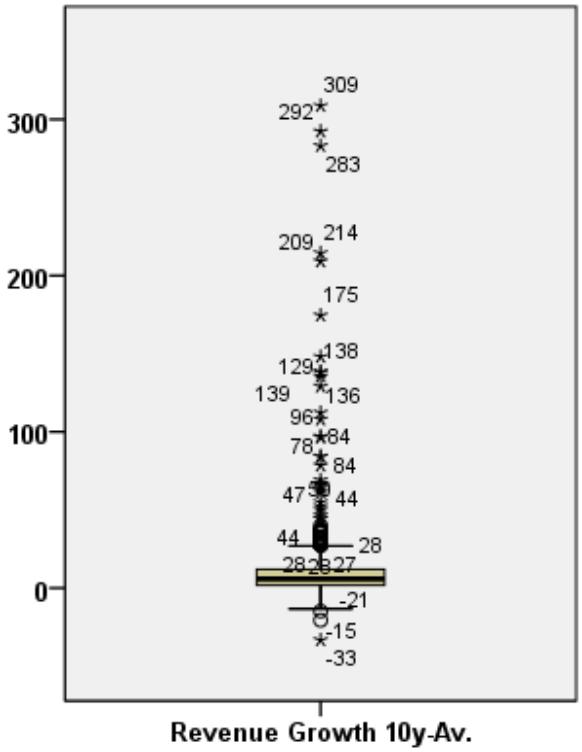
	N	Minimum	Maximum	Mean		Std. Dev.
		Statistic	Statistic	Statistic	Std. Error	Statistic
Debt % Cap. 10y-Av.	570	0	352	33	1	27
Revenue Growth 10y-Av.	570	-33	309	13	1	31
Revenue 10y-Av.	570	100	125,713,545	3,200,314	499,440	11,923,957
R&D 10y-Av.	569	-388	7,523,545	97,291	24,647	587,923
R&D % Rev	570	0	348	4	1	19
Op. Exp. 10y-Av.	561	-82,247	121,947,000	3,005,289	472,441	11,189,979
Op.Exp./Rev. Ratio	570	-89	5,541	112	10	234
Op. Inc. Growth 10y-Av.	558	-5,855	11,248	14	27	631
Op. Inc. 10y-Av.	570	-150,879	12,758,091	243,589	44,437	1,060,910
PPE Growth 10y-Av.	560	-39	4,946	29	9	225
PPE 10y-Av.	570	0	50,680,091	1,129,902	197,415	4,713,216
Intang. Ass. Growth 10y-Av.	538	-42	1,006	57	6	130
Intang. Ass 10y-Av.	569	0	50,070,545	744,024	150,828	3,597,816
Tot. Ass. Growth 10y-Av.	570	-20	466	12	1	30
Tot. Ass. 10y-Av.	570	1,295	186,382,000	4,063,470	711,588	16,988,937
Tot.Ass./Rev. Ratio	570	14	81,687	328	144	3,427
Work. Cap. Growth 10y-Av.	520	-954	1,952	2	8	177
Work. Cap. 10y-Av.	538	-32,144,364	19,305,273	274,995	83,748	1,942,522
Ret. Earn. Growth 10y-Av.	546	-2,185	2,608	12	8	194
Ret. Earn. 10y-Av.	570	-17,196,364	63,503,000	957,815	200,184	4,779,320
Net. Acqui. 10y-Av.	570	-1,051,000	4,568,208	70,999	14,641	349,540
Cap. Exp. Growth 10y-Av.	524	-39	3,547	47	8	187
Cap. Exp 10y-Av.	570	0	13,536,091	201,896	40,882	976,041
Debt % Cap. Growth 10y-Av.	528	-153	461	10	2	39
ROE 10y-Av.	570	-644	7,640	15	14	323
ROA Change 10y-Av.	516	-846	685	-20	6	126
ROA 10y-Av.	570	-59	30	4	0	8
Op.Inc./Cap. Ratio 10y-Av.	570	-16,460	96	-28	29	695
ROIC Change 10y-Av.	512	-866	1,483	-9	6	134
ROIC 10y-Av.	570	-176	366	6	1	22
Ass. Turnov. Change 10y-Av.	568	-41	178	4	1	17
Ass. Turnov. 10y-Av.	570	0	7	1	0	1
Op. Marg. 10y Av.	570	-1,057	152	-1	2	54
Employee 10y-Av.	566	0	455,848	11,098	1,774	42,208
Rev./Employ.10y-Av.	566	18	31,948	464	68	1,623
Acqui/Rev Ratio	570	-0.07	6.35	0.03	0.01	0.27

Source: Own calculation, SPSS output; N = 570.

Therefore, it can be concluded that this sample can be considered as representative for larger Western economies in the 'IFRS or US-GAAP area'. Smaller countries, such as Sweden or the Netherlands, may show differences in the average firm size and thus concerning growth rates because, according to the literature review on high growth, smaller companies tend to have higher growth rates. However, since this sample includes not only companies from a larger industrial country (Germany) but also from smaller countries (Switzerland and Austria), this sample can be considered as a cross-section sample, representing an 'average' Western 'late-industrial' economy.

The box plot diagram shows that 50% of all revenue growth observations remain in a very narrow range of 11 percentage points (lower quartile (Q1) = 1.75%; upper quartile (Q3) = 12.03). The number of negative outliers is very small while the number of positive outliers is high (see Figure 6).

Figure 6. Revenue Growth Box Plot (Sample)



Source: Own calculation, SPSS output; N = 570.

The normal distribution of revenue growth values is correspondingly unlikely, which is evident considering the p-values of the Shapiro-Wilk test (p = 0.0) and the Kolmogorov-Smirnov (p = 0.00) both testing the normal distribution. However, the this raises the question if Gaussian distribution of growth rates can be expected at all. Dosi et al., (2016, p. 89) state that particularly growth rates as well as firm size are extremely heterogeneous on average. Moreover, it must be expected in the case of listed companies that negative growth rates lead more likely to acquisitions extinguishing 'bad' companies because shareholders will not hold endlessly stocks from companies shrinking over a longer period, so that these companies will be extinguished more likely compared to fast growing companies. Therefore, the selection pressure on 'bad' companies is higher, shifting the value distribution curve to the right through M&A activities or liquidation. On the contrary, it can be expected for high-growth firms that high expectations of future returns lead to transfer price expectations no acquiring company is ready to pay. This should lead, at least theoretically, to a 'long life' of positive outliers and their excessive accumulation in the basic population, while negative outliers are 'extinguished' by M&A activities and the exclusion from the regulated stock market leading to a left-skewed distribution.

Companies with the highest revenue growth rates are *Group Business Software* (GBS) (revenue ten-year growth = 309%; firm size (revenue ten-year average) = EUR 14m), *Paion* (292%; EUR 8m), *Adler Real Estate* (283%; EUR 14m) and *Colonia Real Estate* (214%; EUR 63m). These top-4 companies show exemplarily that most of the high-growth firms are small firms. Therefore, their growth rates are not surprising because little fluctuations in revenue can cause extreme changes in growth rates of smaller companies, explaining also the findings of high-growth firm research discussed in Chapter 2. However, in the context of this study's research questions, the debt-to-capital ratios of high-growth firms are much more interesting, which are further discussed in the subsequent section 4.1.2.

Concerning bivariate correlations, it should be specified that none of the total set of variables shows more than a small correlation with the debt ratio of r > 0.2. The variable with the significantly highest correlation is total assets. However, the total assets of a firm are generally strongly correlated to firm size (revenue ten-year average). Consequently, this relationship indicates only that larger firms show a moderately higher debt ratio, which can be interpreted as that larger firms tend to

use rather debt financing than equity financing. Hence, it can be noted that the debt ratio slightly depends on firm size. However, these indications will be further examined in section 4.2 and 4.3.

4.1.2 Distribution of Debt-to-Capital Ratio Values in the Sample

According to the data provider's *Thomson One Database Data Definitions Guide* (Thomson Reuters, 2013, p. 656), the debt-to-capital ratio is calculated as:

> Total Debt % Total Capital = (Long Term Debt + Short Term Debt) / (Total Capital + Short Term Debt + Long Term Debt) * 100

The normal distribution of this variable in the sample is not likely because 17 companies of the original data set are excluded because of negative debt-to-capital ratios. Negative ratios are difficult to interpret. The ratio's numerator (debt) cannot be negative. The only reason for a negative ratio is a negative denominator (negative total capital). However, if one compares a company A with a debt-to-capital of 0% with a company B with -1%, the difference between both is high. Company A is completely funded without external capital, while company B shows a negative total capital. This means that company A shows a high financial health, whereas company B is over-indebted, although the debt-to-capital is only 1 percentage point. While this effect is uncomplicated in comparing two companies applying the financial analysis, in the quantitative statistical analysis, the effect suggested only a low distance between both companies on an interval scale. Therefore, the decision is to exclude companies with a negative debt-to-capital ratio from analyzing the normal distribution of the debt-to-capital values as well as from comparing the high-equity-financed group with the high-debt-financed group (see section 4.1.4 and 4.1.5). This measure is all the more in line with the requirements of the regression analysis, requiring an interval- or a ratio-scale level.[4] Within this context, the variable is so-to-speak zero-point adjusted by eliminating 17 cases with negative ratios. Consequently, 35 companies (6% of the original data set) from the original raw data set of 605 companies existing over the entire observation period are excluded not only because of missing values for revenue and debt-to-capital ratios but also because negative debt-to-capital ratios.

[4] A ratio scale is a metric scale but has, in contrast, an absolute zero and no negative values.

Also, in the case of the distribution of growth rates, a normal distribution of debt-to-capital values cannot be expected both in the basic population (all listed companies in Austria, Germany, and Switzerland) as well as in this sample. The Shapiro-Wilk test and the Kolmogorov-Smirnow test show p-values below an alpha level of $p < 0.05$ (see Table 9), so that the null hypothesis must be rejected, leading to the conclusion that the 570 observations of debt-to-capital ratios are not normally distributed. Instead, the distribution shows a left shift indicating that the sample tends more towards low debt capital shares. This becomes apparent also in the histogram and the box plot (see figure 7 and figure 8).

Table 9. Distribution of Debt-to-Capital Ratio Values (Sample)

Tests of Normality

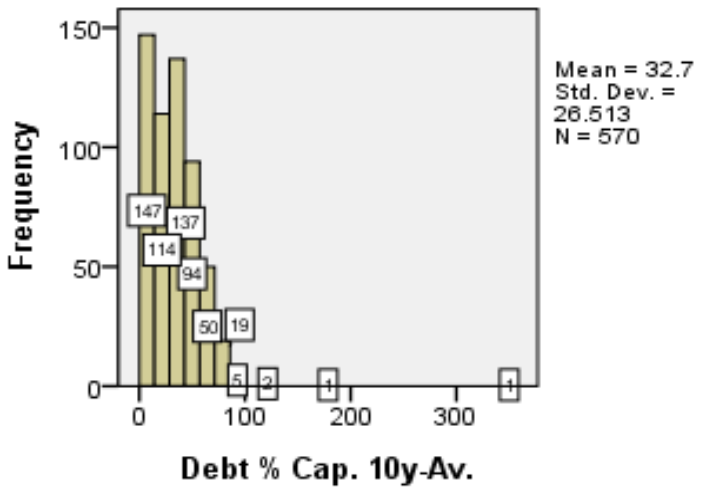
	Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Debt % Cap. 10y-Av.	.109	570	.000	.803	570	.000

a. Lilliefors Significance Correction

Source: Own calculation, SPSS output; N = 570.

The histogram shows an extreme left shift (see figure 7). 75% of all values are located between 0% debt capital and 47% (see table 10).

Figure 7. Debt-to-Capital Ratios Histogram (Sample)



Source: Own calculation, SPSS output; N = 570.

25% of the sample's companies have a debt-capital share of below 14%, 50% of all companies have a debt capital share of 14% to 47% (see table 10).

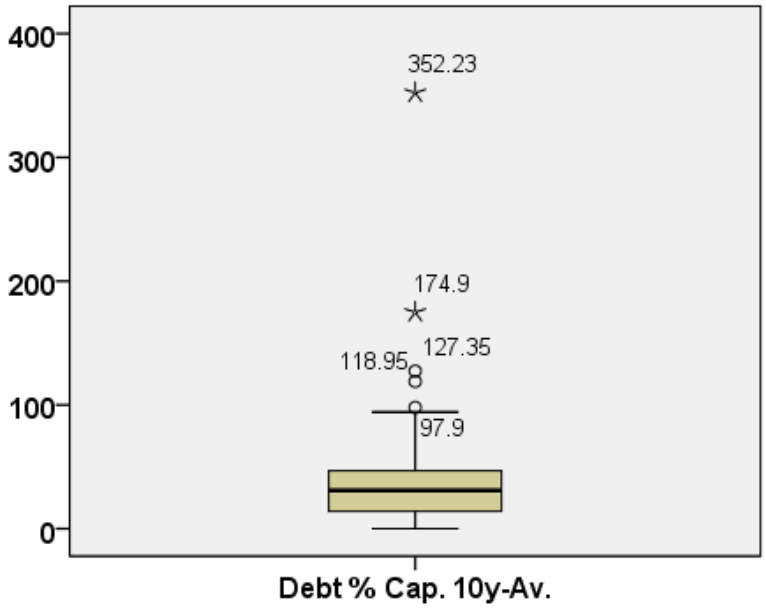
Table 10. Debt-to-Capital Ratio Percentile Statistics (Sample)

		Percentiles						
		5	10	25	50	75	90	95
Weighted Average	Debt % Cap. 10y-Av.	.49	2.81	13.96	30.98	46.91	62.94	71.53
Tukey's Hinges	Debt % Cap. 10y-Av.			13.97	30.98	46.83		

Source: Own calculation, SPSS output table; N = 570.

However, considering the median of Mdn = 30.98 (see table 11), it can be stated that the sample shows a low gearing. The box plot shows only five outliers (see Figure 8), so that it can be assumed that the sample is not skewed by outliers.

Figure 8. Debt-to-Capital 10-Year Average Values Box Plot (Sample)



Source: Own calculation, SPSS output; N = 570.

This is also evident in comparing the mean and median value, which are both very close to each other. The mean and median are in a very narrow range (M = 32.70; Mdn = 30.98), indicating that the mean value is not distorted by extreme outliers (see table 11).

The box plot shows that five companies show abnormal debt-to-capital ratios. The most salient outlier is TELES AG (*Debt%Cap 10y-Av.* = 352%; *Debt%Cap. Growth* = 101%). The company was forced in 2010 and 2011 to finance its operational business with a large loan provided by the majority stakeholder (Teles AG, 2012, pp. 7, 20). However, 50% of the observations are located within a narrow range between 14% and 47%. Furthermore, the number of outliers accounts with five companies for only 1% of the sample (see Figure 8).

Table 11. Debt-to-Capital Ten-Year Average (Sample)

n = 570			Statistic	Std. Error
Debt % Cap. 10y-Av.	Mean		32.70	1.111
	95% Confidence Interval for Mean	Lower Bound	30.52	
		Upper Bound	34.88	
	5% Trimmed Mean		31.01	
	Median		30.98	
	Variance		702.942	
	Std. Deviation		26.513	
	Minimum		0	
	Maximum		352	
	Range		352	
	Interquartile Range		33	
	Skewness		3.634	.102
	Kurtosis		37.467	.204

Source: Own calculation, SPSS output table; N = 570.

To sum up, the sample shows an average debt capital share of 32.7%. Moreover, it can be noted that the sample shows no abnormalities in the data distribution of the variable debt-to-capital (*debt % capital*); 50% of all companies are located in a narrow range between 14 to 47%. Although a general scientific definition of an acceptable debt capital share level does not exist, Sahaf (2013, p. 217) states that, in the context of financial analysis practice, a 1:1 ratio is the heuristic rule to estimate the degree of insolvency risk independent of a company's industry. According to Sahaf (2013, p. 217) and Marks et al. (2009, p. 98), beyond this threshold the expected insolvency risk for investors or providers of debt capital increases exponentially. Compared to the average, all German companies the long-term debt capital share ranges between 51% and 50% (2000-2012) (KfW Research, 2015, p. 1). As a consequence, it can be stated that the average German company is just within the sample's range, while the average sample company shows a comparably lower debt share.

Consequently, the average sample company has an above-average equity ratio compared to the basic population. In the context of the Modigliani-Miller theorem, this raises the question why companies under strong supervision by shareholders

targeting on the maximum ROI are less debt-financed than limited companies representing the majority of the basic population. Based on the Modigliani-Miller theorem, debt-to-capital ratios in the given sample should not be normally distributed and right-skewed, as shareholders should press on high returns by using more than only the equity capital of the company. Consequently, listed companies should tend to have higher debt-to-capital ratios than the basic population. While the basic population is dominated by companies with one or only a few owners, listed companies show a dispersed ownership, which should lead to a higher economic rationality. The principal-agent theory would explain this divergence with the basic population that dispersed ownership leads to lower monitoring quality of the firm's management (Winter & Loo, 2013, p. 228).

However, it could also be argued that, on the one hand, shareholder control rights exerted by the non-executive board prevent excessive debt accumulation, although listed companies have a better access to debt capital; but have, on the other hand, a higher pressure on optimizing the firm's performance leading to—compared to the average company in the basic population—a more intense search for business activitie,s where the return of investment is higher than the costs of capital (Winter & Loo, 2013, pp. 228-229; Clarke, 2017, p. 444). In the context of the Modigliani-Miller theorem, a higher debt-capital ratio should be expected. The results of the descriptive analysis show that the average sample company shows a lower debt share than the population (all German companies). Belcredi and Ferrarini (2013, p. 15) assume, based on theoretical reflection, that capital structure decisions are more dependent on specific strategic situation: Companies with growth opportunities should show a higher debt ratio, whereas companies with a less or no growth opportunities a lower growth ratio. Consequently, the following sections examine high-growth firms and the differences between high-equity and high-debt financed companies.

4.1.3 Descriptive Statistics of the High-Growth Group (n = 79)

The OECD (2000), Hoffmann and Junge (2006), Cassia et al. (2009) as well as Senderovitz et al. (2012) define high growth as revenue growth of >20% in terms of compound average growth rate (CAGR) over a three-year period. This study uses a stricter threshold. High-growth is defined as a revenue growth of >20% in terms of

average annual growth rate (AAGR) over the ten-year observation period (see the discussion of the different types of growth rate calculation in section 3.4). Insofar, this definition is more rigid than the conventional definitions requiring an average of >20% revenue growth per annum. 79 companies fulfill this requirement, so that they are included in the high-growth group.

However, this comparably small number of companies may lead to statistical uncertainties. Small samples or groups can be dominated by outliers. However, regarding a sample's or a group's minimum size, there is no common definition in the existing literature (Wenzelburger, 2014, p. 8). Long (1997, p. 54) postulates that the use of a sample size of n < 100 is to be considered as risky. Backhaus et al. (2011) do not suggest a minimum size for a regression analysis sample. However, they note that the number of cases per expression of the dependent variable should not be less than 25 (Backhaus et al., 2011, p. 295). In the case of metric variables, this would result in a number of expressions of the dependent variable, which tends to be equal to the number of the cases because the chance that such variables as *revenue* or *revenue growth* show the same expression in the basic population may tend against zero. In this respect, no sample size would ever meet the minimum requirements required by Backhaus et al. (2011, p. 295).

However, some researchers argue that, for each independent variable, there should be at least five observations or cases per independent variable. Because this study is a cross-sectional study with an observation period of ten years, it can be assumed that, for each of the 570 cases, ten observations are available for a total of 37 variables. Each observation for one variable for a single case is a compressed observation of ten observations per case (company), because each observation is a ten-year average except for some variable, such as, for example, R&D expenditures, where some companies in specific industries show no investments for R&D, such as real estate companies or only sporadic investments. To this extent, there are approximately ten compressed observations per variable and case (company). In the case of the 79 high-growth companies; this means that approximately 33,180 observations are included in the data analysis. Therefore, it is assumed that the minimum requirements of Long (1997) and Backhaus et al. (2011) are given, so that the validity of the regression analysis is considered as very high.

Concerning the normal distribution of growth rates in the subset, it should also be noted that the companies of the high-growth firms group are per se outliers, as they show, per definition, above-average firm growth. Thus far, it can generally be presumed that samples or groups of high-growth firms are always statistically irregular and that conclusions drawn from their analysis are only valid for this specific data set or sample, which may be extremely divergent from country to country due to their specific economic structure (OECD, 2010, p. 47). Consequently, this high-growth firms group may not allow to draw conclusions to a theoretically global basic population of high-growth firms.

However, this is also not the objective for this group analysis. The main function is rather to form a contrast group to the sample in the context of one of both research questions of this study asking for differences in firm growth behaviour in relation to capital structure (see also Introduction). The main reason for this grouping is that it allows to examine a group not interfered by non-performing companies, as it is the sample. Thus, the high-growth group allows to compare debt-to-capital ratios between the sample as a sample of heterogenous companies and a homogenous contrast group including only high-performing companies which should allow to understand better the relationship between capital structure and firm growth.

The average company of the high-growth group (see table 12 and table 8; see table 27 in the annex for key indicators for all high-growth firms)

- has a revenue (ten-year average) of EUR 0.7bn (firm size) (sample: EUR 3.2bn)
- shows a firm growth rate of 61% p.a. (sample: 13%) in the ten-year observation period
- invests 10% p.a. (sample: 4%) of its revenue in R&D in the ten-year observation period
- generates an operating income EUR 45m (sample: EUR 243m) while the operating income increases 77% p.a. (sample: 14%) in the ten-year observation period
- records EUR 48m (sample: 744m) as intangible assets

- invests EUR 17m (sample: 70m) for M&A (net acquisitions) in the ten-year observation period, equating to 12% (sample: 3%) of revenue (acquisition-revenue ratio)
- shows a ROA of 1% (sample: 4%) and an ROIC of 7% (sample: 6%) in the ten-year average whereby both profitability ratios have decreased steadily in the research period
- has increased its asset turnover ratio generating EUR 19 (sample: EUR 1) in revenue for each EURO invested in assets each year
- has 1,179 employees (sample: 11,098) in the ten-year average with EUR 900,000 revenue per employee (employee productivity in the ten-year average; sample: EUR 464,000).
- shows a debt-to-capital ratio of 33% (sample: 33%), while the share of debt capital increases 21% p.a. (sample: 10%).

In comparison with the sample, the findings are:

(1) The average sample company is four times larger as the average high-growth company.

(2) Fast-growing companies invest a higher share of their revenue in R&D, which suggests that they are rather knowledge-intensive companies than capital or labour-intensive, supporting the overall assumption that knowledge-based companies show higher revenue growth than other companies and, in particularly, labour-intensive companies (Malerba et al., 2016, pp. 5-6). This may also explain the significantly higher employee productivity.

(3) Furthermore, high-growth firms spend more for M&A activities in relation to revenue

(4) Moreover, high-growth firms show higher asset turnover ratios.

However, the debt-to-capital ratio is exactly equal in both the high-growth group and the sample indicating that debt financing and excessive growth are not correlated.

Table 12. High-Growth Group's Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Revenue Growth 10y-Av.	79	20	309	61	64
Revenue 10y-Av.	79	100	23,456,108	703,953	2,809,037
R&D 10y-Av.	79	0	319,144	7,525	36,443
R&D % Rev	79	0	348	10	42
Op. Exp. 10y-Av.	77	466	21,337,354	681,576	2,608,643
Op.Exp./Rev. Ratio	79	0	772	136	119
Op. Inc. Growth 10y-Av.	79	-1,475	3,626	77	549
Op. Inc. 10y-Av.	79	-93,118	2,118,754	45,162	241,933
PPE Growth 10y-Av.	76	-35	4,946	157	588
PPE 10y-Av.	79	15	10,544,962	489,673	1,580,426
Intang. Ass. Growth 10y-Av.	65	-21	983	124	207
Intang. Ass 10y-Av.	79	0	1,319,950	48,218	160,117
Tot. Ass. Growth 10y-Av.	79	-13	466	47	67
Tot. Ass. 10y-Av.	79	1,671	21,210,875	900,854	2,696,018
Tot.Ass./Rev. Ratio	79	22	81,687	1,402	9,163
Work. Cap. Growth 10y-Av.	56	-254	1,952	102	343
Work. Cap. 10y-Av.	62	-902,300	894,058	81,126	243,608
Ret. Earn. Growth 10y-Av.	76	-496	492	19	129
Ret. Earn. 10y-Av.	79	-58,123	6,683,936	162,784	766,233
Net. Acqui. 10y-Av.	79	-41	309,522	17,076	49,404
Cap. Exp. Growth 10y-Av.	66	-17	936	108	191
Cap. Exp 10y-Av.	79	3	2,128,989	60,178	245,511
Debt % Cap. Growth 10y-Av.	69	-30	301	21	48
Debt % Cap. 10y-Av.	79	0	75	33	22
ROE 10y-Av.	79	-141	7,640	95	860
ROA Change 10y-Av.	65	-231	392	-7	103
ROA 10y-Av.	79	-56	22	1	13
Op.Inc./Cap. Ratio 10y-Av.	79	-16,460	89	-205	1,852
ROIC Change 10y-Av.	63	-212	453	9	117
ROIC 10y-Av.	79	-92	366	7	46
Ass. Turnov. Change 10y-Av.	77	-38	155	19	33
Ass. Turnov. 10y-Av.	79	0	6	1	1
Op. Marg. 10y Av.	79	-1,057	116	-8	123
Employee 10y-Av.	77	1	34,668	1,179	4,095
Rev./Employ.10y-Av.	77	18	17,824	911	2,088
Acqui/Rev Ratio	79	0.00	6.35	0.12	0.72

Source: Own calculation, SPSS output; N = 79.

Table 13. Companies Included in the High-Growth Group

Real Estate	Tech-Industry	Others
(1) ADLER REAL ESTATE	(1) 4SC	(1) AURUBIS
(2) AEVIS HOLDING	(2) ACTELION	(2) CUSTODIA HLD
(3) ALLREAL HOLDING	(3) ADESSO	(3) DISKUS WERKE
(4) AMIRA VERWALTUNGS	(4) ADVANCED INFLIGHT	(4) DO & CO
(5) CA IMMOBILIEN	(5) AIROPACK TECHNOLOGY	(5) EISEN UND HUTTENWERK
(6) COLONIA REAL	(6) ALEO SOLAR	(6) ENVITEC BIOGAS
(7) DAHLBUSCH	(7) BIOFRONTERA	(7) EQUITYSTORY
(8) DESIGN BAU	(8) CENTROTEC SUSTAIN	(8) H&R
(9) DIC ASSET	(9) CICOR TECHNOLOGIES	(9) KWG KOMMUNALE
(10) FORST EBNATH	(10) CO.DON	(10) MME MOVIEMENT
(11) HAHN IMMOB	(11) COMPUGROUP HLDG	(11) OMV
(12) HANSA GROUP	(12) DELTICOM	(12) SCHMOLZ & BICKENBACH
(13) HASEN-IMMOBILIEN	(13) DIALOG SEMICOND	
(14) HELMA EIGENHEIMBAU	(14) ENDOR	
(15) IMMOFINANZ	(15) ENERGIEKONTOR	
(16) IMW IMMOBILIEN	(16) F24	
(17) MOBIMO HOLDING	(17) FIRST SENSOR AG	
(18) PATRIZIA IMMOBILIEN	(18) GIGASET AG	
(19) PAX-ANLAGE	(19) GROUP BUSINESS SOFT	
(20) PRIMAG	(20) HPI	
(21) REALITY CAPITAL PART	(21) INTICA SYSTEM	
(22) SPARKASSEN IMMOBIL	(22) KROMI LOGISTIK	
(23) SWISS PRIME SITE	(23) MANZ	
(24) UBM REALITAET	(24) MOLOGEN	
(25) WESTGRUND	(25) MORPHOSYS	
	(26) MS INDUSTRIE	
	(27) MYBET	
	(28) NORDEX	
	(29) OHB TECHNOLOGY	
	(30) PAION	
	(31) PERFECT HOLDING	
	(32) PHOENIX SOLAR	
	(33) REPOWER	
	(34) SCHWEITER TECH	
	(35) SEVEN PRINCIPLES	
	(36) SOFTLINE	
	(37) SOLARWORLD	
	(38) TIPP24	
	(39) TWINTEC	
	(40) UNITED INTERNET	
	(41) WIRECARD	
	(42) YOC	

Source: Own presentation; Data: Thomson One.

Other differences, as presented in the overview above, can be clarified by analysing the companies' businesses (see Table 13). 25 companies among the fast-growing firms are real estate companies, while 42 companies adhere to a technology-based business model, such as biotech companies (e.g. *Actelion*, *Biofrontera*, *Mologen*, *Morphosys*, and *Paion*), IT companies (*Adesso*, *Compugroup*, *Dialog Semicondutors,* and *Group Business Software*) or companies including high technology solutions in their business model, such as *Advanced Inflight*, *First Sensor*, *Gigaset*, *HPI*, and *Kromi Logistics*.

Even the group's energy companies such as *Energiekontor*, *Repower*, and *Aleo Solar* are not simply energy providers because their business model contains smart grid platforms connecting prosumer, consumer and plants or other IT-based solutions. This explains, on the one hand, their higher revenue and income growth and employee productivity as well as higher R&D expenditures.

On the other hand, the comparably higher M&A activities in the high-growth group can be considered as an industry effect: Eight companies among the acquisition-to-revenue ratio top-10 companies are real estate companies indicating that high growth in this industry is mainly generated through buying complete real estate portfolios, instead of focusing on own real estate project developments (see Table 14).

Concerning bivariate correlations in the high-growth firms group between the debt-to-capital ratio and other variables, it can be noted that only one variable shows a highly significant correlation coefficient, which is the operating expenses/revenue ratio with $r = -0.288$ ($p < 0.01$). The debt-to-capital ratio is also the variable with the strongest correlation whereby the relationship is negative meaning that the higher the debt-to-equity ratio, the lower is the operating expenses to revenue ratio.

Operating expenses are calculated as the sum of all non-manufacturing expenses, such as staff payments, commissions, pension contributions and other employee benefits, transportation and travel costs, depreciation and amortization, taxes, repairs and rent (Wahlen et al., 2016, pp. 335-338). Therefore, it applies that lower the operating expenses-to-revenue ratio, the lower is the share of operating expenses in revenue.

Table 14. Acquisition-to-Revenue Ratio in the High-Growth Group(Top 10)

Company	Acqui/Rev Ratio
ADLER REAL ESTATE AG	6.35
IMW IMMOBILIEN SE	0.63
IMMOFINANZ AG	0.48
CA IMMOBILIEN AG	0.44
AEVIS HOLDING SA	0.37
COLONIA REAL	0.28
COMPUGROUP HLDG	0.19
SWISS PRIME SITE	0.18
DIALOG SEMICOND	0.11
FIRST SENSOR AG	0.10
DISKUS WERKE AG	0.08
PATRIZIA IMMOBILIEN	0.07

Source: Own calculation and presentation; Data: Thomson One.

Taking into account the findings of the descriptive statistics showing a higher productivity among high-growth firms and the detailed analysis of the high-growth firms, it should be expected that this result cannot be considered as a causal-effect relationship. Instead, this correlation reflects only the specific constitution of the group.

Neither real estate companies nor technology companies are labour-intensive. Therefore, it can be assumed that the debt-financing level arise is a business model effect or an industry-specific effect. Thus, for example, higher leverages are typical among real estate companies. Furthermore, technology companies have a higher need of to pre-finance extend R&D projects to develop new products.

Thus, for example, real estate companies need only a small staff but generates with a small administrative staff a comparably high revenue compared to, for example, manufacturing company. On the other hand, real estate companies generally invest with a comparably higher leverage (Miglo, 2016, p. 36).

Besides this, it can be ntoted that high-growth firms generally are not higher debt-financed supporting also the financial analysis research, although one third of the

included companies in the high-growth group are companies with a business model using generally a higher leverage. Damodaran (2011, p. 619) notes that empirical research shows that growth companies tend rather to internal than external funding. According to the Modigliani-Miller theorem, it must be expected that debt-to-capital ratio and revenue growth are positively correlated due to the more growth opportunities available. Therefore, high-growth firms should have a higher debt-to-capital ratio compared to the sample's 'average' company, since they should have comparably more profitable investments than slowly or not growing companies, so that debt-capital investment is an additional option to benefit from additional business opportunities. However, this assumption must be rejected based on the findings from comparing the sample and the high-growth firms.

4.1.4 High-Equity-Financed Companies Group Descriptive Statistics

Following Long (1997, p. 54) postulating a group size of at least n = 100 for valid t-Test results, two groups are examined in the following way: (1) the top-100 equity-financed companies (high-equity-financed group), and (2) the top-100 debt-financed companies (high-debt-financed group). The reason for this procedure is that the two-sample t-Test is very sensitive to differences in the group size (Derryberry, 2014, p. 31; see also Section 3.6 concerning the robustness of the t-Test in the case of non-parametric groups). Therefore, the sample is divided into two groups, each including 100 companies. The side effect of this procedure is that both groups are more homogenous because the one group includes only high-equity-financed companies and the other only high-debt-financed companies.

Ranking the sample by its debt-to-capital ratio results, in the case of the high-equity-financed group, in a threshold level of < 8.15 debt-to-capital ratio, meaning that all top-100 equity-financed companies (see Table 25 in the annex for key indicators for all 100 companies) have a debt capital share lower than 8.15%, while the minimum debt-to-capital ratio in the high-debt-financed group accounts for 52% (see Table 15 and Table 16).

Compared to the growth rates of the sample, the high-equity-financed group shows almost the same growth rate (12%; sample: 13%; see Table 8). The profitability ratios as well as asset turnover ratios or other asset's growth ratios as well as the operating expenses/revenue ratio also show only small differences. However, the

firm size is with EUR 802m only one quarter of the sample average firm, while the debt-to-capital ratio average is far below the sample level (3% vs. sample's 33%) Furthermore, the ratio of R&D expenditures to revenue (7% vs. sample's 1%) as well as the PPE growth (21% vs. sample's 9%) and capital expenditure growth (39% vs. sample's 108%) may be interpreted as indicator of differences concerning research and capital intensity – an assumption that is also supported by the huge difference in the employee productivity (EUR 321,000 vs. sample's EUR 68,000), indicating the high-equity financed companies generate more value added per employee (see Table 15 and 8).

To sum up, high-equity-financed companies are, on the one hand, not high-growth firms but technology-intensive companies. This may be explained by their comparably limited debt capital access. Thus, for example, Castillo-Merino et al. (2010, p. 44) have found that innovative, research-intensive companies have to pay higher capital costs, so that they prefer internal financing from the cash flow. However, on the other hand, innovative and research-intensive business does not mean that such companies are much more profitable, which is evident when comparing the profitability indicators. Although the group's average ROIC is with 11% almost twice that of the sample (6%), the ROA is lower (4% vs. sample's 7%). However, this result indicates that high-equity-financed companies are companies using more equity in financing their business and also using their total capital more efficiently. In the context of the Modigliani-Miller theorem, a positive relationship between debt-to-capital ratio and capital efficiency can be expected (Fabich et al., 2012, p. 147). However, this high-growth group analysis show no evidence for this assumption which is confirmed also by the considerations of Fabich et al. (2012, pp. 147-151).

Table 15. High-Equity-Financed Companies Group Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Revenue Growth 10y-Av.	100	-33	139	12	21
Revenue 10y-Av.	100	100	34,680,456	801,940	3596037
R&D 10y-Av.	100	0	2,134,147	33,064	214249
R&D % Rev	100	0	166	7	20
Op. Exp. 10y-Av.	98	-82,247	32,424,895	756,698	3388382
Op.Exp./Rev. Ratio	100	-89	772	115	94
Op. Inc. Growth 10y-Av.	97	-503	1,449	30	196
Op. Inc. 10y-Av.	100	-33,762	2,255,561	61,979	256111
PPE Growth 10y-Av.	94	-39	596	21	67
PPE 10y-Av.	100	0	6,046,126	143,482	629901
Intang. Ass. Growth 10y-Av.	94	-17	983	80	176
Intang. Ass 10y-Av.	100	0	2,761,619	59,266	283689
Tot. Ass. Growth 10y-Av.	100	-13	200	12	25
Tot. Ass. 10y-Av.	100	1,295	25,639,997	674,705	2705328
Tot.Ass./Rev. Ratio	100	14	81,687	1,003	8155
Work. Cap. Growth 10y-Av.	94	-171	244	8	49
Work. Cap. 10y-Av.	96	-35,018	5,427,755	220,671	751067
Ret. Earn. Growth 10y-Av.	94	-813	2,608	22	290
Ret. Earn. 10y-Av.	100	-68,964	8,522,006	320,240	1113335
Net. Acqui. 10y-Av.	100	-33	125,545	6,375	18389
Cap. Exp. Growth 10y-Av.	88	-16	415	39	64
Cap. Exp 10y-Av.	100	0	1,675,757	31,008	169854
Debt % Cap. Growth 10y-Av.	78	-101	461	12	58
Debt % Cap. 10y-Av.	100	0	8	3	3
ROE 10y-Av.	100	-68	36	7	20
ROA Change 10y-Av.	91	-367	411	10	104
ROA 10y-Av.	100	-56	28	5	12
Op.Inc./Cap. Ratio 10y-Av.	100	-282	51	3.2	37
ROIC Change 10y-Av.	91	-384	421	11	105
ROIC 10y-Av.	100	-63	35	7	17
Ass. Turnov. Change 10y-Av.	99	-41	155	3	18
Ass. Turnov. 10y-Av.	100	0	7	1	1
Op. Marg. 10y Av.	100	-72	122	5	29
Employee 10y-Av.	98	2	57,292	2,264	6776
Rev./Employ.10y-Av.	98	18	2,750	321	425
Acqui/Rev Ratio	100	.00	0	0.01	.03240

Source: Own calculation, SPSS output table; n = 100.

4.1.5 High-Debt-Financed Companies Group Statistics

The high-debt-financed companies group shows a lower minimum growth rate of -21% (sample's -33%; see Table 16 vs. Table 8) and a higher maximum growth rate of 214% (sample's 139%). Compared to the average high-equity-financed company, the average high-debt company (see Table 26 in the annex for key indicators for all 100 companies):

- shows a slightly higher revenue growth of 14% (vs. 12%)
- is seven times larger (EUR 5.8bn vs. EUR 0.8bn)
- spends less for R&D (R&D in % revenue of 1% vs. 7%)
- shows a negative operating income growth (-100% vs. 30%)
- uses a higher amount of cash compared to the revenue for M&A (acquisition to revenue ratio of 3% vs. 1%)
- is less profitable in using capital and assets (ROIC: 3% vs. 7%; ROA: 2% vs. 5%)
- and shows an extremely low operating-income-to-capital ratio of 0.12 (vs. 3.2), meaning that the average high-debt company generates only EUR 0.12 from one EURO of the company's total capital.

The comparison of mean values among both groups (high-equity-financed companies vs. high-debt-financed companies) suggests that firm growth may explain capital structure decision differences. Instead, the results indicate rather that inefficiencies in operations or other determinants, such as factor intensity as well as firm size, may explain the differences in the capital structure decision.

However, factor intensity may be excluded because employee productivity of the average high-debt-financed company is much higher (EUR 668,000 vs. EUR 321,000; see Table 15 and Table 16).

- However, to reach a conclusion concerning the explanation of the differences in capital structure decisions, further tests are necessary. The first analysis is the determination of statistical significance of the differences

using the t-Test. In a second step, a logistic regression is performed to find causal effects. The results of both analyses are discussed in the next sections.

Table 16. High-Debt-Financed Companies Group Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Revenue Growth 10y-Av.	100	-21	214	14	35
Revenue 10y-Av.	100	5,957	125,713,545	5,870,379	20,635,795
R&D 10y-Av.	99	0	4,502,273	127,828	687,869
R&D % Rev	100	0	16	1	3
Op. Exp. 10y-Av.	96	5,389	121,947,000	5,795,655	20,116,118
Op.Exp./Rev. Ratio	100	0	229	100	34
Op. Inc. Growth 10y-Av.	94	-5,855	793	-100	682
Op. Inc. 10y-Av.	100	-150,879	5,780,818	303,204	1,081,122
PPE Growth 10y-Av.	100	-25	4,946	82	512
PPE 10y-Av.	100	434	49,056,273	2,546,392	8,571,493
Intang. Ass. Growth 10y-Av.	90	-20	801	62	144
Intang. Ass 10y-Av.	99	0	50,070,545	1,328,484	5,754,887
Tot. Ass. Growth 10y-Av.	100	-18	313	13	36
Tot. Ass. 10y-Av.	100	5,118	186,382,000	8,983,278	31,732,804
Tot.Ass./Rev. Ratio	100	35	2,719	294	432
Work. Cap. Growth 10y-Av.	76	-851	501	-24	178
Work. Cap. 10y-Av.	82	-32,144,364	7,041,636	-303,055	3,801,242
Ret. Earn. Growth 10y-Av.	92	-591	401	13	131
Ret. Earn. 10y-Av.	100	-17,196,364	38,554,182	1,016,711	5,589,763
Net. Acqui. 10y-Av.	100	0	1,713,455	62,204	240,948
Cap. Exp. Growth 10y-Av.	90	-19	914	49	115
Cap. Exp 10y-Av.	100	157	13,536,091	536,261	2,060,240
Debt % Cap. Growth 10y-Av.	98	-18	138	6	23
Debt % Cap. 10y-Av.	100	52	352	71	33
ROE 10y-Av.	100	-396	239	-11	65
ROA Change 10y-Av.	85	-344	393	5	119
ROA 10y-Av.	100	-31	12	2	6
Op.Inc./Cap. Ratio 10y-Av.	100	-275	96	0.12	34
ROIC Change 10y-Av.	86	-345	453	9	123
ROIC 10y-Av.	100	-92	87	3	16
Ass. Turnov. Change 10y-Av.	100	-16	98	6	18
Ass. Turnov. 10y-Av.	100	0	3	1	1
Op. Marg. 10y Av.	100	-87	116	5	30
Employee 10y-Av.	100	1	455,848	20,971	76,313
Rev./Employ.10y-Av.	100	37	17,824	668	1,862
Acqui/Rev Ratio	100	0.00	0.63	0.03	0.08

Source: Own calculation, SPSS output table; n = 100.

4.2 Significant Differences between High-Equity-Financed and High-Debt-Financed Companies (T-Test)

The following variables show variance homogeneity according to Levene's Test indicating no significant differences between both groups concerning (1) revenue growth, (2) intangible assets growth, (3) total assets growth, (4) retained earnings growth, (5) capital expenditures growth, (6) ROA change, (7) ROIC change, (8) asset turnover change, (9) asset turnover and (10) operating margin. This result shows that both groups have developed in a similar pace concerning revenue growth and several other growth indicators as well as in changing their profitability.

However, statistically significant differences at the .05-level between both groups exist in the following areas of firm characteristics, management activities and performance indicators: (1) firm size (*Revenue 10y-Av.*), (2) R&D investment in % of revenue (*R&D % Rev.*), (3) operating expenditures, (4) operating income, (5) the volume of PPE and intangible assets as well as concerning total assets, acquisitions and capital expenditures, (6) ROE, (7) ROA, (8) the operating-income-to-capital ratio and (9) the number of employees.

Table 17. Independent T-Test of the Debt-Equity Groups

		Levene's Test for Equality of		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Revenue Growth 10y-Av.	Equal variances	3.905	.060	.511	198	.610	2.1	4.1
	not assumed			.511	159.560	.610	2.1	4.1
Revenue 10y-Av.	Equal variances	22.959	.000	2.420	198	.016	5068438.7	2094677.9
	not assumed			2.420	105.007	.017	5068438.7	2094677.9
R&D 10y-Av.	Equal variances	7.145	.008	1.315	197	.190	94764.5	72076.9
	not assumed			1.309	116.663	.193	94764.5	72377.2
R&D % Rev	Equal variances	13.521	.000	-2.710	198	.007	-5.4	2.0
	not assumed			-2.710	102.452	.008	-5.4	2.0
Op. Exp. 10y-Av.	Equal variances	23.269	.000	2.445	192	.015	5038957.0	2061146.6
	not assumed			2.421	100.278	.017	5038957.0	2081428.4
Op.Exp./Rev. Ratio	Equal variances	8.361	.004	-1.565	198	.119	-15.7	10.0
	not assumed			-1.565	124.843	.120	-15.7	10.0
Op. Inc. Growth 10y-Av.	Equal variances	4.765	.030	-1.803	189	.073	-130.1	72.1
	not assumed			-1.779	107.799	.078	-130.1	73.1
Op. Inc. 10y-Av.	Equal variances	19.505	.000	2.171	198	.031	241225.0	111104.3
	not assumed			2.171	110.077	.032	241225.0	111104.3
PPE Growth 10y-Av.	Equal variances	4.891	.028	1.146	192	.253	61.0	53.2
	not assumed			1.181	102.652	.240	61.0	51.6
PPE 10y-Av.	Equal variances	25.882	.000	2.796	198	.006	2402910.4	859460.7
	not assumed			2.796	100.069	.006	2402910.4	859460.7
Intang. Ass. Growth 10y-Av.	Equal variances	.770	.381	-.774	182	.440	-18.4	23.8
	not assumed			-.777	177.885	.438	-18.4	23.7
Intang. Ass 10y-Av.	Equal variances	17.196	.000	2.203	197	.029	1269217.7	576179.8
	not assumed			2.192	98.472	.031	1269217.7	579083.2
Tot. Ass. Growth 10y-Av.	Equal variances	1.548	.215	.181	198	.857	0.8	4.4
	not assumed			.181	178.676	.857	0.8	4.4
Tot. Ass. 10y-Av.	Equal variances	25.628	.000	2.609	198	.010	8308573.2	3184791.4
	not assumed			2.609	100.439	.010	8308573.2	3184791.4
Tot.Ass./Rev. Ratio	Equal variances	2.958	.087	-.868	198	.386	-709.1	816.7
	not assumed			-.868	99.556	.387	-709.1	816.7
Work. Cap. Growth 10y-Av.	Equal variances	24.764	.000	-1.635	168	.104	-31.4	19.2
	not assumed			-1.492	84.233	.139	-31.4	21.0
Work. Cap. 10y-Av.	Equal variances	3.998	.047	-1.321	176	.188	-523726.0	396552.6
	not assumed			-1.227	86.410	.223	-523726.0	426718.6
Ret. Earn. Growth 10y-Av.	Equal variances	.001	.971	-.268	184	.789	-8.9	33.2
	not assumed			-.269	130.227	.788	-8.9	32.9
Ret. Earn. 10y-Av.	Equal variances	10.119	.002	1.222	198	.223	696471.1	569955.9
	not assumed			1.222	106.842	.224	696471.1	569955.9
Net. Acqui. 10y-Av.	Equal variances	19.063	.000	2.310	198	.022	55829.0	24164.9
	not assumed			2.310	100.153	.023	55829.0	24164.9
Cap. Exp. Growth 10y-Av.	Equal variances	1.654	.200	.700	176	.485	9.8	14.0
	not assumed			.704	140.244	.483	9.8	13.9

		Levene's Test for Equality of		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Cap. Exp 10y-Av.	Equal variances	21.026	.000	2.444	198	.015	505253.6	206723.0
	not assumed			2.444	100.346	.016	505253.6	206723.0
Debt % Cap. Growth 10y-Av.	Equal variances	5.810	.017	-.937	174	.350	-6.0	6.4
	not assumed			-.861	95.368	.391	-6.0	7.0
Debt % Cap. 10y-Av.	Equal variances	15.103	.000	20.437	198	.000	67.8	3.3
	not assumed			20.437	100.453	.000	67.8	3.3
ROE 10y-Av.	Equal variances	14.405	.000	-2.503	198	.013	-17.1	6.8
	not assumed			-2.503	116.927	.014	-17.1	6.8
ROA Change 10y-Av.	Equal variances	1.340	.249	-.299	174	.765	-5.0	16.8
	not assumed			-.298	167.539	.766	-5.0	16.9
ROA 10y-Av.	Equal variances	11.151	.001	-2.118	198	.035	-2.9	1.3
	not assumed			-2.118	151.177	.036	-2.9	1.3
Op.Inc./Cap. Ratio 10y-Av.	Equal variances	.857	.010	-.610	198	.029	-3.1	5.0
	not assumed			-.610	197.100	.029	-3.1	5.0
ROIC Change 10y-Av.	Equal variances	1.590	.209	-.137	175	.892	-2.3	17.2
	ot assumed			-.136	167.569	.892	-2.3	17.3
ROIC 10y-Av.	Equal variances	4.326	.039	-1.824	198	.070	-4.3	2.4
	not assumed			-1.824	196.895	.070	-4.3	2.4
Ass. Turnov. Change 10y-Av.	Equal variances	.593	.442	1.068	197	.287	2.7	2.6
	ot assumed			1.068	196.746	.287	2.7	2.6
Ass. Turnov. 10y-Av.	Equal variances	.513	.475	-2.121	198	.035	-0.2	0.1
	not assumed			-2.121	183.342	.035	-0.2	0.1
Op. Marg. 10y Av.	Equal variances	1.073	.302	-.175	198	.862	-0.7	4.2
	not assumed			-.175	197.852	.862	-0.7	4.2
Employee 10y-Av.	Equal variances	22.161	.000	2.417	196	.017	18706.7	7738.9
	not assumed			2.441	100.592	.016	18706.7	7662.0
Rev./Employ.10y-Av.	Equal variances	5.510	.020	1.800	196	.073	347.1	192.8
	not assumed			1.817	109.495	.072	347.1	191.1
Acqui/Rev Ratio	Equal variances	7.302	.007	1.443	198	.151	0.012	0.008
	not assumed			1.443	132.487	.151	0.012	0.008

Source: Own calculation, SPSS output table; n = 200.

Most of the abovementioned differences refer to firm size effects, such as the volume of PPE, intangible assets, operating expenditures, operating income, etc. The larger the company, the higher are expenditures as well as the volume of all assets. The highly significant difference concerning debt-to-equity ratio with p = 0.00 is self-explaining when comparing a high-debt-financed and a high-equity-financed group. The same is true for highly significant difference in terms of ROE (p = 0.013 with highly debt-financed group ROE mean of -11 and high-equity-financed group ROE mean of 7) because the higher the debt share in the total capital, the lower is the ROE because interest expenses (debt costs) diminishes the net

income and, thus, the ROE[5] (Hawawini & Viallet, 2011, p. 151). This also applies to the ROA.[6] To sum up, the t-Test has not provided clear results in examining the differences in both groups. Therefore, a logistic regression is conducted to find further evidence.

4.3 Causal Explanation of Group Differences between Capital-Structure-Groups (Logistic Regression)

The binomial logistic regression analysis is used to check whether a relationship exists between a dependent binary variable and one or more independent variables. In contrast, the multiple regression analysis, the dependent variable is binary. In this case, the high-debt group was coded as 1 (. > 51.7% debt share) and the high-equity group as 2 (< 8.15% debt share) (cp. with debt-to-capital ratios in

Table 15 and Table 16). Concerning the independent variables, the requirements for a logistic regression are that the predictors are interval-scaled or nominal-scaled, whereby every variable of the variables set meets this requirement.

The goodness-of-fit test of the models generated through the logistic regression applying the forward selection procedure shows that Model 2 (Step 2) should be accepted as the final model (see table 18).

Step 3 shows a p-value > 0.05 so that some interactions between variables or non-linearities must be assumed in the case of Model 3. Consequently, Model 2 (in Table 18 and Table 19 *Step 2*) is the final model for explaining differences between both groups.

[5] The return on equity is calculated as ROE = Net Income/Shareholder's Equity.
[6] The return on assets is calculated as ROA = Net Income/Total Assets.

Table 18. Hosmer-Lemeshow-Test of the Logistic Regression (High-Debt-Financed Group and High-Equity-Financed Group)

Step	Chi-square	df	Sig.
1	6.610	8	.579
2	4.156	8	.843
3	25.964	8	.001
4	95.747	8	.000
5	55.591	8	.000

Source: Own calculation, SPSS output table; n = 200.

Cox & Snell's R^2 is based on the log-likelihood comparison. However, the theoretical maximum value of this test is less than 1, even for a 'perfect' model. Therefore, Nagelkerke has developed an alternative procedure to cover the full range from 0 to 1 (Menard, 2002, p. 25). Nagelkerke's R-Square is the adjusted version of the Cox & Snell R-Square Test and is used here to determine the explanatory power of the final model, which is model 2 with $r^2 = 0.234$ (see Table 19) indicating that both variables—total asset growth and the amount of total assets (see table 20) predicts the group membership with 23%.

Table 19. Logistic Regression Explaining Debt-to-Capital Ratio (High-Debt-Financed Group vs. High-Equity-Financed Group)

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	132.888[a]	.112	.149
2	125.050[b]	.176	.234
3	101.553[c]	.341	.455
4	59.402[c]	.559	.746
5	61.526[c]	.550	.734

a. Estimation terminated at iteration number 4

b. Estimation terminated at iteration number 6

c. Estimation terminated at iteration number 13

Source: Own calculation, SPSS output table; n = 200.

This means that differences in investment behavior in terms of assets growth and the amount of total assets explains the debt-to-capital ratio, although the amount of total assets is not a statistically significant with p = 0.229 (see table 20).

Table 20. Variables in the Regression Model Explaining Debt-to-Capital Ratio

		B	S.E.	Wald	df	Sig.	Exp(B)	EXP(B)	
								Lower	Upper
Step 1	Tot.Ass.10y-Growth	.095	.031	9.628	1	.002	1.100	1.036	1.168
	Constant	-.452	.266	2.894	1	.089	.636		
Step 2	Tot.Ass.10y-Growth	.092	.031	8.622	1	.003	1.096	1.031	1.166
	Tot.Ass.10yAv	.000	.000	1.447	1	.229	1.000	1.000	1.000
	Constant	-.259	.276	.881	1	.348	.772		
Step 3	Tot.Ass.10yGrowth	.080	.034	5.706	1	.017	1.084	1.015	1.157
	Tot.Ass.10yAv	.000	.000	6.742	1	.009	1.000	1.000	1.000
	Work.Cap.10yAv	.000	.000	8.336	1	.004	1.000	1.000	1.000
	Constant	-.276	.306	.813	1	.367	.759		

Source: Own calculation, SPSS output table; n = 200.

Total assets capture the amount of all gross investments (the amount invested in business assets not accounting for any depreciation), cash and equivalents, receivables and other assets reported in the balance sheet (Vause, 2005, p. 122). Therefore, at first glance, it seems to be difficult to really explain which of the mentioned sub-factors explains the growth in assets and thus the debt-to-capital ratio. However, logical reasoning leads to the assumption that companies do not, for example, use debt capital to accumulate cash but for investing in tangible and intangible assets.

Based on these indications, it could be concluded that low or negative growth, respectively, is associated with higher debt financing. But to gain a clear understanding of this finding, multiple regressions with the dependent variable *debt-to-capital ratio* are conducted, presented and discussed in the following sections.

4.4 Debt-to-Capital Ratio Regression of the Capital-Structure Groups

The analysis among the high-debt-financed group provides the reasons for using debt capital. The operation-income-to-capital ratio shows a strong negative relationship with the dependent variable (see Beta values in and R Square Table 22) and a weak but positive effect on the debt-to-capital ratio (see model 1 in Table 21).

Table 21. Regression Analysis Model Summary (High-Debt-Financed Group)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.802[a]	.643	.638	19.889	.643	113.679	1	63	.000	
2	.848[b]	.719	.710	17.806	.075	16.606	1	62	.000	
3	.859[c]	.738	.725	17.333	.019	4.430	1	61	.039	.915

a. Predictors: (Constant), Op.Inc./Cap. Ratio 10y-Av.

b. Predictors: (Constant), Op.Inc./Cap. Ratio 10y-Av., ROIC 10y-Av.

c. Predictors: (Constant), Op.Inc./Cap. Ratio 10y-Av., ROIC 10y-Av., Ass. Turnov. 10y-Av.

d. Dependent Variable: Debt % Cap. 10y-Av.

Source: Own calculation, SPSS output table; n = 100.

Table 22. Coefficients and Collinearity Diagnostics of the Regression Analysis (High-Debt-Financed Group)

Model		Unstandardized Coefficients		Std. Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	70.847	2.467		28.718	.000		
	Op.Inc./Cap. Ratio 10y-Av.	-.774	.073	-.802	-10.662	.000	1.000	1.000
2	(Constant)	69.106	2.249		30.721	.000		
	Op.Inc./Cap. Ratio 10y-Av.	-.743	.065	-.770	-11.348	.000	.986	1.014
	ROIC 10y-Av.	.568	.140	.276	4.075	.000	.986	1.014
3	(Constant)	62.710	3.746		16.741	.000		
	Op.Inc./Cap. Ratio 10y-Av.	-.754	.064	-.781	-11.794	.000	.979	1.021
	ROIC 10y-Av.	.562	.136	.273	4.140	.000	.986	1.015
	Ass. Turnov. 10y-Av.	6.854	3.257	.138	2.105	.039	.993	1.007

a. Dependent Variable: Debt % Cap. 10y-Av.

Source: Own calculation, SPSS output table; n = 100.

However, the Durbin-Watson test shows a value slightly beyond the acceptable range of $1.5 < d < 2.5$ (see Table 21), so that it must be stated that weak auto-correlation effects may exist between the predictors in all models. Therefore, the multiple regression's result must be considered, on the one hand, as not very, but sufficiently robust. Yet, on the other hand, even the final model (model 3) show high tolerance values (>0.979) and low VIF values (<1.02), indicating a low level of collinearity risks and thus a certain structural validity of the final model (see Table 22).

The main predictor of the final model (model 3), as mentioned, is the operation-income-to-capital ratio ($r = 0.802$; $p = 0.000$; $B = -0.774$; see table 21 and table 22). This means that, when the operating-income-to-total-capital ratio decreases, the debt-to-capital ratio increases. The relationship is strong ($r = 0.802$) and statistically significant ($p = 0.000$). The operating-income-to-total-capital ratio becomes smaller when the operating income decreases with constant total capital. The indicator expresses the efficiency with which the total capital is transformed into operating income. The ratio is equal to 1 when, from each EUR of total capital, 1 EUR of operating income is generated. If only EUR 0.5 is generated from 1 EUR of total capital invested, the ratio decreases to 0.5.

The Beta (B) indicates a negative correlation. This means that, the lower the ratio the higher is the share of debt in the total capital. This, in turn, means that the lower the operating income generated from the total capital invested, the higher is the debt share. Therefore, it can be stated concerning the capital structure decision that the management increasingly uses debt capital in the case of decreasing efficiency in the capital allocation. This result converge with the results of the logistic regression discussed in section 4.3. Here, it was assumed that the results of the logistic regression are indications for low and negative firm growth, respectively, being associated with higher debt financing. Therefore, it can be concluded that higher debt financing is an indication for performance failure.

The result of the Durbin-Watson test suggests a low but negligible risk of autocorrelations between the variables included in the regression. However, the p-value of the final model remains below the significance level of $p < 0.05$ ($p = 0.039$; see table 22) after the last significant variable of the model is entered, so that it can be concluded that the model is nevertheless highly significant. Furthermore, it can

be stated that the explanatory power of the final model (model 3) is R^2 = 0.725, while one single variable explains 64% (R^2 (adjusted) = 0.638; p = 0.00) of the dependent variable's manifestation. Both other variables increase the final model's explanatory power by an additional 9% only. Consequently, it can be concluded that the main reason for debt financing is a low profitability of capital employed and a low asset turnover, because the relation between asset turnover and debt-to-capital ratio shows a positive Beta, indicating that the higher the debt share, the higher is the asset turnover ratio, meaning an increasing period for generating revenue from the assets employed.[7]

Low asset turnover is often associated with low margins, which explains also the positive effect relation between debt share and the ROIC (see the Beta (B) value in Table 22) which seems to be, at first glance, counter-intuitive, because it could rather be assumed that the higher the capital allocation efficiency in terms of a higher ROIC, the lower is the debt financing demand. However, this a calculative effect. The ROIC is calculate as EBIT divided by invested capital. Shearn (2012, p. 130) argues that two companies with the same EBIT show differences concerning the ROIC due to differences in the asset turnover ratio. The lower the asset turnover ratio, the lower is also the profit margin. Consequently, the ROIC reflects, in the context of the high-debt-financed companies, only the same as the decrease in the operating income. Furthermore, the t-Test has shown a highly significant difference in terms of operating income growth (p = 0.03) and the ROIC (p = 0.039) see table 17).

Finally, a regression analysis is conducted to explain the debt-to-capital ratio in the high-equity-financed group. The regression analysis generates only a single valid model with a low explanatory power of R^2(adjusted) = 0.13 (see table 23), which means that the expression of the dependent variable is explained be only one variable (*Net Acqui. 10y-Av.*), while the final model provides an explanatory power of 13%. All other variables are excluded due insignificance or collinearity effects.

[7] The asset turnover formula is: Asset Turnover = Revenue / Average Total Assets

Table 23. Regression Analysis Model Summary (High-Equity-Financed Group)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.363[a]	.132	.119	2.657	.132	10.192	1	67	.002	.291

a. Predictors: (Constant), Net. Acqui. 10y-Av.

b. Dependent Variable: Debt % Cap. 10y-Av.

Source: Own calculation, SPSS output table; n = 100.

Table 24. Coefficients and Collinearity Diagnostics of the Regression Analysis (High-Equity-Financed Group)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Error	Beta			Tolerance	VIF
1	(Constant)	2.617	.339		7.723	.000		
	Net. Acqui. 10y-Av.	.000	.000	.363	3.192	.002	1.000	1.000

a. Dependent Variable: Debt % Cap. 10y-Av.

Source: Own calculation, SPSS output table; n = 100.

This result is not surprising due to the low variance of the debt-to-capital ratio in the high-equity-financed group within the range of -8% to 6% (see Table 15), while the variance in the high-debt-financed group ranges from 52% to 352% (see Table 16). Hence, the variable's variance is low, the covariance with independent variables is less likely and, therefore, also significant correlations particularly in the case of widely varying values.

Furthermore, the Durbin-Watson test shows a value beyond the acceptable range of 1.5 < d < 2.5 (see table 23) so that it must be stated that there may exist an auto-correlation issue. Therefore, the final model should be considered as not very

robust. However, besides these statistical issues, the relevance of this test should not be seen in the measurable relationship between both variables but in the fact that all other performance and decisions indicators have not shown any significant correlation with the capital structure. Therefore, it could be assumed, on the one hand, that companies with a high level of equity use debt financing mainly for financing external growth. On the other hand, it can be assumed that there are no other 'reasons' for a higher debt share in the capital structure in the high-equity-financed group.

5. Discussion, Conclusions, and Recommendations

5.1 Summary of Results

5.1.1 Sample

The sample analysis revealed an average debt capital share of 32.7% and no abnormalities concerning the data distribution of the debt-to-capital values. The sample was compared to the basic population concluding that the average sample company has an above-average equity ratio, so that the average sample company uses more equity-financed than the basic population. This finding was discussed in the context of the Modigliani-Miller theorem. It was argued that this sample should show rather a higher debt financing ratio because listed companies are under strong supervision by shareholders targeting on the maximum return on investment so that the companies in this sample should be stronger debt-financed than limited companies representing the majority of the basic population. Therefore, the debt-to-capital values in this sample should not be normally distributed but right-skewed because listed companies should tend to have higher debt-to-capital ratios than the basic population. To explain this deviation from this expected result, it was argued in line with some prior studies that capital structure decisions are more dependent on the firm-specific strategic situation. Therefore, the subsequent test examined different groups distinguished by their growth rates and debt-to-capital ratios.

Furthermore, it was determined that this sample is highly comparably in its key firm performance indicators with the S&P 500. It was, therefore, concluded that this sample can be considered as representative for larger Western economies in the

‘IFRS or US-GAAP area’. Due to the fact that this sample includes not only companies from a larger industrial country (Germany) but also from smaller countries (Switzerland and Austria), the sample was representative for the ‘average’ Western ‘late-industrial’ economy, whereas ‘late-industrial’ means economies with a disproportional higher share of non-manufacturing companies, which also became evident in examining the constituents (included companies) of the high-growth group.

5.1.2 Growth Groups

The group definition was similar to the definition of high-growth of the OECD (2000) also used by the mentioned other empirical studies defining high growth as revenue CAGR of > 20% in terms of the over a three-year period. However, this research has applied a stricter threshold with a revenue AAGR of > 20% over the ten-year observation period. The group statistics have shown that high-growth firms are much smaller than other companies but are much more knowledge-intensive indicated by considerably higher R&D expenditures. Furthermore, they are not more profitable than the sample’s average company.

The analysis of this group has revealed that high-growth firms generally are not higher debt-financed than other companies. On the contrary, it was found that high-growth firms prefer rather internal than external funding. If one assumes, in the context of Modigliani-Miller theorem, that growth companies should have more opportunities for profitable investment than slow- or no-growth companies, it must be expected that a positive link between debt financing and firm growth exists. This should be also more valid for listed company, since they generally have more pressure finding profitable business opportunities because of the shareholder’s interest in return on investment maximization. However, this research shows that growth companies tend to be financed more conservative, which is in line with some prior research cited.

5.1.3 Capital-Structure Groups

Concerning the high-equity-financed companies, it was found that the top-100 companies of this sample are mainly technology-intensive companies, in contrast to

the sample as well as to the high-debt-financed group. Compared with the sample, the high-equity-financed companies group have shown almost equal growth rates, while the profitability ratios as well as asset turnover ratios, other asset's growth ratios as well as the operating expenses/revenue ratio have shown only small differences. However, concerning firm size, it was determined that the average high-equity-financed company accounts for only one quarter of the sample's average firm, while the debt-to-capital ratio average is significantly below the sample level (one-tenth of the sample).

It is further found that the high-equity-financed companies group's average ROIC is almost twice that of the sample, interpreted as indication for that high-equity-financed companies are companies using their total capital more efficient. In the context of the Modigliani-Miller theorem, it was expected that a positive relationship between debt-to-capital ratio and capital efficiency exists. However, the discussed results indicate that the contrary is valid.

Concerning the high-debt-financed companies, it was found that, in comparison with high-equity-financed companies, firm growth is not an explanation for capital structure differences, supporting the findings of the high-growth firms' group analysis. Instead, evidence was found in the high-debt-financed companies group, that inefficiencies in operations explain capital structure differences. The t-Test comparing both capital-structure groups has shown highly significant difference in terms of ROE resulting from a higher debt share in the total capital as a result of higher interest expenses (debt costs), diminishing the net income and thus the ROE and also the ROA. Furthermore, the logistic regression for examining capital structure group differences has led to the presumption that low or negative growth, respectively, is associated with higher debt financing, which was further investigated through a multiple regression within both groups on the *debt-to-capital ratio*. The multiple regression of the high-debt-financed group has confirmed the assumption that debt financing results from bad firm performance. It was found that debt financing linked to low margins and profitability as well as low asset turnover. In contrast to this finding, the regression analysis within the high-equity-financed group has provided evidence that companies showing a high level of equity use debt financing mainly for financing external growth. Hence, it can be expected that capital structure decisions depend on the strategic context of decision-making: Defensive strategies resulting from low performance lead to debt financing of low

performance, while offensive (growth) strategies are financed with debt capital, even in the case of high-equity companies.

5.2 Conclusions and Recommendations

5.2.1 Empirical Conclusion

Consequently, it can be concluded concerning research question RQ1 (Can differences in firm growth behaviour explain investment behaviour and capital structure differences?) that, firstly, firm growth differences alone do not explain capital structure differences. However, secondly, the investment behaviour may explain in part capital structure differences but only in the context of specific business model. It was found, on the one hand, that high-growth firms are active research-intensive industries. On the other hand, it was found that high-equity-financed companies can be distinguished from high-debt-financed companies by their a higher research intensity. Yet, it must be considered that, in comparing both capital structure groups, the cause-effect relationship remains unclear because the low research intensity in the case of the high-debt group may be result of business model differences but can also be a result of financial crisis. However, both characteristics refer to a firm's positioning strategy and business model, respectively, as well as on the specific financial and strategic situation of the firm, respectively. Therefore, the conclusion may be the same, independent from the cause-relationship issue: The capital-structure decision is the result of strategic decisions.

Concerning research question RQ2 (How can capital structure differences be explained?), the conclusion is obvious. Companies with a low operating performance tend to increase debt share while growth companies and high-equity companies do not. Obviously, capital structure decisions are not made in the context of firm growth or a growth strategy, as it should be expected if one follows the pecking-order theory.

Growth companies dispose over higher internal funding opportunities from the incoming cash flow. As discussed in Chapter 2, the pecking-order theory implies that companies prioritize their sources of funding on the principle of least effort or the lowest resistance, so that managers can rely on internal funding, which is

associated with more or less no resistance from the supervisory board. This is particularly evident in the case of high-growth firms because growth can be financed by increasingly incoming cash flow. Therefore, expanding companies can be and are very conservative concerning external funding and debt-making. Additionally, based on the expectations of the financial market theory, the firm value will also increase with a conservative capital structure policy in terms of market performance and, thus, in terms of firm value increase because a higher debt share increases bankruptcy risks (Prasad et al., 2005, p. 371).

From the Modigliani-Miller perspective, the inclusion of debt financing in investment decisions is rational as long as the future cash flow is higher than the costs of capital. However, the problem is that future cash flow is only based on estimations on future cash flows, so that the investment calculation itself is risky, while the risk increases with debt capital due to contract risks, changes in interest rates, and smaller margins. Therefore, it is much more rational that the management acts according to the pecking-order theory to avoid future calculator risks.

Instead, debt increase seems to be more a sign of increasing problems of a company. This study has provided some evidence that debt increase is associated with operating inefficiencies, while growth companies' managers must not be interested in additional capital, because it can be expected that they are more engaged in organizing business processes of a growing organization, so that it less risky to grow step-by-step without exceeding the company's growth capacities. Thus, following the pecking-order approach, managers act rational in their perspective as well as in the interest of shareholders by reducing calculatory and overstretching risks or growth pains, respectively, which leads to additional issues concerning the interaction between corporate lifecycle stages and capital structure decisions.

5.2.2 Theoretical Conclusions

Based on the reflections above, it is argued that the optimal capital structure concept may be of theoretical value but remains only of limited value concerning financial decision-making. This research has shown that particularly the strategic positioning as well as the strategic situation are key factors of success: (1) When a company follows a growth strategy or can at least take growth opportunities, the problem is not how to finance additional growth but organizing the growth process while cash without interest costs is available; (2) however, when a company has to deal with operational problems management tends to fall back on debt capital, whereas it can be expected that this is the case in situations where inefficiencies may exist unresolved over a longer time, so that—from the shareholder perspective—not only the bankruptcy risk increases but also the question of if additional debt capital is the right solution. This implies, from the theoretical viewpoint, that firm strategy, the firm-specific strategic situation and the corporate lifecycle stage should be issues of future research.

Concerning the existing main capital structure theories, the result of this research supports the overall view of the pecking-order theory; but without its negative connotations of the management rationale. A ‘positive’ pecking order theory would more discuss the issues in the context of the firm-specific strategic situation or strategy, respectively, instead of convenience and exploitation of asymmetric information on the shareholders’ expense. Rather, it could be expected in the sense of sustainable growth and responsible stewardship that pecking order expresses risk aversion. It may be that such behaviour may impose opportunity costs for shareholders. However, at the bottom line, it is the management which will be held responsible in the case of failures and not the dispersed ownership of listed companies. Fast growth imposes higher risks, for which the management is, in the worst case, fully personally liable. And, vice versa, in the sense of a ‘negative’ pecking-order theory, it should be also examined in future research if particularly operational inefficiencies are not better explaining the capital structure. Consequently, increasing debt capital is a contra-indicator to determine the efficiency of capital allocation decisions and management efficiency but an indicator of bad-performing management preferring debt capital instead of increasing the operational efficiency or deciding to disinvest from non-performing businesses.

5.3 Management and Governance Recommendations

The main management recommendations can be derived from the results of examining the sample's high-growth firms. Here, it was found that M&A activities are not relevant for firm growth. Instead, it seems that organic growth with step-by-step extension of the firm-specific resources in terms of tangible and intangible assets is the 'main route' to corporate success. Extensive use of capital, in particular debt capital, should not be considered to avoid calculatory risks arising from overshooting growth. On the contrary, operation efficiency and steady moderate growth in terms of 50% to 60% revenue growth should be pursued, while the operating income growth should be some 10 percentage points higher than the revenue growth (see Table 12).

However, the overall conclusion of this research provides even more recommendations for the supervisory board. Here, it can be said that a rising debt capital should always be an indicator of increased monitoring activities and closer management relationships. On the one hand, a rising debt capital may be even an indicator of capital allocation efficiency but–on the other hand–, in every case, increases risks of growth pains or miscalculations in terms of empire-building temptations. And, in the context of low-performing businesses, the supervisory board is very much more required in questioning and monitoring the operational efficiency and the success relevance of the existing businesses. Therefore, it can be finally reasoned that transcending the average debt-to-capital ratio of 10 to 30 (see Table 8 and Table 12) as well as the fall below this benchmark are signs for increased attentiveness, whereas these benchmarks may be different in other countries or other times due to different external determinants such as interest rates, business cycles, and other externalities.

5.4 Limitations and Research Recommendations

As it was argued in several sections of this research, this study has fulfilled in general the requirements of the statistical tests applied. Additionally, the comparison with the German basic population and the S&P 500 has provided evidence concerning the representativeness of this sample. Therefore, it may be concluded that this research has produced representative results based on measures and indicators widely used in prior research but exceeds many studies in

the number of different variables included and the period of time. Furthermore, the cross-country sample approach has allowed to increase the number of cases and the variety of companies, whereby the selection of countries with comparable regulations and affiliation to a single currency area or a currency assigned to this area excludes external macroeconomic, regulatory and other comparable effects.

It may be the case that, on the one hand, an even longer research period would generate different results. But, on the other hand, the data preparation has shown that the extension of the research period would lead to the risk of shrinking data sets because a lot of companies had to be incorporated or extinguished in the ten-year period alone. Additionally, a longer research period may also pose the problem of being subject to a longevity bias in the sense that it is likely that only companies with a sustainable strategic advantage prevail in such samples.

However, the main recommendation remains concerning strategy management: Capital structure decisions must be examined in the context of the strategic situation and the selected strategy of the firm. This study has revealed that the strategic situation of companies must be considered as an explanatory factor. However, this means that qualitative data must be collected and interpreted to define strategy groups, which can be converted into a coding procedure to gather quantitative data to be analysed with other numerical data by statistical methods.

Annex

Table 25. Key Indicators of the High-Equity-Financed Group

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
AIXTRON SE	19.4	285,444	397	0.0
CO.DON AG	27.9	1,542	3	0.0
DAHLBUSCH AG	78.4	100	-503	0.0
NTT COM SECURITY	6.4	162,057	28	0.0
ZOO BERLIN	6.9	14,230	14	0.0
MUENCHENER TIERPARK	5.2	8,822	3	0.0
FORST EBNATH AG	24.6	1,936	11	0.0
CYCOS AG	-3.1	16,157	22	0.0
FHW NEUKOELLN	6.1	22,796	5	0.0
HIGHLIGHT EVENT AND	3.8	7,930	-15	0.1
FORTEC ELEKTRONIK	4.7	40,568	31	0.1
ZEAG ENERGIE AG	8.2	121,974	-4	0.1
MORPHOSYS AG	22.5	59,648	122	0.1
BERTHOLD HERMLE AG	13.9	211,815	52	0.1
MICRONAS SEM	-12.0	509,883	0	0.1
DINKELACKER	-14.8	22,113	581	0.2
DOCCHECK AG	3.6	14,915	46	0.2
PIRONET NDH AG	10.2	46,441	-26	0.2
SOFTLINE AG	138.6	21,800	3	0.3
WESTAG & GETALIT AG	3.5	204,412	16	0.3
TIPP24 AG	27.6	71,909	218	0.4
ATOSS SOFTWARE AG	4.4	27,045	41	0.4
ALLGAEUER BRAUHAUS	1.1	22,808	-206	0.4
MOLOGEN AG	97.0	874	1,449	0.4
CREALOGIX HOLDING	15.5	49,019	79	0.5

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
USU SOFTWARE AG	11.6	34,015	156	0.5
MUEHLBAUER HOLDING A	8.6	171,022	54	0.5
P&I PERSONAL & INFO	8.1	57,401	25	0.5
NORCOM AG	0.0	26,567	191	0.5
JOST AG	15.5	1,158		0.5
ALLGEM GOLD & SILBER	13.9	892,350	13	0.6
SCHULTE SCHLAGBAUM	2.6	35,687	-55	0.6
LECHWERKE AG	13.4	1,308,963	20	0.7
BIJOU BRIGITTE AG	8.9	330,939	6	0.7
GOING PUBLIC MEDIA	8.0	2,210	207	0.7
DESIGN HOTELS AG	12.7	8,388	-214	0.7
PLENUM AG	-10.5	22,228	-58	0.8
SECUNET SECURITY NET	13.4	48,775	95	0.9
RENK AG	7.0	398,744	16	0.9
VSM-VEREINIGTE SCHMI	2.8	114,527	38	1.0
CONZZETA AG	3.9	1,166,140	15	1.0
NEXUS AG	18.2	37,838	-179	1.1
LEIFHEIT	-3.8	266,525	46	1.5
SOFTSHIP AG	10.3	6,897		1.7
GELSENWASSER AG	11.8	650,409	16	1.8
TRIPLAN AG	6.8	37,679	-5	1.9
NUCLETRON ELECTRONIC	-0.7	16,392	111	2.1
MAGIX AG	6.2	30,806	-39	2.2
INFICON HOLDING AG	3.4	252,685	182	2.2

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
PANALPINA WEL	3.6	6,976,185	96	2.2
TELEGATE AG	-5.3	139,925	4	2.2
HUBER UND SUHNER AG	3.9	673,134	135	2.5
VISCOM AG	12.4	44,939	33	2.5
SCHWEITER TECH AG	61.3	470,329	41	2.6
MEDION AG	-4.4	1,873,532	-335	2.8
GFT TECHNOLOGIES AG	8.4	207,270	-50	2.8
FIELMANN AG	4.0	908,013	24	2.8
SIMONA AG	6.3	259,343	28	2.8
KRONES AG	7.6	2,100,100	84	3.4
PUMA SE	9.5	2,389,166	0	3.6
ARTEC TECH	5.8	1,977		4.1
SOFTING AG	11.4	31,557	-95	4.2
BACHEM HOLDING	2.1	165,428	-31	4.4
EPIGENOMICS AG	-8.3	4,279	5	4.5
CENIT SYSTEMHAUS	5.6	89,795	32	4.6
MASCHINEN. HEID AG	16.5	1,025	-95	4.6
PSI AG	2.8	142,807	-26	4.8
MOBILEZONE HOLDING	0.8	299,968	66	4.8
CCR LOGISTICS	14.0	55,072	66	4.9
DR. HOENLE AG	18.0	43,500	-21	5.0
SNP SCHNEIDER	16.4	17,708	18	5.2
ERLUS AG	2.6	103,379	-116	5.4
AUDI AG	8.3	34,680,456	47	5.4
STRAUMANN HOLDING AG	7.6	627,186	4	5.6
EQUITYSTORY AG	44.3	8,001	255	5.6
KHD HUMBOLDT	17.1	237,772	-64	5.8

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
WEDAG				
LINZ TEXTIL HOLDING	-1.5	150,400	-21	6.0
BEIERSDORF AG	2.9	5,486,273	6	6.0
ARTNET AG	10.8	10,359	272	6.1
REALITY CAPITAL PART	36.7	427	-10	6.1
IFA SYSTEMS AG	6.9	5,660	45	6.2
INIT AG	13.1	60,633	47	6.2
AMIRA VERWALTUNGS AG	31.6	5,978	26	6.3
REALTECH AG	-2.5	52,155	61	6.3
DIALOG SEMICOND	28.0	238,116	-81	6.6
KWS SAAT AG	10.6	678,683	14	6.6
BB BIOTECH AG	-33.3	91,908	-133	6.7
ROMANDE ENERGIE	2.5	523,305	30	6.7
PFEIFFER VACUUM TECH	15.9	256,487	12	6.7
WMF AG	6.0	793,902	25	6.8
LOGITECH INTERNAT	2.9	2,134,407	-11	7.2
SEVEN PRINCIPLES AG	31.7	57,689	-164	7.3
THE SWATCH GROUP	8.5	5,684,273	15	7.4
ACINO HOLDING AG	11.1	226,271	-372	7.5
DELTICOM AG	27.7	280,778	35	7.5
INTERSHOP COMMUNICAT	10.0	32,530	-55	7.5
METALL ZUG AG	6.9	694,312	26	7.6
TAMEDIA AG	7.3	800,583	-16	7.7
BECHTLE AG	11.7	1,505,526	17	7.7
CURASAN AG	-3.8	6,948	25	7.7

Source: Own calculation; Data: Thomson One.

Table 26. Key Indicators of the High-Debt-Financed Group

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
TELES AG INFO TECH	-13.3	29,444	-55	352.2
ALNO	0.0	516,891	183	174.9
VIVANCO GRUPPE AG	-3.2	99,174	76	127.3
GIRINDUS AG	-20.6	16,849	-3	119.0
HUMANOPTICS AG	1.8	7,142	-23	97.9
RHI AG	4.4	1,477,855	9	94.2
DEUTSCHE REAL ESTATE	-4.0	36,300	250	91.7
SCHALTBAU HOLDING AG	5.9	272,115	24	90.1
MATERNUS-KLINIKEN AG	-9.2	107,575	-42	89.8
GRENKELEASING AG	4.1	636,562	12	81.5
INFRANOR INTER AG	-2.5	57,149	-30	81.2
HTI HIGH TECH	8.7	134,069	-174	80.9
BRUDER MANNE	-1.2	76,774	45	80.0
AGROB IMMOBILIEN	2.9	10,583	16	79.4
PERROT DUVAL HOLDING	-2.9	65,564		77.7
SW STOISER & WOLSCHN	-2.2	79,339	-26	77.5
BREMER STRASSENBAHN	3.2	78,194	-1	77.2
ZAPF CREATION AG	-12.0	106,453	-2,609	76.1
AIR BERLIN PLC	18.4	2,752,241	-84	76.0
GAG IMMOBILIEN AG	-1.1	318,171	5	75.6
WARIMPEX FINANZ	7.3	73,214	-7	75.0
YOC AG	30.0	16,930	-755	75.0
COLONIA REAL	214.5	63,906	-238	73.5
FRANCOTYP POSTALIA	5.6	137,127	-444	73.4
WESTGRUND AG	52.4	8,860	283	72.9
DEUTSCHE STEINZEUG	-3.0	209,585	-121	72.5
ZUBLIN IMMOBILIEN	-3.0	100,607	-125	72.0
ENERGIEKONTOR	34.8	50,578	91	71.9

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
KOELN-DUESSELDORFER	3.3	23,880	103	71.2
ATB AUSTRIA ANTRIEB	10.1	299,241	-139	70.5
PORR AG	6.7	2,138,794	181	70.2
HIRSCH SERVO	5.9	80,142	-89	70.0
PATRIZIA IMMOBILIEN	135.5	194,517	411	69.7
TAG IMMOBILIEN AG	12.0	158,288	44	69.4
HALLOREN SCHOKOLA	19.4	50,111	-16	69.4
SIXT SE	-1.6	1,711,961	48	69.1
BAYER. MOTOREN WERKE	6.5	56,692,273	793	68.5
INTERCARD AG	13.7	7,470		68.3
SEDLBAUER	0.1	18,063	81	67.7
HAHN IMMOB	96.4	115,771	-297	67.5
UBM REALITAET	23.1	139,228	160	67.5
CURANUM AG	5.7	237,026		67.5
TELEKOM AUSTRIA AG	0.7	4,514,656	68	66.8
JOH. F. BEHRENS AG	-0.2	92,953	-67	66.0
ADM HAMBURG AG	-9.2	1,146,029	-35	65.5
DIC ASSET AG	37.0	105,578	105	65.5
PROSIEBENSAT.1 MEDIA	4.4	2,451,963		65.2
INDUS HOLDING AG	6.0	909,470	16	65.1
VBH HOLDING AG	1.5	743,462	58	65.0
VOLKSWAGEN AG	8.6	125,713,545	150	65.0
GREIFFENBERGER AG	3.1	143,826	343	64.9
DAIMLER AG	-0.2	117,333,091	-459	64.4
CUSTODIA HLD AG	22.9	17,824	-91	63.9
DIERIG HOLDING AG	-0.8	71,486	95	63.3
SPARKASSEN IMMOBIL	35.4	198,049	41	63.0
DEUTSCHE WOHNEN AG	17.2	299,180	67	63.0
MIFA MITTELDEUTSCHE	7.3	90,198	-215	63.0
RIM AG	-1.5	7,381	84	62.8

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
IFA HOTEL & TOURIST.	0.0	107,908	13	62.5
TUI AG	-0.1	18,602,126	-60	62.5
KABA HOLDING AG	0.4	1,061,709	3	62.4
INNOTEC TSS AG	5.2	67,789	26	62.3
CLOPPENBURG AUTOMOBI	11.8	414,132	-253	62.2
REGENBOGEN AG	4.6	10,493	17	62.2
BBI BURGERLICHES	0.8	17,448	85	62.0
PRIMAG AG	209.2	5,957	-73	61.3
RWE AG	2.0	45,812,636	4	61.2
PIPER GENERAL. AG	2.0	23,400		60.9
PNE WIND AG	15.8	83,001	-256	60.4
VTG AG	0.2	643,745	-20	59.4
SYMRISE AG	4.8	1,395,132	-11	58.6
BVZ HOLDING AG	3.0	118,457	-495	58.6
DEUTSCHE POST AG	4.1	51,583,455	-48	58.3
METRO AG	1.5	62,353,653		58.2
MARSEILLE-KLINIKEN	0.8	209,756	-105	57.9
BERLINER SYNCHRON AG	6.3	7,901	-80	57.5
BRILLIANT AG	1.3	61,640	-70	57.4
SWISS PRIME SITE	24.6	357,673	20	57.2
VERITAS AG	7.8	436,380	15	56.9
WASGAU PRODUKTIONS	0.1	481,993	27	56.6
HELMA EIGENHEIMBAU	26.9	65,109	-1	56.0
_WIGE MEDIA AG	0.0	35,671	-5,855	56.0
BAUER AG	9.2	1,026,988	17	55.6
MVV ENERGIE AG	9.8	2,780,796	14	55.5
EHLEBRACHT AG	4.4	64,534	21	55.3
IMW IMMOBILIEN SE	64.0	35,212	197	53.8
PELIKAN HOLDING AG	0.6	236,646	66	53.7
HASEN-IMMOBILIEN AG	84.1	45,087	29	53.5

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
INTERSHOP HOLDING AG	2.9	96,561	5	53.3
SKY DEUTSCHL	7.4	1,066,817	-37	53.3
SCHULER AG	11.5	791,086	-98	53.2
NABALTEC AG	11.8	90,980	-22	53.1
DEUTSCHE TELEKOM AG	0.8	60,260,455	9	53.1
SWISSCOM	-1.7	11,416,727	-2	53.0
SLOMAN NEPTUN AG	8.5	99,734	44	52.9
BOCHUM-GELSEN STRASS	2.8	93,517	0	52.8
COMPUGROUP HLDG	21.3	248,561	45	52.7
MCH GROUP AG	12.0	300,836	63	52.6
SOLARWORLD AG	24.5	653,232	-18	52.4
VK MUEHLEN AG	3.6	528,270	-323	51.8

Source: Own calculation; Data: Thomson One.

Table 27. Key Indicators of the High-Growth Companies Group

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
GROUP BUSINESS SOFT	308.7	14,082	-95	15.4
PAION AG	292.3	8,657	3,626	22.6
ADLER REAL ESTATE AG	283.1	14,553	2,078	34.4
COLONIA REAL	214.5	63,906	-238	73.5
PRIMAG AG	209.2	5,957	-73	61.3
ADVANCED INFLIGHT	174.5	81,959	-1	38.2
ENVITEC BIOGAS AG	148.0	111,061	177	23.7
SOFTLINE AG	138.6	21,800	3	0.3
KWG KOMMUNALE	137.9	15,610	-1,475	38.6
PATRIZIA IMMOBILIEN	135.5	194,517	411	69.7
AEVIS HOLDING SA	129.1	137,027	-55	32.4
AIROPACK TECHNOLOGY	112.3	313,380	-19	37.7
WIRECARD AG	107.9	200,740	-113	9.6
MOLOGEN AG	97.0	874	1,449	0.4
HAHN IMMOB	96.4	115,771	-297	67.5
GIGASET AG	84.1	1,279,293	73	34.8
HASEN-IMMOBILIEN AG	84.1	45,087	29	53.5
DAHLBUSCH AG	78.4	100	-503	0.0
HANSA GROUP AG	69.1	200,774	89	38.9
4SC AG	66.2	2,455	6	15.4
MS INDUSTRIE AG	65.7	113,763	102	46.0
IMW IMMOBILIEN SE	64.0	35,212	197	53.8
SCHWEITER TECH AG	61.3	470,329	41	2.6
TWINTEC AG	55.0	33,351	329	31.6
WESTGRUND AG	52.4	8,860	283	72.9
PERFECT HOLDING SA	50.0	21,646	25	22.0
MANZ AG	46.6	126,267	-443	26.8

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
PAX-ANLAGE AG	44.5	135,993	13	50.3
EQUITYSTORY AG	44.3	8,001	255	5.6
ADESSO AG	40.0	62,701	93	27.7
PHOENIX SOLAR AG	37.6	252,927	-3	20.7
DIC ASSET AG	37.0	105,578	105	65.5
REALITY CAPITAL PART	36.7	427	-10	6.1
IMMOFINANZ AG	36.4	641,510	149	49.3
ALLREAL HOLDING AG	35.8	532,382	10	49.7
SPARKASSEN IMMOBIL	35.4	198,049	41	63.0
ENERGIEKONTOR	34.8	50,578	91	71.9
SCHMOLZ&BICKENBACH	32.8	3,849,508	-25	50.5
INTICA SYSTEM	32.8	30,329	-193	27.4
SEVEN PRINCIPLES AG	31.7	57,689	-164	7.3
AMIRA VERWALTUNGS AG	31.6	5,978	26	6.3
CICOR TECHNOLOGIES	31.2	150,515	27	26.0
YOC AG	30.0	16,930	-755	75.0
CA IMMOBILIEN AG	29.5	215,248	31	46.0
FIRST SENSOR AG	29.4	46,454	-44	30.9
MME MOVIEMENT AG	29.3	79,806	-5	13.7
DIALOG SEMICOND	28.0	238,116	-81	6.6
CO.DON AG	27.9	1,542	3	0.0
DISKUS WERKE AG	27.9	92,711	317	39.2
DELTICOM AG	27.7	280,778	35	7.5
ENDOR AG	27.6	2,852	148	17.4
TIPP24 AG	27.6	71,909	218	0.4
MOBIMO HOLDING AG	27.5	181,039	67	47.5
KROMI LOGISTIK AG	26.9	32,505	16	12.4
HELMA EIGENHEIMBAU	26.9	65,109	-1	56.0
MYBET HOLDING	26.7	68,060	-203	24.0

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
H&R AG	24.6	861,825	151	43.2
AURUBIS AG	24.6	7,631,729	-137	29.5
SWISS PRIME SITE	24.6	357,673	20	57.2
FORST EBNATH AG	24.6	1,936	11	0.0
NORDEX SE	24.6	792,640	-30	30.5
SOLARWORLD AG	24.5	653,232	-18	52.4
REPOWER AG	24.4	1,665,907	-2	34.3
OHB TECHNOLOGY AG	23.3	320,628	29	19.0
UBM REALITAET	23.1	139,228	160	67.5
CUSTODIA HLD AG	22.9	17,824	-91	63.9
ALEO SOLAR AG	22.6	250,710	94	21.7
F24 AG	22.6	2,756	-186	13.5
MORPHOSYS AG	22.5	59,648	122	0.1
CENTROTEC SUSTAIN	21.9	384,133	11	45.9
DESIGN BAU AG	21.8	19,132	16	47.4
HPI AG	21.8	113,145	18	23.5
DO & CO AG	21.8	294,478	-29	12.2
UNITED INTERNET AG	21.7	1,531,199	21	43.0
COMPUGROUP HLDG	21.3	248,561	45	52.7
OMV AG	21.3	23,456,108	21	28.4
ACTELION AG	21.0	1,290,120	32	35.1
ALSO HOLDING AG	20.2	4,345,836	24	39.3

Source: Own calculation; Data: Thomson One.

Table 28. Key Indicators of the Sample ranked by Firm Size (Revenue 10y-Aver.)

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
VOLKSWAGEN AG	8.6	125,713,545	150	65.0
DAIMLER AG	-0.2	117,333,091	-459	64.4
NESTLE SA	0.9	95,901,727	5	31.8
E.ON SE	11.7	81,908,909	1	36.0
SIEMENS AG	0.5	76,569,727	13	36.4
METRO AG	1.5	62,353,653		58.2
DEUTSCHE TELEKOM AG	0.8	60,260,455	9	53.1
BASF SE	9.1	57,024,791	13	32.1
BAYER. MOTOREN WERKE	6.5	56,692,273	793	68.5
DEUTSCHE POST AG	4.1	51,583,455	-48	58.3
RWE AG	2.0	45,812,636	4	61.2
NOVARTIS	5.2	45,746,378	2	18.3
THYSSENKRUPP AG	1.2	43,185,455	-48	41.1
ROCHE HOLDING AG	4.4	42,102,636	14	39.4
AUDI AG	8.3	34,680,456	47	5.4
BAYER AG	3.7	32,969,818	53	42.1
ABB LTD	4.6	32,464,449	16	33.4
ADECCO	0.5	27,261,495	8	36.5
OMV AG	21.3	23,456,108	21	28.4
DEUTSCHE LUFTHANSA	6.8	23,330,000	348	44.5
CONTINENTAL AG	12.3	21,493,527	28	50.1
CELESIO AG	1.5	21,400,931	1	46.1
HOLCIM LTD	5.8	20,477,545	4	45.7
TUI AG	-0.1	18,602,126	-60	62.5
HOCHTIEF	9.5	18,183,870	-23	42.7
ENBW ENERGIE BADEN	7.1	15,191,682	470	51.4
MAN SE	1.1	14,748,909	97	32.2

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
EVONIK INDUSTRIES AG	1.1	14,603,518	2	45.5
KUEHNE & NAGEL	9.6	14,495,936	12	10.5
HENKEL AG	5.8	13,552,909	15	34.9
FRESENIUS SE	11.6	13,041,455	15	47.6
LINDE AG	6.9	12,283,909	16	43.9
SWISSCOM	-1.7	11,416,727	-2	53.0
SAP AG	9.3	11,333,423	10	13.2
SYNGENTA AG	4.7	11,280,839	8	26.8
ALPIQ HOLDING AG	7.6	11,104,545	12	46.2
HEIDELBERGCEMENT AG	9.0	10,829,436	28	47.1
ADIDAS AG	9.7	10,513,864	14	33.2
STRABAG SE	11.5	10,213,989	14	37.3
SCHINDLER HOLDING AG	2.5	9,781,000	10	26.2
SALZGITTER AG	8.6	8,606,985	777	11.7
VOEST-ALPINE AG	11.8	8,505,536	64	48.6
BAYWA AG	11.7	8,463,332	-554	47.7
MERCK KGAA	5.2	8,078,873	18	23.8
COMPAGNIE FINAN	9.1	7,971,214	24	13.4
BILFINGER SE	6.9	7,711,509	45	39.2
FRESENIUS MEDICAL CA	8.8	7,668,948	10	45.1
AURUBIS AG	24.6	7,631,729	-137	29.5
CLARIANT AG	-2.0	7,493,273	12	49.7
LANXESS AG	4.0	7,155,636	-819	44.7
PANALPINA WEL	3.6	6,976,185	96	2.2
SUEDZUCKER AG	6.2	5,754,309	18	42.6
THE SWATCH GROUP	8.5	5,684,273	15	7.4
KLOECKNER & CO SE	8.1	5,642,595	5	45.4

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
BEIERSDORF AG	2.9	5,486,273	6	6.0
INFINEON TECHNOLOGIE	-2.2	5,282,182	-171	20.1
GEA GROUP AG	-2.1	4,906,315	123	22.8
TELEKOM AUSTRIA AG	0.7	4,514,656	68	66.8
BARRY CALLEBAUT	3.5	4,475,208	6	47.9
KUONI REISEN HLD AG	6.3	4,427,583	44	20.5
ALSO HOLDING AG	20.2	4,345,836	24	39.3
SGS SA	9.3	4,302,909	13	16.3
SIKA AG	9.1	3,994,245	13	33.6
RHEINMETALL AG	1.4	3,981,636	34	32.5
SCHMOLZ&BICKENBACH	32.8	3,849,508	-25	50.5
WACKER CHEMIE AG	6.8	3,788,509	45	30.1
GEORG FISCHER AG	2.6	3,714,364	-32	40.1
K+S AG	7.8	3,671,396	63	22.1
GIVAUDAN SA	5.6	3,640,000	7	39.8
ANDRITZ AG	17.7	3,298,870	21	37.1
HEIDELBERGER DRUCK	-3.4	3,224,961	-64	38.9
VERBUND AG	3.6	3,157,844	14	51.4
OC OERLIKON CORP	14.5	3,107,636	132	32.3
SULZER AG	6.9	3,076,445	42	13.5
VALORA HOLDING AG	-0.5	2,888,481	7	32.9
GALENICA AG	2.9	2,813,880	-146	49.2
LONZA GROUP AG	6.0	2,782,545	2	47.5
MVV ENERGIE AG	9.8	2,780,796	14	55.5
BKW AG	0.4	2,770,736	-16	17.3
AIR BERLIN PLC	18.4	2,752,241	-84	76.0
AXEL SPRINGER AG	1.7	2,701,161	17	24.1
MTU AERO ENGINES AG	7.0	2,644,871	13	32.3
FREENET AG	7.1	2,642,551	32	26.0

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
HORNBACH HOLDING AG	6.7	2,597,294	22	51.3
LEONI AG	15.3	2,527,839	-40	48.2
CHOCO LINDT & SPRUEN	5.2	2,516,164	8	8.9
EMMI AG	6.0	2,505,430	19	30.2
PROSIEBENSAT.1 MEDIA	4.4	2,451,963		65.2
HORNBACH-BAUMARKT-AG	6.5	2,443,897	20	45.9
RIETER HOLDING AG	-5.5	2,419,209	188	28.4
PUMA SE	9.5	2,389,166	0	3.6
EVN AG	10.4	2,219,136	10	36.4
BUCHER INDUSTRIES AG	6.5	2,206,436	30	34.8
FRAPORT AG	3.6	2,185,318	11	45.3
PORR AG	6.7	2,138,794	181	70.2
LOGITECH INTERNAT	2.9	2,134,407	-11	7.2
WIENERBERGER AG	4.7	2,116,174	-68	44.1
OSTERREICHISCHE	4.9	2,112,611	69	10.2
KRONES AG	7.6	2,100,100	84	3.4
RHOEN-KLINIKUM AG	12.7	2,080,304	-291	40.5
WINCOR NIXDORF AG	5.6	2,072,383	12	42.8
DUFRY AG	18.7	2,028,910	-21	50.1
BELL LTD	5.8	2,028,543	7	29.2
DRAEGERWERK AG	5.4	1,927,450	89	38.8
JUNGHEINRICH AG	5.1	1,878,906	-29	34.2
MEDION AG	-4.4	1,873,532	-335	2.8
GEBERIT AG	5.8	1,841,173	10	14.9
AGRANA BETEILIGUNGS	14.4	1,805,072	26	34.1
KSB AG	6.8	1,785,804	25	17.2

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
DUERR AG	3.6	1,755,434	-36	42.4
SIXT SE	-1.6	1,711,961	48	69.1
HUGO BOSS AG	9.0	1,679,420	20	40.6
MAYR-MELNHOF KARTON	4.4	1,679,110	2	15.1
REPOWER AG	24.4	1,665,907	-2	34.3
FORBO HOLDING AG	-2.1	1,627,464	17	32.8
MAINOVA AG	7.2	1,615,592	149	36.2
KUKA AG	-0.6	1,556,078	110	45.2
UNITED INTERNET AG	21.7	1,531,199	21	43.0
PUBLIGROUPE SA	-12.3	1,509,285	-89	19.2
BECHTLE AG	11.7	1,505,526	17	7.7
DMG MORI	9.5	1,480,674	65	38.1
EMS-CHEMIE HOLDING	5.2	1,480,446	12	26.2
RHI AG	4.4	1,477,855	9	94.2
PAUL HARTMANN AG	3.3	1,462,770	16	28.8
BOBST MEX SA	0.9	1,446,755	528	39.2
STADA ARZNEIMITTEL	10.9	1,436,872	16	47.5
FUCHS PETROLUB SE	6.3	1,397,018	15	22.7
SYMRISE AG	4.8	1,395,132	-11	58.6
LENZING AG	12.8	1,385,109	13	37.8
KOENIG & BAUER AG	0.0	1,367,600	-748	21.4
DEUTZ AG	4.6	1,324,845	572	31.7
SGL CARBON SE	4.6	1,322,764	2	47.7
LECHWERKE AG	13.4	1,308,963	20	0.7
ACTELION AG	21.0	1,290,120	32	35.1
GIGASET AG	84.1	1,279,293	73	34.8
CHARLES VOG	-3.8	1,238,552	82	33.6
ARBONIA-FORSTER-HOLD	5.3	1,225,725	-48	46.8

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
ZUMTOBEL AG	0.6	1,200,161	10	50.7
DAETWYLER HOLDING AG	2.6	1,177,882	-149	19.8
CONZZETA AG	3.9	1,166,140	15	1.0
SONOVA HOLDING AG	12.9	1,162,954	30	13.9
ADM HAMBURG AG	-9.2	1,146,029	-35	65.5
VOSSLOH AG	4.1	1,144,073	-2	36.7
GFK AG	10.2	1,140,102	11	41.0
SKY DEUTSCHL	7.4	1,066,817	-37	53.3
KABA HOLDING AG	0.4	1,061,709	3	62.4
BAUER AG	9.2	1,026,988	17	55.6
JENOPTIK AG	-4.8	971,592	274	40.2
ENERGIEDIENST HLDG	9.3	966,338	-26	15.9
GRAMMER	5.9	956,024	-39	37.9
STO AG	6.1	917,105	83	23.2
INDUS HOLDING AG	6.0	909,470	16	65.1
FIELMANN AG	4.0	908,013	24	2.8
ALLGEM GOLD & SILBER	13.9	892,350	13	0.6
H&R AG	24.6	861,825	151	43.2
TAKKT AG	3.6	851,761	14	39.2
VILLEROY & BOCH AG	-2.1	828,790	-109	14.3
KUDELSKI SA	9.5	815,930	111	44.7
FLUGHAFEN ZURICH AG	5.8	800,797	19	51.3
TAMEDIA AG	7.3	800,583	-16	7.7
WMF AG	6.0	793,902	25	6.8
NORDEX SE	24.6	792,640	-30	30.5
SCHULER AG	11.5	791,086	-98	53.2
NOBEL BIOCARE HLDG	4.2	784,916	-1	23.8
CENTRALSCHWEIZERI	3.5	763,364	8	14.9
SOFTWARE AG	9.5	743,792	77	18.7

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
VBH HOLDING AG	1.5	743,462	58	65.0
WACKER NEUSON SE	13.9	736,883	-23	11.6
ELRINGKLINGER AG	11.7	713,565	19	34.6
WALTER MEIER AG	-1.6	698,127	28	19.6
METALL ZUG AG	6.9	694,312	26	7.6
KWS SAAT AG	10.6	678,683	14	6.6
HUBER UND SUHNER AG	3.9	673,134	135	2.5
PALFINGER AG	13.3	659,299	-16	29.2
ASCOM HOLDING AG	-9.2	655,700	-502	20.7
SOLARWORLD AG	24.5	653,232	-18	52.4
GELSENWASSER AG	11.8	650,409	16	1.8
SEMPERIT AG HOLDING	7.2	647,773	10	8.2
VTG AG	0.2	643,745	-20	59.4
SWISSLOG HOLDING AG	-0.1	642,582	2	37.4
ZEHNDER GROUP AG	1.7	641,660	-7	15.5
IMMOFINANZ AG	36.4	641,510	149	49.3
GRENKELEASING AG	4.1	636,562	12	81.5
STRAUMANN HOLDING AG	7.6	627,186	4	5.6
KARDEX REMSTAR INTL	-1.2	597,238	-22	35.5
PHOENIX MECANO AG	2.6	586,413	25	25.3
EUROKAI GMBH	4.3	584,559	139	47.4
POLYTEC HOLDING AG	11.0	584,000	-609	41.5
CARL ZEISS MEDITEC	15.3	563,509	19	10.2
VETROPACK AG	3.1	562,687	5	19.5
GERRY WEBER AG	9.6	561,268	22	21.7
VON ROLL HOLDING	-1.7	546,589	-109	19.3
ALLREAL HOLDING AG	35.8	532,382	10	49.7
VK MUEHLEN AG	3.6	528,270	-323	51.8

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
ROMANDE ENERGIE	2.5	523,305	30	6.7
ALNO	0.0	516,891	183	174.9
MICRONAS SEM	-12.0	509,883	0	0.1
FLUGHAFEN WIEN AG	6.2	503,386	3	34.0
BOSSARD HOLDING AG	4.7	491,812	27	39.8
CPH CHEMIE & PAPIER	2.4	487,228	-2,231	13.7
ROSENBAUER INT AG	9.0	482,213	12	33.8
WASGAU PRODUKTIONS	0.1	481,993	27	56.6
SCHWEITER TECH AG	61.3	470,329	41	2.6
SAINT-GOBAIN OBERL	4.2	459,607	1	33.8
FRAUENTHAL HOLDING	20.0	453,897	0	51.1
FEINTOOL INT HOLDING	2.7	449,743	-258	40.1
BWT AG	2.6	444,323	8	25.6
CHAM PAPER GROUP	-12.6	443,805	-48	34.5
CEWE STIFTUNG	2.5	442,479	-16	17.7
MEDICLIN AG	3.9	436,783	-23	38.6
VERITAS AG	7.8	436,380	15	56.9
KONTRON AG	7.8	427,306	-69	10.9
GURIT HOLDING AG	-4.0	415,277	-164	19.1
CLOPPENBURG AUTOMOBI	11.8	414,132	-253	62.2
BERTRANDT AG	14.7	413,611	-44	14.6
CTS EVENTIM AG	11.3	406,612	27	24.7
RENK AG	7.0	398,744	16	0.9
MIBA AG	8.7	394,600	24	24.6
SURTECO SE	1.6	391,184	-3	50.3
CENTROTEC SUSTAIN	21.9	384,133	11	45.9
CANCOM SE	12.6	383,989	41	25.9
TECAN GROUP AG	2.6	370,698	10	14.8
EINHELL GERMANY AG	4.2	365,248	-19	29.2

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
BELIMO HOLDINGS AG	7.4	365,069	10	16.9
NORDWEST HANDEL AG	8.1	363,397		20.0
SWISS PRIME SITE	24.6	357,673	20	57.2
BIOTEST AG	8.9	356,740	22	39.9
HAWESKO HOLDING AG	5.3	351,659	26	18.1
TEMENOS GROUP AG	9.3	346,450	-201	30.7
FROSTA AG	4.1	345,628	-7	40.9
HOCHDORF HOLDING AG	2.1	342,239	41	34.2
QSC AG	15.6	338,623	2	19.4
APG SGA SA	1.2	331,294	23	10.7
SIEGFRIED HOLDING AG	0.7	331,000	25	15.3
BIJOU BRIGITTE AG	8.9	330,939	6	0.7
ADVANCED DIGITAL	15.5	327,496	-36	37.9
RATIONAL AG	9.8	324,573	13	10.3
OHB TECHNOLOGY AG	23.3	320,628	29	19.0
DEUFOL SE	0.1	318,998	-99	47.2
ORELL FUESSLI HOLD	-0.8	318,599	-457	13.5
GAG IMMOBILIEN AG	-1.1	318,171	5	75.6
DRILLISCH	11.3	317,507	28	32.8
HUEGLI HOLDING AG	5.7	317,333	14	44.0
AIROPACK TECHNOLOGY	112.3	313,380	-19	37.7
SCHOELLER-BLECKMANN	15.5	303,940	40	34.6
MCH GROUP AG	12.0	300,836	63	52.6
MOBILEZONE HOLDING	0.8	299,968	66	4.8
ATB AUSTRIA ANTRIEB	10.1	299,241	-139	70.5
DEUTSCHE WOHNEN AG	17.2	299,180	67	63.0
DO & CO AG	21.8	294,478	-29	12.2

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
KOMAX HOLDING AG	7.9	294,279	-27	14.2
GESCO AG	12.2	290,918	29	45.4
SCHLOSS WACHENHEIM	-0.3	286,783	103	51.4
INTERROLL HOLDING AG	5.1	286,316	-8	13.8
AIXTRON SE	19.4	285,444	397	0.0
ADVAL TECH HOLDING A	2.5	283,540	-341	50.1
DELTICOM AG	27.7	280,778	35	7.5
SUDWESTDEUTSCHE	3.7	279,203	-135	27.2
AHLERS AG	-2.4	273,026	6	28.6
PSP SWISS PROPERTY	5.0	272,909	7	40.9
SCHALTBAU HOLDING AG	5.9	272,115	24	90.1
LEIFHEIT	-3.8	266,525	46	1.5
WASHTEC AG	2.5	265,829	-10	44.8
HERLITZ AG	-11.3	264,984	-81	49.0
PROGRESS-WERK OBERK	7.8	263,206	-66	48.9
SIMONA AG	6.3	259,343	28	2.8
PFEIFFER VACUUM TECH	15.9	256,487	12	6.7
STARRAG GROUP HOLD	11.8	254,629	134	16.9
PHOENIX SOLAR AG	37.6	252,927	-3	20.7
INFICON HOLDING AG	3.4	252,685	182	2.2
MIKRON HOLDING AG	-3.0	252,517	-85	8.1
ALEO SOLAR AG	22.6	250,710	94	21.7
COMPUGROUP HLDG	21.3	248,561	45	52.7
YPSOMED HOLDING AG	7.2	246,860	107	28.3
DIALOG SEMICOND	28.0	238,116	-81	6.6
KHD HUMBOLDT WEDAG	17.1	237,772	-64	5.8

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
CURANUM AG	5.7	237,026		67.5
PELIKAN HOLDING AG	0.6	236,646	66	53.7
R. STAHL	4.7	226,848	20	18.2
ACINO HOLDING AG	11.1	226,271	-372	7.5
BEATE UHSE AG	-5.7	225,806	11	44.0
BALDA AG	-9.5	224,343	-236	25.4
ADVA AG	14.4	223,817	-403	18.1
CA IMMOBILIEN AG	29.5	215,248	31	46.0
KULMBACHER BRAUEREI	0.5	213,839	28	42.6
SINGULUS TECHNOL.	-4.8	212,686	-187	11.5
BERTHOLD HERMLE AG	13.9	211,815	52	0.1
FUNKWERK AG	-4.1	211,131	383	8.2
INTERSPORT PSC HLDG	4.7	211,059	12	15.6
MARSEILLE-KLINIKEN	0.8	209,756	-105	57.9
DEUTSCHE STEINZEUG	-3.0	209,585	-121	72.5
GFT TECHNOLOGIES AG	8.4	207,270	-50	2.8
WESTAG & GETALIT AG	3.5	204,412	16	0.3
TORNOS HOLDINGS SA	5.1	204,313	166	20.3
SWMTL HOLDING AG	-7.7	201,662	149	40.3
HANSA GROUP AG	69.1	200,774	89	38.9
WIRECARD AG	107.9	200,740	-113	9.6
MAX AUTOMATION AG	9.0	198,716	-45	35.0
SPARKASSEN IMMOBIL	35.4	198,049	41	63.0
SCHWAELBCHEN	1.0	195,077	100	20.4
PATRIZIA IMMOBILIEN	135.5	194,517	411	69.7
LEM HOLDING SA	6.5	194,242	81	14.0
SCHLUMBERGER AG	4.2	193,836	-2	44.1
EUROMICRON AG COMMUN	10.6	193,835	10	34.4

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
COLTENE HOLDING	-1.1	193,509	10	27.3
HOFTEX GROUP AG	0.8	187,272	-43	36.4
CARLO GAVAZZI AG	-3.0	186,717	-75	13.0
CALIDA HOLDING AG	5.3	186,548	88	10.0
CREATON AG	5.3	184,658	-236	14.5
MUEHLHAN AG	4.0	181,060	9	34.0
MOBIMO HOLDING AG	27.5	181,039	67	47.5
KAESSBOHRER GELAENDE	-5.1	179,856	7	37.7
BERENTZEN-GRUPPE AG	-2.2	172,444	43	26.7
MUEHLBAUER HOLDING A	8.6	171,022	54	0.5
SCHAFFNER HOLDING AG	3.4	170,354	-21	42.6
AS CREATION TAPETEN	5.3	168,178	6	24.8
UZIN UTZ AG	7.8	167,146	21	42.2
BACHEM HOLDING	2.1	165,428	-31	4.4
MENSCH UND MASCHINE	1.6	165,029	-291	50.7
ELMOS SEMICONDUCTOR	6.2	163,240	-55	23.7
FRIWO AG	4.7	162,249	-151	32.4
NTT COM SECURITY	6.4	162,057	28	0.0
COMET HOLDING AG	19.9	160,558	-225	31.6
UESTRA HANNOVER	0.6	160,384	16	20.8
TAG IMMOBILIEN AG	12.0	158,288	44	69.4
LOEB HOLDING AG	-6.4	156,506	56	14.9
JOSEF MANNER & COMP.	4.7	154,108	233	35.0
MINERALBRUNNEN AG	0.0	151,807	-373	30.7

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
DATACOLOR AG	-7.9	151,533	260	28.6
CICOR TECHNOLOGIES	31.2	150,515	27	26.0
LINZ TEXTIL HOLDING	-1.5	150,400	-21	6.0
AUGUSTA TECHNOLOGIE	-5.5	144,010		30.0
GREIFFENBERGER AG	3.1	143,826	343	64.9
PSI AG	2.8	142,807	-26	4.8
EDEL AG	1.5	140,480	546	48.9
TELEGATE AG	-5.3	139,925	4	2.2
WOLFORD AG	2.2	139,921	-17	29.4
UBM REALITAET	23.1	139,228	160	67.5
FRANCOTYP POSTALIA	5.6	137,127	-444	73.4
AEVIS HOLDING SA	129.1	137,027	-55	32.4
NEMETSCHEK AG	7.4	136,857	28	14.4
DATA MODUL AG	3.6	136,741	-87	28.1
BIEN ZENKER AG	-1.7	136,069	10	25.6
PAX-ANLAGE AG	44.5	135,993	13	50.3
BORUSSIA DORTMUND	11.5	135,710	-42	50.2
SUESS MICROTEC AG	6.0	135,466	-154	12.9
HTI HIGH TECH	8.7	134,069	-174	80.9
GROUPE MINOTERIES SA	1.3	129,100	13	28.8
DEUTSCHE EUROSHOP AG	12.5	127,794	52	47.5
MANZ AG	46.6	126,267	-443	26.8
ESSANELLE HAIR	1.2	122,918	38	26.2
ZEAG ENERGIE AG	8.2	121,974	-4	0.1
SWARCO TRAFFIC HLDG	7.8	121,641	315	45.7
BVZ HOLDING AG	3.0	118,457	-495	58.6
DUERKOPP ADLER	-2.0	117,005	-65	47.6

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
ELMA ELECTRONIC AG	3.3	116,218	-35	45.7
HAHN IMMOB	96.4	115,771	-297	67.5
SOLAR-FABRIK AG	18.4	114,663	-1,837	12.7
TECHNOTRANS AG	1.6	114,648	-14	27.2
OTTAKRINGER GE	15.7	114,542	-94	18.4
VSM-VEREINIGTE SCHMI	2.8	114,527	38	1.0
DEAG DEUTSCHE	4.8	114,365	2,400	22.8
MS INDUSTRIE AG	65.7	113,763	102	46.0
HPI AG	21.8	113,145	18	23.5
IVF HARTMANN HLDG	1.6	112,973	24	9.8
ENVITEC BIOGAS AG	148.0	111,061	177	23.7
IFA HOTEL & TOURIST.	0.0	107,908	13	62.5
MATERNUS-KLINIKEN AG	-9.2	107,575	-42	89.8
EDDING AG	2.9	107,163	2	30.9
ZAPF CREATION AG	-12.0	106,453	-2,609	76.1
DIC ASSET AG	37.0	105,578	105	65.5
JUNGFRAUBAHN	6.2	104,625	-37	9.5
ERLUS AG	2.6	103,379	-116	5.4
TURBON AG	-5.1	102,343	23	36.1
ZUBLIN IMMOBILIEN	-3.0	100,607	-125	72.0
SLOMAN NEPTUN AG	8.5	99,734	44	52.9
VIVANCO GRUPPE AG	-3.2	99,174	76	127.3
PANKL RACING SYSTEMS	8.3	97,598	-19	41.5
TOMORROW FOCUS AG	14.9	96,768	-19	16.7
INTERSHOP HOLDING AG	2.9	96,561	5	53.3
PVA TEPLA AG	9.6	94,747	94	19.7
BOCHUM-GELSEN	2.8	93,517	0	52.8

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
STRASS				
GABRIEL SEDLMAYR	-3.0	93,328	83	42.2
JOH. F. BEHRENS AG	-0.2	92,953	-67	66.0
DISKUS WERKE AG	27.9	92,711	317	39.2
BB BIOTECH AG	-33.3	91,908	-133	6.7
MSG LIFE AG	4.6	91,688	-697	33.9
NABALTEC AG	11.8	90,980	-22	53.1
MIFA MITTELDEUTSCHE	7.3	90,198	-215	63.0
CENIT SYSTEMHAUS	5.6	89,795	32	4.6
ZWAHLEN & MAYR S.A.	3.5	89,561	-17	21.1
VILLARS HOLDING SA	3.6	88,782	26	21.4
SCHUMAG AG	-0.5	88,399	-246	12.0
BHS TABLETOP	0.5	88,280	-166	11.5
HOEFT & WESSEL AG	-0.4	87,598	-76	47.2
ALL FOR ONE STEEB	17.0	86,921	130	25.4
LUDWIG BECK AM RATH	0.7	86,534	23	46.4
3U HOLDING AG	0.1	85,427	-275	20.5
SCHWEIZER ELECTRONIC	4.4	84,590	41	30.9
PNE WIND AG	15.8	83,001	-256	60.4
MUELLER DIE LILA	5.6	82,632	-48	42.8
ADVANCED INFLIGHT	174.5	81,959	-1	38.2
HIRSCH SERVO	5.9	80,142	-89	70.0
BRAIN FORCE HLDG	4.8	80,139	-118	25.5
MME MOVIEMENT AG	29.3	79,806	-5	13.7
SW STOISER & WOLSCHN	-2.2	79,339	-26	77.5
ANALYTIK JENA AG	2.1	79,276	49	32.5
STRATEC BIOMEDICAL	16.1	78,619	24	12.4
LIFEWATCH AG	5.3	78,280	133	15.9

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
BREMER STRASSENBAHN	3.2	78,194	-1	77.2
PARAGON AG	9.3	77,855	3	45.9
RATH AG	4.4	77,336	-9	40.9
ECKERT & ZIEGLER STR	15.6	77,162	-58	19.9
BRUDER MANNE	-1.2	76,774	45	80.0
NORDDEUTSCHE STE	3.4	75,205	-40	40.6
NET MOBILE AG	17.8	75,016	-660	21.8
WARIMPEX FINANZ	7.3	73,214	-7	75.0
TIPP24 AG	27.6	71,909	218	0.4
DIERIG HOLDING AG	-0.8	71,486	95	63.3
ALUMINIUM UNNA AG	4.0	70,883	-37	33.2
BETA SYSTEMS	0.4	69,953	117	21.3
MYBET HOLDING	26.7	68,060	-203	24.0
INNOTEC TSS AG	5.2	67,789	26	62.3
PERROT DUVAL HOLDING	-2.9	65,564		77.7
EVOTEC AG	4.7	65,534	-47	8.9
HELMA EIGENHEIMBAU	26.9	65,109	-1	56.0
EHLEBRACHT AG	4.4	64,534	21	55.3
COLONIA REAL	214.5	63,906	-238	73.5
MATTH. HOHNER AG	0.0	63,517	13	30.3
ADESSO AG	40.0	62,701	93	27.7
BRILLIANT AG	1.3	61,640	-70	57.4
LPKF LASER & ELECTRO	20.0	61,622	64	14.2
INIT AG	13.1	60,633	47	6.2
MORPHOSYS AG	22.5	59,648	122	0.1
ISRA VISION AG	14.1	59,141	21	18.1
SEVEN PRINCIPLES AG	31.7	57,689	-164	7.3
P&I PERSONAL & INFO	8.1	57,401	25	0.5

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
INFRANOR INTER AG	-2.5	57,149	-30	81.2
TRANSTEC AG	-4.2	56,363	19	44.3
CCR LOGISTICS	14.0	55,072	66	4.9
ROEDER ZELTSYSTEME	8.8	54,691	25	23.6
MYRIAD GROUP	18.6	53,328	98	22.3
REALTECH AG	-2.5	52,155	61	6.3
ENERGIEKONTOR	34.8	50,578	91	71.9
BASLER AG	9.4	50,358	-26	37.3
HALLOREN SCHOKOLA	19.4	50,111	-16	69.4
CREALOGIX HOLDING	15.5	49,019	79	0.5
SECUNET SECURITY NET	13.4	48,775	95	0.9
BAYERISCHE GEWE	-4.9	47,073	39	32.4
FIRST SENSOR AG	29.4	46,454	-44	30.9
PIRONET NDH AG	10.2	46,441	-26	0.2
LEWAG HOLDING AG	6.4	46,165	22	31.7
HASEN-IMMOBILIEN AG	84.1	45,087	29	53.5
VISCOM AG	12.4	44,939	33	2.5
BERGBAHNEN TITLIS AG	7.0	44,337	33	41.1
UNITED LABLES AG	0.9	43,934	-334	28.0
DR. HOENLE AG	18.0	43,500	-21	5.0
ODEON FILM AG	1.3	42,599	1,831	21.1
UMS UNITED MED	-3.6	41,925	35	37.8
PRIMION TECHN	17.2	40,699	-320	42.5
FORTEC ELEKTRONIK	4.7	40,568	31	0.1
KPS AG	18.9	38,972	-62	29.0
EIFELHOEHEN-KLINIK	0.0	38,561	-273	48.5
NEXUS AG	18.2	37,838	-179	1.1
TRIPLAN AG	6.8	37,679	-5	1.9
DEUTSCHE REAL	-4.0	36,300	250	91.7

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
ESTATE				
SCHULTE SCHLAGBAUM	2.6	35,687	-55	0.6
_WIGE MEDIA AG	0.0	35,671	-5,855	56.0
IVU TRAFFIC TECHNOLO	4.7	35,471	60	15.0
SPLENDID MEDIEN AG	6.4	35,278	276	29.9
IMW IMMOBILIEN SE	64.0	35,212	197	53.8
USU SOFTWARE AG	11.6	34,015	156	0.5
TWINTEC AG	55.0	33,351	329	31.6
INTERSHOP COMMUNICAT	10.0	32,530	-55	7.5
KROMI LOGISTIK AG	26.9	32,505	16	12.4
SHS VIVEON AG	1.6	31,784	11,248	31.0
SOFTING AG	11.4	31,557	-95	4.2
PIXELPARK AG	11.0	31,074	14	35.4
MAGIX AG	6.2	30,806	-39	2.2
JETTER AG	14.7	30,791	-11	10.7
INTICA SYSTEM	32.8	30,329	-193	27.4
MEDISANA AG	1.4	30,170	-69	29.6
TELES AG INFO TECH	-13.3	29,444	-55	352.2
BECHSTEIN PIANOFORTE	2.7	29,402	-170	33.8
ATOSS SOFTWARE AG	4.4	27,045	41	0.4
PULSION MEDICAL SYS	10.6	26,778	234	10.9
NORCOM AG	0.0	26,567	191	0.5
GRUSCHWITZ TEXTIL AG	7.3	25,651	18	51.2
AAP IMPLANTATE AG	15.2	25,577	-153	17.3
ORBIS AG	5.9	24,812	151	8.5
WARTECK INVEST AG	2.3	24,537	-1	48.5
KOELN-	3.3	23,880	103	71.2

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
DUESSELDORFER				
PIPER GENERAL. AG	2.0	23,400		60.9
ALLGAEUER BRAUHAUS	1.1	22,808	-206	0.4
FHW NEUKOELLN	6.1	22,796	5	0.0
EASY SOFTWARE AG	7.7	22,454	-137	35.1
ALPHAFORM AG	2.4	22,440	-177	13.8
PLENUM AG	-10.5	22,228	-58	0.8
DINKELACKER	-14.8	22,113	581	0.2
SOFTLINE AG	138.6	21,800	3	0.3
PERFECT HOLDING SA	50.0	21,646	25	22.0
IBS AG	4.3	21,296	274	15.8
INFAS HOLDING	2.8	19,471	-101	17.9
DESIGN BAU AG	21.8	19,132	16	47.4
LECLANCHE SA	-9.0	18,932	42	9.1
VEREINIG FILZFAB. AG	3.2	18,657	-194	41.8
SEDLBAUER	0.1	18,063	81	67.7
CUSTODIA HLD AG	22.9	17,824	-91	63.9
SNP SCHNEIDER	16.4	17,708	18	5.2
BBI BURGERLICHES	0.8	17,448	85	62.0
YOC AG	30.0	16,930	-755	75.0
GIRINDUS AG	-20.6	16,849	-3	119.0
SCHWABENVERLAG AG	0.0	16,539	-5	37.0
NUCLETRON ELECTRONIC	-0.7	16,392	111	2.1
LS TELCOM AG	17.6	16,246	103	14.6
CYCOS AG	-3.1	16,157	22	0.0
KWG KOMMUNALE	137.9	15,610	-1,475	38.6
DOCCHECK AG	3.6	14,915	46	0.2
BRAUEREI KAUFBEUREN	-12.9	14,910		49.7

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
ADLER REAL ESTATE AG	283.1	14,553	2,078	34.4
ZOO BERLIN	6.9	14,230	14	0.0
GROUP BUSINESS SOFT	308.7	14,082	-95	15.4
STAATL. MINERALBRUNN	0.6	13,856	296	29.1
VERIANOS REAL	-5.7	13,363	229	41.1
GERATHERM MEDICAL AG	9.2	11,963	15	8.3
AGROB IMMOBILIEN	2.9	10,583	16	79.4
REGENBOGEN AG	4.6	10,493	17	62.2
ARTNET AG	10.8	10,359	272	6.1
WESTGRUND AG	52.4	8,860	283	72.9
MUENCHENER TIERPARK	5.2	8,822	3	0.0
PAION AG	292.3	8,657	3,626	22.6
DESIGN HOTELS AG	12.7	8,388	-214	0.7
WEBAC-HOLDING AG	6.0	8,268	1,101	14.2
NANOFOCUS AG	2.8	8,134	-324	21.0
EQUITYSTORY AG	44.3	8,001	255	5.6
HIGHLIGHT EVENT AND	3.8	7,930	-15	0.1
BERLINER SYNCHRON AG	6.3	7,901	-80	57.5
INTERCARD AG	13.7	7,470		68.3
RIM AG	-1.5	7,381	84	62.8
HUMANOPTICS AG	1.8	7,142	-23	97.9
CURASAN AG	-3.8	6,948	25	7.7
SOFTSHIP AG	10.3	6,897		1.7
AG ALLG ANLAGEVERW	17.6	6,534	-68	39.7
SCHLOSSGARTENBAU	9.7	6,284	14	30.0

Company	Revenue 10y-Growth	Revenue 10y-Aver.	Op. Inc. 10y-Growth	Debt%Cap. 10y-Aver.
AG				
NEBELHORNBAHN AG	2.7	6,163	26	37.9
AMIRA VERWALTUNGS AG	31.6	5,978	26	6.3
PRIMAG AG	209.2	5,957	-73	61.3
IFA SYSTEMS AG	6.9	5,660	45	6.2
PLAN OPTIK AG	14.6	5,562	47	25.1
SYGNIS AG	6.4	4,783	7	14.5
YOUR FAMILY ENT	5.2	4,294	52	20.1
EPIGENOMICS AG	-8.3	4,279	5	4.5
ITN NANOVATION AG	15.2	3,821	11	34.5
SOLARPRAXIS AG	15.9	3,715	-327	14.8
ELEKTRISCHE L & K AG	-1.3	3,395	-26	26.1
ENDOR AG	27.6	2,852	148	17.4
F24 AG	22.6	2,756	-186	13.5
4SC AG	66.2	2,455	6	15.4
GOING PUBLIC MEDIA	8.0	2,210	207	0.7
HYDROTEC AG	1.8	2,058	-30	12.4
ARTEC TECH	5.8	1,977		4.1
FORST EBNATH AG	24.6	1,936	11	0.0
CO.DON AG	27.9	1,542	3	0.0
BASTFASERKONTOR	12.2	1,456	4	29.9
JOST AG	15.5	1,158		0.5
AG FUR HISTORISCHE	3.8	1,125	-164	19.5
MASCHINEN. HEID AG	16.5	1,025	-95	4.6
MOLOGEN AG	97.0	874	1,449	0.4
REALITY CAPITAL PART	36.7	427	-10	6.1
DAHLBUSCH AG	78.4	100	-503	0.0

Source: Own calculation; Data: Thomson One.

References

Achtenhagen, L., Naldi, L. & Melin, L. (2010). “Business Growth”—Do Practitioners and Scholars Really Talk about the Same Thing? *Entrepreneurship Theory and Practice*, 34(2), 289-316.

Acs, Z. J., Morck, R., & Yeung, B. (1999). Productivity Growth and Firm Size Distribution. In Z. J. Acs, B. Carlsson & C. Karlsson (Eds.), *Entrepreneurship, Small and Medium-Sized Enterprises and the Macroeconomy* (pp. 367–396). Cambridge: Cambridge University Press.

Acs, Z., Parsons, W. & Tracy, S. (2008). *High-Impact Firms: Gazelles Revisited* (Report to the SBA). Washington: Corporate Research Board.

Agarwal, S., Driscoll, J., Gabaix, X., & Laibson, D. (2009). Fnancial decisions over the life cycle and implications for regulation. *Brookings Papers on Economic Activity*, 2, 51–117.

Ahmad, N., Salman, A., & Shamsi, A.F. (2015). Impact of Financial Leverage on Firms’ Profitability: An Investigation from Cement Sector of Pakistan. *Research Journal of Finance and Accounting*, 6(7), 75-80.

Ahuja, G., & Katila, R. (2001). Technological acquisitions and the innovation performance of acquiring firms: a longitudinal study. *Strategic Management Journal*, 22, 197–220.

Akbas, H. E., & Karaduman, H. A. (2012). The effect of firm size on profitability: An empirical investigation on Turkish manufacturing companies. *European Journal of Economics, Finance and Administrative Sciences*, 55, 21-27.

Akerlof, G. (1970). The Market for “Lemons”: Qualitative Uncertainty and the Market Mechanism. *Quarterly Journal of Economics*, 84, 488–500.

Alchian, A. A. (1950). Uncertainty, Evolution and Economic Theory. The *Journal of Political Economy*, 58(3), 211–221.

Aldrich, H. (1999). *Evolving Organisations*. London: Sage.

Almus, M. (2000). *What characterizes a Fast-Growing Firm? Discussion Paper 01-40*. Mannheim: Zentrum für Europäische Wirtschaftsforschung.

Analoui, F. & Karami, A. (2003). *Strategic Management in Small and Medium Enterprises.* London: Thomson.

Andrews, T. (2012). *Grounded Theory Review*. Retrieved from http://groundedtheoryreview.com

Annacker, D. (2001). *Unbeobachtbare Einflussgrößen in der strategischen Erfolgsfaktorenforschung. Ein kausalanalytischer Ansatz auf der Basis von Paneldaten*. Wiesbaden: DVU.

Ansoff, H. I. (1965). *Checklist for Competitive and Competence Profiles; Corporate Strategy*. New York: McGraw-Hill.

Antoniou, A., Guney, Y., & Paudyal, K. (2009).The determinants of capital structure: Capital market-oriented versus bank-oriented institutions. *Journal of Financial & Quantitative Analysis*, 43(19), 59–92.

Arikan, A., & Stulz, R. (2016). Corporate Acquisitions, Diversification, and the Firm's Life Cycle. *Journal of Finance, 71*(1), 139-194.

Arnold, G. (2008). *Corporate Financial Management* (4th ed.). Harlow: Prentice-Hall.

Arrighetti, A., Landini, F., & Lasagni, A. (2016). *Swimming upstream throughout the turmoil: evidence on firm growth during the Great recession* (Research Paper). Parma: Universita di Parma.

Artz, M. (2010). *Controlling in Marketing und Vertrieb: Planung, Budgetierung und Performance Measurement*. Wiesbaden: Gabler Springer.

Autio, E., & Rannikko, H. (2016). Retaining winners: Can policy boost high-growth entrepreneurship? *Research Policy*, 45(1), 42–55.

Axtell, R. L. (2001). Zipf Distribution of Firm Sizes. *Science*, 293, 1818-1820.

Backhaus, K., Erichson, B., Plinke, W., & Weiber, R. (2011). *Multivariate Analysemethoden. Eine anwendungsorientierte Einführung* (13th ed.). Berlin: Springer Gabler.

Baker, H. K., & Anderson, R. (2010). *Corporate Governance: A Synthesis of Theory, Research, and Practice*. Hoboken: Wiley.

Baker, M., & Wurgler, J. (2002). Market Timing and Capital Structure. *Journal of Finance,* 57(1), 1–32.

Bancel, F., & Mitoo, U. R. (2004). Cross-Country Determinants of Capital Structure Choice: A Survey of European Firms. *Financial Management*, 33(4), 103-132.

Banchuenvijit, W. (2012). *Determinants of Firm Performance of Vietnam Listed Companies*. Bangkok: Academic and Business Research Instıtute.

Barnes, L. B., & Hershon, S. A. (1994). Transferring power in the family business. *Family Business Review*, 7(4), 377–93.

Barringer, B. R., & Jones, F. F. (2004). Achieving rapid growth - revisiting the managerial capacity problem. *Journal of Developmental Entrepreneurship*, 9(1), 73–87.

Bastesen, J., & Vante, E. (2014). Rapid-growth firms: exploring the role and location of entrepreneurial ventures. In C. J. Karlsson (Ed.), *Agglomerations, Clusters and Entrepreneurship: Studies in Regional Economic Development* (pp. 159–198). Cheltenham: Edward Elgar Publishing.

Bauer, H. H. & Sauer, N. E. (2004). Die Erfolgsfaktorenforschung als schwarzes Loch? *Die Betriebswirtschaft*, 64(5), 621-622.

Baum, C. F., Schafer, D., & Talavera, O. (2006). *The effects of short-term liabilities on profitability: The case of Germany*. Berlin: Deutsches Institut für Wirtschaftsforschung (DIW).

Baumol, W. J. (1959). *Business Behavior, Value and Growth*. Princton: Princton University.

Bea, F. X., & Haas, J. (2005). *Strategisches Management* (4th ed.). Konstanz: UVK.

Beck, T., Demirgüc-Kunt, A. & Maksimovic, V. (2005). Financial and Legal Constraints to Growth: Does Firm Size Matter? *The Journal of Finance*, 60(1), 137-177.

Becker-Blease, J. R., Kaen, F. R., Etebari, A. & Baumann, H. (2010). Employees, firm size and profitability in U.S. manufacturing industries. *Investment Management and Financial Innovation*, 7(2), 7-23.

Beers, C., & Zand, F. (2014). R&D Cooperation, Partner Diversity, and Innovation Performance: An Empirical Analysis. *Journal of Product Innovation Management*, 31, 292-312.

Belcredi, M., & G. Ferrarini (2013). Corporate boards, incentive pay and shareholder activism in Europe: main issues and policy perspectives. In M. Belcredi & G. Ferrarini (Eds.), *Boards and Shareholders in European Listed Companie*s (pp. 1-65). Cambrigde: Cambridge University Press.

Ben-David, I., Graham, J., & Harvey, C. (2006). *Managerial Overconfidence and Corporate Policies* (Working Paper, Duke University). Retrieved from http://portal.idc.ac.il/en/main/research/caesarea-center/annualsummit/docu¬ments/ben-david.pdf

Bennett, B., Bettis, J., Gopalan, R., & Milbourn, T. (2017). Compensation goals and firm performance. *Journal of Financial Economics,* 124(2), 307-330.

Berger, A. N., & Udell, G. F. (1998): The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle. *Journal of Banking & Finance*, 22(6), 613–673.

Berger, A., & Bonaccorsi di Patti, E. (2006). Capital structure and firm performance: A new approach to testing agency theory and an application to the banking industry. *Journal of Banking & Finance*, 30, 1065-1102.

Bernström, S. (2014). *Valuation: The Market Approach*. Chichester: Wiley.

Bertrand, M., & Schoar, A., (2003). Managing with style: the effect of managers on corporate policy. *Quarterly Journal of Economics*, 118(4), 1169–1208.

Bessant, J., Phelps, B., & Adams, R. (2005). *External Knowledge: a Review of the Literature Addressing the Role of External Knowledge and Expertise at Key Stages of Business Growth and Development*. London: Institute of Management.

Bessler, W., Drobetz, W., & Zimmermann, J. (2011). Financing Corporate Mergers and Acquisitions. In H. Kent Baker & G. S. Martin (Eds.), *Capital Structure and Corporate Financing Decisions: Theory, Evidence, and Practice* (pp. 419–444). Hoboken: Wiley.

Bhabra, G. S., & Yao, Y. (2011). Is Bankruptcy Costly? Recent Evidence on the Magnitude and Determinants of Indirect Bankruptcy Costs. *Journal of Applied Finance & Banking*, 1(2) 2011, 39-68.

Bianchini, S., Bottazzi, G. & Tamagni, F. (2017). What does (not) characterize persistent corporate high-growth? *Small Business Economics*, 48(3), 633-656.

Bindewald, A. (2004). Unternehmensinsolvenzen in Deutschland und ihre Bedeutung für die volkswirtschaftliche Entwicklung. In KfW Research (Eds.), *Was erfolgreiche Unternehmen ausmacht.* (pp. 1-14). Bonn: Physica-Verlag.

Black, E. (1998). Life-Cycle Impacts on the Incremental Value-Relevance of Earnings and Cash Flow Measures. *The Journal of Financial Statement Analysis*, 4(1), 40-57.

Blazejewski, S. (2011). When truth is the daughter of time: longitudinal case studes in international business research. In R. Marschan-Piekkari & C. Welch (Eds.), *Rethinking the Case Study in International Business and Management Research* (pp. 251-276). Cheltenham: Edward Elgar.

Böning, U. (2010). Übernahmen und Fusionen: Psychologie ist nicht alles, aber ohne Psychologie ist alles nichts. In G. Müller-Stewens, S. Kunisch & A. Binder (Eds.), *Mergers & Acquisitions: Analysen, Trends und Best Practices* (pp. 346–358). Stuttgart: Schäffer Poeschel.

Bontis, N. (1999). Managing Organizational Knowledge by Diagnosing Intellectual Capital. *International Journal of Technology Management*, 18, 433-462.

Booth, L., Varouj, A., Demirgüç-Kunt, A. & Maksimovic, V. (2001). Capital structure in developing countries*. The Journal of Finance*, 56(1), 87-130.

Börner, C. J., Grichnik, D., & Reize, F. (2010). Finanzierungsentscheidungen mittelständischer Unternehmer—Einflussfaktoren der Fremdfinanzierung deutscher KMU. *Zeitschrift für betriebswirtschaftliche Forschung*, 2, 227–250.

Bortz, J., & Schuster, C. (2010). *Statistik für Human- und Sozialwissenschaftler* (7th ed.). Berlin: Springer.

Botazzi, G., & A. Secchi. (2003). A Stochastic Model of Firm Growth. *Physica A: Statistical Mechanics and its Applications*, 324(1), 213-219.

Bottazzi, G., Cefis, E., & Dosi, G. (2002). Corporate growth and industrial structures: some evidence from the Italian manufacturing industry. *Industrial and Corporate Change*, 11(4), 705–723.

Bottazzi, G., Coad, A., Jacoby, N., & Secchi, A. (2011). Corporate growth and industrial dynamics: Evidence from French manufacturing. *Applied Economics,* 43(1), 103-116.

Braunecker, C. (2016). *How to do Empirie, how to do SPSS: Eine Gebrauchsanleitung*. Wien: UTB Falcutas.

Brigham, E. F., & Houston, J. F. (2017). *Fundamentals of Financial Management*. Boston: Cengage.

Bromiley, P. (1991). Testing a causal model of corporate risk taking and performance. *The Academy of Management Journal*, 34(1), 37–59.

Brush, C. G, Ceru, D. J., & Blackburn, R. (2009). Pathways to entrepreneurial growth: The influence of management, marketing and money. *Business Horizons*, 52(5), 481–491.

Burghardt, D., & Helm, M. (2015). Firm growth in the course of mergers and acquisitions. *Small Business Economics*, 44(4), 889-904.

Burns, P., & Dewhurst, J. (1996). *Small business and entrepreneurship*. Hampshire: Basingstoke.

Buzzell, D & Gale, B. T. (1989). *Das PIMS-Programm.* Wiesbaden: Gabler.

Buzzell, R. D., Gale, B. T. & Sultan, R. G. (1975). Market share: a key to profitability. *Harvard Business Review*, 53(1), 97-106.

Campello, M., Giambona, E., Graham, J. R., &, Harvey, C. R. (2010). *Liquidity Management and Corporate Investment During a Financial Crisis* (NBER Working Paper 16309). Washington: National Bureau of Economic Research.

Capasso, M., Treibich, T. & Verspagen B. (2015). The medium-term effect of R&D on firm growth. *Small Business Economics*, 45, 39-62.

Capon, N., & Go, F. (2017). *Frameworks for Market Strategy*: Milton Park: Routledge.

Carlisle, T. E. (2014). *Deep Value: Why Activist Investors and Other Contrarians Battle for Control of Losing Corporations*. Hoboken: Wiley.

Carznitzki, D. & Delanote, J. (2013). *Young Innovative Companies: the new high-growth firms? Industrial and Corporate Change*. Oxford: Oxford University.

Cassia, L., Cogliati, G., Minola, T., & Paleari, S. (2009). *Hyper growth among European SMEs: an explorative study*. Retrieved March 20, 2015 from http://dx.doi.org/10.2139/ssrn.1389521

Castillo-Merino, D., Vilaseca-Requena, J., & Plana-Erta, D. (2010). Financial Constraints for Innovative Firms. The Role of Size, Industry and ICT Uses as Determinants of Firm's Financial Structure. In M. D. Lytras, P. Ordonez De Pablos, A. Ziderman, A. Roulstone, H. Maurer & J. B. Imber (Eds.), *Organizational, Business, and Technological Aspects of the Knowledge Society, Part 2* (pp. 34-45). Berlin: Springer.

Chadha, S., & Sharma, A. K. (2015). Capital Structure and Firm Performance: Empirical Evidence from India. Vision: *The Journal of Business Perspective*, 19(4), 295-302.

Chang, X., & Dasgupta, S. (2009). Target behaviour and financing: How conclusive is the evidence? *Journal of Finance*, 64(4), 1767–1796.

Chang. C., Lee, A. C., & Lee, C. F. (2009). Determinants of capital structure choice: A structural equation modeling approach. *The Quarterly Review of Economics and Finance*, 49(2). 197–213.

Chen, S. (2014). *Financial Constraints, Intangible Assets, and Firm Dynamics: Theory and Evidence* (Working Paper 14/88). New York: International Monetary Fund.

Chen, S., & Dauchy, E. (2014). *The Tax-adjusted Q Model with Intangible Assets: Theory and Evidence from Temporary Investment Tax Incentives* (IMF Working Papers 14/104). New York: IMF.

Childs, P., Mauer, D., & Ott, S. (2005). Interactions of Corporate Financing and Investment Decisions: The Effects of Agency Conflicts. *Journal of Financial Economics*, 76(3), 667–690.

Chin, W. W. (2001). *PLS-Graph Users Guide Version 3.0.* Houston: University of Houston.

Choudhry, M. (2011). *Bank Asset and Liability Management: Strategy, Trading, Analysis.* Singapore: Wiley.

CIS Markets (2016). *S&P 500 Operating Income Growth*. Retrieved from: http://csimarket.com/Industry/industry_growth_rates.php?oper&sp5

Clark, V. L. P., & Badiee, M. (2010). Research Questions in Mixed Methods Research. In A. Tashakkori & C. Teddlie (Eds.), *Sage Handbook of Mixed Methods in Social and Behavioral Research* (pp. 275-304). Thousand Oaks: Sage.

Clarke, T. (2017). *International Corporate Governance: A Comparative Approach* (2nd ed.). Routledge: Milton Park.

Clayman, M. R., Fridson, M. S., & Troughton, G. H. (2012). *Corporate Finance*. Hoboken: Wiley.

Cloodt, M., Hagedoorn, J., & Van Kranenburg, H. (2006). Mergers and acquisitions: Their effect on the innovative performance of companies in high-tech industries. *Research Policy*, 35(5), 642–654.

Coad, A. & Rao, R. (2010). Firm growth and R&D expenditure'. *Economics of Innovation and New Technology*, 19(2), 127–145.

Coad, A. (2010). Exploring the processes of firm growth: Evidence from a vector auto-regression. *Industrial and Corporate Change*, 19, 1677-1703

Coad, A., Cowling, M., Nightingale, P., Pellegrino, G., Savona, M., & Siepel, J. (2014). *Innovative Firms and Growth.* London: Macmillan.

Coad, A., Segarra, A., & Teruel, M. (2016). Innovation and firm growth: Does firm age play a role? *Research Policy*, 45(2), 387–400.

Coleman, S., 2000. Access to capital and terms of credit: a comparison of men- and women-owned small businesses. *Journal of Small Business Management*, 38(3), 37-52.

Coles, M., & Mortensen, D. (2016). Equilibrium Labor Turnover, Firm Growth, and Unemployment. *Econometrica, 84*(1), 347-363.

Corrado-Bravo, F. (2003). *Managing Global Finance in the Digital Economy*. Westport: Praerger.

Cotei, C., & Farhat, J. (2011). Worldwide Patterns in Capital Structure. In H. Kent Baker & G. S. Martin (Eds.), *Capital Structure and Corporate Financing Decisions: Theory, Evidence, and Practice* (pp. 111–126). Hoboken: Wiley.

Cyert, R. M., & March, J. G. (1992). *A Behavioral Theory of the Firm*. Upper Saddle River: Prentice-Hall.

Damodaran, A. (2012). *Investment Valuation*. Hoboken: Wiley.

Damodaran, A. (2015). *Applied Corporate Finance* (4th ed.). Hoboken: Wiley.

Damodaran. A. (2011). *Applied Corporate Finance* (3rd ed.). Hoboken: Wiley.

Davidson, P., Achtenhagen, L., & Naldi, L. (2013). Towards an integrative scope for future research on small firm growth. In P. Davidsson & J. Wiklund (Eds.), *New Perspectives on Firm Growth* (pp. 176-186). Cheltenham: Edward Elgar.

Davidsson, P., & Klofsten, M. (2003). The Business Platform: Developing an Instrument to Gauge and to assist the Development of Young Firms. *Journal of Small Business Management*, 41, 1-26.

Davidsson, P., & Wiklund, J. (2013). *New Perspectives on Firm Growth*. Cheltenham: Edward Elgar.

Davidsson, P., Kirchhoff, B., Hatemi, A. & Gustavsson, H. (2002). Empirical Analysis of Business Growth Factors using Swedish Data. *Journal of Small Business Management*, 40(4), 332-349.

Davidsson, P., Steffens, P, &, Fitzsimmons, J. (2013). Growting profitable or growing from profit. In P. Davidsson & J. Wiklund (Eds.), *New Perspectives on Firm Growth* (pp. 187-220). Cheltenham: Edward Elgar.

Davies, S., & Lyons, B. (2007). *Mergers and Merger Remedies in the EU: Assessing the Consequences for Competition*. Cheltenham: Esward Elgar.

Davis, H., & Lam, P.–L. (2001). *Managerial Economics: An Analysis of Business Issues* (3rd ed.). Harlow: Prentice Hall.

De Vries, A., & Erasmus, P.D. 2010. Determinants of Capital Structure: A South African study. *Corporate Ownership and Control*, 8(1), 590-599.

Deakins, D. & Freel, M. (1998). Entrepreneurial Learning and Growth Process in SMEs. *The Learning Organization*, 5(3), 144-156.

DeAngelo, H., & Masulis, R. (1980). Optimal Capital Structure under Corporate and Personal Taxation. *Journal of Financial Economics*, 8, 3–29.

DeAngelo, H., DeAngelo, L., & Stulz, R.M. (2006). Dividend Policy and the Earned/Contributed Capital Mix: A Test of the Life-Cycle Theory. *Journal of Financial Economics*, 2, 227-254.

Debarshi, B. (2011). *Management Accounting*. New Delhi: Dorling Kindersley.

DeFusco, R., McLeavey, D., & Pinto, J. (2007). *Quantitative Investment Analysis*. Hoboken: Wiley.

Del Monte, A. & Papagni, E. (2003). R&D and the growth of firms: empirical analysis of a panel of Italian firms. *Research Policy*, 32(6), 1003-1014.

Derryberry, D. R. (2014). *Data Analysis for Time Series with R*. Hoboken: Wiley.

Dickie, R. A. (2006). *Financial Statement Analysis and Business Valuation*. Chicago: American Bar Association.

Dilek, T., Ozlem, T., & Ayca, T. (2009). Determinants of capital structure for Turkish firms: A panel data analysis. *International Research Journal of Finance and Economics*, 29, 1450-2887.

Diller, H. & Lucking, J. (1993). Die Resonanz der Erfolgsfaktorenforschung beim Management von Großunternehmen. *Zeitschrift für Betriebswirtschaft*, 63(12), S. 1229-1249.

Dittmar, A., & Mahrt-Smith, J. (2007). Corporate Governance and the Value of Cash Holdings. *Journal of Financial Economics*, 83(3), 599–634.

Dobbs, M. & Hamilton, R. (2007). Small business growth: recent evidence and new directions. *International Journal of Entrepreneurial Behavior & Research,* 13(5), 296-322.

Dömötör, R. (2011). *Erfolgsfaktoren der Innovativität von kleinen und mittleren Unternehmen*. Wiesbaden: Gabler.

Dosi, G. (2005). *Statistical Regularities in the evolution of Industries* (SSSUP Working Paper 2005/17). Pisa: Santa Anna School of Advanced Studies.

Dosi, G., Napoletano, M., Roventini, A., & Treibch, T. (2016). The Short- and Long-Run Damages of Fiscal Austerity: Keynes beyond Schumpeter. In J. E.

Stiglitz & M. Guzman (Eds.), *Contemporary Issues in Macroeconomics: Lessons from The Crisis and Beyond* (pp. 79-100). New York: Palgrave Macillan.

Downes, J., & Goodman, J. E. (2014). *Dictionary of Finance and Investment Terms*. New York: Barrons.

Draho, J. (2004). *The IPO Decision: Why and how Companies Go Public*. Cheltenham: Edward Elgar.

Drucker, P. (1954). *The Practice of Management*. New York: Harper Business.

Drucker, P. (2007). *The Practice of Management* (26th ed.). Oxford: Elsevier.

Duschl, M., Schimke, S., Brenner, T., & Luxen, D. (2011). *Firm Growth: Empirical Evidence for Germany Manufacturing Firms* (Working Paper No. 03/11). Marburg: Marburg University Press.

Dwivedi, D. N. (2010). *Macroeconomics*. New Delhi: McGraw-Hill.

Edelman, L. F., Brush, C. G. & Manolova, T. (2005). Co-Alignment in the Resource-Performance Relationship. *Journal of Business Venturing*, 20(3), 359-383.

Ehrhardt, M. C., & Brigham, E. F. (2016). *Corporate Finance: A Focused Approach.* Sydney: Cengage.

Erdogan, S. (2016). The Effect of Capital Structure on Profitability: An Empirical Analysis. In U. Akkucuk (Ed.), *Research for Developing Sustainable Value in Economics, Finance, and Marketing* (pp. 307-323). Boston: Cengage Business Science.

Erhardt, E. C. (2018). *Firm performance after high growth: A comparison of absolute and relative growth measures* (Working Paper). Munich: MPRA

Eriotis N. P., Franguoli Z., & Neokosmides Z. V. (2002). Profit Margin and Capital Structure: An Empirical Relationship. *Journal of Applied Business Research*, 18, 85-89.

Eriotis, N. P., Franguoli Z., & Neokosmides Z. V. (2002). Profit Margin and Capital Structure: An Empirical Relationship. *The Journal of Applied Business Research*, 18, 85-89.

Erlen, B., & Isaak, A. J. (2015). Kennzahlen/Business Ratios: German/English. Weinheim: Wiley.

Ernst, H., Glänzer, S., & Witt, P. (2005). *Success Factors of Fast-Growing Companies: Selected Case Studies*. Gabler Wiesbaden

Evans, D. S. (1987). Tests of alternative theories of firm growth. *The Journal of Political Economy*, 95(4), 657–674.

Fabich, M., Schellenberg, E., & Wöfler, K. (2012). Integrated Capital Structure Management: Value Improvement by Overcomming the Silo Approach of Financial Institutions. In U. Hommel, M. Fabich, E. Schellenberg & L. Firnkorn (Eds.), *The Strategic CFO: Creating Value in a Dynamic Market Environment* (pp. 143–170). Berlin: Springer.

Fadahunsi, A. (2012). The Growth of Small Businesses: Towards A Research Agenda. *American Journal of Economics and Business Administration*, 4(1), 105-115.

Falahati, K. (2013). *New Paradigms in Financial Economics: How Would Keynes Reconstruct Economics?* Milton Park: Routledge.

Fama, E. F., & French, K. R. (2002). Testing Trade-Off and Pecking Order Predictions about Dividends and Debt. *Review of Financial Studies*, 15(1), 1–33.

Faulkender, M., & Petersen, M. A. (2006). Does the source of capital affect capital structure? *Review of Financial Studies*, 19(1), 45–79.

Feng, H., Morgan, N., & Rego, A. (2017). Firm capabilities and growth: The moderating role of market conditions. *Journal of the Academy of Marketing Science,* 45(1), 76-92.

Ferran, E., & Ho, L. C. (2014). *Principles of Corporate Finance Law*. Oxford: Oxford University Press.

Finch, V. (2002). *Corporate Insolvency Law: Perspectives and Principles.* Cambridge: Cambridge University Press.

Forsman, H. (2015). *Small Firms as Innovators: From Innovation to Sustainable Growth*. London: Imperial College Press.

Fosu, S. (2013). Capital structure, product market competition and firm performance: Evidence from South Africa. *The Quarterly Review of Economics and Finance*, 53(2), 140–151.

Frank, M. Z., & Goyal, V. K. (2003). Testing the pecking order theory of capital structure. *Journal of Financial Economics*, 67, 217–248.

Frank. M. Z., & Goyal. V. K. (2009). Capital structure decisions: which factors are reliably important? *Financial Management*, 38(1), 1–37.

Frank. M. Z., & Goyal. V. K. (2009). Capital structure decisions: which factors are reliably important? *Financial Management, 38*(1), 1–37.

Frees, E. W. (2004). *Longitudinal and Panel Data: Analysis and Applications for the Social Sciences*. Cambridge: Cambridge University Press.

Frenz, M., & Letto-Gillies, G. (2009). The Impact on Innovation Performance: Evidence from the UK Community Innovation Survey. *Research Policy*, 38, 1125-1135.

Friebel, G., & Raith, M. (2006). *Resource Allocation and Firm Scope* (IZA Discussion Paper No. 2249). Bonn: Institute for the Study of Labor.

Fritz, T. (2008). *The Competitive Advantage Period and the Industry Advantage Period*. Wiesbaden: Gabler.

Fritz, W. (1993). *Die empirische Erfolgsfaktorforschung und ihr Beitrag zum Marketing* (AP-Nr. 93/12). Braunschweig. Universität Braunschweig.

Fritzenschaft, T. (2014). *Critical Success Factors of Change Management: An Empirical Research in German Small and Medium-Sized Enterprises*. Wiesbaden: Springer Gabler.

Gassmann, O., & Frankenberger, K., Sauer, R. (2016). *Exploring the Field of Business Model Innovation: New Theoretical Perspectives*. Lucerne: Palgrave Macmillan

Gavigan, S. (2017). Mixed Research Methodes. In K. Lawlor & P. Buckley (Eds.), *Proceedings of the 16th European Conference on Research Methods in Business and Management Studies* (pp. 424-431). Dublin: Dublin Institute of Technology.

Geroski P., Machin, S. J., & Reenen, J. (1993). The profitability of innovating firms. *Rand Journal of Economics*, 24, 198–211.

Gervais, S., Heaton, J., & Odean, T. (2006). *Overconfidence, Investment Policy, and Manager Welfare* (Working Paper, Duke University). Retrieved from faculty.fuqua.duke.edu/~sgervais/Research/Papers/OvMan.WP.pdf

Gibb, A. A. (2000). SME policy, academic research and the growth of ignorance, mythical concepts, myths, assumptions, rituals and confusions.*International Small Business Journal*, 18(3), 13–36.

Gibrat, R. (1931). *Les Inégalités Économiques*. Paris: Librairie du Recueil Sirey.

Gibrat, R. (1931). *Les Inégalités Économiques*. Paris: Librairie du Recueil Sirey.

Gill, R. (2011). *Theory and Practice of Leadership*. London: Sage.

Goddard J., Tavakoli M. &, Wilson J. (2005). Determinants of profitability in European manufacturing and services: Evidence from a dynamic panel data. *Applied Financial Economics*, 15, 1269–1282.

Goddard, J., Tavakoli, M., & Wilson, J. (2005). Determinants of profitability in European manufacturing and services: Evidence from a dynamic panel data. *Applied Financial Economics*, 15, 1269-1282.

Golin, J., & Delhaise, P. (2013). *The Bank Credit Analysis Handbook*. Singapore: Wiley.

Gomes, A., & Phillips, G. (2012). Why do public firms issue private and public securities? *Journal of Financial Intermediation*, 21, 619–658.

Gordon, M. (1963). Optimal Investmetn and Financing Policy. *Journal of Finance*, 18(2), 264-272.

Gosh, A. (2017). *Capital Structure and Firm Performance*. New York: Routledge.

Graham, J. R., & Harvey, C. (2001). The Theory and Practice of Corporate Finance: Evidence from the Field. *Journal of Financial Economics*, 60(2), 187–243.

Graham, J. R., & Leary, M. T. (2011). A Review of Empirical Capital Structure Research and Directions for the Future. *Annual Review of Financial Economics*, 3(1), 309–345

Graham, J., Harvey, C., & Puri, M. (2013) Managerial Attitudes and Corporate Action. *Journal of Financial Economics*, 109(1), 103–121.

Graham. J., & Harvey. C. (2002). How do CFOs make capital budgeting and capital structure decisions? *Journal of Applied Corporate Finance*, 15(1), 8–23.

Greiner, L. (1972). Evolution and revolution as organizations grow. *Harvard Business Review*, 50(4), Reprint.

Grillitsch, A., Schubert, B. & Srholec. C. (2018). Knowledge base combinations and firm growth. *Research Policy,* DOI: https://doi.org/10.1016/j.respol.2018.08.009

Gruenwald, R. K. (2013). Entrepreneurship Challenges in High-Growth Companies and Consequences for SME Policy. *Entrepreneurial Busssiness and Economics Review*, 1(1), 41-54.

Gruenwald, R. K. (2016). *Causes of High-Growth of Small- and Mid-Cap Companies in the DACH Countries*. Krakow: University of Economics Krakow.

Gulati, S., & Singh, Y. P. (2013). Financial Management. New Delhi: McGraw Hill.

Gungoraydinoglu, A., & Öztekin, Ö. (2011). Firm-and country-level determinants of corporate leverage: Some new international evidence. *Journal of Corporate Finance*, 17(5), 1457–1474.

Gurusamy, S. (2009). *Financial Services* (2nd ed.). New Delhi: Tata McGraw Hill.

Gutenberg, E. (1989). *Zur Theorie der Unternehmung*. Berlin: Springer.

Hackbarth, D., (2008). Managerial traits and capital structure decisions. *Journal of Financial and Quantitative Analysis*, 43(4), 843–882.

Haenecke, H. (2002). Methodenorientierte Systematisierung der Kritik an der Erfolgsfaktorenforschung. *Zeitschrift für Betriebswirtschaft*, 72 (2), 165–183.

Hall, B. (1987). The Relationship between Firm Size and Firm Growth in the U.S. Manufacturing Sector. *Journal of Industrial Economics*, 35(4), 583–606.

Hamel, G., & Prahalad, C. K. (1990). The Core Competence of the Corporation. *Harvard Business Review*, 68(3), 79-90.

Hamel, G., & Prahalad, C. K. (1994). *Competing for the Future*. Boston: Harvard Business School Press.

Handa, J. (2000). *Monetary Economics*. Milton Park: Routlegde.

Haric, P. (2013). *Hidden Champion*. Vienna: Leitbetriebe Austria Institut.

Harms, R. (2004). *Entrepreneurship in Wachstumsunternehmen: Unternehmerisches Management als Erfolgsfaktor*. Wiesbaden: DUV.

Harris, M., & Raviv, A. (1991). The Theory of Capital Structure. *Journal of Finance*, 46, 297–355.

Hasan, I., Kobeissi, N., Liu, L., & Wang, H. (2018). Corporate Social Responsibility and Firm Financial Performance: The Mediating Role of Productivity. *Journal of Business Ethics,* 149(3), 671-688.

Hasan, M. M., Hossain, M., & Cheung, A. (2015). Corporate life cycle and cost of equity capital. *Journal of Contemporary Accounting & Economics, 11*(1), 46-60.

Havlik, P., Leitner, S., & Stehrer, R. (2012). Growth resurgence, productivity catchin-up and labour demand in Central and Eastern European countries.

In M. Mas & R. Stehrer (Eds.), *Industrial Productivity in Europe: Growth and Crisis* (pp. 219–235). Cheltenham: Edward Elgar.

Hawawini, G., & Viallet, C. (2011). *Finance for Executives: Managing for Value Creation* (4th ed.). Mason: South-Western.

Heaton, J. B. (2002). Managerial optimism and corporate finance. *Financial Management*, 31, 33–45.

Henrekson, M., & Johansson, D. (2010). Gazelles as Job Creators. *Small Business Economics*, 35, 227–244.

Herr, C. (2006). *Nicht-lineare Wirkungsbeziehungen von Erfolgsfaktoren.* Wiesbaden: DUV.

Hill, C. (2003). *Strategic Management*. Boston: Houghton Mifflin.

Hirschey, M. (2005). *Fundamentals of Managerial Economics* (11th ed.). Mason: South-Western.

Hmieleski, K. M., & Baron, R. A. (2008). When does entrepreneurial self-efficacy enhance versus reduce firm performance? *Strategic Entrepreneurship Journal*, 2, 57-72.

Hoff, (2012). *Greentech Innovation and Diffusion. A Financial Economics and Firm-Level Perspective*. Wiesbaden: Gabler Springer.

Hoffmann, A. N. & Junge, M. (2006). *Documenting data on high-growth firms and entrepreneurs across 17 Countries*. Copenhagen: Mimeo.

Holt, D., Rutherford, M., & Kuratko, D. (2010). Advancing the Field of Family Business Research: Further Testing the Measurement Properties of the F-PEC. *Family Business Review,* 23(1), 76-88.

Holtmann, D. (2010). *Grundlegende multivariate Modelle der sozialwissenschaftlichen Datenanalyse.* (3rd ed.). Potsdam: Universitätsverlag Potsdam.

Hölzl, W. (2009). Is the R&D Behaviour of Fast-Growing SMEs different? *Small Business Economics*, 1, 59–75.

Homburg, C. (2000). *Quantitative Betriebswirtschaftslehre*. Berlin: Springer.

Hopkins, P., & Richmond, K. (2016). Fast-Growth Companies in Scotland. *Fraser of Allander Economic Commentary*, 40(1), 64-73.

Hoyle, R. H., & Duvall, J. L. (2004). Determining the Number of Factors in Exploratory and Confirmatory Factor Analysis. In D. Kaplan (Ed.), *The SAGE Handbook of Quantitative Methodology for the Social Sciences* (pp. 301-316). Thousand Oaks: SAGE.

Hsiao, P., & Li, D. (2012). What is a good Investment Measure? *Investment Management and Financial Innovations*, 9(1), 8-19.

Huggins, R. H. & Izushi, H. (2011). *Competition, Competitive Advantage, and Clusters: The Ideas of Michael Porter*. Oxford: Oxford University Press.

Impink, J. (2011). *Firm Growth, Firm Size and the Diversification Discount*. New York: New York University Stern School of Business.

International Accounting Standards Council (2017). *IFRS & IAS Standards*. Retrieved from http://www.ifrs.org/IFRSs/Pages/IFRS.aspx

IRFS (2014). *International Financial Reporting Standards (IFRS) 2014*. Weinheim: Wiley.

J. P. Morgan (2014). *Creating Value through Best-In-Class Capital Allocation*. New York: J. P. Morgan.

Jager, M. (2010). Dynamische Prozesse der Internationalisierung: Theoriegeleitete empirische Analyse familiengeführter KMU. Wiesbaden: Gabler Springer.

Jain, B., & Kini, O., (1994). The post issue operating performance of IPO firms. *Journal of Finance*, 49, 1699-1726.

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review*, 76(2), 323–329.

Jonsson, B. (2007). Does the size matter? The Relationship Between Size and Profitability. Journal of Social Sciences, 1, 43-55.

Kaen, F. R. (2005). Risk Management, Corporate Governance and the Public Corporation. In M. Frenkel, U. Hommel & M. Rudolf (Eds.), Risk Management: Challenge and Opportunity (pp. 423-436). Berlin: Springer.

Kaldasch, J. (2012). Evolutionary Model of Growth and Size of Firms. *Physica A: Statistical Mechanics and its Applications,* 391(14), 3751-3769.

Kangasharju, A. (2000). Determinants of Small Firm Growth During Strong Macroeconomic Fluctuations. *International Small Business Journal,* 19(1), 28–43.

Kanji G., & Moura, P. (2007). Performance Measurement and Business Excellence. *Total Quality Management*, 18(1-2), 49–56.

Kanji, G., Moura e Sá, P. (2007). Performance Measurement and Business Excellence: The Reinforcing Link for the Public Sector. *Total Quality Management*, 18(1-2), 49–56.

Karasahin, R., & Kücüksarac, D. (2016) *Revisiting Capital Structure of Non-Financial Public Firms in Turkey*. Ankara: Central Bank of Turkey.

Kaserer, C. (2011). *Solvency II und Basel III: Die Reform der europäischen Versicherungs- und Bankenregulierung und deren Auswirkung auf die Unternehmensfinanzierung*. Munich: FPMI.

Kayo, E. K., & Kimura, H. (2011). Hierarchical determinants of capital structure. *Journal of Banking & Finance*, 35(2), 358–371.

Kebewar, M. (2012). *La structure du capital et la profitabilité: Une étude empirique sur données de panel françaises* (MPRA Paper 42446). Munich: Ludwig-Maximilian-University.

Kebewar, M. (2013). *The effect of debt on corporate profitability Evidence from French service sector* (Working Paper). Laboratoire d'Economie d'Orléans: Orléans.

KfW Research (2015). *Fokus Volkswirtschaft Nr. 109*. Frankfurt: Kreditanstalt für Wiederaufbau.

Khan, M. Y, & Jain, P. K. (2007). *Financial Management* (5th ed.). New Delhi: Tata McGraw-Hill.

Kim, E. H., Lewellen, W. G., & McConell, J. J. (1979). Financial Leverage Clientels—Theory and Evidence. *Journal of Financial Economics*, 7, 83–109.

Klenke, K. (2016). *Qualitative Research in the Study of Leadership* (2nd ed.). Bingley: Emerald.

Klug, M. (2006). *Market Entry Strategies in Eastern Europe in the Context of the European Union*. Wiesbaden: DUV/GWV.

Koen, M., & Oberholster, J. (1999). *Analysis and Interpretation of Financial Statements*. Cape Town: JUTA.

Koryak, O., Mole, K., Lockett, A., Hayton, J., Ucbasaran, D., & Hodgkinson, G. (2015). Entrepreneurial leadership, capabilities and firm growth. *International Small Business Journal, 33*(1), 89-105.

Kotler, P. (1999). *Marketing*. New York: The Free Press.

Kraus, A., & Litzenberger, R. H. (1973). A State-Preference Model of Optimal Financial Leverage. *Journal of Finance*, 28(4), 911–922.

Krause, H.–U., & Arora, D. (2010). *Controlling, Kennzahlen, Key Performance Indicator*s. Munich: Oldenbourg.

Kressin, T. (2003). *Risikokapital und Aktienfinanzierung: Der Financial Growth Cycle innovativer Unternehmensgründung*. Wiesbaden: DUV.

Kugler, F., & Zickert, K. (2005). *Innovationsaktivitäten kleiner und mittlerer Unternehmen: Eine empirische Analyse in Südthüringen*. Köln: EUL.

Kuhnhausen, F., & Stieber, H. W. (2014). *Determinants of Capital Structure in Non-Financial Companies* (Munich Discussion Paper No. 2014-38). Munich: Ludwig-Maximilians-Universität.

Kühnhausen, F., & Stieber, H. W. (2015). *Determinants of Capital Structure in Non-Financial Companies* (Working Paper European Commission). Brussels: European Commission.

Kumar, M. V. S. (2009). The relationship between product and international diversification: The effects of short-run constraints and endogeneity. *Strategic Management Journal*, 30, 99-116.

Kuß, A., Wildner, R., & Kreis, H. (2014). *Marktforschung: Grundlagen Der Datenerhebung und Datenanalyse* (5th ed.). Wiesbaden: Springer.

Lahti, A. (2010). Globalization and the Nordic Success Model. Telluride: Ventus

Laitinen, E. (1999). Stochastic Growth Processes in Large Finnish Companies: Test of Gibrat's Law of Proportionate Effect. *LTA*, 1/99, 27-49.

Langohr, H., & Langohr, P. (2008). The Rating Agencies and Their Credit Ratings. Chichester: Wiley.

Leary M. T., & Roberts, M. (2010). The pecking order, debt capacity, and information asymmetry*. Journal of Financial Economics*, 95(3), 332–355.

Leary, M. T. (2009). Bank Loan Supply, Lender Choice, and Corporate Capital Structure*. Journal of Finance*, 64, 1143–1185.

Lee, C.-F., & Lee, J. (2010). *Handbook of Quantitative Finance and Risk Management*. New York: Springer.

Lee, J. (2009). Does Size Matter in Firm Performance? Evidence from US Public Firms. *International Journal of the Economics of Business*, 16(2), 189-203.

Lee, N. (2014). What holds back high-growth firms? Evidence from UK SMEs. *Small Business Economics* ,43(1), 183-195.

Leleux, B., Swaay, H., & Megally, E. (2015). *Private Equity 4.0: Reinventing Value Creation*. Chichester: Wiley.

Lemmon, M. L., & Zender, J. F. (2010). Debt Capacity and Tests of Capital Structure Theories. *Journal of Financial and Quantitative Analysis*, 45(5), 1161–1187.

Lemmon, M. L., Roberts, M., & Zender, J. F. (2008). Back to the Beginning: Persistence and the Cross-Section of Corporate Capital Structure. *Journal of Finance*, 63(4), 1575–1608.

Levine, O. & Warusawitharana, M. (2014). *Finance and Productivity Growth: Firm-level Evidence* (FEDS Working Paper No. 2014-17). Washington: Federal Reserve Board.

Lewellen, W. G. (1971). A Financial Rationale for the Conglomerate Merger. *Journal of Finance*, 26(2), 521–537.

Lewis, V. L., & Churchill, N. C. (1983). The five stages of small business growth. *Harvard Business Review*, 61(3), 30-50.

Lintner, J. (1962). Dividends, Earnings, Leverage, Stock Prices and the Supply of Capital to Corporations. *The Review of Economics and Statistics*, 44(3), 243-269.

Long, J. S. (1997). *Regression Models for Categorical and Limited Dependent Variables*. Thousand Oaks: Sage.

Loos, N. (2005). *Value Creation in Leveraged Buyouts: Analysis of Factors Driving Private Equity Investment Performance*. Wiesbaden: DUV.

López-Garcia, P. & Puente, S. (2012). *What Makes A High-Growth Firm? A Probit Analysis Using Spanish Firm-Level Data. Small Business Economics*, 39(4), 1029-1041.

Luchs, R. H., & Müller, R. (1985). Das PIMS-Programm—Strategien empirisch fundieren. *Strategische Planung*, 1, 79–98.

Mac an Bhaird, C. (2010). Resourcing Small and Medium Sized Enterprises: A Financial Growth Life Cycle Approach. Berlin: Springer.

MacMenamin, J. (1999). *Financial Management: An Introduction*. London: Routledge.

Macpherson, A. (2005). Learning to Grow. *Technovation*, 25(10), 1129–1140.

Mahoney, J. T. (2005). *The Behavioral Theory of the Firm*. Thousand Oaks: Sage.

Majumdar, S. K., & Chhibber, P. (1999). Capital structure and performance: Evidence from a transition economy on an aspect of corporate governance. *Public Choice*, 98(3), 287-305.

Majumdar, S.K., & Sen, K. (2010). Corporate Borrowing and Profitability in India. *Managerial and Decision Economics*, 31, 33-45.

Malerba, F., Caloghirou, Y., McKelvey, M., & Radoševic, S. (2016) Intoduction. In F. Malerba, Y. Caloghirou, M. McKelvey & S. Radoševic (Eds.), *Dynamics of Knowledge Intensive Entrepreneurship: Business Strategy and Public Policy* (pp. 1-16). London: Routledge.

Malik, F. (2008). Ende des Blindflugs mit PIMS. *Malik on Management*, 9-2018, *146*–158.

Malmendier, U., & Tate, G. (2005). CEO overconfidence and corporate investment. *Journal of Finance*, 60(6), 2661–2700.

Malmendier, U., & Tate, G. (2008). Who makes acquisitions? CEO overconfidence and the market's reaction. *Journal of Financial Economics*, 89(1), 20–43.

Malmendier, U., Tate, G., & Yan, J. (2012). Overconfidence and Early-life Experiences: The Effect of Managerial Traits on Corporate Financial Policies*. Journal of Finance*, 66(5), 1687–1733.

Margaritis D., & Psillaki M. (2007). Capital Structure and Firm Efficiency. *Journal of Business Finance & Accounting*, 34(9),1447-1469.

Marks, K. H., Robbins, L. E., Fernandez, G., Funkhouser, J. P., & Williams, D. L. (2009). *The Handbook of Financing Growth: Strategies, Capital Structure, and M&A Transactions*. Hoboken: New Jersey.

Marks, M. L. & Mirvis, P. H. (2011). Merge Ahead: A Research Agenda to Increase Merger and Acquisition Success. *Journal of Business and Psychology*, 26(2), 161–168.

Mary, A., El-Sayeda, M., & Mohamed, S. (2011). The determinants of capital structure in Egyptian. *Journal of Middle Eastern Finance and Economics*, 9, 84-99.

Mattessich, R. (2014). Reality and Accounting: Ontological Explorations in the Economic and Social Sciences. Milton Park: Routledge.

Mauboussin, M., & Callahan, D. (2013). *Assessing the Magnitude and Sustainability of Value Creation*. Zürich: Credit Suisse.

Mauboussin, M., & Callahan, D. (2015). *Capital Allocation*. Zurich: Credit Suisse.

McMahon, R. G. (1998). Stage models of SME growth reconsidered. *Small Business Research*, 6(2), 20–35.

McManus, P., Mulhall, S., & Ragab, M. (2017). Methodological Approaches. In K. Lawlor & P. Buckley (Eds.), *Proceedings of the 16th European Conference on Research Methods in Business and Management Studies* (pp. 233-241). Dublin: Dublin Institute of Technology.

Meffert, J. & Klein, H. (2007). *DNS der Weltmarktführer.* Heidelberg: Redline.

Menard, S. (2002). *Applied Logistic Regression Analysis* (2nd ed.). Thousand Oaks: Sage.

Michaely, R., & Roberts, M. (2012). Corporate Dividend Policies: Lessons from Private Firms. *The Review of Financial Studies*, 25(3), 711-746.

Miglo, A. (2016). *Capital Structure in the Modern World* Cham: Palgrave Macmillan.

Miller. M. H., & Modigliani, F. (1961). Dividend Policy, Growth, and the Valuation of Shares. *Journal of Business*, 34(4), 411-433.

Mintzberg, H. (1994). *Rise and Fall of Strategic Planning*. Hempstead: Prentice-Hall.

Mishra, C. S. (2015). *Getting Funded: Proof-of-Concept, Due Diligence, Risk and Reward*. New York: McMillan.

Modigliani, F., & Miller, H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *American Economic Review*, 48(3), 261–297.

Modigliani, F., & Miller, M. H. (1963): Corporate Income Taxes and the Cost of Capital: A Correction. *American Economic Review*, 53(3), 433–443.

Morgan, G., & Sturdy, A. (2000). *Beyond Organizational Change: Structure, Discourse and Power in UK Financial Services*. Basingstoke: Palgrave Macmillan.

Morningstar (2016). *Data Definitions*. Chicago: Morningstar.

Moses, J., & Knutsen, T. (2012). *Ways of Knowing.* Houndsmills: Palgrave Macmillan.

Moussa, A. (2018). The impact of working capital management on firms' performance and value: evidence from Egypt. *Journal of Asset Management*, 19(4), 259–273.

Mowery, D. C. (1983). Industrial research and firm size, survival, and growth in American manufacturing, 1921–1946: An assessment. *Journal of Economic History, 43*, 953–980.

Murmann, J. P., Kkorn, J. U., & Worch, H. (2014). *How Fast Can Firms Grow?* (UNSW Research Paper No. 301). Sydney: UNSW Business School.

Mwambuli, E. L. (2015). What Determines Corporate Capital Structure in Developing Economies? *Research Journal of Finance and Accounting*, 6(12), 221-239.

Mwambuli, E. L. (2016). Does Corporate Capital Structure Influence Corporate Financial Performance in Developing Economies? *International Finance and Banking*, 3(1), 97-123.

Myers, S., & Majluf, N. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13(2), 187–221.

Nason, R. S., & Wiklund, J. (2015). An Assessment of Resource-Based Theorizing on Firm Growth and Suggestions for the Future. *Journal of Management*, 44(1), 32-60.

Nath, P., & Mahajan, V. (2011). Marketing in the C-Suite: A Study of Chief Marketing Officer Power in Firms' Top Management Teams. *Journal of Marketing, 75*(1), 60-77.

Naujoks, T. (1998). *Unternehmensentwicklung im Spannungsfeld von Stabilität und Dynamik: Management von Dualitäten*. Wiesbaden: DUV.

Nelson, R. R. (2005). Technology, Institutions, and Economic Growth. Harvard University Press, Cambridge.

Neubauer, F. (1997). PIMS-Programm und Portfolio-Management. In D. Hahn & B. Taylor (Eds.), *Strategische Unternehmensplanung und Unternehmensführung: Stand und Entwicklungstendenzen* (7th ed.) (pp.. 436-463). Heidelberg: Springer.

Ngobo P.V., & Capiez A. (2004). *Structure du capital et performance de l'entreprise: le rôle modérateur des différences culturelles*. Le Havre: Congrès de l'Association Internationale de Management Stratégique (AIMS).

Ngobo, P. V., & Capiez, A. (2004). *Structure du capital et performance de l'entreprise: le role modérateur des différences culturelles. Congrès de l'Association Internationale de Management Stratégique* (AIMS). Le Havre: AIMS.

Nguyen, T., & Rachandran, N. (2006). Capital Structure in Small and Medium-sized Enterprises: The Case of Vietnam. Asean Economic Bulletin, 23(2), 192-211.

Niglas, K. (2010). The Multidimensional Model of Research Mehtodology: An Integrated Set of Continua. In A. Tashakkori & C. Teddlie (Eds.), Handbook of Mixed Methods in Social and Behavioral Research (2nd ed.) (pp. 215-236). Thousand Oaks: Sage.

Nonaka, I., &, Takeuchi, H. (1995). *The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation*. Oxford: Oxford University Press.

Nooteboom, B. (2000). *Learning and innovation in organizations and economies*. Oxford: Oxford University Press.

Nunes P. J. M., Serrasqueiro Z. M., & Sequeira T. N. (2009). Profitability in Portuguese service industries: a panel data approach. *The Service Industries Journal,* (29), 693-707.

OECD (2000). *High-growth firms and employment* (OECD STI Working Paper No. 2000/3). Paris: Organisation for Economic Co-operation and Development.

Oetken, P. (2010). *Die deutschen Small Caps: Definition, Situation und Finanzkommunikation*. Hamburg: Diplomica.

Ogebe, P., Ogebe, P., & Kemi, A. (2013). *The Impact of Capital Structure on Firms' Performance in Nigeria* (MPRA Paper No. 46173). Munich: University of Munich.

O'Gorman, C. (2001). The Sustainability of Growth in Small- and Medium-Sized Enterprises. *International Journal of Entrepreneurship Behavior & Research*, 7(2), 60–71.

Olderog, T. (2003). *Faktoren des Markterfolges im Online-Handel*. Wiesbaden: GWV.

Oxelheim, L., & Wihlborg, C. (2008). Markets and Compensation for Executives in Europe. Bingley: Emerald.

Ozgulbas, N., A.S. Koyuncugil, & Yilmaz, F. (2006). dentifying the Effect of Firm Size onFinancial Performance of SMEs. *The Business Review*, 6(1), 162-167.

Ozgulbas, N., A.S. Koyuncugil, & Yilmaz, F. (2006). Identifying the Effect of Firm Size on Financial Performance of SMEs. *The Business Review*, 6(1), 162-167.

Palepu, K., Healy, P.., & Peek, E. (2007). *Business Analysis and Valuation: Text and Cases*. Mason: Thomson.

Pandey, I. M. (2015). *Financial Management* (11th ed.). New Dehli: Vikas.

Park, Y. & Chen, K. (2006). The Effect of Accounting Conservatism And Life-Cycle Stages On Firm Valuation. *Journal of Applied Business Research*, 22, 75-92.

Penrose, E. (1959 [2009]). *The Theory of the Growth of the Firm* (4th ed..). Oxford: Oxford University Press.

Petilis, C. (2010). *Penorse's Theory of the Growth of the Firm Fifty Years Later*. Munich: Ludwig-Maximilians-University.

Petty, J. W., Titman, S., Keown, A. J.,Martin, P., Martin, J. D., & Burrow, M. (2012). Financial Management: Principles and Applications (6th ed.). French Forest: Pearson.

Pfingsten, F. (1998). *Shareholder-Value im Lebenszyklus: Methoden einer marktwertorientierten Unternehmensführung*. Wiesbaden: DUV.

Phelps, B., Adams, R. & Bessant, J. (2007). Lifecycles of growing organisations: a review with implications for knowledge and learning. *International Journal of Management Reviews*, 9(1), 1-30.

Pitelis, C. N. (2013). Penrose's Contribution to Economics and Management Scholarship. In M. Witzel & M. Warner (Eds.), The Oxford Handbook of Management Theorists (pp. 244-270). Oxford: Oxford University Press.

Poosch, H. (2010). *Handbuch Total Factor Governance: Das Geheimnis langfristig erfolgreicher Unternehmen*. Norderstedt: BoD

Porter, K., Smith, P., & Fagg, R. (2006). *Leadership and Management* (3rd ed.). Milton Park: Routledge.

Porter, M. E. (1980). *Competitive Strategy: Techniques for Analyzing Industries and Competitor*s. New York: Free Press.

Prasad. S., Green, C. J., & Murinde, V. (2005). Company financial structure: a survey and implications for developing economies. In C. J. Green, C. Kirkpatrick & V. Murinde (Eds.), *Finance and Development: Surveys of Theory, Evidence and Policy* (pp. 356-429). Cheltenham: Edward Elgar.

Pratt, J. (2011). *Financial Accounting in an Economic Context*. Hoboken: Wiley.

Probst, G. J.B. (1987): *Selbstorganisation: Ordnungsprozesse in sozialen Systemen ausganzheitlicher Sicht*. Berlin: Paul Parey.

Puri, M., & Robinson, D. (2007). Optimism and economic choice. *Journal of Financial Economics*, 86(1), 71–99.

Quinn, G. P., & Keough, M. J. (2003). *Experimental Design and Data Analysis*. Cambridge: Cambridge University Press.

Raab, G., Unger, A., & Unger, F. (2009). *Methoden der Marketing-Forschung: Grundlagen und Praxisbeispiele.* Wiesbaden: Gabler.

Rafols, I., Hopkins, M. M., Hoekman, J., Sieple, J., O'Hare, A., Perianes-Rodriguez, A., & Nightingale, P. (2014). Big Pharma, little science? A bibliometric perspective on Big Pharma's R&D decline. *Technological Forecasting and Social Change*, 81, 22–38.

Raisch, S. (2004). *Dynamic Strategic Analysis: Demystifying simple success strategies*. Wiesbaden: DUV/GWV

Rajan, R. G., & Zingales, L. (1995). What do we know about capital structure? Some evidence from international data. *Journal of Finance,* 50, 1421-1460.

Rao N. V., Al Yahyaee K. H. M., & Syed L. A. M. (2007): Capital structure and financial performance: evidence from Oman. *Indian Journal of Economics and Business*, 7,1-14.

Rao, N. V., Al-Yahyee, K., & Syed, L. (2007). Capital Structure and financial performance: Evidence from Oman. *Indian Journal of Economics and business*, 7, 1-14.

Rao, S., & Ramachandra, V. S. (2008). *Capital Structure, Industry Pricing, and Firm Performance. 21st Australasian Finance and Banking Conference 2008 Paper*. Retrieved from http://ssrn.com/abstract=1263245.

Reichstein, T., & Dahl, M. S. (2004). Are Firm Growth Rates Random? Analysing Patterns and Dependencies. *International Review of Applied Economics*, 18(2), 225–246.

Reichstein, T., & Jensen, M. B. (2005). Firm size and firm growth rate distributions. *Industrial and Corporate Change*, 14(6), 1145–1166.

Relander, P. (2011). *Gibrat's Law Revisited: A Study on Gibrat's Law*. Aalto: University of Economics.

Rist, M., & Pizzica, A. J. (2014). Financial Ratios for Executives. New York: Apress Springer.

Robbins, D. K., Pantuosco, L. J., & Parker, D. F. (2000). An Empirical Assessment of the Contribution of Small Business Employment to US State Economic Performance *Small Business Economics*, 15(4), 293–302.

Robinson, T. R., Henry, E., Pirie, W.., & Cope, A. (2015). *International Financial Statement Analysis* (3rd ed.). Hoboken: CFA Institute.

Rohtak, D. (2003). *Financial Management*. New Delhi: Maharshi Dayanand University.

Ross, S. A. (1977). The Determinants of Financial Structure: The Incentive Signaling Approach. *Bell Journal of Economics, 8*(1), 23–40.

Rubin, A. (2013). *Statistics for Evidence-Based Practice and Evaluation*. Belmont: Cengage.

Rupp, A. (2013). Clustering and Classification. In T. D. Little (Ed.), *The Oxford Handbook of Quantitative Methods, Vol. 2: Statistical Analysis* (pp. 517-550). Oxford: Oxford University Press

Sahaf, M.A. (2013). *Management Accounting: Principles & Practice* (3rd ed.). New Delhi: Vikas.

Samonas, M. (2015). *Financial Forecasting, Analysis, and Modelling*. Chichester: Wiley.

Sandner, P. (2010). *The Valuation of Intangible Assets: An Exploration of Patents and Trademarks as Assets*. Wiesbaden. Gabler

Santarelli, E., Klomp, L., & Thurik, A. R. (2006). Gibrat's Law: An Overview of the Empirical Literature. In E. Santarelli (Ed.), *Entrepreneurship, Growth, and Innovation – International Studies in Entrepreneurship* (pp. 41-73). Berlin: Springer Science.

Sanyal, S., Datta, S. K., & Banerjee, A. K. (2013). Conceptualisation of branding: strategy based on the Indian pharma sector. *International Journal of Pharmaceutical and Healthcare Marketing*, 7(2), 175–198.

SAP (2016). *Balance Sheet Planning*. Retrieved from http://help.sap.com/saphelp_scm41/helpdata/en/c4/93d332c69911d4b3400050dadfb23f/content.htm

Schipporeit, E. (2001). Externe Eigenfinanzierung bei Kapitalgesellschaften. In R. E. Breuer (Ed.), *Handbuch Finanzierung* (pp. 437-468). Wiesbaden: Springer.

Schmidt, D. (2014). *Entrepreneur's choice between Venture Capitalist and Business Angels.* Hamburg: Anchor.

Schmitt, A. (2009). *Innovation and Growth in Corporate Restructurings.* Wiesbaden: Gabler GWV.

Schneider, F. (1991). Efficiency and profitability: an inverse relationship according to the size of Austrian firms. Small Business Economics, 3, 287-2996

Schneider, H. (2010). *Determinanten der Kapitalstruktur: Eine meta-analytische Studie der empirischen Literatur*. Wiesbaden: Gabler.

Schoeffler, S. (1977). Cross-Sectional Study of Strategy, Structure, and Performance: Aspects of the PIMS Program. In H. B. Thorelli (Ed.), *Strategy + Structure = Performance. The Strategic Planning Perspective* (pp. 108–121). Bloomington: Indiana University Press.

Schoppe, S. G., Münchow, M. M., Stein, I., & Zimmer, K. (1995). *Moderne Theorie der Unternehmung*. Munich: Oldenbourg.

Schulz, M., & Wasmeier, O. (2012). *The Law of Business Organizations: A Concise Overview of German Corporate Law*. Berlin: Springer

Schulze, P. M., & Porath, D. (2012). *Statistik: mit Datenanalyse und ökonometrischen Grundlagen* (7th ed.). Munich: Oldenbourg.

Schumpeter, J. A. (1934). *The Theory of Economic Development, Cambridge, Mass.: Harvard University Press* (Reprint 1997).

Schwenker, B., & Spremann, K. (2009*). Management Between Strategy and Finance.* Berlin: Springer.

Scott, M., & Bruce, R. (1987). Five Stages of Growth in Small Business*. Long Range Planning*, 20(3), 45-52.

Senderovitz, M., Klyver, K., Steffens, P., & Evald, R.M. (2012). *Four years on—are the Gazelles still running? A longitudinal study of firm performance after a period of rapid growth* (Babson College Entrepreneurial Research Conference) Fort Worth: Babson College.

Senge, P. (1990). *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York: Doubleday.

Shaw, J. D., Gupta, N., & Delery, J. E. (2005). Alternative conceptualizations of the relationship between voluntary turnover and organizational performance. *Academy of Management Journal*, 48(1), 50-68.

Shearn, M. (2012). *The Investment Checklist: The Art of In-Depth Research*. Hoboken: Wiley.

Shepherd, D. & Wiklund, J. 2009. Are We Comparing Apples with Apples or Apples with Oranges? Appropriateness of Knowledge Accumulation Across Growth Studies. *Entrepreneurship Theory and Practice*, 33(1), 105-123.

Sheskin, D. J. (2004). Handbook of Parametric and Nonparametric Statistical Procedures (3rd eds). London: Chapman Hall.

Shoar, A., & Bertrand, M. (2003). Managing with Style: The Effect of Managers on Firm Policies. *Quarterly Journal of Economics*, 118(11), 1169-1208

Sihler, W. W., Crawford, R. D., & Davis, H. A. (2004). *Smart Financial Management.* New York: AMACOM.

Simerly R. L., & Li, M. (2000). Environmental dynamism, capital structure and performance: a theoretical integration and an empirical test. *Strategic Management Journal*, 21(1), 31-49.

Simon, H. (2007). *Hidden Champions des 21. Jahrhunderts*. Frankfurt: Campus.

Simon, H. (2012). *Hidden Champions: Aufbruch nach Globalia*. Frankfurt: Campus.

Simon, L. J. (1962). Size, Strength and Profit. *Proceedings of the Casualty Actuarial Society Casualty Actuarial Society*, XLIX(91-92), 41-48.

Singh, G. (2010). A Review of Optimal Capital Structure Determinant of Selected ASEAN Countries. *International Research Journal of Business and Economics*, 47, 32-43.

Sirkin, R. M. (2006). *Statistics for the Social Sciences* (3rd ed.) Thousand Oaks: Sage.

Skovoroda, R., & Bruce, A. (2016). Shifting the Goalposts? Analysing Changes to Performance Peer Groups Used to Determine the Remuneration of FTSE 100 CEOs. *British Journal of Management*, 28(2), 265-279.

Smallbone, D., & Wyer, P. (2006). Growth and development in the small business. In S. Carter & D. Jones-Evans (Eds.), *Enterprise and Small Business: Principles, Practice and Policy* (pp. 100-125). Harlow: Pearson.

Smolarski, J., and Kut, C., 2011. The impact of venture capital financing method on SME performance and internationalization. *International Entrepreneurship and Management Journal*, 7(1), 39-55.

Solow, R. (1956). A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics,* 70(1), 65-94.

Som, O. (2012). *Innovation without R&D: Heterogeneous Innovation Patterns of Non-R&D-Performing Firms in the German Manufacturing Industry*. Wiesbaden: Springer Gabler.

Sontag, B. (2012). *Strategische Erfolgsfaktoren professioneller Sportorganisationen.* Wiesbaden: Gabler Springer.

Standard & Poor's (2018). *S&P 500 Sales Growth Rate*. Retrieved from http://us.spindices.com/indices/equity/sp-500

Stickney, C. P., Weil, R. L., Schipper, K., & Francis. J. (2010). Financial Accounting: An Introduction to Concepts, Methods and Uses. Mason: South-Western Cengage.

Stierwald, A. (2010). Determinants of Profitability: An Analysis of Large Australian Firms. *Melbourne Institute Working Paper Series*, 10(3), 1-34.

Stiglitz, J., & Weiss, A. (1981). Credit Rationing in Markets with Imperfect Information. *American Economic Review*, 71, 393-410.

Stolowy, H., & Lebas, M. (2013). *Financial Accounting and Reporting: A Global Perspective*. Andover: Cengage.

Sunder, S., & Yamaji, H. (1999*). The Japanese style of business accounting*. Westport: Quorum.

Sutton J. (1997). Gibrat's legacy. *Journal of Economic Literature*, 35, 40–59.

Sutton, T. (2004). *Corporate Financial Accounting and Reporting* (2nd ed.). Harlow: Pearson.

Sydow, J. (1992). Strategische Netzwerke: Evolution und Organisation. Wiesbaden: Gabler.

Tanski, J. S. (2013). *Rechnungslegung und Bilanztheorie*. Munich: Oldenbourg.

Teece, D. J. (2008). Technological Know-How, Organizational Capabilities, and Strategic Management. Singapore: World Scientific.

Teles AG (2012). *Geschäftsbericht 2011*. Berlin: Teles AG.

Thomson Reuters (2013). *Database Data Definitions Guide*. New York: Thomson Reuters.

Titman, S., & Wessels, R. (1988). The Determinants of Capital Structure Choice. *The Journal of Finance*, 43(1), 1–19.

Touché, B. (2013). *Aktuelle Entwicklungen der KfW Förderung (KfW Working Paper)*. Frankfurt: Kreditanstalt für Wiederaufbau.

Trevino, R. (2008). *Essential Quantitative Concepts for Business Math*. New York: Palgrave Macmillan.

Trommsdorff, G. (2006). Parent-child relations over the lifespan: A cross-cultural perspective. In K. H. Rubin & O. B. Chung (Eds.), *Parenting beliefs, behaviors, and parent-child relations. A cross-cultural perspective* (pp. 143-183). New York: Psychology Press.

Tsuruta, D. (2016). Variance of Firm Performance and Leverage of Small Businesses. *Journal of Small Business Management*. DOI: 10.1111/jsbm.12243

Umar, M., Tanveer, Z., Aslam, S., & Sajid, M. (2012). Impact of Capital Structure on Firms' Financial Performance: Evidence from Pakistan. *Research Journal of Finance and Accounting*, 3(9), 1-19.

Urgal, B., Quintás, M. A., & Arévalo-Tomé, R. (2013). Knowledge resources and innovation performance: the mediation of innovation capability moderated by management commitment. *Technology Analysis & Strategic Management*, 25, 543-565.

Vallack, J. (2017). Alchemy Methodolgy. In K. Lawlor & P. Buckley (Eds.), *Proceedings of the 16th European Conference on Research Methods in Business and Management Studies* (pp. 349-354). Dublin: Dublin Institute of Technology.

Vandemaele S., & Vancauteren, M. (2015). Nonfinancial Goals, Governance, and Dividend Payout in Private Family Firms. *Small Business Management*, 53(1), 166-182.

Vause, A. H. (2005). *Guide to Analysing Companies*. London: Economist Press.

Verriest, A., Bouwens, J., & Kok, T. (2018). *The Prevalence and Validity of EBITDA as a Performance Measure*. Retrieved from http://dx.doi.org/10.2139/ssrn.3171131

Vinnell, R., & Hamilton, R. T. (1999). A historical perspective on small firm development. *Entrepreneurship Theory and Practice*, 23(4), 5–18.

Volk, S. (2013). *Einfluss der Eigentümerstruktur auf Finanzierungs- und Investitionsentscheidungen in privaten und börsennotierten Unternehmen*(Dissertation). Munich: University of Munich.

Wach, K. (2012). *Europeanization of Small and Medium Enterprises: Development by Internationalization* [Europeizacja małych i średnich przedsiębiorstw: rozwój przez umiędzynarodowienie]. Warszawa: PWN.

Wahlen, J. M.,. Jones, J. P., & Pagach, D. (2016). *Intermediate Accounting: Reporting and Analysis*. Boston: Cengage.

Wei, Y. (2014). The determinants of capital structure: Evidence from Dutch listed companies (White Paper). Twente: University of Twente.

Weill, L. (2008). Leverage and corporate performance: does institutional environment matter*? Small Business Economics*, 30, 251-265.

Welch, I. (2011): Two Common Problems in Capital Structure Research: The Financial Debt-To-Asset Ratio and Issuing Activity Versus Leverage Changes. *International Review of Finance*, 11(1), 1–17.

Wenzelburger, G., Jäckle, S., & König, P. (2014*). Weiterführende statistische Methoden für Politikwissenschaftler: Eine anwendungsbezogene Einführung mit Stata.* Munich: Oldenbourg.

Wernerfelt. B. (1984). A Resource-Based View of the Firm. *Strategic Management Journal,* 5(2), 171-180.

Wibbens, P. D., & Siggelkow, N. (2017). Introducing LIVA to Measure Long-Term Firm Performance. *Academy of Management*, 2017/1, DOI: https://doi.org/10.5465/ambpp.2017.210

Winter, J., Loo, E. (2013). Board on Task: developing a comprehensive understanding of the performance of boards. In M. Belcredi & G. Ferrarini (Eds.), *Boards and Shareholders in European Listed Companies* (pp. 225-250). Cambrigde: Cambridge University Press.

Wintoki, M. B., Linck, J., & Netter, J. M. (2012). Endogeneity and the dynamics of internal corporate governance. *Journal of Financial Economics*, 105, 581–606.

Wöginger, H. (2004). *Das Synergy-Value-Konzept: Synergien bei Merger & Acquisitions.* Wiesbaden: Springer.

Wohlenberg, H., & Plagge, J.-C. (2012). Capital Markets: New Requirements for the Financial Manager? In U. Hommel, M. Fabich, E. Schellenberg & L. Firnkorn (Eds.), *The Strategic CFO*(pp. 109–126). Berlin: Springer.

Wolff, J., Pett, T., & Ring, J. (2015). Small firm growth as a function of both learning orientation and entrepreneurial orientation. *International Journal of Entrepreneurial Behavior & Research,* 21(5), 709-730.

Wooldridge, J., & Snow, C. (1990). Stock market reaction to strategic investment decisions. *Strategic Management Journal*, 11(5), 353-363.

Woywode, M. (2004). Wege aus der Erfolglosigkeit der Erfolgsfaktorenforschung. In KfW Research (Ed.), *Was erfolgreiche Unternehmen ausmacht. Erkenntnisse aus Wissenschaft und Praxis* (pp. 15-48). Heidelberg: Physica-Verlag.

Wright, M., Pruthi, S., & Lockett, A. (2005). International venture capital research: From cross-country comparisons to crossing borders. *International Journal of Management Reviews*, 7(3), 135–165.

Wrona, T. (2005). *Die Fallstudienanalyse als wissenschaftliche Forschungsmethode* (ESCP-EAP Working Paper Nr. 10). Berlin: European School of Management.

Wu, X., & Yeung, C. K. A. (2012). Firm growth type and capital structure persistence. *Journal of Banking & Finance*, 36 (12), 3427-3443.

Yoon, E. & Jang, S.C. (2005). The Effect of Financial Leverage on Profitability and Risk of Restaurant Firms. *The Journal of Hospitality Financial Management*, 13, 200-210

Yoon, E., & Jan, S. C. (2005). The Effect of Financial Leverage on Profitability and Risk of Restaurant Firms. *Journal of Hospitality Financial Management*, 13(1), 35-47.

Zaepfel, G. (2000). *Strategisches Produktionsmanagement*. Munich: Oldenbourg.

Zambon, S. (2013). Accounting and Business Economics: A Conceptual Revisitation. In Y. Biondi & S. Zambon (Eds.), *Accounting and Business Economics: Insights from National Traditions* (pp. XI-XXII). New York: Routledge. 2013

Zeitun, R., & Tian, G. G. (2014). Capital structure and corporate performance: Evidence from Jordan. *The Australasian Accounting Business and Finance Journal*, 1(4), 40-61.

Ziebarth, G. (2013). *Wie finanzieren sich Unternehmen in Zeiten der Krise? Neue Antworten der Jahresabschlussanalyse*. Frankfurt: Deutsche Bundesbank.

Affidavit

I hereby confirm that my thesis entitled ''Capital Structure and Firm Growth: Firm Growth, Investment Decisions and Financial Management in Listed Companies'' is the result of my own work. I did not receive any help or support from commercial consultants. All sources and / or materials applied are listed and specified in the thesis.

Furthermore, I confirm that this thesis has not yet been submitted as part of another examination process neither in identical nor in similar form.

Place, Date Signature

DOI: 10.17185/duepublico/70385
URN: urn:nbn:de:hbz:464-20190905-145954-4