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The Modes of Firm Growth and Their Effects on Firm Performance – An Empirical Analysis of the Chemical Industry

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List of Abbreviations

ANOVA	Analysis of variance
CAR	Cumulative abnormal return
EBIT	Earnings before interest and taxes
EBITD	Earnings before interest, taxes, and depreciation
EBITDA	Earnings before interest, taxes, depreciation, and amortization
e.g.	For example
EMH	Efficient market hypothesis
GICS	Global industry classification standard
GDP	Gross domestic product
i.e.	That means
IFRS	International financial reporting standards
IPO	Initial public offering
M&A	Mergers & acquisitions
OCF	Operating cash flow
OLS	Ordinary least squares
PIMS	Profit impact of market strategy
R&D	Research & development
RBV	Resource-based view
ROA	Return on assets
ROE	Return on equity
ROI	Return on investment
ROIC	Return on invested capital
ROS	Return on sales
SCP	Structure-conduct-performance
SME	Small and medium enterprises
TSR	Total shareholder return
UK	United Kingdom
US	United States
US GAAP	United States Generally Accepted Accounting Principles

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1 Introduction

1.1 Problem Definition and Objectives

The growth of firms constitutes one of the central topics of interest to business and economic scholars. The investigation of firm growth delivers fundamental understandings of one of the key indicators of company performance (Wennekers & Thurik, 1999) as well as one of the fundamental factors of economies at all (B. H. Hall, 1988). Due to its role in economics, firm growth is of substantial interest to policy-makers based on its importance for job creation (Birch, 1979, 1987; Coad & Hölzl, 2012) and productivity growth (Bartelsman, Haltiwanger, & Scarpetta, 2009). Regulatory policy programs are often designed to support firm growth, hoping that these programs result in a net creation of jobs (Storey, 1994b). Additionally, firm growth is often regarded as a performance indicator of companies itself (Davidsson, Steffens, & Fitzsimmons, 2009) and is a top priority for top management executives (Brush, Bromiley, & Hendrickx, 2000; Gartner, 2014). For example, after being elected as the chief executive officer of The Coca-Cola Company in 2008, Muhtar Kent defined firm growth as one of its two top priorities going forward (M. Kent & Ignatius, 2011). Consistently, Joe Kaeser, recently elected chief executive officer of the German-based Siemens AG, named firm growth as his top priority to bring the company back on track after years of underperformance (Siemens AG, 2014). Consistently, firm growth is a key parameter in the decision-making process of financial investors (De Jong, Mertens, Van der Poel, & Van Dijk, 2012). Moreover, the growth of firms is a frequently debated topic in business media. Several of the major business print media have annual issues honoring fast growing companies, e.g., the Business Week Magazine by Bloomberg or the Fortune Magazine (Nicholls-Nixon, 2005). Consequently, it can be summarized that firm growth is an important topic for several interest groups and it is almost exclusively regarded as a positive phenomenon across these stakeholders.

In addition to firm growth, the performance of companies constitutes another central topic of interest to a variety of interest groups. With respect to researchers, firm performance is considered as the most significant construct of strategic management research (Rumelt, Schendel, & Teece, 1994). The primary purpose of strategic management research is to identify the determinants of firm performance and thus support managers in increasing the performance level of their companies (Meyer, 1991). For practitioners, firm performance represents the top priority on their agenda. Some academics even state the opinion that sustaining and increasing firm performance should be the ultimate goal of a company (Mauboussin, 2011). As superior performance secures the survival of companies, it is a matter of interest to policy makers as well (Carton & Hofer, 2006; Storey, Keasey, Wynarczyk, & Watson, 1987). The importance of firm performance to managers and their companies is reflected in being mentioned as a central element in several companies' vision statements, e.g., German Lufthansa Group (Lufthansa Group, 2015), Dow Chemical Company (Dow Chemical Company, 2015), or Hewlett-Packard (Hewlett-Packard, 2015). Analogue to firm growth, media frequently praises the highest performing companies, e.g., via the Forbes Global High Performers Ranking (Forbes, 2015) or the Bloomberg Business Week 50 (Bloomberg, 2015). In summary, firm performance is a construct of significant matter to several interest groups.

As previously mentioned, research in strategic management aims at identifying the determinants of superior firm performance. Researchers try to establish firm growth as a determinant of firm performance (Capon, Farley, & Hoenig, 1990; Cho & Pucik, 2005). However, despite the overall positive perception of firm growth, the effects of firm growth on firm performance remain ambiguous. Despite showing steady sales growth in the recent past, several companies experience a stagnation or even deterioration in their profit and market performance. Examples include the German consumer goods company Beiersdorf AG (Beiersdorf AG, 2014), Royal Dutch Shell plc (Royal Dutch Shell plc, 2014), or Fiat Chrysler Automobiles NV (Fiat Chrysler Automobiles NV, 2014). In contrast, other companies, e.g., Apple Inc. (Apple Inc., 2014) or Google Inc. (Google Inc., 2014) show steady increases in sales as well their performance indicators. Consistently, academic research does not provide conclusive evidence on the performance effects of firm growth. This ambiguity of performance consequences is partially related to a relatively slow theoretical development in the research field of firm growth (Delmar, Davidsson, & Gartner, 2003; D. Shepherd & Wiklund, 2009). The slow theoretical progress in the field of firm growth is substantiated by the fact that, up to date, the most popular and extensive research book on this topic, *The Theory of the Growth of the Firm,* was published in 1959 by Penrose, i.e., more than 50 years ago (McKelvie & Wiklund, 2010). Furthermore, research on firm growth faces methodological challenges. Research publications in this field are missing a definition of a generally acknowledged firm growth indicator (Weinzimmer, Nystrom, & Freeman, 1998) or the appropriate time frame of analysis (Delmar et al., 2003) impeding the respective research efforts. In addition, within the more than 50 years since Penrose's seminal publication, academic researchers primarily focused their efforts on explaining variations in growth across firms and identifying the underlying determinants. Consequently, as the majority of researchers focused on the role of firm growth as a dependent variable, the analysis of the implications and effects of firm growth and thus its role as an independent variable has been mostly disregarded among academics (McKelvie & Wiklund, 2010). Researchers focusing on the consequences of firm growth were primarily concerned with its respective managerial implications (Flamholtz & Randle, 2012; Kazanjian, 1988). The relatively limited number of studies analyzing the performance implications of firm growth provide theoretically as well as empirically contradicting arguments and results (Cox, Camp, & Ensley, 2002; Markman & Gartner, 2002; Sexton, Pricer, & Nenide, 2000; Woo, Willard, & Daellenbach, 1992). Hence, in order to gain an understanding of the diverging performance implications of firm growth, a detailed analysis of different firm growth patterns and their corresponding performance effects is necessary (McKelvie & Wiklund, 2010). One perspective to examine the performance effects of firm growth in a more detailed manner is to analyze the different modes of growth of a company. The growth of firms can be differentiated into organic growth, i.e., based on its existing assets and resources, and inorganic growth, i.e., via the acquisitions of other companies (Hess & Kazanjian, 2006). The differentiation of firm growth into its different modes has been mostly disregarded in firm growth research (Aktas, de Bodt, & Samaras, 2008; Davidsson, Achtenhagen, & Naldi, 2005). The different modes of growth have different benefits and drawbacks for a company. Consequently, an investigation of the financial performance effects of the different firm growth modes would be of "utmost value" to the field of firm growth research (McKelvie & Wiklund, 2010, p. 279).

Based on this, the primary objective of this dissertation is to review the literature and thus create transparency on the status quo of academic research on the performance effects of the individual firm growth modes. Derived from this, an empirical analysis to test the causality between a firm's growth modes and the corresponding financial performance is conducted.

1.2 Course of the study

The dissertation is structured as illustrated in this subchapter. Initially, chapter 2 focuses on exemplifying the theoretical basics and definitions with respect to firm growth and firm performance as the major elements of analysis. This covers a definition of the firm itself, the concept of firm growth, the individual firm growth modes, as well as the different dimensions of firm performance. Subsequently, chapter 3 provides an overview of the different research streams within the field of firm growth. Based on this, the chapter explains the affiliation of this dissertation among the exemplified research streams. Afterwards, chapter 4 elaborates on the driving factors and determinants of firm growth. The determinants are differentiated between organic and inorganic firm growth drivers. Whereas chapter 4 introduces the drivers of firm growth, chapter 5 focuses on the outcomes of firm growth and its effects on firm performance in particular. At first, the performance implications of firm growth in general are reviewed. Subsequently, each firm growth mode and its respective performance effects are illustrated individually. The chapter concludes by deriving the research hypotheses to be tested in the empirical analysis. Since the empirical analysis focuses on chemical companies, chapter 6 provides an introduction to the chemical industry. The chapter comprises a general overview of the industry, its economic importance, as well as the rationale for focusing on chemical companies in the empirical analysis. Afterwards, chapter 7 elaborates on the methodological basics for the empirical analysis. At first, the derivation of the firm sample followed by the applied data sources is illustrated. Subsequently, the methodology for decomposing firm growth is explained in detail. The chapter concludes by defining the firm performance metrics applied in the context of this analysis as well as an introduction of control variables applied. Subsequently, chapter 8 presents the results of the empirical analysis including the respective statistical concepts applied. At first, the results of the descriptive statistics are exemplified. Subsequently, the results of a mean comparison analysis are discussed. Finally, the results of a regression analysis are illustrated in detail. Chapter 9 concludes the dissertation by summarizing the main findings and providing an outlook for future research questions derived from the results of this thesis.

1.3 Summary of Major Findings

This subchapter provides an upfront summary of the major findings of this dissertation along the course of the study introduced in the previous subchapter.

Initially, chapter 2 provides the necessary conceptual basics by discussing the definition of firm growth as the major independent construct of this dissertation. Firm growth in general refers to the change in size of a company between two points in time. Several indicators to measure firm size and thus growth exist including a firm's sales, assets, employees, or profits. As sales are the predominant indicator of firm size among researchers, the definition of firm growth in this dissertation is based on a firm's sales. To determine firm growth, a relative approach, deriving the firm growth rate, and an absolute approach, deriving the absolute change in firm size over time, are common among researchers. As we compare firms of different sizes in the empirical analysis, the focus of this dissertation is on the relative change in firm size, i.e., a company's sales growth rate. This firm growth rate can be decomposed into its different growth modes. Two major growth modes exist: inorganic growth, i.e., firm growth via mergers and acquisitions (M&A), and organic growth, i.e., growth based on the existing resources of the firm. Organic growth can be further decomposed into growth from market momentum and growth from changes in market share. Growth from market momentum represents the weighted growth rate of the markets a firm is active in. Organic growth from changes in market share results from an out- or underperformance of the market with respect to growth, respectively. In addition to firm growth as the central independent construct, firm performance as the major dependent parameter of this dissertation is discussed. Firm performance is measured by objective as well as subjective indicators. Objective indicators are regarded as independent and externally verified indicators including accounting-based, market-based, growth, hybrid, survival, and operational measures. Subjective measures rely on a personal assessment of individuals. Hence, academics less frequently use subjective firm performance measures in their empirical analyses.

Based on the theoretical foundations laid out in chapter 2, chapter 3 provides an overview of the academic research streams in the field of firm growth. Research on firm growth can be classified into three major streams: (1) firm growth as an outcome, (2) the outcome of firm growth, and (3) firm growth as a process. The first research stream focuses on firm growth as a dependent variable and aims at explaining differences in the magnitude of firm growth rates. This first research stream represents the vast majority of academic publications on firm growth. In contrast to the first stream, the second research stream focuses on firm growth as an independent variable and thus the effects and consequences of firm growth. The third research stream analyses the developments within a firm during the process of growth and is regarded the least developed among the three streams. As this dissertation aims to analyze the performance effects of firm growth modes, it can be classified as part of the second research stream of firm growth.

Nevertheless, in order to analyze the effects of firm growth, it is first necessary to understand the different underlying drivers of firm growth. Chapter 4 provides an overview of the determinants of firm growth differentiated for organic and inorganic growth. The determinants of organic firm growth can be grouped into firm internal on the one hand and firm-external determinants on the other hand. The major firm-internal driving factors of organic growth are structural characteristics such as firm size and firm age, financial determinants such as the financial performance and access to capital, personnel determinants of the management, strategic determinants as the level of diversification, as well as other determinants, e.g., the level of R&D and advertising intensity. Firm-external factors comprise industry determinants such as market growth, competition intensity, or industry dynamism, as well as other determinants, e.g., the macroeconomic environment and the development of financial markets. Analogue to organic growth, the determinants of inorganic growth can be classified into firm-internal and firm-external determinants. The most relevant firm-internal factors driving inorganic growth are a firm's strive for synergies, its financial resources, its size, and its management's personal goals. The primary firm-external determinants of inorganic growth are industry shocks, e.g., in form of deregulation, sufficient capital liquidity in the market, and overall valuation levels of stock markets. As illustrated, the growth rate of a firm is dependent on a wide range of factors across several dimensions.

Subsequent to gaining an understanding of the drivers, chapter 5 elaborates on the corresponding consequences of firm growth. Firm growth in general is perceived substantially positive among practitioners, researchers, and policy makers. However, the performance implications of firm growth are ambiguous among academics. From a theoretical perspective, researchers name a number of performance-enhancing effects of firm growth including economies of scale and scope, better access to financial capital, increased efficiency as a result from routine activities, and stronger external networks as the most prominent arguments. In addition, corporate finance theory directly links firm growth to accounting- and market-based performance metrics. Contrarily, a potential loss of control by the management, increased internal complexity, and decreased dynamism are identified as potential performance-drawbacks of firm growth. Additionally, agency theorists see firm growth as potentially value-decreasing due to a misalignment between managers and shareholders, wrong incentive mechanisms, and weak governance systems. Empirically, researchers find heterogeneous results for the effect of firm growth on accounting as well as market performance. In order to gain more detailed insights on the performance consequences of firm growth, a valuable contribution is to assess, whether the different firm growth modes have a differential impact on firm performance (McKelvie & Wiklund, 2010). Based on a literature review of the performance effects of the individual firm growth modes, as summarized below, the research hypotheses for this dissertation are derived.

Several academics analyzed the performance effects of inorganic firm growth, i.e., M&A, on firm performance. Theoretically, M&A positively influences firm performance due to economies scale and scope, increased market power, and the exploitation of synergies. Contrarily, failures in post-merger integration, regulatory actions, or high costs for synergy exploitation potentially pressurize the performance level of a company. From an empirical perspective, researchers find M&A to have no significant or even a negative effect on accounting performance and an insignificant effect in the short- and a negative effect in the long run on market performance. In contrast to inorganic growth, focused and specific research on the performance implications of organic growth is yet substantially limited. Theory identifies the extensive knowledge of the management about a firm's asset and resources leading to more efficient investments, the compatibility of management within an existing organization, and the lower likelihood of imitation or replication of organic strategies as positive aspects of organic growth for a firm's performance. In contrast, organic growth is considered as a slow process, it negatively affects a firm's future growth by decreasing the marginal ability to newly combine the existing resources, and it is associated with organizational inertia. The low number of empirical studies assessing the performance implications of organic firm growth offers support towards a positive relation between both parameters. Analyzing the performance implications of the two sub-modes of organic growth confirms this tendency. With respect to growth stemming from market momentum, theory hypothesizes a positive influence on firm performance. This positive relation is based on a number of aspects, e.g., a higher number of opportunities in high growth markets, a lower degree of rivalry, and higher price levels. Consistently, the majority of empirical studies indicate a positive impact of market momentum on various firm performance metrics. With respect to organic growth from changes in market share, academic theory provides ambiguous arguments. One the one hand, economies of scale resulting from increased market shares, participation in oligopolistic market structures, or increased bargaining powers are reasons for a positive impact of market share increases on firm performance. In contrast, increased market shares may result in decreased quality and exclusivity perception by customers, cause regulatory interactions, or develop a state of complacency within companies potentially harming performance. Empirical studies found heterogeneous evidence for the influence of market share gains on firm performance averaging a slightly positive effect on firm performance.

Based on these reviews of the relationship between the individual firm growth modes and their corresponding performance implications, four research hypotheses are derived:

H1: Organic firm growth has a more positive effect on firm performance than inorganic firm growth.

H2: Market momentum growth has a more positive effect on firm performance than inorganic firm growth.

H3: Market momentum growth has a more positive effect on firm performance than market share change growth.

H4: Market share change growth has a more positive effect on firm performance than inorganic growth.

The empirical analysis in this dissertation contributes a number of new aspects to the research on firm growth. First, this dissertation is, to our knowledge, the first academic study to analyze the effects of firm growth modes with respect to sales. The very limited number of previous studies analyzing firm growth modes are based on growth in employees (Aktas et al., 2008) or growth in assets (Xia, 2007a). Second, this dissertation further decomposes organic growth into growth via market momentum and growth via changes in market share enabled by rare access to historical and granular market growth rates. Third, whereas previous studies in this field of research primarily focused on small firms, this dissertation analyzes large, multinational companies. Since academics believe the choice of growth modes to be influenced by firm size, the focus on large firms provides additional, new insights. Fourth, in contrast to previous studies focusing on the outcome firm growth, this dissertation applies year-over-year growth data in the empirical analysis. The application of year-over-year data on firm growth is named a valuable contribution by Weinzimmer et al. (1998).

To test the specified research hypotheses, an empirical analysis of chemical companies is conducted. The empirical analysis focuses on chemical companies due to three reasons. First, M&A, i.e., inorganic growth, constantly plays an important role for chemical companies driven by substantial portfolio optimizations and industry consolidation efforts in the recent two decades. Second, the chemical industry provides a large number of sub-segments influencing the firms' market momentum growth differently. Third, economies of scale are of high relevance in the chemical industry and are defined as a major performance driver.

The empirical analysis is based on a firm sample of 50 listed chemical companies. These companies are the largest Western European or Northern American chemical firms based on their 2007 sales. The data sample comprises annual data from 2003 to 2012. However, not for all sample firms data for the entire period of analysis is available. Hence, the data set is an unbalanced panel covering 404 firm year observations. To derive the growth decomposition data, 500 annual reports were manually analyzed and the necessary data identified. The growth decomposition analysis disaggregates each firm's growth rate into inorganic growth, growth from market momentum, and growth from changes in market share. With respect to firm performance, this dissertation focuses on Tobin's Q as the dependent construct of the analysis.

The empirical analysis comprises a mean comparison analysis and a panel regression analysis. First, the mean comparison analysis is conducted by grouping the firm year observations with respect to the predominant firm growth mode and comparing the respective performance means. In addition to the mean comparison analysis, a panel regression analysis is conducted. The panel regression is based on a fixed effects regression model, but the corresponding random effects estimates are reported as well. Additional robustness checks are conducted.

The results of the empirical analysis offer considerable support for the introduced research hypotheses. The mean comparison analysis only finds indicative, in most cases statistically insignificant differences in the performance means across growth modes. However, the fixed effects panel regression analysis identifies considerable and statistically significant support for all four research hypotheses. The corresponding random effects results are consistent. Furthermore, the regression results are robust against changes in the definition of control variables, biases from non-chemical-industry-sales of the sample firms, as well as the currency effects in sales. These results provide evidence that the individual firm growth modes differently affect the performance level of companies. Organic firm growth shows better performance effects than inorganic growth. Moreover, in the three-growth-modes-model, market momentum growth reports the most positive effects of firm performance and thus shows superior performance effects compared to market share change growth and inorganic growth. Additionally, these results provide support for better performance consequences of market share change growth in comparison to inorganic growth.

These results provide initial insights for researchers and practitioners on the performance effects of firm growth modes. The insights may act as an initial set of guidelines for managers in defining their growth strategies. However, given the early development of the research efforts in this field, additional studies need to be conducted in order to develop a proven set of instruments supporting managers in their decisions with respect to firm growth modes.

2 Theoretical Basics of Firm Growth and Firm Performance

To conduct an analysis focusing on the components of firm growth and their importance for firm performance, an introductory definition of the terms "firm" and "firm growth" is necessary. This subchapter illustrates different explanations from the academic literature for both of these terms and the choice of definition used as a basis throughout the remainder of this dissertation. Furthermore, a definition of firm performance as the major dependent construct of this thesis is provided.

2.1 Definition of the Firm

Since the purpose of this thesis is to analyze the growth of firms in detail, a clear definition of “the firm” is inevitable. The academic literature has created various definitions of the firm[1] over time (Garrouste & Saussier, 2005). However, no generally accepted answer to the definition of a firm exists (Wernerfelt, 2013). In fact, the academic literature provides two streams focusing on the definition of a firm: (1) an economics-based stream dominated by Anglo-Saxon researchers and (2) a business-based stream. In the following, both streams will be illustrated in detail.

2.1.1 Economics-Based Definition of the Firm

Coase (1937) generated the first seminal article with respect to theoretical considerations about the firm. In this article, Coase explains his reasons for the existence of firms and illustrates the differences between markets and firms building on the work of A. Smith (1863). Smith argues, a price mechanism in form of an "invisible hand" results in an optimal allocation of resources within an economic system (pp. 454-456). Coase (1937) disagrees with this concept in the context of a firm. While price movements organize production outside of a firm, i.e., in the market, the entrepreneur replaces these market transactions and allocates resources within a firm. Based on this, Coase identifies two reasons for the existence of firms. First, the major reason for the existence of firms are

[1] The terms "firm" and "company" are used as synonyms throughout this dissertation.

costs associated with the usage of a price mechanism. This is most obvious for costs incurred for market participants in the process of the determination of the relevant price. Secondly, each market transaction requires the formation of a contract resulting in additional costs. Within firms, contracts exist as well. However, intracompany contracts, e.g. between the firm and an employee, are characterized by longer durations and thus cover more than a single transaction resulting in a reduction of transaction costs for both parties. Thus, firms exist in order to minimize the costs entailed by the formation of contracts. Coase (1972) himself lamented his publication has been ignored in research for more than three decades.

The post-Coase economic research on the theory of the firm can be categorized in two major fields: (1) Principal-agent concepts based on comprehensive contract theories and (2) incomplete contract concepts including a need for ex-post governance (Foss, 2000). Both fields are discussed in the following.

(1) The principal-agent based concepts of the firm were primarily developed by Alchian and Demsetz (1972), Jensen and Meckling (1976), and Holmstrom and Milgrom (1994).

According to Alchian and Demsetz (1972), a firm is a structure of bilateral contracts between employees and their employer. This contractual structure results in a higher team output than the sum of each factor individually. Thus, team production synergies are referred to as the major reason for the existence of firms. In addition, firms, more efficiently than markets, are able to measure and control the individual contributions of each employee through the bundling and organizing function of the employer.

Jensen and Meckling (1976) similarly define firms as a complex network of legal contracts. Whereas Alchian and Demsetz (1972) limit their definition to the contracts between employers and their employees, Jensen and Meckling (1976) enlarge the definition of a firm by contractual relations to suppliers, creditors, and customers and a firm's ability to manage these relations efficiently.

Holmstrom and Milgrom (1994) define firms as a system aiming to minimize potential incentive problems, particularly between employees and their employer. In contrast to the preceding studies, a substantial difference between employment relationships and contractor relationships is emphasized. According to the authors, employment relationships need a specific, different management approach in comparison to contractors. Firms, as a system of incentive mechanisms, thus efficiently and effectively are able to manage employment relations and thus increase productivity.

(2) The incomplete contract concepts on the theory of the firm were primarily developed by Williamson (1975), Grossman and Hart (1986), O. D. Hart and Moore (1990), and O. D. Hart (1995). The previously defined principal-agent concepts are based on the ability of parties to define and enter contracts considering all potential eventualities. Thus, corresponding costs occur primarily in the phase of the contract definition, i.e., ex-ante.

Williamson (1985) believes the ex-ante definition of comprehensive contracts results in substantial costs. These costs force the contract parties to enter incomplete agreements and negotiate relevant relationship terms during the contract period resulting in other, i.e., ex-post, costs. However, the incompleteness of contracts and corresponding costs of ex-post negotiation incentivize the contract parties to opportunistic behavior in order to maximize their share of the ex-post surplus. According to Williamson, firms exist due to their ability to limit this opportunistic behavior and thus the resulting transaction costs in comparison to open market transactions. Nevertheless, Williamson leaves the underlying reasoning of his theory unclear.

Grossman and Hart (1986) and O. D. Hart and Moore (1990) both define a company by the assets it owns. Additionally, similar to Williamson's assumption, both articles consider substantial costs involved in the definition of complete contracts. In order to mitigate these costs, the relevant parties should enter into less costly, incomplete contracts and let one party create a firm by buying the assets of which the usage has not been specified in the contracts (Grossman & Hart, 1986). The clear allocation of property rights, i.e., ownership, of the assets increases the overall efficiency of their management (O. D. Hart & Moore, 1990), exemplifying the benefits of firms versus the market.

This subchapter provided an overview of the major theories within the Anglo-Saxon-dominated discussion of the definition of the firm primarily in an economics-based context. Since the focus of this dissertation is less economics-based, only the most relevant theories in academic literature are explained.

2.1.2 Business-Based Definition of the Firm

In addition to the economics-based definitions of a firm, a comparably more recent set of business-theory-based definitions of the firm is existent. Similar to the economic perspective, the business perspective provides varying definitions of the firm, which as well are still missing a generally accepted version.

In his seminal habilitation paper, Gutenberg (1997) defines the firm as the core element of business theory. By combining human and material factors, a firm aims to produce and sell goods and services to third parties. A firm conducts these activities based on two principles: (1) commercially, firms target to maximize the return on invested capital, since this is assumed to be most beneficial to economic welfare. (2) The decisions of firms are completely independent from external authorities.

In addition to Gutenberg's definition, a firm is described as a social system combining the key characteristics of openness, dynamism, and productivity (Thommen & Achleitner, 2012; Ulrich, 1970). This definition refers to several aspects of a firm. First, firms are defined as open systems, since they have various interlinks and are in a constant process of exchange with their environment. Second, firms are defined as dynamic systems, due to their ongoing need for adapting to or influencing their environment. Thirdly, firms are productive systems, since they combine various factors in order to produce certain products or services. Finally, firms are social systems, since human beings, either individually or group-wise, act within firms and thus influence the behavior of firms considerably (Thommen & Achleitner, 2012).

Similarly, Hutzschenreuter and Hungenberg (2006) provide a translation of the definition of the firm as the previously described system by illustrating their role within various markets and the relationship with their environment. In sales markets, firms create products and services for their customers while constantly being in competition with their competitors. In supply markets, firms source products and services from suppliers. In capital markets, firms establish relationships with investors. Employees are the key elements in conducting the firm activities and continuously interacting with the participants across the various markets.

Furthermore, Chandler Jr (1992) provides a very practical and one of the most cited definitions of the firm with an emphasis on four components. First of all, a firm is defined by its characteristic as a legal entity entering various contracts with employees, suppliers, and customers. The importance of the legal entity aspect is also mentioned by Hodgson (2002) as well as Biondi, Canziani, and Kirat (2008). Secondly, a firm is an administrative entity responsible for dividing, coordinating, and monitoring several activities. Thirdly, a firm is a collection of financial capital, physical facilities, and accumulated skills. Finally, in capitalist economies, firms fulfill the role of producing and allocating products and services (Chandler Jr, 1992).

Based on the definitions illustrated in this sub-chapter, firms can be classified according to a large variety of factors. Key distinguishing factors between firms are, e.g., their legal form, their industry or sales focus, and their production or input factors (Olfert & Rahn, 2005). As a result of a large number of distinguishing factors, firms exist in manifold types and thus can be described as a complex phenomenon (Simon, 1996).

Since this dissertation focuses on the analyses of interrelationships between certain strategic business decisions and their respective outcomes, a less economics-based and more business-focused definition of the firm is applied throughout the thesis.

2.2 Definition of Firm Growth

Since the previous sub-chapter provides a definition of the firm itself, this subchapter illustrates a definition of *firm growth*, as the major independent parameter of analysis within this thesis. Although firm growth is a widely used term in academic research, a generally accepted definition was and is still non-existent (Hutzschenreuter & Hungenberg, 2006; Young, 1961). Throughout this chapter, a general definition is provided followed by detailed illustrations with respect to a firm growth indicator, a formula to determine firm growth, as well as an appropriate time frame for the analysis of firm growth.

2.2.1 General Definition of Firm Growth

In her groundbreaking publication, Penrose (1995) defines firm growth in two different ways. First, Penrose refers to firm growth as increase in a specific amount, e.g., growth of certain parameters such as sales, production, or exports. Secondly, Penrose defines firm growth as a specific development process, similar to biological processes, resulting in an increase of size or improvements in quality.

Similar to Penrose's approach is the classification of growth into quantitative and qualitative aspects. Whereas quantitative firm growth refers to an increase of a measurable parameter that is representative for the size of a firm, qualitative growth corresponds to improvements of less quantifiable criteria, e.g., the quality of products or the quality of customer relationships (Hutzschenreuter & Hungenberg, 2006).

Up to date, academic research primarily focused on analyzing firm growth as a change in the amount of certain parameters, i.e., the quantitative aspect of growth (Davidsson, Achtenhagen, & Naldi, 2010). This academic focus is emphasized by additional firm growth definitions explaining firm growth as an increase in the size of a company (Albach, 1965; Brockhoff, 1966; J. Grimm, 1966).

The illustrated introductory definitions of firm growth establish the size of a firm as the basis of firm growth. Both parameters are intrinsically tied to each other. However, a clear differentiation between firm size and firm growth is important (Whetten, 1987). The size of a firm, in this case, is an absolute figure representing the scale of a company or an organization at a certain point in time (Kimberly, 1976). Contrarily, firm growth is a figure measuring the change of the firm size over time (Weinzimmer et al., 1998; Whetten, 1987). Consequently, the firm size acts as a reference indicator for the determination of firm growth within two points in time.

The explained relationship between firm size and firm growth leads to several subsequent discussion points regarding the definition of firm growth. (1) Since firm growth represents the change in the size of the firm, a discussion and selection of an appropriate firm size indicator and thus relevant growth measure needs to be provided. (2) Furthermore, the mathematical derivation of firm growth needs to be discussed, i.e., how to measure growth from a quantitative perspective. (3) Since firm growth refers to change in size over time, a definition of a suitable time frame is important. The subsequent sub-chapters provide a detailed discussion of these three aspects.

2.2.2 Definition of a Firm Growth Measure

The choice of firm growth measures in academic research studies is considerably heterogeneous. Up to date, no agreement on a general firm size indicator in studies on firm growth exists. Consequently, researchers use a large variety of firm growth measures in academic studies (Birley & Westhead, 1990; Coad & Hölzl, 2012). However, the specific choice of a growth indicator used in academic research is of high importance to the respective results. D. Shepherd and Wiklund (2009) empirically deviated low concurrent results among the range of growth measures. For example, a high growth firm indicated by one growth measure may not be a high growth firm in terms of another growth indicator. Hence, the choice of growth measure potentially affects the findings of academic studies and thus needs to be selected wisely.

D. Shepherd and Wiklund (2009) provide the most comprehensive literature review on the choice of growth measure by analyzing 82 empirical firm growth studies.

As illustrated in Table 1 below, a company's sales is the predominant firm growth indicator used in the empirical studies under review appearing in 61 studies and representing 74.4% of all studies. The number of a company's employees represents the second most used growth measure selected in 13 studies and representing 15.9% of the sample. Additionally, a company's profit and its equity or assets were the growth measure of choice in nine and six studies, respectively. An accumulation of further, less frequently used growth indicators accounts for the remaining 15 indicator choices reviewed.

Table 1. Choice of Firm Growth Indicator in 82 Empirical Studies Under Review.

Growth Indicator	**Appearances of Indicator** [Number of Studies]	**Share of Studies** [Percentage]
Sales	61	74.4%
Number of Employees	13	15.9%
Profit	9	11.0%
Equity/Assets	6	7.3%
Other	15	18.3%
Total	**104**	**N/A**

Note. Adapted from D. Shepherd and Wiklund (2009). Share of studies derived by own calculation based on 82 studies under review. Total appearances of firm growth indicators (104) exceed the number of studies under review (82) due to the usage of more than one indicator in some of the studies under review.

The large variety of firm growth indicators in academic studies with sales and the number of employees being the most predominant ones is confirmed by the findings of an additional literature review of Weinzimmer et al. (1998) (see Table A1). In 35 studies under review, sales represent the prevalent measure of growth being used in 29 studies. Analogue to the findings of D. Shepherd and Wiklund (2009), the number of employees is the second most important growth measure appearing in seven of the reviewed studies. In addition to these two predominantly used growth indicators, some academic studies based their analysis on further, less frequently used, growth measures. McDougall, Robinson Jr, and DeNisi (1992) used a firm's market share as growth respectively size indicator. Bourgeois (1985) employed return on investment as an indicator of growth. Hamilton and Shergill (1992) and Varaiya, Kerin, and Weeks (1987), amongst others, applied growth in dividends as a growth measure. Both studies, Bourgeois (1985) as well as Hamilton and Shergill (1992), additionally based their empirical analysis on growth in earnings per share as a second growth indicator. Finally, Van de Ven, Hudson, and Schroeder (1984) considered the number of customers as a metric of firm growth. Moreover, depending on the sample focus, researchers applied industry-specific growth measures. For example, C. R. Weiss (1998), studying firm growth in the farming sector, applied the number of cattle and the number of cultivated acres as indicators of firm growth, whereas Bolton (1972) refers to the number of seats for the restaurant industry and the number of cars for rental car firms.

Additional studies by Storey (1994b), Ardishvili, Cardozo, Harmon, and Vadakath (1998) and Delmar (2006) also indicate both, the large variety of firm growth measures used in academic research as well as the predominant role of sales and the number of employees within this variety. Several factors establish the leading role of sales as the leading firm growth indicator. First, sales apply to virtually all type of firms. Secondly, sales figures of companies are easily available. Thirdly, sales are relatively uncorrelated to the capital intensity of a company's business model. Fourthly, it is independent from a firm's level of integration (Delmar et al., 2003). Fifthly, every firm depends on the generation of sales in order to survive (Davidsson et al., 2010). Furthermore, it is the favorite growth indicator of choice for managers, investors, and entrepreneurs (Barkham, Gudgin, & Hart, 2012). Finally, it is argued that it is the increase in sales that requires a rise in a firm's employees and assets potentially resulting in increasing market shares and profits (Flamholtz & Randle, 2012).

Despite these supporting factors for sales, some researchers choose the number of employees as an indicator of firm growth. Similar to sales, data on the number of employees are characterized by a high level of availability (Davidsson et al., 2010). Additionally, the number of employees is a key metric for policy makers and thus highly relevant for studies focusing on growth in employment (Davidsson & Wiklund, 2006). Moreover, the number of employees is insensitive to changes in currency rates as well as inflation. Furthermore, if a company is regarded as an accumulation of resources, the number of employees, as one of the key resources, represents an appropriate choice of growth measure (Delmar et al., 2003).

However, the choice of employment as a firm growth indicator entails several disadvantages. The number of employees does not reflect changes in labor productivity, any substitution of employees by machines, the level of a firm's integration as well as additional make-or-buy effects (Delmar et al., 2003). Additionally, managers see a growth in the number of employees not as a primary goal (Robson & Bennett, 2000).

Consequently, based on these arguments, in the meantime a trend among researchers to consider sales as the most relevant indicator of firm growth can be observed (Ardishvili et al., 1998; Hoy, McDougall, & Dsouza, 1992; Weinzimmer et al., 1998). Alternative concepts to the selection of one specific indicator are the use of multiple indicators separately or the use of an index measure. The choice in growth measure for empirical studies needs to match the underlying theory and the respective research question. Academics are advised to invest time into the selection of an appropriate growth measure (Davidsson et al., 2010).

Based on these contents, this thesis focuses on firm growth with respect to the growth in a company’s sales, if not specifically stated otherwise in some occasions. However, in order to provide a comprehensive overview of the theoretical aspects of firm growth, other forms of firm growth despite growth in sales are considered in some cases, if regarded as valuable to the course of the study.

2.2.3 Definition of a Firm Growth Formula

As the previous subchapter covered the selection of a growth measure, this subchapter elaborates on the definition of an appropriate growth formula for analyzing firm growth.

Analogue to the choice of a growth measure, no general agreement regarding the formula to quantify firm growth exists among researchers resulting in several concepts applied in empirical studies (Delmar, 2006). Conversely, the choice of firm growth formula has a large influence on the results of an empirical study (Dobbs & Hamilton, 2007).

In addition to growth measures, D. Shepherd and Wiklund (2009) as well give the most comprehensive overview of growth formulas applied in academic research based on a review of 82 empirical studies on firm growth.

Table 2. Choice of Firm Growth Formula in 82 Empirical Studies Under Review.

Growth Formula	Appearances of Formula [Number of Studies]	Share of Studies [Percentage]
Relative	37	45.1%
Absolute	32	39.0%
Other	6	7.3%
Not reported	7	8.5%
Total	**82**	**100.0%**

Note. Adapted from D. Shepherd and Wiklund (2009). Share of studies derived by own calculation.

As illustrated in Table 2, two predominant formulas to quantify firm growth are used in academic research. Firstly, in 45.1% of the studies under review, the respective researchers applied a relative measurement of firm growth. Relative measurement refers to the difference in firm size at two different points in time, i.e., the absolute change in firm size, divided by the initial firm size (D. Shepherd & Wiklund, 2009). The relative measurement is also referred to as firm growth rate (Coad & Hölzl, 2012). Thus follows:

$$(Eq. 1) \quad Relative\ Firm\ Growth_t = FGR_t = \frac{Firm\ Size_t\ - Firm\ Size_{t-n}}{Firm\ Size_{t-n}}$$

where FGR_t refers to the firm growth rate in the period between the starting point in time t-n and the ending point in time t.

In second position, representing 39.0% of the studies under review, researchers used an absolute formula for determining growth.

$$(Eq. 2) \quad Absolute\ Firm\ Growth_t = FG_t = \ Firm\ Size_t - Firm\ Size_{t-n}$$

where FG_t refers to the absolute firm growth in the period between the starting point in time t-n and the ending point in time t.

Two additional studies confirm the illustrated predominant role of a relative firm growth formula. Out of 55 studies under review, Delmar (2006) identified 28 studies, equaling 50.9% of the sample, applying a relative firm growth formula. 16 studies, representing 29.1%, used an absolute calculation of growth (see Table A2). Additionally, Weinzimmer et al. (1998) investigated 35 empirical studies on firm growth. 60.0% of the sample determined firm growth on a relative basis followed by miscellaneous and absolute formulas accounting for 22.9% and 8.6%, respectively (see Table A3).

The challenge in choosing between a relative and an absolute determination of firm growth in an empirical analysis is apparent. Whereas relative measurement favors growth in smaller firms, absolute formulas bias growth effects for the benefit of larger companies, since growth is linked to firm size (Delmar, 2006). Additionally, Birch (1987) and Schreyer (2000) both introduce a formula combining characteristics of relative and absolute measures in order to overcome this challenge. However, as the previously discussed literature reviews indicate, researchers abstained from using this specific measure in their analyses. As the choice of firm growth formula is of high relevance to the outcome of empirical analysis, researchers need to select the appropriate firm growth formulas considering their sample as well as the theoretical background of their analysis (Delmar, 2006).

2.2.4 Definition of a Firm Growth Time Frame

Whereas the previous two subchapters exemplified the choice of an appropriate firm growth indicator as well as a firm growth formula, this subchapter elaborates on the definition of a suitable time frame for analyzing firm growth. Similar to growth indicators and growth formulas, time frames vary substantially across academic studies. Since firm growth equals the difference in firm size at two different points in time, the question arises what the appropriate time frame between the starting point and the end point in time is.

As exemplified in Table 3, short time periods to determine firm growth dominate academic research. The majority of researchers, representing 64.0% of the studies under review, applied time frames of five years or less to determine firm growth. Time frames of more than 5 years accounted for 25.3% of the reviewed studies.

The tendency among researchers of using shorter time frames to measure firm growth is confirmed by additional studies. In 55 studies reviewed by Delmar (2006), studies with a firm growth time frame of five years or less account for 72.7% (see Table A4). Furthermore, in 28 out 35 studies under review, Weinzimmer et al. (1998) identified an observation period for firm growth of five years or less (see Table A5).

Table 3. Choice of Firm Growth Time Frame in 75 Empirical Studies Under Review.

Time Frame	**Appearances of Time Frame** [Number of Studies]	**Share of Studies** [Percentage]
1 year	14	18.7%
2 years	11	14.7%
3 years	5	6.7%
4 years	5	6.7%
5 years	13	17.3%
Subtotal 5 years or less	**48**	**64.0%**
Other	19	25.3%
Not reported	8	10.7%
Total	**75**	**100.0%**

Note. Adapted from D. Shepherd and Wiklund (2009). Share of studies derived by own calculation.

As indicated by the presented reviews, firm growth time frames vary substantially. Hutzschenreuter and Hungenberg (2006) emphasize the need for a time period of three years or more when analyzing firm growth. However, despite this very strict suggestion, Delmar (2006) argues the choice of time frame for empirically analyzing firm growth needs to be closely linked to the underlying research question, i.e., is the aim of the study to examine long-term or short-term growth-related effects and determinants .

An additional concern regarding the time frame of firm growth is the usage of data between the first-year and last-year of firm size observations. Of the studies under review by Weinzimmer et al. (1998), 86.0% of the studies reporting a growth formula limited their growth analysis to a comparison of the firm size in year 1 and the final year under observation. Consequently, only a minority of academic studies considered data for the years in between these two points in time as relevant for their studies. By focusing on a two-point-in-time approach, valuable insights of the years in between might be ignored. Thus, if the available data sample comprises year-over-year data, researchers should incorporate these data points into their analysis.

2.3 Definition of Firm Growth Modes

The previous subchapter exemplified the basic theoretical concept of firm growth. Since the focus of this dissertation is to analyze the potentially different effects of modes of firm growth on the performance of companies, this subchapter provides an introduction to the different modes of growth available to companies.

In general, two different modes for firms to grow exist: (1) *inorganic firm growth*[2]and (2) *organic firm growth*[3] (Penrose, 1995). Firms may also engage in a combination of both of these growth modes (Bahadir, Bharadwaj, & Parzen, 2009). Additionally, the minor form of hybrid growth modes is an option to companies (McKelvie & Wiklund, 2010). The following subchapter discusses all firm growth modes in detail as a theoretical knowledge of these aspects is of importance to the remaining part of this dissertation.

As the first major firm growth mode, inorganic firm growth refers to growth resulting from the acquisition of or the merger with other firms (Tilly, 1982). Although mergers and acquisitions are frequently used interchangeably within the literature, both terms refer to different theoretical backgrounds (Lubatkin & Shrieves, 1986)[4]. By acquiring other firms, the buying company gains control over the respective resources and assets of the target company (Buckley & Ghauri, 2002). Companies have the option to engage in horizontal, vertical, and conglomerate M&A. Horizontal M&A refers to a combination of firms from the same part of the value chain in the same industry. Vertical M&A is a combination of two firms from the same industry, but different stages along the value chain. Companies integrate either front-, i.e. down the value chain towards the end-customer, or backward, i.e., up the value chain away from the end-customer, in case of vertical M&A. Conglomerate M&A is a combination of companies from completely distinct industries (Brealey, Myers, & Allen, 2011). Commonly researchers refer to conglomerate M&A in case of an acquisition of a company from an unrelated industry exemplified by a different 2-digit-standard industry classification code of the acquired businesses (P. G.

[2] Inorganic firm growth is also referred to in academic literature as external or acquisitive firm growth. All three denominations are used interchangeably in the remainder of this dissertation.
[3] Organic firm growth is also referred to in academic literature as internal firm growth. Both denominations are used interchangeably in the remainder of this dissertation.
[4] For the remainder of this dissertation, no differentiation between mergers and acquisitions is applied, since any differences between both terms are not at the core of the analysis.

Berger & Ofek, 1995; Lamont & Polk, 2002). Contrarily to acquisitions, i.e., firm-enhancing inorganic growth, firms also engage in the sale of businesses or parts of their business. Business sales by companies are referred to as divestitures (Brealey, Myers, & Marcus, 2011). According to Penrose (1995), acquisitive growth is more relevant for larger companies competing in established industries.

In contrast to inorganic growth, organic growth refers to the delta of a firm's total growth minus any growth effects resulting from acquisitions and divestitures of a company (Delmar et al., 2003). Organic growth emerges from a firm itself and is based on the existing resources of a company, which influence its strategic and operational performance. In the case of organic growth, firms are able to combine these already existing resources to a higher performing structure (Hutzschenreuter & Hungenberg, 2006). Smaller companies in most cases are supposed to rely primarily on internal growth activities (Penrose, 1995).

As this thesis focuses on firm growth with respect to sales, organic growth can be further decomposed into a more fine-grained perspective on growth modes. Analogue to Viguerie, Smit, and Baghai (2011), organic firm growth can be detailed into organic growth from market momentum on the one hand and organic market share gains or losses on the other hand. Market momentum represents the share of firm growth stemming from the market growth of a firm’s underlying portfolio of markets or segments a company competes in. Consequently, a firm’s market momentum growth equals the weighted growth rate of the markets or segments a company is active in. A company is able to influence its growth from market momentum via several instruments. First, firms can change their market or segment portfolio by acquiring or divesting firms and thus (a) enter or prioritize and (b) exit or deprioritize specific markets or segments. Second, companies can enter or exit markets or segments on a green field basis and thus alter their portfolio composition. Third, firms may generate market growth in their existing segment portfolio by themselves, e.g., by the introduction of new product categories (Baghai, Smit, & Viguerie, 2007). A company’s corporate or portfolio strategy focuses on a company’s selection of industries, markets, and segments it competes in and the corresponding allocation of its resources across these selected items (Bourgeois, 1980). Since growth from portfolio momentum is to a large extent linked to a company’s market or segment portfolio, it is consequently highly influenced by a company's actions with respect to its corporate or portfolio strategy and thus an indicator of the strategic performance of a firm (Viguerie et al., 2011).

Moreover, a company's sales growth from market momentum may be further decomposed into effects stemming from changes in currency exchange rates and effects from the actual growth of a market or segment in the local currencies of the international sales markets. The currency effect contained in growth from market momentum results from changes in the exchange rate between a company's sales reporting currency and the respective local currency of the sales markets (Baghai et al., 2007). If a company sells a constant volume of a product at a constant price as in the previous year in a specific regional market at constant exchange rates, the firm's sales in that regional market remain constant. However, changes in the currency exchange rate of the firm's reporting currency and the local currency of the respective region directly influence the reported sales figures of the company, although the operational efforts for the company remain constant (Viguerie et al., 2011). Since a company's portfolio strategy comprises the selection of regions a company decides to compete in, a company's exposure to changes in foreign exchange movements and thus the effects on its growth is part of a firm's portfolio momentum (Viguerie et al., 2011).

In addition to growth stemming from the underlying market growth of their market or segment portfolio, firms are able to organically grow by gaining or losing market share (Baghai et al., 2007). Market share is generally defined as a company's sales in a specific market or segment divided by the corresponding market's or segment's total sales (Enis & Roering, 2012). Alternatively, instead of using sales as a reference parameter, market share can be defined on a volume basis, i.e., on the respective units sold. Either way, market share as a metric indicates a company's performance relative to its competitors in a specific market (Xu, 2005). In general, a company increases its market share by achieving a higher growth than the corresponding market and loses market share by underperforming the market with respect to growth (Brush et al., 2000; Schwenker & Bötzel, 2007).

In addition to the predominant modes of organic growth and inorganic growth, a less important hybrid mode of growth exists. Hybrid firm growth combines characteristics of both organic and inorganic growth. Firms contractually open themselves to external parties while maintaining partial control as well as ownership over the assets involved (McKelvie & Wiklund, 2010). Among the most common vehicles of hybrid growth for firms are joint ventures, license agreements, franchising, and supplier arrangements (Borys & Jemison, 1989; Grant & Baden-Fuller, 2004). However, hybrid growth modes will not be considered in detail throughout the remainder of this thesis, as this is yet a very special mode of firm growth.

2.4 Definition of Firm Performance

In addition to the definition of the firm itself and firm growth in particular, a clear understanding of firm performance as the major dependent construct of this thesis is inevitable. Measuring firm performance is at the heart of strategic management (Venkatraman & Ramanujam, 1986). However, a generally accepted definition of firm performance is inexistent as it is a complex and multi-dimensional object (R. S. Kaplan & Norton, 1996a). Academic researchers have defined and used a large variety of indicators assessing firm performance. Overall, these indicators can be classified into objective and subjective indicators (Richard, Devinney, Yip, & Johnson, 2009). In the following, these different measures of firm performance are introduced and discussed in detail.

2.4.1 Objective Indicators of Firm Performance

Objective firm performance indicators are regarded as independent and impartial from the unit of analysis. These indicators precisely assess a specific performance dimension and their accuracy is externally verified (Boyne, 2006). Common clusters of objective firm performance indicators are (1) accounting measures, (2) market measures, (3) growth measures, (4) hybrid measures of accounting and market measures, (5) firm survival measures, and (6) operational measures (Shook, 2005).

Accounting measures are the most commonly used indicators of firm performance among academics. These measures are based on performance data generated in line with the corresponding accounting principles of a company, i.e., the financial statements, and are publicly disclosed (Verweire & Berghe, 2004). Accounting measures are used by academics due to a variety of advantages. Firstly, these indicators are the most readily available measures of the financial performance of a company (Richard et al., 2009). Secondly, research revealed accounting performance to be highly related to the underlying economic returns of a company (Danielson & Press, 2003). Thirdly, accounting measures indicate actual and realized performance by a company as disclosed in their financial statements (C. L. Cooper & Finkelstein, 2012). Despite these benefits, researchers named several drawbacks of accounting-based measures in recent years. The most frequently mentioned disadvantage of accounting measures is their focus on the past performance of a company and thus these measures only provide limited usefulness to guide and monitor future performance (Verweire & Berghe, 2004). Additionally, within the respective company's accounting principles, accounting-based measures provide firms room for manipulating the respective performance figures. For example, a firm's choice of an inventory valuation method, expense booking, or depreciation schedule impacts its corresponding accounting figures and thus potentially the comparability across companies (Richard et al., 2009). Finally, since accounting standards may differ from country to country, a cross-country comparison between accounting-based measures needs to be treated with caution (Chang, Van Witteloostuijn, & Eden, 2010). However, the increased and widespread application of the International Financial Reporting Standards (IFRS) and its convergence with the United States General Accepted Accounting Principles (US GAAP) in recent years have at least increased comparability of the accounting performance between United States (US) Firms and non-US firms (Barth, Landsman, Lang, & Williams, 2012). However, despite these potential drawbacks, accounting-based measured are still the most widely applied indicators of firm performance. In an extensive literature review, Shook (2005) identified accounting measures to account for more than 40% of the applied firm performance indicators by researchers. Within the accounting-based measures, researchers used a large variety of indicators.

As indicated in Table 4, academics primarily focused on return figures as accounting measures with return on assets (ROA) accounting for 33.7% followed by return on sales (ROS) representing 17.9%. These return figures construct ratios between certain profitability or cash flow figures of companies and a corresponding reference point, e.g., sales, assets, or equity. In an additional literature review, Richard et al. (2009) identified further accounting indicators to be frequently used by academic researchers as measures of firm performance, e.g., earnings before interest, taxes, depreciation, and amortization (EBITDA), earnings before interest and taxes (EBIT), and return on invested capital. However, the authors do not reveal any information about the relative use of these indicators in the studies under review.

Table 4. Overview of Accounting Measures Applied in Firm Performance Studies.

Accounting Measure	**Application Share** [Percentage]
Return on Assets	33.7%
Return on Sales	17.9%
Return on Equity	13.7%
Return on Investment	7.9%
Operating Margin	7.4%
Net Income	6.8%
Profit Scale	4.7%
Combined Accounting Measures	2.6%
Cash Flow/Assets	2.1%
Earnings Per Share	1.6%
Net Income/Employees	1.1%
Cash Flow/Sales	0.5%
Total	100.0%

Note. Own illustration and calculation based on Shook (2005).

In addition to accounting measures, financial market measures are another important group of firm performance indicators among academics. Market-based measures assess the market value of a firm in rates of change or ratios. Consequently, these measures only exist for public companies, private equity-owned firms, or firms sold via intermediaries and thus are able to provide transaction value data to academic researchers (Carton & Hofer, 2006). Several researchers promote market-based measures as the most accurate indicators of a company's economic value (Koller, Goedhart, & Wessels, 2010; Rappaport, 1986). Academics value market-based measures due to a number of reasons. First, contrary to accounting-based measures, market-based measures in theory represent the discounted future cash flows of a company and thus take a forward-looking perspective (Fisher & McGowan, 1983). Hence, market-based indicators reflect the exploitation of existing opportunities as well as potential future opportunities of a company (Carton & Hofer, 2006). Secondly, market-based measures are considered to better reflect a company's intangible asset base (Lev, 2000). Thirdly, in contrast to accounting measures, market measures are considered to be free from management judgment or discretion. Finally, based on the assumption of efficient financial markets, market-based measures are able to echo changes in a firm's economic value, e.g., resulting from managerial actions (Carton & Hofer, 2006). The efficiency level of financial markets refers back to the concept of the efficient market hypothesis (EMH). The EMH represents a major theoretical concept on the relationship between available information and their reflection in security prices (Malkiel, 2003). The level of a market's efficiency illustrates its ability to reflect available information in the respective market prices. Hence, e.g., an efficient market at all times reflects all available information in its prices (Fama, 1970). Consequently, prices at all-time represent unbiased approximations of a security's underlying value in case of an efficient market (Basu, 1977). Contrarily, some researchers criticize the usage of market-based measures as indicators of firm performance due to a variety of arguments. First, share prices do not only reflect the change in economic value of a company. Instead, share price movements are substantially influenced by additional factors, e.g., herding behavior of investors (Grinblatt, Titman, & Wermers, 1995) or stock market volatility (Shiller, 1992). In addition to that, the efficiency of capital markets varies across countries resulting in potential biases in market-based measures (Wan & Hoskisson, 2003). Despite these drawbacks, market measures are still widely used by academics as firm performance indicators (Shook, 2005).

Table 5. Overview of Financial Market Measures Applied in Firm Performance Studies.

Financial Market Measure	**Application Share** [Percentage]
Stock Returns	37.5%
Market to Book Value (Tobin's Q)	37.5%
Jensen	12.5%
Sharpe	5.0%
Treynor	5.0%
Security Analyst Assessment	2.5%
Total	100.0%

Note. Own illustration and calculation based on Shook (2005).

As illustrated in Table 5, researchers apply a variety of market-based indicators in their studies. The two primarily used market measures are a company's stock returns and the ratio of a firm's market to book value, also referred to as Tobin's Q[5]. Each of both indicators was used in 37.5% of the cases reviewed by Shook (2005) followed by Jensen's alpha[6], the Sharpe ratio[7], and the Treynor ratio[8]. Richard et al. (2009) identified a company's market capitalization and the total shareholder return (TSR) as additional frequently used market-based measures for firm performance.

Besides accounting- and market-based measures as the predominant groups of firm performance indicators, researchers apply various measures of firm growth itself as a proxy of firm performance. These growth measures intend to reflect the corresponding growth of an organization (Carton & Hofer, 2006). Researchers apply these measures as a proxy of firm performance, since organizational growth and sales growth in particular, is considered a major driver of the economic value of companies (Brealey, Myers, & Allen, 2011). However, growth measures are often criticized in their role as firm performance indicator due to a number of reasons. This is primarily based on the fact that organizational growth has often been found to be independent from accounting-based profitability or market-based measures and thus is regarded critical in assessing the economic value of a company (Carton & Hofer, 2006)[9]. Consistent to subchapter 2.2.2, the most used firm growth measures to assess firm performance are growth in firm sales and growth in the number of employees (Shook, 2005).

Moreover, academics use hybrid measures to assess the performance of firms. Hybrid measures are a combination of accounting-based and market-based measures and consequently try to limit the drawbacks of both groups of indicators. Hybrid measures are regarded to better balance risk and future opportunities of companies, as pointed out as a potential drawback of accounting measures, while simultaneously incorporating the operational performance of companies, as pointed out a potential bias within market-based measures (Richard et al., 2009). However, these measures are nevertheless exposed to similar drawbacks as their individual components, e.g., the sensitivity to stock market

[5] For more detailed information on Tobin's Q see, e.g., Brainard and Tobin (1968) and Tobin (1969).
[6] For more detailed information on Jensen's alpha see Jensen (1968).
[7] For more detailed information on the Sharpe ratio see Sharpe (1994).
[8] For more detailed information on the Treynor ratio see Treynor (1965).
[9] The relationship between sales growth and accounting-based as well as market-based firm performance indicators is covered in detail in chapter 5 of this dissertation.

movements not based on the underlying economic performance of the respective company (Groß, 2007). The mostly applied hybrid firm performance indicators in academic research are the price-to-earnings ratio, the cash flow-to-market value ratio (Carton & Hofer, 2006) as well as economic value added (Richard et al., 2009)[10].

Furthermore, measures linked to the survival of companies are used as indicators of firm performance. These measures assess a firm's past or a firm's future ability to remain in business (Carton & Hofer, 2006). According to Drucker (2012), a firm's ability to survive should be regarded as the most critical indicator to assess long-term firm performance. Long-term survival requires the satisfaction of all important resource suppliers including shareholders. Nevertheless, the application of survival measures as indicators of firm performance has some drawbacks. First, historical survival patterns are commonly assessed via a categorical variable evaluating the ongoing existence of a company, i.e., either a company still exists or not. This categorization does not differentiate between different forms of exits of a company. Failing for bankruptcy potentially implies a different firm performance compared to being acquired by another company. Consequently, the categorization of firm survival in this case limits the derivation of implications on firm performance (Richard et al., 2009). Furthermore, firm survival measures may only provide sufficient implications on firm performance for academic studies focusing on long-term periods, since firm survival in most cases only becomes relevant in the long-run for companies (Carton & Hofer, 2006). Analogue to the limited application of survival measures, the variety of indicators is small. As illustrated, past survival patterns is measured by a categorization variable. The Z-score, defined by Altman (1968), is an alternative indicator of the future survival likelihood of a company (Richard et al., 2009). However, overall only a few academic studies focus on firm survival measures as indicators of firm performance.

In addition to the introduced financial and survival measures, a number of academics use operational indicators to assess firm performance. Operational indicators provide information about the non-financial performance of a company (Venkatraman & Ramanujam, 1986). It acts as a mediating instrument between a firm's internal actions, e.g., resource

[10] In general, Tobin's Q should be classified as a market-based measure. However, the ideal combination of market-based values in the calculation is often substituted by approximating accounting-based values in case of total debt resulting in a potential classification of Tobin's Q as a hybrid firm performance measure (Groß, 2007).

allocation or strategic decisions, and a firm's financial performance (Ray, Barney, & Muhanna, 2004). The major advantage of operational measures is their foreseeing characteristic of opportunities as well as risks of the business, which have not yet been reflected in financial parameters. Despite their intermediary and foreseeing character, the application of operational measures has a number of drawbacks. A substantial question to operational measures is, if they are able to materialize into the expected financial implications. Additionally, differences in operational performance are expected to diminish over time as a result of adoption of critical resources or imitation. Moreover, operational performance has limited comparability across industries or even between companies of the same industry (Carton & Hofer, 2006). Researchers apply a wide variety of operational performance measures across several functions, e.g., delivery time, number of new product introductions, or turnover ratios. Nevertheless, the use of operational measures as indicators of firm performance is relatively rare compared to financial measures, i.e., accounting- or market-based measures (Shook, 2005).

In summary, a large variety of objective metrics to assess firm performance exists. The most widely used measures among academic researchers are accounting-based and market-based indicators of firm performance. Analogue to a large number of studies in corporate finance and strategic management, the remainder of this thesis focuses on Tobin's Q as the mostly used market-based indicator of firm performance in empirical research. The use of a market-based indicator over other measures aims at mitigating potential time lags between an event and the realization on performance metric and ensuring the highest level of comparability across firms. Furthermore, the focus on an objective, financial indicator is consistent with the research question raised by McKelvie and Wiklund (2010). Nevertheless, for reasons of comprehensiveness, subjective measures of firm performance are discussed in detail in the following subchapter as well.

2.4.2 Subjective Indicators of Firm Performance

The previous subchapter illustrated objective measures of firm performance. Contrarily, this subchapter focuses on introducing subjective indicators applied by researchers to determine the performance of companies. Whereas objective performance measures are based on mostly verified data, subjective performance indicators rely on personal information and the personal assessment of theoretically well informed individuals about a firm's performance, e.g., managers, founders, or regular employees. Subjective firm performance measures can be differentiated into quasi-objective indicators on the one hand and fully-subjective indicators on the other hand (Richard et al., 2009).

Quasi-objective firm performance indicators focus on the same performance dimensions as the previously introduced objective performance indicators. However, whereas data on objective measures on these dimensions are sourced from secondary, mostly validated sources, the data for quasi-objective measures is gathered via self-reporting methods and personal judgment of knowledgeable individuals (Dess & Robinson, 1984). An example for a quasi-objective measure is the market value assessment of a firm's chief executive officer. In contrast to quasi-objective measures, fully-subjective performance indicators are not anchored to a specific, objective parameter (March & Sutton, 1997). A top manager's assessment of his company's performance compared the main competitors independent from specific parameters is a common example of a fully subjective performance measure. On the positive side, the inexistence of a fixed reference parameter provides a higher flexibility to fully-subjective measures (Richard et al., 2009). On the negative side, fully-subjective indicators face potential biases from psychological effects, e.g., the halo effect, impacting the performance assessments of individuals (Rosenzweig, 2007). Additionally, self-reporting individuals show a tendency to be overoptimistic (Taylor & Brown, 1988) or taking credit for positive outcomes driven by external factors (Campbell & Sedikides, 1999).

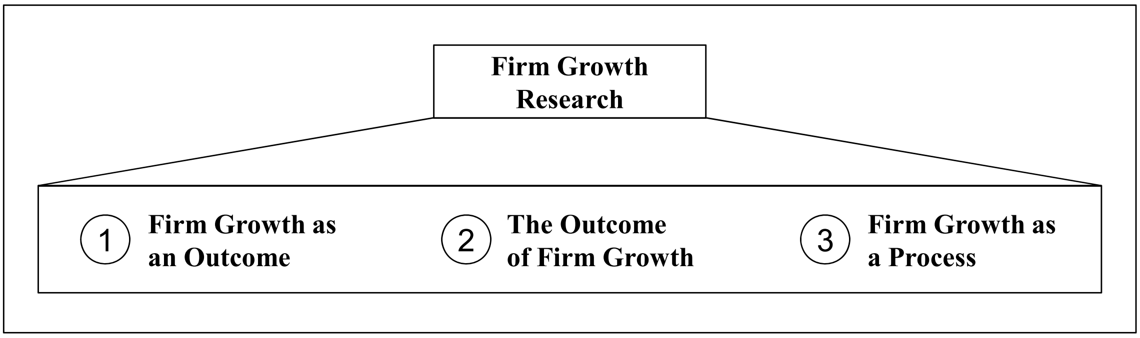
Despite these challenges, researchers found a significantly positive correlation between equivalent objective and subjective performance indicators (Wall et al., 2004). Based on these empirical results, academic researchers should not regard subjective firm performance indicators as a second-best choice. Rather, researchers should consider the context of research as well as the benefits and drawbacks of both indicator forms, e.g., availability, in their process of choice (Richard et al., 2009).

3 The Academic Research Streams of Firm Growth

The previous chapter exemplified the relevant conceptual background and theoretical definitions of the major parameters of interest within this thesis, i.e., the firm, firm growth, and firm performance, respectively. Based on these contents, this chapter provides an introduction to the field of firm growth research up to date. First, the different research streams of firm growth research are introduced in detail. Afterwards, the research focus of this dissertation is integrated into these research fields of firm growth and thus the focus for the remaining chapters defined.

Academic research on firm growth is a major topic of interest to scholars in the field of management as well as related fields such as economics and entrepreneurship (Stam, 2010). Within the recent decades, several academic studies on firm growth were published. In order to structurally discuss these academic contributions, they can be classified into three major streams of academic research on firm growth (McKelvie & Wiklund, 2010).

Figure 1. Overview of Academic Research Streams in the Field of Firm Growth.



Note. Own illustration based on McKelvie and Wiklund (2010).

As illustrated in Figure 1, the academic field of firm growth research can be divided into three streams consisting of (1) Firm Growth as an Outcome, (2) The Outcome of Firm Growth, and (3) Firm Growth as a Process. In the following, these three research streams are discussed in detail.

The first research stream focuses on firm growth as an outcome determined by specific factors. Consequently, this research stream focuses on the role of firm growth as a dependent variable. The objective of this stream is to explain differentials and variations in the magnitude of firm growth rates by identifying the underlying driving factors and determinants of firm growth. Overall, the majority of academic publications in the field of firm growth are dedicated towards this research stream.

In contrast to the first stream, the second research stream focuses on the outcome of firm growth. Consequently, this stream analyses the role of firm growth as an independent variable and thus the effects and implications of firm growth are the focus of these research publications. In contrast to the first research stream on firm growth, firm growth is regarded as given and its consequences are in the center of research. Furthermore, instead of analyzing how much firms grow, this research stream analyzes the question how firms grow and what the implications of different growth strategies are (Coad & Guenther, 2014).

The final and third stream of firm growth research is dedicated towards growth as a process. Whereas the previously introduced streams define firm growth as an input or output factor, this stream focuses on the developments within a firm during the process of growth. Although this area of research can be defined as an independent stream, a variety of intersecting components between this and the other research streams exists. Among these three streams, research regarding firm growth as a process is considered the least developed (McKelvie & Wiklund, 2010).

This dissertation aims to analyze the influences of different firm growth modes on certain metrics of firm performance. Consequently, the focus of this thesis classifies this thesis as part of the second research stream focusing on the outcome of firm growth. Hence, the research contributions of this second stream up to date focusing on growth as an independent variable will be discussed in detail in the forthcoming. However, to analyze the consequences of firm growth, knowledge of the factors determining firm growth is valuable. Accordingly, the results of the first research stream covering growth as a dependent variable are introduced beforehand. The third research stream, elaborating on firm growth as a process, is regarded as less relevant to the scope of this dissertation and in consequence will not be covered in detail as part of this dissertation.

4 The Determinants of Firm Growth

As previously introduced, the major share of academic research within the field of firm growth is dedicated towards the driving factors and determinants of firm growth. These studies consider firm growth as a dependent variable and hence as an outcome of certain factors. In order to analyze the influences of firm growth, it is first necessary to understand these driving factors behind it. Hence, this chapter illustrates the underlying drivers by first discussing the determinants of organic growth and subsequently exemplifying the driving factors behind inorganic growth.

4.1 Determinants of Organic Firm Growth

The following subchapters focus on the introduction of the determinants and driving factors behind organic firm growth. Overall, the determinants of organic firm growth can be classified into two categories: firm-internal and firm-external factors (Davidsson et al., 2010). Both categories are discussed in detail in the following.

4.1.1 Firm-Internal Determinants

Academics put much research effort in investigating the firm-internal determinants of firm growth. In the following, the most relevant firm-internal determinants of firm growth are introduced and discussed in detail. These firm-internal driving factors can be classified into firm-structure-related, financial, personnel, strategic, and other determinants.

4.1.1.1 *Firm-Structure Determinants*

The first and probably the academically most studied driving factor of firm growth is the size of a firm. Several researchers have put much effort on investigating the role of firm size as a determinant of firm growth (Cabral & Mata, 2003). Firm growth and thus firm size is considered to be limitless. Only the respective growth rate may be restricted in the short run (Penrose, 1995). This idea of unlimited growth raised the interest of researchers into the relationship between the size and the growth rate of a firm. A negative relation between size and growth would question the idea of unlimited firm size and thus result in a point at which further increases in size are impossible for a company (Hermelo &

Vassolo, 2007). The discussion of firm size as a determinant of firm growth is primarily based on the seminal article of Gibrat (1931). Gibrat's *law of proportionate effect* states that a company's growth rate in a specific time interval is the same for all companies independent of their size at the start of the time interval and is based on the discovery of the lognormal distribution of French manufacturing companies (Mansfield, 1962). Consequently, a firm's growth rate can be considered as stochastic and random (Coad & Hölzl, 2012). In contrast to the independence of firm size and growth proposed by Gibrat, some theoretical considerations assume a relationship between firm size and firm growth. For some theorists, larger companies are characterized by a higher level of bureaucracy in comparison to smaller companies. Companies that are more bureaucratic are supposed to be less flexible in exploiting growth opportunities resulting in lower growth rates for larger firms (Haveman, 1993). In contrast to this inverse relationship, some academics assume firm size to be a positive driver firm growth. Large companies possess more underused resources than small companies helping them to better manage volatile environments and act on chance resulting in higher firm growth (Chandy & Tellis, 1998).

However, primarily the formulation of Gibrat's hypothesis resulted in a large variety of studies empirically analyzing the relationship between firm size and firm growth. These empirical studies result in varying implications for firm size as an indicator of firm growth (Coad, 2007a). The early analyses, primarily focusing on samples comprising large companies due to data availability, show a positive relationship between firm size and firm growth. Larger companies feature higher growth rates and thus contradict Gibrat's hypothesis of independence between size and growth (P. Hart, 1962; Samuels, 1965; Singh & Whittington, 1975). In contrast to these early studies, the majority of succeeding publications identified a negative relationship between firm size and growth. Similar to the early studies, these publications as well question the independence of firm size and firm growth, but link higher growth to smaller firms and vice versa (Coad, 2007a). This reverse relationship and thus the role of firm size as a determinant of firm growth has been proven by several studies across different regions, company sizes, and sectors. Among studies analyzing large companies, Kumar (1985) and P. Dunne and Hughes (1994) identified the reverse effect for United Kingdom (UK) manufacturing firms, whereas B. H. Hall (1988) and Bottazzi, Dosi, Lippi, Pammolli, and Riccaboni (2001) as well as Goddard, Wilson, and Blandon (2002) found similar evidence for US and Japanese manufacturing companies, respectively. Additionally, Wagner (1992) focusing on German firms, McPherson (1996) studying South African firms, and Yasuda (2005) examining Japanese firms, identified the equivalent reverse relationship for small scale companies. Whereas most of the previous studies focused on manufacturing companies, Variyam and Kraybill (1992) and Johnson, Conway, and Kattuman (1999) proved smaller growth rates for larger firms in the service sector as well. Higher growth rates for smaller firms were also confirmed by Barron, West, and Hannan (1994) in the financial service industry, C. R. Weiss (1998) in the farming industry, and Bottazzi and Secchi (2005) in the pharmaceutical industry and thus across different industrial sectors. In addition to these studies indicating a significant relationship between firm size and firm growth, a little number of studies does not find a significant influence of size on growth and thus confirm the theory behind Gibrat's law. Droucopoulos (1983) analyzing more than 500 of the world's largest firms and Audretsch, Klomp, Santarelli, and Thurik (2004) examining small Dutch service companies did not find any significant link between firm size and firm growth and thus an indirect confirmation of Gibrat's hypothesis. Furthermore, some researchers found evidence of Gibrat's law being valid for companies exceeding a certain size threshold, whereas for small companies the law is rejected and size and growth are found to be negatively related (Geroski & Gugler, 2004; P. E. Hart & Oulton, 1996; Mowery, 1983). Mansfield (1962) describes this threshold as a minimum efficient scale. The minimum efficient scale is the firm size up to which unit costs decrease substantially and only improve marginally above. In conclusion, the majority of empirical studies observe a negative relationship between firm size and firm growth resulting in a rejection of Gibrat's hypothesis. Consequently, firm size can be regarded as a determinant of a firm's growth rate.

In addition and closely related to firm size, the role of firm age as a determinant of its growth rate has as well been analyzed intensely by researchers. Firm size and firm age are two strongly interlinked factors (Coad, 2007a). On occasion, firm age and firm size are equally used to embody the same phenomenon (Greiner, 1972). Regarding the influence of firm age on firm growth, different theoretical concepts exist. Among the most relevant theories, learn-theoretical models postulate a negative relationship between age and growth. Firms are involved in a continuous learning process about their relative efficiency within their respective market. Efficient companies increase production and thus grow. However, the returns from the learning process decrease from year to year resulting in smaller efficiency improvements and thus less growth over time. Consequently, firm age is supposed to have a negative relationship with firm growth, i.e., younger firms are characterized by higher growth rates than older firms (Jovanovic, 1982). Additionally, younger firms are supposed to have an advantage in learning in comparison to older firms. This learning advantage is attributable to a higher flexibility in the working environment as well as less routine in daily collaboration resulting in a higher level of entrepreneurship (Autio, Sapienza, & Almeida, 2000; Sapienza, Autio, George, & Zahra, 2006). Accordingly, younger firms are assumed to better exploit market opportunities and thus grow faster than older companies.

In contrast to the hypothesis of age being a negative determinant of growth, younger firms are assumed to have a disadvantage due to their less developed networks and relationships as well as the absence of sufficient resources. Hence, younger firms are inferior in competing effectively against older firms (Stinchcombe, 1965). This theoretical concept implies a positive relationship between age and growth, i.e., higher growth rates for older firms. Additionally, younger firms may experience a disadvantage due to a shortage of reputation and thus grow slower (Barron et al., 1994).

Several academic studies empirically analyzed the role of age as a determinant of growth. Among those studies, the majority found a significantly negative relationship between both parameters. For small companies, age as an inverse determinant of growth was confirmed in France (Fizaine, 1968) and the US (T. Dunne, Roberts, & Samuelson, 1989). On a firm level, the negative relationship was proven for US manufacturing companies (Evans, 1987a, 1987b), US service companies (Variyam & Kraybill, 1992), and large European firms (Geroski & Gugler, 2004). In contrast to this negative relationship, Das (1995) observes a positive relationship between growth and age. Additionally, Barron et al. (1994) identify an unsteady relationship between age and growth showing the highest growth rates for the youngest firms, the second highest growth rates for the oldest firms, and the lowest growth rates for mid-age firms. In conclusion, the majority of empirical studies observe a negative relationship between firm age and firm growth supporting the learn-theoretical concepts. Consequently, indication exists of firm age being a determinant of the respective growth rate of a company.

As an additional factor of firm structure, the legal form of a company is considered to be a determinant of firm growth. The influence of the legal form on firm growth is primarily based on the liability of the management (Harhoff, Stahl, & Woywode, 1998). In legal forms with an unlimited liability, managers gain the entire return in a best-case scenario, but are completely liable in case of failure. Contrarily, a legal form with limited liability caps the accountability of managers in a failure scenario. Consequently, legal forms with a limited liability incentivize managers to conduct investments with associated higher returns as wells as higher risks of failure (Stiglitz & Weiss, 1981). Thus, companies operating under a legal form with limited liability for the management are assumed to experience higher growth rates in comparison to companies with unlimited liability. However, this advantage in terms of higher growth rates is accompanied by higher exit probabilities. In addition to the liability of the managers, the legal form of a company influences its access to financing sources and thus indirectly affects a firm's growth rate. (Storey, 1994a) argues, that companies with a limited legal form indicate the seriousness of a business to banks and consequently improve a firm's loan eligibility. This higher loan eligibility in return enables companies to achieve higher growth rates.

Academics empirically analyzed the role of the legal form as a determinant of firm growth. Harhoff et al. (1998), empirically examining Western German firms, found evidence of higher growth rates for companies with a legal form involving limited liability. Additionally, their sample indicated a higher probability of exit for these companies. Furthermore, Storey (1994a) identifies a significant relationship between the legal form of a company and its growth trajectory. Companies with a legally limited management are more likely to experience higher firm growth according to the results of this study. Summarizing, the few empirical studies conducted indicate the legal form of a company to be a determinant of firm growth rates. However, this determinant is assumed to be more relevant for small scale and private companies, since legal forms with limited liability are not or less frequently used among large scale and listed companies.

4.1.1.2 *Financial Determinants*

Financial capital is among the mostly analyzed determinants of firm growth (A. C. Cooper, Gimeno-Gascon, & Woo, 1994; Gilbert, McDougall, & Audretsch, 2006). Referring to financial capital as a determinant of firm growth, two dimensions are of relevance: a firm's financial performance on the one hand and its access to external financing on the other hand. Although the access to external financing may be considered as an external determinant, it is decided to discuss this factor in this part of the thesis, as financial performance and financing access are closely related. Generally, a firm may finance additional resources by retained earnings, the issuance of equity, or the borrowing of debt (Brealey, Myers, & Allen, 2011). A firm's financial performance may influence its growth in an internal as well as an external way. Internally, higher performance enables companies to faster invest in additional resources and capture growth opportunities. Externally, high levels of profitability or further performance measures increase a firm's attractiveness to external capital providers, both equity and debt, and thus are assumed to have a positive influence on their access to external financing (Chen, Babb, & Schrader, 1985). Additionally, a low debt-to-equity ratio, also referred to as leverage ratio, may increase a company's attractiveness to potential investors and thus increase its access to external financing (Hermelo & Vassolo, 2007).

Empirical analyses focusing on the influence of financial performance and a company's access to external financing is limited. Focusing on food industry companies, Chen et al. (1985) found a significant positive relationship between profitability and firm growth. However, their results regarding the role of the leverage ratio on firm growth were inconsistent. Becchetti and Trovato (2002) found no evidence for the influence of the leverage ratio on firm growth. However, a qualitative variable approximating creditworthiness was confirmed to be an important factor driving firm growth. Furthermore, Hermelo and Vassolo (2007) found a significantly positive relationship between financial resources of a company and growth analyzing firms from Argentina. Coad (2007b) identified a positive and statistically significant influence of profitability on growth for French manufacturing companies. However, due to a low magnitude of the coefficient, the author argues to treat a firm's profitability and its rate of growth as independent parameters. These findings are in line with the results of Bottazzi, Secchi, and Tamagni (2007). Summarizing, empirical studies analyzing the importance of financial performance and access to capital on firm growth show a mixed picture. Whereas Coad (2007a) defines financial performance as a minor determinant of firm growth, Davidsson et al. (2010) recognize the complexity between both parameters and thus refrain from a conclusive statement on the role of financing as a driving factor of firm growth.

4.1.1.3 *Personnel Determinants*

Furthermore, researchers identified personal characteristics of the management or the founder of a company as determinants of firm growth.

First, Eisenhardt and Schoonhoven (1990) regard heterogeneous industry experience among the members of the top management team of a company as a driving factor of firm growth. Whereas executives with deep insights in a specific industry provide expertise and rare insights based on their extensive experience, executives with different backgrounds contribute new perspectives resulting in improved decisions making processes in the top management team. Furthermore, Hambrick and Mason (1984) consider different functional expertise within the top management team as a positive determinant of firm growth due additional checks and balances in the decision making process. In addition to the heterogeneity with regard to industrial and functional expertise of the top management team, Hambrick and Mason (1984) propose the age of executives to be an element influencing firm growth. Older managers are considered to be more conservative and thus prefer to keep the status quo. These executives are regarded as less mobile in comparison to younger managers and thus probably avoid risks with regard to firm growth. Empirically, Weinzimmer (2000) found empirical evidence for all of these hypotheses with regard to characteristics of the top management team. Whereas industrial and functional heterogeneity among top managers proved to be significantly positive determinants of firm growth, the average age of the top management team is a significantly negative factor driving firm growth.

In relation to the discussed characteristics of a top management team, but more relevant in a small firm context, researchers identified characteristics of the entrepreneur or founder as determinants of firm growth[11]. A first set of empirically proven and related determinants of firm growth with respect to the entrepreneur are his or her motivation to grow the firm as well as his or her communicated goals and vision for the firm (J. R. Baum, Locke, & Kirkpatrick, 1998; J. R. Baum, Locke, & Smith, 2001; Wiklund, 2001). Moreover and closely related to the previously discussed expertise of top management teams in larger companies, the individual capabilities and characteristics of the entrepre-

[11] As this dissertation aims to provide insights into the field of management and less to the field of entrepreneurship, determinants of firm growth with regard to the entrepreneur are discussed in less detail.

neur are of importance to the rate of firm growth in small businesses. Among these characteristics, Storey (1994b) identified joblessness of the founder as the reason to establish a business as the most negative driver of firm growth in a comprehensive review of the literature. For other entrepreneur characteristics, e.g., previous industry experience, gender, age, training, and ethnicity, the review indicated mixed results. Contrarily, Wasilczuk (2000) identified previous experience in founding firms as a significant and positive predictor of firm growth. Furthermore, Box, White, and Barr (1993) found evidence for previous experience in founding businesses and industry experience being drivers of firm growth. Additionally, the size of a founding team is positively correlated to the rate of firm growth. The positive effect on firm growth is based on the complementarity of skills each member of the founding team contributes (A. C. Cooper et al., 1994), similar to the heterogeneity of capabilities within top management teams. Finally and closely related to the number of members of the founding team is the positive influence of managerial capacity on firm growth. In comparison to large firms, small companies have limited access to external resources to overcome shortfalls in management resources. Since management capacity is regarded as a crucial factor in order to successfully compete in today's markets, companies with high management capacity are considered to outperform with respect to firm growth (Davidsson et al., 2010). In conclusion, the characteristics of the top management team in medium- and large-scale companies as well as of the entrepreneur in small companies are relevant determinants of firm growth.

4.1.1.4 *Strategic Determinants*

Furthermore, determinants related to a company's strategy are assumed to affect its rate of growth (Weinzimmer, 2000). Several researchers illustrated the importance of strategy for the success of a company (Feeser & Willard, 1990; Grinyer, McKiernan, & Yasai-Ardekani, 1988). The major strategic determinants of firm growth refer to the corporate or portfolio strategy of a company, a firm's business strategy, the level of diversification, and the level of internationalization of a company.

A company’s corporate or portfolio strategy is considered to be among the major strategic drivers of firm growth. The corporate or portfolio strategy, as the first strategic determinant of firm growth under review, refers to the selection of industries, markets, or segments a company competes in and the corresponding resource allocation across these markets (Bourgeois, 1980). The selection of industries or markets a company decides to compete in, i.e., a firm's business portfolio, is regarded as a significant determinant of a company's rate of growth (Weinzimmer, 2000). This theory is consistent with the industry-related determinants of firm growth discussed in the following subchapter of firm-external determinants of firm growth. If certain characteristics, e.g. market growth, of an individual industry determine firm growth, the overall selection of individual industries or markets by a company is assumed to affect firm growth as well.

The level of diversification and internationalization of a company is closely related to its corporate strategy. The definition of firm diversification goes back to Ansoff (1957). Two general diversification modes are defined in this article: diversification into new markets and diversification into new products. However, only in case of a simultaneous implementation of both diversification modes Ansoff refers to a diversification strategy of a company. This perspective on diversification is shared by additional academics (Chandler Jr, 1977, 1990). Consequently, several researchers refer to the level of diversification of a company as the number of different industries or markets a firm competes in and the corresponding sales shares it achieves in these different industries or markets, respectively (P. G. Berger & Ofek, 1995; Jacquemin & Berry, 1979). In general, three typologies of diversification exist: (1) related or unrelated diversification referring to the similarity of industries a company is active in, (2) conglomerate, vertical, or horizontal diversification referring to the direction along the value chain, and (3) international and domestic diversification referring to the number of countries or regions covered by a company (M. Weiss, 2009). A high level of diversification is believed to enable companies to attract a larger number of customers and to decrease volatility in sales resulting in higher sales growth rates on average (Hermelo & Vassolo, 2007). However, empirical evidence of the impact of diversification on firm growth is inconclusive. Geroski and Gugler (2004) found an inverse relationship between the level of diversification of companies and their corresponding growth rates. Contrarily, Hardwick and Adams (2002) found a significantly positive influence of diversification on a firm’s growth rate. Additionally, Federico, Rabetino, and Kantis (2012) identified a positive influence of the degree of internationalization in terms of export markets to have a positive influence on firm growth rates.

4.1.1.5 *Other Firm-Internal Determinants*

An additional set of other firm-internal factors influences a company's growth performance. Among these factors, a company's integration into professional networks is considered to affect its rate of growth. Companies engage in several relationships with other organizational entities, e.g., their customers, their suppliers, or financial institutions (Park & Luo, 2001). Being part of professional networks brings several advantages to companies. First, firms are able to obtain important resources from these networks, e.g., capital, goods and services, or specific information. Secondly, companies minimize the number of transactions by sharing information and norm development within their networks. Thirdly, by establishing entry barriers to key suppliers, companies defend their supplier base from competitors (DeBresson & Amesse, 1991; Zaheer, Gulati, & Nohria, 2000). Based on these advantages, a company's professional network can be regarded as an asset of strategic importance. This strategic asset enables companies to more effectively develop new products and faster respond to market developments resulting in higher firm growth (R. P. Lee, Johnson, & Grewal, 2008). Companies engaged in professional networking activities have a higher probability of firm growth and survival (Brüderl & Preisendörfer, 1998; Dubini & Aldrich, 1991).

Additionally, innovation or research & development (R&D) is among the most studied determinants of firm growth (Bahadir et al., 2009). R&D comprises all activities within a firm aiming at the development of new services and products (Scherer, 1965). Innovation is, under certain circumstances, a key component in generating a competitive advantage (Lengnick-Hall, 1992). Thus, R&D is considered as an important organizational capability based on its knowledge generation role resulting in new products and services and ultimately in stronger firm performance (Geroski, 1989; Stremersch & Tellis, 2004). This high-profile role of innovation is reflected by its perception among executives. Owners as well as managers regard innovation as a key vehicle to drive firm growth. In a survey focusing on small and medium enterprises (SME) across several industries, executives name the innovation of new products as their predominant strategic initiative to drive growth (Hay & Kamshad, 1994). Similarly, executives of large scale companies define innovation as an elementary factor to further drive growth (Carden, Mendonca, & Shavers, 2005).

The role of innovation as a determinant of firm growth has received a lot of attention in empirical studies. In an early study covering a period of 40 years, companies of the US petroleum and steel industries characterized by high innovation activity were found to grow quicker than their competitors. Particularly small firms benefit from innovation in terms of growth (Mansfield, 1962). Additionally, Scherer (1965) identified a positive relationship between innovation, measured in the number of patents, and sales growth for 365 of the largest corporations in the US. An additional study analyzing US manufacturing firms from 1921 to 1946 observed ambiguous results. Whereas the period 1933-1946 indicated a positive relationship between R&D and firm growth, the period 1921-1933 did not provide similar evidence. These findings where consistent for two samples distinguishing between large and small firms (Mowery, 1983). Covering 539 large and publicly listed UK firms, Geroski and Machin (1992) observed higher growth rates for firms producing a minimum of one main innovation in the period under analysis. These findings are consistent with the results of Geroski and Toker (1996) and their examination of 209 UK firms. Furthermore, Roper (1997) found a positive influence of newly innovated products on sales growth. Consistently, Del Monte and Papagni (2003) reveal a positive relation between research intensity and firm growth. Furthermore, Coad and Rao (2008) found innovation to be a key element particularly for the highest growing firms. In contrast to these findings, some empirical studies do not find any significantly positive relation between innovation and firm growth (Bottazzi et al., 2001; Brouwer, Kleinknecht, & Reijnen, 1993; Corsino & Gabriele, 2011). In conclusion, the majority of empirical studies identify innovation or R&D as a positive determinant of firm growth.

Marketing and advertising activities are additional determinants of the growth rate of a firm (Bahadir et al., 2009). By engaging in marketing activities, companies are able to generate strategic assets, e.g., brands or channel equity. These strategic assets support a company in, amongst other, enhancing their revenues particularly via market share increases (Srivastava, Shervani, & Fahey, 1998). Furthermore, companies use advertising in order to promote newly developed products and to emphasize superior product or service characteristics resulting in a stimulation of additional product or service sales (Bahadir et al., 2009). Empirically, Geroski and Toker (1996) found evidence for the influence of the advertising intensity of a company on its growth rate. A firm's advertising intensity was proven to be a positive and significant driver for the size of a firm. Additionally, Srinivasan, Rangaswamy, and Lilien (2005) found a significantly positive relationship between the rate of growth and the marketing expenditures of a firm. The authors even confirmed these findings for times of a recession.

An additional, however less studied, factor influencing the rate of growth is the location of a company. Theory suggests that a location of a company located within an agglomeration or a geographically concentrated region generates substantial efficiency benefits. These efficiency increases are based on three elements. First, companies located in agglomerations benefit from labor market pools. Secondly, these companies gain access to special intermediate inputs and non-traded inputs. Thirdly, these firms gain advantage from knowledge spillovers and further knowledge externalities from other closely located firms (Audretsch & Dohse, 2004). Particularly in the case of knowledge spillovers, location and proximity between companies are the considered to be the decisive enablers (Glaeser, Kallal, Scheinkman, & Shleifer, 1991). Consequently, a company located within an agglomeration has better access to knowledge resources and spillovers resulting in higher growth performance (Audretsch & Dohse, 2004). Empirically, Davidsson and Wiklund (2006) found evidence of a significantly negative relationship between the rurality of a location and a company's growth rate. These findings are confirmed by Audretsch and Dohse (2007). The authors identified companies located in an agglomeration are more likely to experience high growth than comparable companies in rural areas.

In addition to the previous discussed determinants, a variety of further factors potentially driving firm growth exists. However, research on these firm growth determinants is yet limited. The ownership structure of a company is considered to be an influencing factor of firm growth. In comparison to privately owned companies, state-owned companies seem to experience smaller growth rates (Beck, Demirgüç-Kunt, & Maksimovic, 2005). Furthermore, managers, in comparison to owners, are regarded to put special emphasis on the growth and size of a company. Hence, managers may pursue strategies resulting in above optimal growth rates (Coad, 2007a). Whereas Holl (1975) did not find any supporting evidence, Hay and Kamshad (1994) identified smaller growth rates for owner-managed companies. Moreover, companies using professional external business advice experience higher growth (Robson & Bennett, 2000). Finally, the organizational culture of a company may be a determinant of growth. Organizational culture may serve some companies as a strategic asset (Hitt, Ireland, Camp, & Sexton, 2001). More specific, the organizational orientation towards entrepreneurship is assumed to be an indicator of firm growth. Companies with a higher entrepreneurial orientation are better equipped to identify and exploit emerging business opportunities (C. Lee, Lee, & Pennings, 2001). Hence, these companies are less risk-adverse in investing in upcoming opportunities and thus are expected to experience higher growth rates (Bahadir et al., 2009).

4.1.2 Firm-External Determinants

Whereas the previous subchapter introduced firm growth determinants as a part of or closely related to the firm itself, the following subchapter provides an overview of organic growth determinants external of the firm. Initially, industry or market related determinants are introduced followed by additional firm-external drivers of firm growth.

4.1.2.1 *Industry or Market Determinants*

A particular determinant of firm growth is the industry or the market a company competes in (Weinzimmer, 2000). Several theories and empirical evidence support the view of companies being influenced by their environment, e.g., their respective target market or industry (Aldrich & Wiedenmayer, 1993). Certain characteristics of an industry are regarded to affect the level of a company's growth rate.

Among the most studied elements characterizing an industry, the rate of growth of an industry itself is regarded as a key determinant of the growth rate of individual firms competing within this industry. Empirical studies confirmed the theory of a positive relationship between the growth rate of an industry and the growth of the individual firms of this industry. This is due to several factors, e.g., higher availability of business opportunities or less intense rivalry (McDougall, Covin, Robinson, & Herron, 1994; Porter, 1980). Audretsch and Mahmood (1994) as well as Audretsch (1995) found evidence for the industry growth rate to be a positive and significant determinant of the growth rate of individual companies across varying industries and time frames. Similarly, Capon et al. (1990) found industry growth rates to be a positive and significant indicator of firm growth. Davidsson (1991) identified the market growth rate as well as market size to be significantly positive indicators of firm growth. Additionally, Geroski and Toker (1996) confirm the industry growth rate to be a determinant of the market share of industry leaders for UK manufacturing firms. Moreover, firms characterized by superior growth rates competing in low growth or even stagnant industries are found to position themselves in small and dynamic high growth niches of this industry providing additional evidence for the influence of underlying market growth rates on firm growth (Storey, 1998; Wiklund, 1998). According to Wiklund (1998), it is more important for companies to compete in highly growing market segments than to take market share from competing companies in order to spur firm growth emphasizing the importance of market growth rates for individual companies' growth.

In addition to the respective growth rate of a market or industry, the competition intensity, the level of munificence, the degree of dynamism, and the level of complexity are considered as determinants of firm growth rates (Bahadir et al., 2009; Davidsson et al., 2010).

First, the competition intensity of an industry often refers to the number and size of competitors (Hermelo & Vassolo, 2007). In general, higher competition, e.g., represented by larger competitors, is assumed to negatively affect the growth of firms (Porter, 1980). Thus, intensified competition results in lower individual firm growth rates (Bahadir et al., 2009). However, some empirical studies indicate the opposite effects of increased competition. In some cases, firms competing in highly competitive industries were found to experience higher growth rates (Birley & Westhead, 1990; Capelleras & Rabetino, 2008). These results are partially explained by the fact that companies favorably participate in markets characterized by a high-level attractiveness. However, due to their superior attractiveness, these markets simultaneously experience a high degree of competition (Hermelo & Vassolo, 2007).

As a second market characteristic, the level of munificence within an industry refers to the environmental resource availability enabling firm growth (Dess & Beard, 1984). A high level of munificence supports companies to address challenges by utilizing these external resources. Empirical analysis of the significance of munificence for firm growth is ambiguous. The majority of researchers found a positive relationship between resource availability and firm growth (Bahadir et al., 2009; Rajan & Zingales, 1996). However, contrary results exist as well (J. R. Baum et al., 2001). The level of munificence within an industry is closely related to the previously discussed subject of a company's access to capital or personnel as these are key resources for firm growth.

As a third industry characteristic, an industry's level of dynamism is defined by its instability and volatility (Aldrich, 2008). It represents the uncertainty level about forces outside the area of control of a company (Dess & Beard, 1984). Firms in highly dynamic industries experience a higher difficulty to forecast customer behavior and demand. These difficulties result in suboptimal decisions with respect to product innovation and marketing activities harming a firm's rate of growth (Bahadir et al., 2009). Empirically, the majority of studies found a negative relationship between high dynamism of the environment, in particular within an industry or region, and a firm's growth rate (Carroll & Hannan, 2000; Davidsson & Wiklund, 2006; Jovanovic, 1982).

As a fourth industry attribute influencing firm growth, the complexity of an industry characterizes the activities of an organization in terms of range and level of heterogeneity (Child, 1972). Companies targeting industries requiring several input factors or producing a variety of products are assumed to face a more complex environment to source their inputs or sell their outputs (Dess & Beard, 1984), resulting in lower individual growth rates (Bahadir et al., 2009). Empirical analyses on the influence of industry complexity on firm growth has been limited and insignificant (J. R. Baum et al., 2001).

4.1.2.1 *Other Firm-External Determinants*

An additional set of firm-external determinants is identified to affect the growth of companies. A particular firm-external determinant of firm growth is a company's macroeconomic environment. Companies operate in a setting comprising several factors and forces influencing their business activity. These factors, e.g., the gross domestic product (GDP) growth, the monetary policy, or the balance of payments situations, are considered to influence the business opportunities available to companies and thus substantially determine their growth paths (Fernando, 2011). A variety of studies analyzed the influence of macroeconomic factors on firm growth performance. By analyzing US companies covering the business cycle from 1950 to 1999, Higson, Holly, and Kattuman (2002) found the average growth rates of a company to be influenced by the macroeconomic environment, e.g., the GDP growth of the US. Contrarily, Gabe and Kraybill (2002) did not find any statistically significant relationship between regional growth rates and individual firm growth. Furthermore, Beck et al. (2005) identified several economic indicators to drive firm growth. By analyzing 4000 companies in 54 countries, the rate of inflation as well as the rate of GDP growth are positive indicators of firm growth. Hardwick and Adams (2002) found differences of the influence of macroeconomic factors as growth determinants across firm sizes. Whereas small firms outperform larger firms in terms of growth in times of high economic growth, larger firms show higher growth rates in times of low and negative GDP growth.

As a further factor, Demirgüç-Kunt and Maksimovic (1998) analyzed the role of the financial as well as the legal system of a country as determinants of individual firm growth. The development of the financial market of a country is an indicator of its economic growth performance (Beck & Levine, 2004; Levine & Zervos, 1998). As previously discussed, economic growth was considered as a predictor of individual firm growth. On the one hand, well-developed financial markets act as a capital source for companies and on the other hand provide investors with information about companies. Thus, well-developed financial markets should have a positive impact on firms' ability to access long-term funding and thus influence their rates of growth (Diamond, 1993, 1997; Holmstrom & Tirole, 1993). This theory is closely related to a firm's financial resources as a determinant of firm growth as previously discussed. Additionally, effective legal systems are important in enabling firms to credibly control opportunistic activities of firm insiders. Effective legal control mechanisms to these opportunistic behaviors are important for potential shareholders and thus for firms seeking external sources of financing (Williamson, 1988, 1998). Empirically, Demirgüç-Kunt and Maksimovic (1998) found both, the legal as well as the financial system of a country, to be determinants of an individual firm's growth rate. Firms in countries with highly developed financial systems and well-established legal norms have better access to external sources of capital enabling them to higher growth.

4.2 Determinants of Inorganic Growth

The following subchapter focuses on the driving factors of a company's inorganic growth activity in particular and thus how much a company engages in acquisitions and divestitures. Analogue to the previous subchapter, the determinants again can be clustered into firm-internal and firm-external factors. It is decided to elaborate on the determinants of inorganic growth in detail as M&A and divestitures are central strategic decisions of firms.

4.2.1 Firm-Internal Determinants of Inorganic Firm Growth

Inorganic firm growth activity is based on a variety of firm-internal reasons. Among these, the search of companies for synergies between the acquiring company and the respective target company is the most predominant reason for acquisitions (Grinblatt & Titman, 2002). Synergies are defined as the ability to increase the value of the combined companies compared to both companies individually (Gaughan, 2010). Synergies emerge from several sources, e.g., as a result of economies of scope and scale (Bradley, Desai, & Kim, 1983, 1988) and stemming from a better control and thus a possibility to better use of the target company's assets (Jensen & Ruback, 1983). The resulting synergies can be distinguished into three categories: Financial synergies, operational synergies, managerial synergies. Financial synergies reduce a firm’s cost of capital due to cheaper access to capital based on a larger firm size or by lowering a firm’s systematic risk by investing in unrelated businesses (Trautwein, 1990). Operational synergies are based on knowledge transfers or the combination of previously separate operations (Porter, 2008) resulting in either lower costs or higher sales. Managerial synergies emerge from transferring superior monitoring and planning capabilities to an acquired company and thus increasing the respective performance (Trautwein, 1990). The search for these synergies is the major argument for justifying inorganic growth activities (Porter, 1987).

In addition to synergies, the search of companies for increased market power is a determinant of their inorganic growth activity. By engaging in conglomerate acquisitions, a company may hinder a company to enter its markets as well as to cross-subsidize between different markets. Rhoades (1983) found evidence of companies’ search for market power to be a driving factor of inorganic growth activity.

Additionally, a firm’s financial resources affect its activity with respect to acquisitions. Harford (1999) identified a positive relationship between a company’s cash reserves and its acquisition activity. Despite holding an optimal liquidity buffer as a security in case of worsening business conditions, managers tend to invest excessive cash piles. Jensen (1986) argues managers value the lower level of monitoring caused by internal financing in comparison to the substantial monitoring routines of external capital providers. Managers are likely to invest the excessive cash reserves as a result of the lower monitoring conditions and acquisitions are a primary use of the cash.

Moreover, a company's size is an indicator of its inorganic growth activity. In addition to the theory of Penrose (1995) implying a higher relevance of acquisitive growth for larger firms, e.g., Harford (1999) and Owen and Yawson (2010) found significant empirical evidence for firm size to be a positive determinant for the likelihood of acquisitions for a company. Large firms are believed to have superior access to internal funds or capital markets in comparison to smaller companies. Additionally, larger companies are considered to have the respective specialized resources to identify and takeover target companies (Damodaran, 2012)

Furthermore, personal motives of a firm's managers are regarded as drivers of inorganic growth activity of companies. For managers trying to maximize their personal utility instead of their respective companies', acquisitions are regarded as a common instrument to foster firm growth and thus their personal benefits (Trautwein, 1990). Rhoades (1983) and Black (1989) found evidence of managers' personal goals to be a determinant of the inorganic growth activity of companies.

Finally, a company's willingness to diversify its portfolio into new markets is regarded as a determinant of inorganic activity. Although firms in general have the possibility to enter new markets via internal growth, i.e., expanding into new markets based on a firm's own resources, diversification via acquisitions is considered a more opportune instrument. This is based on the potential inadequateness of a firm's own resources to successfully perform in the newly entered markets, whereas an acquired company is believed to already possess the industry-specific resources and capabilities. Empirical evidence of the diversification strategy to be a determinant for a firm's inorganic activity is provided, e.g., by Xia (2007b).

In addition to the underlying factors for acquisitions by companies, academics have identified primarily three reasons for companies to engage in negative inorganic growth, i.e., divestitures, and thus influencing their respective external growth rate. First, companies divest businesses or segments, since they are not the best owner to run the respective assets most efficiently. Second, firms aim to decrease their level of diversification and focus their business to fewer segments to increase overall efficiency. Third, firms sell businesses in order to increase their financial scope and release credit constraints (Schlingemann, Stulz, & Walkling, 2002).

4.2.2 Firm-External Determinants of Inorganic Firm Growth

In addition to firm-internal factors driving inorganic growth, factors external of the firm are as well considered to have an impact on a company's acquisitive growth activity.

First, Andrade, Mitchell, and Stafford (2001) identify industry shocks to be a determinant of the inorganic growth activity of companies within an industry. Deregulation, technological innovations and resulting excess capacities, and supply shortages are examples of industry shocks. Firms' reaction to these industry shocks is often the restructuring of their businesses involving, amongst others, acquisitions and divestitures.

The only well studied example of industry shocks with respect to inorganic activity are deregulation events within an industry. These events open up new opportunities for investment for companies in the specific industry. Furthermore, deregulation potentially eliminates barriers to acquisitions. Consequently, the presence of deregulation events within an industry has been identified to have an impact on the M&A activity and thus inorganic growth of firms of that industry. Empirical evidence was provided, e.g., by Mitchell and Mulherin (1996) and Mulherin and Boone (2000).

Harford (2005) confirms the role of industry shocks as determinants of the overall inorganic activity in an industry. However, according to his results, a prerequisite for industry shocks to be determinants of inorganic activity is the simultaneous presence of sufficient overall capital liquidity in an economy or an industry. Hence, sufficient levels of macro capital liquidity can be regarded as a determinant for acquisitive firm growth themselves. High capital liquidity levels imply relatively low transaction costs for companies with regard to the capital required for investments thus providing an incentive for economic expansion including inorganic activity. The role of overall capital availability in an economy or industry as a determinant of inorganic activity is consistent to the role of surplus cash reserves on the company level as discussed in the previous subchapter.

Furthermore, the valuation levels of stock markets are considered as driving factors of the M&A activity of companies (Golbe & White, 1988). Bull markets accompanied by stock overvaluations incentivize bidders to sell overvalued stocks and buy undervalued assets via acquisitions. Hence, inorganic activity of companies is driven by deviations in stock prices based on mispricing in the market. Empirical evidence for the relationship between inorganic activity and stock market valuations was provided, e.g., by Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2004).

Additional firm-external factors are considered to drive the M&A activity of firms. Research on these determinants however has been limited in the past. These factors comprise, e.g., industry uncertainty defined as stock market volatility, analyst expectations, credit spreads, quality of accounting standards, shareholder protection, and bond yields (Corrao, 2012; Rossi & Volpin, 2004).

5 The Effects of Firm Growth

The previous chapter provided a foundation by elaborating on the first research stream of firm growth and outlining the determinants of and underlying driving factors behind firm growth. As indicated by McKelvie and Wiklund (2010), research within the second research stream of firm growth focusing on the respective outcomes and consequences is comparably limited. Nevertheless, the following chapter focuses and elaborates on this second research stream of firm growth by first describing the general role of firm growth followed by an overview of the performance implications of firm growth in general. Subsequently, the academic literature on the performance effects of each individual firm growth modes is illustrated and, based on this, the research hypotheses for the empirical analysis are derived and introduced.

5.1 The General Role of Firm Growth

Several practitioners, policy-makers, and researchers instantaneously associate firm growth as a major indicator of successful businesses. Financial media frequently praises the fastest growing companies around the globe (Davidsson et al., 2009). Despite this very positive perception towards firm growth, evidence of negative effects of firm growth exists as well (Ramezani, Soenen, & Jung, 2002). In many cases, firm growth is considered as a key indicator for the success of a firm. Firm growth with respect to a company's sales is a major element and objective among top managers (Brush et al., 2000). Asking senior managers about the primary indicators for managing their businesses, the expansion of the company in terms of sales ranks at the top of the list (Hubbard & Bromiley, 1994; Zook & Seidensticker, 2004). In addition to that, Eliasson (1976) identifies most of companies' economic planning procedures to start with the definition of targets for sales. Consistently, companies must define a wide range of targets, with sales growth being one of them, in order to achieve their overall financial goals (R. S. Kaplan & Norton, 1993, 1996b). Additionally, the importance of firm growth for top managers may be based on the relationship between firm growth and executive compensation as well other benefits including prestige. Baumol (1959) and Finkelstein and Hambrick (1989) found evidence for a strong interlink between a firm's size and the compensation level of its executives. In addition to remuneration, managers might benefit from firm growth in terms of higher personal job security (Morck, Shleifer, & Vishny, 1990). Consequently, firm growth may be advantageous to the personal situation of a firm's managers. Finally, firm growth plays a substantial role in economics. Some economists regard firm growth as an essential positive determinant for job creation as firm growth, especially the growth of small companies, is regarded to be one of the major foundations of job creation (Davidsson & Wiklund, 2006). Several academic studies, e.g., Davidsson, Lindmark, and Olofsson (1994) and Dupuy (1997) provided empirical evidence for the positive influence of firm growth on net job creation. However, despite these positive associations with respect to the role of firm growth, it should never be regarded as the sole target of a company. Although firm growth may come along with the potential benefits illustrated, a complete focus on growth neglecting profitability and thus value creation is not a sustainable strategy for companies and may lead to bankruptcy (Davidsson et al., 2009; Fitzsimmons, Steffens, & Douglas, 2005).

Summarized, firm growth and its outcomes are of major relevance to a wide range of interest groups. Additionally, its general role and outcomes have a rather positive connotation among researchers and practitioners. In the following chapters, the performance implications of firm growth in general and its respective growth modes are reviewed in detail.

5.2 The Performance Effect of Firm Growth

Going beyond the general role of firm growth, this thesis aims at analyzing the impact of firm growth and its different modes on firm performance. The academic literature provides a large accumulation of theoretical arguments and empirical evidence relating the growth of a firm in general to its performance level. In the next subchapters, these theoretical considerations and empirical results are exemplified.

5.2.1 Theory Review on the Performance Effect of Firm Growth

Academic research provides a number of theories focusing on the influence of a firm's growth on a firm's performance. Initially, theoretical arguments suggesting a positive effect of firm growth on firm performance are discussed followed by an illustration of theories assuming a negative relation between both parameters.

5.2.1.1 *Positive Theories on the Performance Effect of Firm Growth*

Researchers provide several theoretical arguments linking firm growth positively to firm performance. As a fundamental consideration, a major implication of firm growth is its influence on the survival probability of a company. Business survival, as introduced in chapter 2, is considered as a measure of firm performance among academics as it affects a wide variety of stakeholders comprising shareholders, employees, distributors, suppliers, as well as communities (Bercovitz & Mitchell, 2007). Companies with lower growth and thus smaller in size are considered to have a higher probability of non-survival. Consistent to these theoretical arguments, several studies provide empirical evidence for a respective influence of firm growth and size on the probability of survival of companies. Star and Massel (1981) empirically proved a positive relationship between firm size and thus growth and survival rates of companies. For a sample covering retail companies between 1974 and 1979, the survival rates for companies in clusters with sales less than 240,000 US dollars (USD), between 240,000 USD and 1,200,000 USD, between 1,200,000 USD and 2,400,000 USD, and more than 2,400,000 USD were 31%, 54%, 64%, and 92%, respectively. Hence, firm growth seems to have a positive implication on the survival probability of companies. These results were further confirmed by an analysis of the Small Business Administration (1983) covering the entire population of US companies between 1978 and 1980. Survival rates in this analysis were highest for large companies and lowest for small companies again indicating an incentive for companies to grow and increase their survival probability. Analyzing a similar dataset, Birch (1979) as well found a positive relationship between firm growth as well as size and survival probability. Based on a sample of companies from 1969 and analyzing their survival up to 1976, large companies show the lowest rate of non-survival varying between 16.0% and 33.0% dependent on the firm age. Consistently, the cluster comprising the smallest companies in the sample indicates the highest rate of dissolutions in the period analyzed varying between 50.0% and 63.0% across different firm age clusters. Despite these empirical findings indicating a positive impact of firm growth on survival, Aldrich and Auster (1986) still warn to directly equate survival with firm growth. Still a large number of companies maintaining their size and thus show no signs of growth are able to overcome the respective obstacles and survive. In addition to that, even large businesses still face uncertain futures regarding their survival (Armington & Odle, 1982).

As illustrated, firm growth apparently has a positive influence on firm survival. Starting from firm survival as the most fundamental of firm performance metrics, academic research provides a wide range of reasons for the positive influence of firm growth on firm performance, in particular accounting and market performance (Aldrich & Auster, 1986). In the following, these performance-supporting factors are introduced and discussed in detail.

Among the most prominently discussed advantages of firm growth for firm performance are economies of scale and scope benefiting larger companies. Economies of scale are defined as the resulting reduction in unit cost of distribution or production caused by an increased size of the distributing or producing unit, respectively (Hikino & Chandler, 2009). Consequently, larger firms are able to produce at lower cost per unit than smaller firms resulting in increased profitability and thus provide an incentive to grow in order to increase competitiveness. Additionally, economies of scale provide a barrier to market entry for smaller firms and thus protect these firms from increased competition. Sources of economies of scale are, e.g., specialization, since employees can focus on one instead of several tasks, or the advantages of larger production assets (Boyes & Melvin, 2012). Economies of scope are defined as the ability of companies to produce or distribute a larger range of products due their own capabilities and processes (Hikino & Chandler, 2009). Alternatively, economies of scope are defined as the savings of producing or distributing a range of products in one in comparison to two or more companies (Besanko, Dranove, Shanley, & Schaefer, 2009). E.g., more established, larger firms possess a stronger brand recognition and market acceptance of their products and thus potentially limit smaller firms to differentiate their product portfolio further (Aldrich & Auster, 1986).

Moreover, legitimacy represents another obstacle to performance for smaller, less grown firms (Delmar & Shane, 2004). Before companies earn sufficient returns, various factors, e.g., worker and product safety, requirements arising from environmental protection laws, and other administrative and regulatory boundaries need to be satisfied and thus benefit already established companies (Aldrich & Auster, 1986).

Furthermore, faster growing and thus larger companies embody a competitive threat to smaller companies. Larger, in this case more diversified, firms are able to cross-subsidize between the different industries they act in and thus better conduct competitive actions

(Ferris, Kim, & Kitsabunnarat, 2003). Additionally, more vertically integrated firms can shut down smaller competitors from raw material sources or distribution channels. Finally, smaller firms need to find out the most efficient way of operating, whereas larger firms already benefit from past mistakes providing them a competitive advantage (Aldrich & Auster, 1986).

In addition to the above discussed factors, Bercovitz and Mitchell (2007) identified larger companies to have better access to more internal financial resources. At a given rate of return and providing a flexibility of cash-flow allocation, larger firms have a higher possibility of internal cash reserve accumulation. These cash accumulations support companies in creating a competitive advantage and thus reduce the probability of non-performance (Barney, 1986; Levinthal, 1991). More precise, these competitive advantages arise from spending on marketing and sales or R&D resulting in increased brand equity or superior knowledge, respectively (Hambrick & D'Aveni, 1988).

Moreover and closely related to the previous argument, firm growth increases a company's attractiveness to external investors and thus facilitates external financing. Whereas the access to external capital constitutes a determinant of a company's growth rate as exemplified in the previous chapter, the opposite causality is also considered in certain academic studies. Several studies, e.g., Beck et al. (2005), Schiffer and Weder (2001) and Bercovitz and Mitchell (2007), identified firm growth as being a positive determinant of a company's ability to receive external financing.

Furthermore, larger companies develop routines and thus are able to increase their internal efficiency level (Bercovitz & Mitchell, 2007). More sizable firms are able to frequently employ a range of centrally available managerial and operational routines resulting in continuous refinements and increased efficiency (Hannan & Freeman, 1984; March, 1991). Consistently, greater scale generates more chances for firms to benefit from learning by doing and thus increase productivity (Argote, 1996).

Additionally, larger companies are able to generate stronger external networks (Bercovitz & Mitchell, 2007). The establishment of new relationships is more cost-intensive than the exploitation and deepening of existing relationships (Uzzi, 1996). Since the relationship between sales and the number of relations tends to be non-proportional, the external relationships of larger firms are deeper compared to smaller companies. Additionally, the larger the financial magnitude of a relationship, the higher the mutual interdependence of the parties involved becomes (Bercovitz & Mitchell, 2007). Especially in times of crisis, mutually dependent parties have a higher tendency to continue supporting the corresponding counterparty (Winter, 1998). For instance, key customers may engage in mutual investments with respect to technology to increase the survival likelihood of important suppliers or suppliers might agree to superior volume rebates or lengthen payment cycles to support a related party in times of crisis (Bercovitz & Mitchell, 2007). In conclusion, deep external relations may act as a buffering element for companies in crisis times and help them to absorb economic shocks (Miner, Amburgey, & Stearns, 1990).

Furthermore, a range of less intensive studied positive implications of firm growth on firm performance is discussed in the academic literature. First, companies may benefit from growth by supporting them in the process of corporate renewal or helping them to overcome inertia. Firm growth as a target helps and requires firms to continuously improve their capabilities and resources and in order to maintain a competitive advantage (Pettus, 2001; Robins & Wiersema, 1995). Secondly, firm growth provides benefits to companies with respect to their human resources situation. For instance, Dent (1959) as well as Donaldson (1984) argue firm growth generates attractive positions for promotion for junior management staff. Consequently, firm growth helps companies to retain young management talent more easily. Closely related to the retention of existing management staff, firm growth helps companies to attract exceptional external management talent. Growing firms signal enthusiasm about their future and their attractiveness as an employer and thus gain the attention of external talents (Canals, 2001).

In addition to this large range of arguments positively affecting a wide range of firm performance drivers, corporate finance theory provides a very specific link of growth in a firm's sales to its performance, in particular accounting- and market-based measures (Cho & Pucik, 2005). The direct relationship between sales growth and firm performance refers back to fundamental valuation techniques within corporate finance. Considering firm growth as one of the major driving factors of value creation and thus firm performance is a widely accepted concept in the investment industry (Ramezani et al., 2002). Rappaport (1983) mentioned sales growth to be the major determinant of corporate performance particularly with respect to market-based measures besides the margin on sales, the investment requirements, and the risk characteristics of a company. Similarly, Koller et al. (2010) refer to sales growth as the second main driver of shareholder value next to the expected return on invested capital. Based on the discounted cash flow[12] methodology, the authors define firm value as the result of a company's future cash flows discounted by the corresponding company's cost of capital. Furthermore, a company's future cash flows are determined by the expected return of the capital invested on the one hand and sales growth on the other hand. Assuming a constant growth rate for a company's sales and corresponding net operating profit less adjusted taxes as well as a constant investment rate, a company's cash flow will grow constantly as well thus driving shareholder value and hence market-based performance measures (Koller et al., 2010). Consequently, corporate finance valuation techniques suggest a positive interlink between sales growth and firm performance, market-based measures in particular.

Additionally, a closely related indirect theoretical relation between sales growth and market performance exists. The previously introduced arguments, e.g. economies of scale and scope or first mover advantages, are drivers of a firm's profitability and thus its accounting-based performance. Based on this potential relation between sales growth and profitability, Rappaport (1986) defines profitability, i.e., accounting-based performance of a firm, as a key driver of market value and thus market-based performance measures of a company. Profitability is described as a major underlying driver of a company's cash flow and thus its resulting market valuation (Rappaport, 1986). Thus, a firm's sales growth is first assumed to have a direct impact on a firm's profitability and thus accounting-based performance. Additionally, since profitability is a major driver of a firm's market-based performance, sales growth is additionally assumed to have an indirect effect via accounting-based performance on a firm's market performance (Cho & Pucik, 2005).

Summarized, the growth of firms is associated with a wide variety of potential benefits and positive implications for a firm's performance level among academics. These theoretical arguments support the view of firm growth increasing a company's performance by either establishing a stronger market position or lowering its respective cost base to positively drive performance (Davidsson et al., 2009). Hence and as illustrated, several theoretical considerations of firm growth positively influencing a firm's accounting-based as well as market-based performance exist.

[12] For more detailed information on the discounted cash flow method see, e.g., Brealey, Myers, and Allen (2011) or Brealey, Myers, and Marcus (2011).

5.2.1.2 *Negative Theories on the Performance Effect of Firm Growth*

Whereas the previous subchapter illustrated the theoretical benefits, several academics enlist possible negative effects of firm growth on firm performance (Markman & Gartner, 2002). Despite the dangers arising from a purely growth-oriented focus of a company, an initial drawback of firm growth is the perception of control loss by managers or owners of a company stemming from an increased firm size or the magnitude of the growth rate (Coad, 2009). As a consequence of the increased size of a company potentially implying an increased number of hierarchies and a higher number of employees, the management may feel less well briefed about the current activities and thus may perceive a decreased level of control (Williamson, 1967). Closely related to a potential loss of control by the management is an increase in a firm's internal complexity. Clifford Jr (1975) as well as Covin and Slevin (2000) both refer to a substantial increase in a company's internal complexity as a negative aspect of its growth. Increased internal complexity implies a rise in variety and number of relations between a company's operational tasks. This increase requires companies, in particular their management, to foster change in capabilities, structure, and processes (D. Miller, 1993; Nicholls-Nixon, 2005). However, several companies find it difficult to manage these new requirements caused by an increase in their internal complexity (Mahoney & Pandian, 1992). For instance, growing companies may need to rapidly rent new space, hire additional employees, develop and introduce new reward systems, or acquire new equipment (Markman & Gartner, 2002). Consequently, acting on new needs, dealing with a rise in internal complexity, and implement the necessary changes may result in a sudden and substantial rise in a company's cost base (Covin & Slevin, 2000). Whereas some companies are able to successfully handle these challenges arising from an increase in complexity, others fail (Hambrick & Crozier, 1986).

Furthermore, Coad (2007a) identified certain reasons making larger and thus stronger growing firms less attractive environments compared to smaller companies. Larger firms are regarded as less flexible and less adaptable than smaller companies. Whereas small firms are characterized by dynamism and initiative, routines and bureaucracy may dominate the environment in large companies. Consequently and contrary to the potential benefits, large and growing companies may as well represent a less attractive working environment for their employees. Consistent to this argument, firm growth may result in a change of organizational culture.

Contrarily to the previously illustrated positive firm growth implications suggested by the corporate finance theory, agency theorists mention three arguments for sales growth not always being a positive determinant of a company's performance (Brush et al., 2000). This argument is based on three major premises. First, rather than optimizing the wealth of their firm's shareholders, managers focus on enhancing their own wealth instead (Jensen, 1986). Secondly, incentives for managers exist to grow their firms beyond the optimal amount of sales and thus increase the number of resources they control. This increase in sales also benefits their compensation, since executive compensation is, amongst other parameters, positively linked to sales growth (Murphy, 1985), as previously already introduced. Thirdly, the existence of weak governance mechanisms and free cash flow in a company are two enablers to foster growth in sales without considering the effects on shareholder wealth. Weak corporate governance may result in a misalignment of interests between shareholders and management. The existence of available free cash flow enables managers to conduct investments without external capital and the corresponding surveillance mechanisms of debt or equity markets (Jensen, 1991, 1997). Combining these three arguments, managers may conduct sales growth projects even in case of low expected returns and thus harming a firm's performance level (Jensen, 1986, 1993).

In summary, a number of theoretical considerations of firm growth negatively influencing firm performance among academics exist. However, in comparison the number of positive theoretical aspects of firm growth with respect to firm performance seems to outbalance these negative considerations.

5.2.2 Empiricism Review on the Performance Effect of Firm Growth

Whereas the previous subchapter introduced the theoretical considerations linking firm growth to firm performance, this subchapter reviews the empirical literature on the relationship between both parameters. The review focuses on accounting-based and market-based measures as the major categories of firm performance metrics as exemplified in chapter 2. First, the effects of firm growth on accounting-based performance measures are illustrated followed by the effects on market-based performance metrics.

5.2.2.1 *Empiricism on the Accounting Performance Effect of Firm Growth*

Several academic studies analyzed the effects of firm growth on accounting-based performance metrics. Despite the rather positive notion of theoretical arguments of the implications of firm growth on firm performance, the empirical evidence among researchers is ambiguous as illustrated in the following.

A number of academic studies identified a substantial positive relation between firm growth and profitability. Chandler and Jansen (1992) analyzed the influence of management competence on firm performance and covered the relationship between growth and profitability as a side product of their analysis. By analyzing a sample of 134 companies covering manufacturing as well as service firms from the US, the authors found a significantly positive influence of sales growth on the earnings level of a company (p. 229). Moreover, Woo et al. (1992) identified a positive relation between a company's sales growth rate and its level of profitability defined as ROA. By analyzing 51 cross-industry companies, the study revealed a statistically significant and positive link between sales growth and ROA (p. 441). Consistently, Mendelson (2000) revealed a similar relationship between both variables as a side product of his analysis on the influence of organizational architecture on firm performance. The analysis of a sample covering 63 businesses manufacturing information technology hardware from 1994 to 1995 identified a positive and significant effect of sales growth on firm profitability defined as ROS (p. 522). Furthermore, Cox et al. (2002) confirm these results with an analysis of 672 small and mid-sized companies across industries. Their research indicates a positive and significant effect of growth in sales on the level of a company's profitability (pp. 1-3). Finally, the most comprehensive, although quite dated, analysis of the relationship between firm growth and profitability was conducted by Capon et al. (1990). On the first view, the conducted meta-analysis reveals a positive and significant relationship between growth in sales and profitability (p. 1149). However, the positive relationship between both variables is only significant for cross-industry studies. Studies focusing on individual industries only indicate a negligible and statistically insignificant effect of firm growth on profit levels and thus reveal a potential influence of industry characteristics on the level of a company's profitability (p. 1154).

In addition to the studies supporting a substantially positive and significant relationship between firm growth and profitability, a number of academic papers found only a weak, yet statistically significant influence. In a study covering more than 400 US companies across industries and analyzing the influence of decision speed on firm performance, J. R. Baum and Wally (2003) found a low, statistically significant relation between a firm's sales growth and profitability as a side focus of their analysis. Sales growth was measured as the relative increase in sales for a time frame of four years, whereas profitability was measured as the margin of pretax profit to assets (pp. 1116-1117). Moreover, for a sample of 488 US companies of all size classes, Cho and Pucik (2005) analyzed the relationship between the relative growth in sales and three profitability measures defined as the three-year average of ROA, ROE, and ROI, respectively. Their results indicate positive relationships between firm growth and the three performance metrics, respectively. Of these three coefficients, only the effect of sales growth on ROA is statistically significant questioning the relation between firm growth and ROE as well as ROI (p. 567). Kim, Hoskisson, and Wan (2004) analyzed a sample of 295 publicly traded Japanese companies with annual sales greater than one billion USD. Their analysis reveals a significantly positive link between growth in sales and a firm's profitability measured as ROA (p. 626). Additionally, Peng (2004) confirmed these results for ROE by analyzing 530 public Chinese companies (Peng, 2004, p. 464).

In addition, a number of studies found no significant relationship between firm growth and accounting-based performance measures. Roper (1999) analyzed a sample of 1853 small European companies focusing on the underlying drivers of firm performance. Contrary to the studies previously discussed, his results indicate no significant effect of sales growth on the profitability measured as the ROA of a company. Thus, higher firm growth seems neither to be a positive nor a negative indicator of firm profitability (p. 235). These findings were backed by an additional study of Sexton et al. (2000) analyzing a database of 75,000 firms over a period of four years (pp. 1-2).

Finally, a number of studies identified a negative influence of firm growth on firm accounting indicators and thus support the theories of firm growth drawbacks as previously discussed. For example, Reid (1995) analyzed a sample of 73 small business in Scotland and the respective interdependence of growth in sales and accounting measures. The results indicate a harmful influence of sales growth on a firm's profitability. The study mentions an increasing level of organizational complexity as the main profit-eroding factor of sales growth. According to the author, companies face a trade-off between sales growth and profitability (pp. 93-94). These findings were confirmed by a study of Markman and Gartner (2002). For a sample of 1233 companies and a period of three years, the authors found a negative, yet not significant relation between sales growth and profitability in two of the three years under investigation. The third year of analysis indicated an insignificant and positive relation between both measures (p. 71). However, the authors lack an explanation for their heterogeneous results for the relationship between sales growth and profits.

In conclusion, the current status of empirical studies illustrates a heterogeneous picture of the effects of firm growth in general on accounting-based performance measures ranging from a very positive causality to studies with an even negative relation between both measures. Yet, positive evidence seems to outbalance negative evidence on the effects between both factors.

5.2.2.2 *Empiricism on the Market Performance Effect of Firm Growth*

In addition to accounting performance, several academic studies analyzed the impact of firm growth on market-based performance measures. These studies show rather heterogeneous results and are illustrated in the following.

One the one hand, a number of studies identified a significantly positive relationship between a firm's growth in sales and its market-based measures. Nerlove (1968) analyzed a sample of 371 firms covering the years from 1950 to 1964. The author focused on determining the influence of eight explanatory variables on stock returns for shareholders. Among these eight independent variables under analysis, growth in sales and retention of earnings were identified as the most important driving factors of stock returns. Sales growth was identified as a positive and statistically significant determinant of stockholder returns (pp. 326-327). Similarly, by analyzing a sample comprising data for 354 companies between 1965 and 1969, Stano (1976) found sales growth to be a statistically significant and positive determinant of stockholder returns representing capital gains as well as dividends. Furthermore, Miedich (1980) confirmed a positive and significant influence of growth in sales on stockholder returns in his analysis of 450 US industrial firms. In all nine periods of analysis, the study found a consistently positive and statistically significant relationship. Moreover, the author found no evidence of a negative influence of sales growth on market value even for consistently high-growth firms. These results contradict the agency theoretical arguments of managers conducting value-diminishing investments beyond an optimal point of firm sales (pp. 1-2). Brush et al. (2000) analyzed a sample of more than 800 firms and corresponding 1,570 useable firm observations for the years 1988 to 1995. Their results indicate a significantly positive relationship between a company's growth in sales and stockholder returns. However, the authors as well confirmed a negative influence of available free cash flow on the extent to which sales growth influences market-based measures thus partially confirming agency theoretical arguments (pp. 465-467). Additionally, in their analysis of 672 small and mid-sized companies, Cox et al. (2002) as well found a positive and statistically significant relation between a firm's growth in sales and the corresponding market value of the company (pp. 1-3). Furthermore, Cho and Pucik (2005) found a weakly positive, yet statistically significant, direct relationship between sales growth and the market value of a company. In addition to the confirmation of the direct relationship between both parameters, the authors as well identified statistically significant and weakly positive indirect effects between sales growth and market value via a firm's profitability. However, the results indicate a much stronger influence of profitability on shareholder returns than growth itself (p. 570).

Contrarily, a number of academic studies found sales growth to be not or negatively related to market-based measures of firm performance. By analyzing data of 2,035 companies for the years 1987 to 1997, Zook and Allen (1999) found no or an even negative direct influence of sales growth on a company's TSR. Firms characterized by sales growth were indeed more probable to decrease their market value. Only companies simultaneously growing sales as well as net income were identified to increase shareholder value and thus market-based measures of firm performance (pp. 2-3). Furthermore, S. Smit, Thompson, and Viguerie (2005) found mixed results for the relation between sales growth and total shareholder return. Whereas a large share of firms in their sample indicated a positive relation between both parameters, a substantial number of companies showed no significant increase in shareholder return despite substantial growth in sales (pp. 3-4). Copeland and Dolgoff (2011) found no general relationship between growth in sales and performance in market-based measures. In their analysis of companies across sectors from 1993 to 1997, firm growth is not a statistically significant indicator of higher market performance with respect to the market-to-book ratio of a company. However, the authors distinguish between profitable, measured as return on invested capital minus the cost of capital, and unprofitable sales growth. Whereas companies with profitable sales growth show a high market-based performance, companies with less profitable sales growth show a significantly lower market performance. Consequently, the results of these studies stress the importance of sales growth in combination with profitability and not sales growth as a single driver of market-based performance (pp. 20-21). Thakor (2011) identified a similar relationship between growth in sales and stockholder returns. The author's analysis of the companies in the Standard & Poor's 500 indicated high sales growth rates for the first quartile of companies with respect to TSR. However, for the companies in all three other quartiles of shareholder performance, sales growth has been identical thus questioning the influence of growth in sales on market-based measures. In addition to growth in sales, the author analyzed the level of profitability, defined as return on net assets minus the cost of capital, as well. Companies with high sales growth and simultaneous high profitability delivered the strongest performance with respect to stockholder returns. Contrarily, companies with sales growth on the one hand, but low or negative profitability on the other hand underperformed in terms of market performance again questioning the sole influence of sales growth on market-based measures (pp. 5-6).

In summary, the academic literature provides heterogeneous empirical evidence for the effect of sales growth on market-based measures and thus suggests further research into the performance consequences of firm growth.

5.3 Effect of Firm Growth Modes on Firm Performance

As illustrated in the previous chapter, the current understanding of the effects of firm growth on firm performance is inconsistent across academic studies. Consequently, a more detailed analysis of firm growth and the potential effects on firm performance is necessary. According to McKelvie and Wiklund (2010), a valuable contribution to a deeper understanding of the effects of firm growth on firm performance is to assess, whether the different firm growth modes have a differential impact on firm performance. To start this analysis, the following subchapters review the performance implications of the different firm growth modes introduced in chapter 2 starting with inorganic growth, followed by organic growth and its two sub-modes, i.e., growth via market momentum and growth via changes in market share. Each subchapter follows a consistent structure by first reviewing the theoretical arguments on the potential performance implications followed by empirical evidence. In case of abundance literature, a differentiation between the performance effects on accounting-based measures on the one hand and market-based measures on the other hand is presented.

5.3.1 Effect of Inorganic Firm Growth on Firm Performance

A vast literature in academic research empirically analyzed the performance implications of acquisitions and divestitures for the buying, the target, and the selling company of a transaction, respectively. In the following, the results of these studies are introduced initially focusing on accounting performance effects followed by the effects on market-based measures. Since the focus of this thesis, amongst others, is to assess the effects of strategic inorganic growth decisions of individual companies, the effects for the target company as well as the combined effects, i.e., the combined performance effects for the buying and the target company, are neglected. Instead, the results for the performance effects for the acquiring or divesting company are illustrated in detail.

5.3.1.1 *Effect of Inorganic Firm Growth on Accounting Performance*

Several researchers analyzed the accounting performance implications of inorganic growth activities. These studies compare the accounting-based performance of acquiring and divesting companies before and after the transaction date (Bruner, 2002). Initially, an introduction to the theoretical reasons for the potential accounting-based performance effects of firm-enhancing inorganic growth, i.e., M&A, is provided followed by the respective empirical literature. Subsequently, the theoretical as well as empirical arguments for the effects of negative inorganic growth, i.e., divestitures, on the accounting performance of a firm are illustrated.

Theory supposes diverging implications of M&A on a firm's accounting performance. On the one hand, as previously illustrated in chapter 4, expected synergies stemming from better access to capital, economies of scale and scope, or better managerial control of the acquired assets, as well as first mover advantages are considered to result in a higher accounting performance of the acquiring company. Contrarily, M&A may be an instrument for empire building of managers and thus potentially contributing negative synergies to the acquiring firm (Andrade et al., 2001). Further theoretical arguments of a negative influence of M&A on firm performance are potential risks of post-merger integration arising from, e.g., differences in top-management style or reward systems (Datta, 1991), regulatory actions (Aktas, De Bodt, Levasseur, & Schmitt, 2001), or high costs necessary for the exploitation of the estimated synergies (Denrell, Fang, & Winter, 2003). Consequently, the theoretical foundation for the effects of M&A and thus firm-enlarging inorganic growth on accounting-based performance measures is ambiguous.

In addition to these theoretical considerations, a variety of studies empirically assessed the implications of M&A on the acquiring firms' accounting-performance. A small number of studies found M&A to have a positive effect on accounting-based measures of the acquiring company. Healy, Palepu, and Ruback (1992) found a positive influence of inorganic growth on accounting-based performance measures. Their sample covered the 50 largest mergers in the US in the period from 1979 to mid-1984 and benchmarked the acquirers' performance to the corresponding industry performance. The accounting indicator of analysis was the pre-tax operating cash flow deflated by the sum of net debt book value plus equity market value and was analyzed for a window of five years post the acquisition. The study results show improved and statistically significant, industry-adjusted cash flow returns post-acquisition. This improved accounting performance is not based on decreases in R&D expenses or lower capital expenditures and thus not at the expense of the sample firms' ability to deliver this performance in the long-term according to the authors (pp. 24-29). A couple of years later, Healy, Palepu, and Ruback (1997) updated the analysis of their sample by including acquisition premium costs. The updated analysis indicated a positive, yet insignificant impact of acquisition activity on cash-flow returns (pp. 52-54). Andrade et al. (2001, pp. 115-116) found acquiring firms to experience a statistically significant increase in profitability in the two years post-acquisition. A further study by Ghosh (2001) analyzed a sample of 315 companies and corresponding data for the period of 1981 to 1995. Analogue to the approach of Healy et al. (1992), the author defined the ratio of the operating cash flow to assets excluding the costs of acquisition premiums as the accounting performance indicator. The comparison of the three-year average pre- and post-acquisition performance revealed a positive but insignificant influence of M&A activity on accounting performance. These results are also confirmed via a corresponding industry control sample (p. 163). Further studies finding a positive relationship between M&A and the acquiring firm's accounting performance comprise, e.g., Herman and Lowenstein (1988) and Seth (1990).

Contrarily, a variety of empirical studies found M&A to have a negative impact on acquiring companies' accounting performance metrics. One of the first studies to analyze the accounting effects of acquisitions was conducted by Meeks (1977). For a sample of 233 UK firms covering data from 1964 to 1971, the author compared the change of the acquiring firms' ROA to the change of the corresponding industry ROA following the merger. The results of the analysis imply a statistically significant decline in ROA for the acquiring company in the years after the transaction. The effect is most distinct in year five after the transaction (pp. 25-28). An additional analysis by Mueller (1980) covered data for the years 1962 to 1972 for a sample of 287 companies from seven countries. The author compared the change of the acquirers' profitability measured as ROE, ROA, and ROS, to the change in profitability for comparable, non-acquiring companies. For the majority of observations, this analysis revealed a slight, yet insignificant decline for the three accounting measures of profitability for the acquiring company. In addition, Ravenscraft and Scherer (1987) analyzed a sample of 471 companies for the period between 1950 and 1977. While controlling for the choice of accounting method, industry characteristics, and market shares, the authors found the ROA of acquiring companies to be significantly less than for control firms post the acquisition activity (pp. 150-153). Following the same approach, C. J. Smit and Ward (2007) analyzed a sample of 27 South African large-scale mergers in the years from 2000 until 2002. A comparison of the mean cash-flow return on assets for the two years before and the two years post acquisition shows a slight, yet insignificant decrease in accounting performance. Hence, the authors conclude that M&A does not have neither an improving nor a deteriorating effect on a firm's accounting performance (p. 13). Further individual academic studies indicating a negative effect of M&A on accounting performance comprise, e.g., Salter and Weinhold (1979) or Dickerson, Gibson, and Tsakalotos (1997).

In addition to the illustrated individual studies on the effects of M&A on accounting-based measures of a firm, King, Dalton, Daily, and Covin (2004) conducted a comprehensive meta-analysis of empirical studies on the performance implications of M&A. Their analysis results in a primarily negative effect of M&A on a firm's accounting performance. The one-year post-acquisition effect on ROA was identified as statistically negative, whereas ROA for the three-year post-acquisition window was marginal, but insignificantly positive. The results for ROE as well as ROS were slightly, yet insignificantly negative in both cases for the acquiring firm (p. 192).

Summarized, the effect of M&A on the accounting-based performance of the acquiring company varies from very positive to substantially negative consequences with slightly more evidence for negative implications. Consequently, M&A does not have an abnormally positive effect on the account-based performance of the acquiring firm in the majority of cases (Bruner, 2002). Even more, researchers tend to describe the effect of M&A on the long-term accounting performance, i.e., beyond day one after the acquisition, as either zero or negative thus contradicting theories about expected synergies and gained economies of scale of acquisitions (King et al., 2004).

In contrast to firm-enlarging inorganic growth, i.e., M&A, divestitures show different accounting performance implications. Academics provide a limited number of studies analyzing the accounting performance implications of divestitures. In general, theory suggests an improvement in accounting-based firm performance subsequent to divestitures. This is primarily based on the believe in the elimination of negative synergies (Hanson & Song, 2003). The major underlying reason for the elimination of negative synergies as a consequence of a divestiture relates back to the focus theory. The divested assets may interfere with the selling company's other assets. This is often the case with unrelated assets. By selling off these interfering assets, a company eliminates these negative synergies (Linn & Rozeff, 2006). The elimination of negative synergies arises from a more focused allocation of resources, e.g. management attention, to the remaining core operations (John & Ofek, 1995). Closely related to the sell-off of non-core assets are divestitures of non-performing acquisitions (S. N. Kaplan & Weisbach, 1992) and low performing businesses (Linn & Rozeff, 2006). Similar to non-core assets, both cases increasingly require the engagement of valuable resources from other operational parts of the company and thus decrease overall performance (Hanson & Song, 2003).

Empirically, a limited number of studies analyzed the effects of divestitures on the accounting performance measures of the divesting company. John and Ofek (1995) analyzed a sample of the largest 321 US divestitures between 1986 and 1988. The authors compared the accounting performance, measured threefold as Earnings before interest, taxes, and depreciation (EBITD)/sales, EBITD/book value of assets, and EBITD/book value of debt and market value of equity, of the divesting company in the year of the sell-off to the three years after the divestiture. The authors furthermore compared the changes in accounting performance to changes of the corresponding company's industry performance to control for respective effects. The results of the analysis indicate a positive and significant influence of divestiture activity on the accounting-performance of a company even after controlling for industry effects. The authors conclude that divestitures, i.e., firm-demagnifying inorganic growth, are successful in eliminating negative synergies within firms and thus improve a company's performance (pp. 113-114). Additionally, Gadad and Thomas (2004) analyzed a sample of 74 divesting companies, which are headquartered in the UK and publicly traded. The sample period covers data for the years from 1985 to 1991. The authors found a statistically significant and positive relation between divestiture activity and the three-year post-divestiture accounting performance of companies. The results were controlled for corresponding changes in industry performance and the level of industry competitiveness (pp. 11-14). Consequently, the limited number of studies analyzing the accounting performance effects of divestitures for the parent company indicates a significant and positive increase in performance.

In summary, the literature review on firm-enlarging inorganic growth, i.e., M&A, suggests no significant or even negative changes to a firm's accounting performance. Furthermore, research on divestitures suggests a positive influence of firm-demagnifying inorganic growth on accounting-based performance metrics.

5.3.1.2 *Effect of Inorganic Firm Growth on Market Performance*

In comparison to research on the effects of M&A on accounting-based measures, academic studies of inorganic growth, i.e., M&A and divestitures, on market-based performance measures are more numerous. Analogue to the previous subchapter, the performance effects of M&A are explained at first followed by the performance implications of divestitures. In case of M&A, an illustration of the underlying theoretical arguments is not provided, since these are identical to the reasons provided in the previous subchapter on the effects of M&A on accounting-based firm performance.

Several researchers empirically analyzed the market performance effects of acquisitions for the acquiring company. The mostly used and statistically reliable method to analyze the market effects of acquisitions are event studies around the day of the merger announcement. These studies measure the cumulative abnormal returns (CAR) of the stock price around the acquisition date as an indicator of market value creation or destruction (Andrade et al., 2001). The CAR basically measure the difference between the expected and the actual return of a company's stock[13] (Jensen & Ruback, 1983). The time frame of analysis varies between studies from very short periods, e.g., only the day of the transaction announcement, to long-term periods covering several days or months before and after the announcement (Andrade et al., 2001). Consequently, the respective academic studies can be classified into articles analyzing the short-term performance effects on the one hand and studies focusing on the long-run effects on the other hand.

Studies analyzing the short-term market-based performance implications show particularly ambiguous results. Summarizing the results of individual empirical studies, the effect of M&A on market-based firm performance is at best insignificant or zero (Tuch & O'Sullivan, 2007). A large number of studies found M&A to be significantly and negatively related to the short-term market performance of acquirers. Among the first studies to analyze the market-based performance effects of M&A, Dodd (1980) found evidence for M&A being a significant and negative determinant of acquiring firms' market performance for both, successful and unsuccessful merger offers. The study covered a sample of 126 companies, corresponding data between 1970-77, and an event window for the day before and the day of the merger announcement (p. 136). These results were confirmed for the same event window by the studies of Varaiya and Ferris (1987, pp. 71-73) and Asquith, Bruner, and Mullins (1990, p. 16) for samples of 96 and 343 firms, respectively. In addition, Varaiya and Ferris (1987, p. 64) found the same evidence for an alternative event window comprising the 20 days prior and 80 days after the transaction date. Later on, S. N. Kaplan and Weisbach (1992, pp. 123-124) found the same significantly negative relationship for a sample of 271 US acquisitions and an event window of five days prior and five days after the transaction date. Furthermore, focusing on 64 mergers in the banking industry between 1985 and 1996, Houston, James, and Ryngaert (2001, p. 299) confirm a negative influence of M&A on the short-term market performance of acquiring and

[13] For more detailed information on CAR see, e.g., Strong (1992).

thus inorganically growing companies. Additional studies identifying significantly negative performance implications of M&A comprise, e.g., Jennings and Mazzeo (1991), Byrd and Hickman (1992), and Mitchell and Stafford (2000). In addition to the studies indicating a significantly negative relation, a number of empirical analyses found a negative, yet statistically insignificant influence of M&A on the short-term market performance of an acquiring company. Among those studies are, e.g., Langetieg (1978), Morck et al. (1990), Healy et al. (1992), Andrade et al. (2001), as well as Eckbo and Thorburn (2000) for cross-border acquisitions.

In contrast to these studies, a number of empirical analyses found M&A to be a positive driver of short-term market performance of acquiring companies. Several of these studies found a statistically significant relationship between both parameters. Among the first studies, Bradley, Desai, and Kim (1982, p. 1) analyzed a sample of 161 acquisitions in the period from 1962 to 1980. For their event window comprising the ten days prior and after a transaction date respectively, the analysis reveals M&A to significantly and positively influence the acquiring company's stock performance. Later on, Bradley et al. (1988) extended their analysis to a sample of 236 acquisitions of publicly listed US companies. The study confirmed the results of their previous analysis for an event window covering five days prior and after the transaction date, respectively (p. 11). Furthermore, Jarrell and Poulsen (1989) consistently found positive and significant evidence for the same event window analyzing a sample of 461 acquisitions conducted by publicly listed US firms (p. 16). Moreover, Maquieira, Megginson, and Nail (1998) investigated the market performance effects of 102 acquisitions of public US companies between 1863 and 1996. For a relatively large event window with respect to a short-term focused study of 60 days before as well as after the acquisition, respectively, the authors revealed M&A to be a positive and significant driver of the acquiring firms' short-term stock prices in the case of non-conglomerate, i.e., related, acquisitions (pp. 13-14). Further studies to identify M&A as a positive and significant determinant of the short-term market-based firm performance comprise, e.g., Dodd and Ruback (1977), Bradley (1980), Dennis and McConnell (1986), Leeth and Borg (2000), or Hassan, Patro, Tuckman, and Wang (2007). In addition to the studies indicating a significantly positive relation, a range of empirical analyses identified a positive, yet statistically insignificant influence of M&A on the short-term market performance of acquirers. These studies comprise, e.g., Asquith (1983), Eckbo (1983), and Schwert (1996).

Besides the illustrated individual empirical studies, a small number of summarizing or meta-analytical studies analyzing the short-term market performance effects of M&A exists. In their review of more than ten empirical studies, Jensen and Ruback (1983) overall found acquiring companies to experience a positive and significant short-term development of their respective stock prices (p. 4). Furthermore, Datta, Pinches, and Narayanan (1992) conducted a meta-analysis of 41 empirical studies. The results of this meta-analysis overall reveal M&A to be a positive, yet insignificant driver of the acquiring firm's market performance in the short-run (p. 75). More recently, King et al. (2004) provided a more comprehensive meta-analysis comprising 93 empirical studies under investigation. In comparison to Datta et al. (1992), the authors were able to distinguish between different event windows as part of their meta-analysis. Covering the day of the transaction announcement, the analysis identifies M&A to positively and significantly affect an acquiring firm's market performance. However, moving further beyond the announcement date, the market performance effect becomes less positive resulting in constantly negative and statistically significant performance implications from day 22 post-acquisition onwards (p. 192).

In summary, studies analyzing the short-term effects of M&A on market-based performance measures show controversial results ranging from very positive to very negative relations. Combining the respective empirical results, the short-term market performance implications can be considered to be insignificant (Zollo & Meier, 2008, p. 66).

In addition to the illustrated research articles analyzing the short-term impact of M&A, a less numerous amount of empirical studies investigating the long-term market-based performance effects for acquirers exists. A substantial share of these studies found M&A to have a significantly negative impact on acquirers' market performance in the long-run (Bruner, 2002). Among the first studies, Langetieg (1978) analyzed a sample of 149 acquisitions of public US firms between 1929 and 1969. The results revealed significantly negative CAR for the twelve months after the corresponding acquisition announcement (pp. 375-377). Furthermore, Asquith (1983) found the same evidence for his analysis of 196 acquisitions and the corresponding 240 days post of the transaction date (p. 81). Moreover, Agrawal, Jaffe, and Mandelker (1992) confirmed the significantly negative relation between M&A and an acquiring firm's long-term market performance. Their empirical analysis focused on 765 US mergers and covered a post-transaction window of 60 months (pp. 1610-1612). Additionally, Gregory (1997) found similar evidence by analyzing a sample of 452 acquisitions of public UK companies and a post-transaction period of two years (pp. 984-986). Furthermore, Rau and Vermaelen (1998) found significantly negative three-year post acquisition stock returns for a substantial sample of more than 3,000 mergers of public US companies (pp. 235-239). In addition to these studies, further empirical analyses revealed a negative, however statistically insignificant, relationship between M&A and the long-term market-based performance of acquiring firms. Among these studies are, e.g., Mandelker (1974), Dodd and Ruback (1977), or Malatesta (1983).

In contrast, a relatively small number of studies found M&A to be a positive driver of the long-rum market performance of acquirers. Loughran and Vijh (1997, pp. 1776-1778) as well as Rau and Vermaelen (1998, p. 235) identified a positive and significant relationship between both parameters for tender offers covering post-transaction event windows of five and three years, respectively. Furthermore, Loderer and Martin (1992) as well as Kyei (2010) provide evidence of M&A being a positive, however statistically insignificant, determinant of acquirers' long-run market performance.

Consequently, the overview of empirical studies implies M&A, i.e., acquisitive firm growth, to have a negative long-term influence on a firm's market-based performance measures. This perspective is further supported by the results of the meta-analysis of King et al. (2004). In the long-run, acquisitions are identified to have a significantly negative effect on the stock performance of acquirers (p. 192)

In summary, the effect of M&A on the acquiring firm's market-based performance is at best insignificant. Whereas studies focusing on short-term post-acquisition event windows indicate ambiguous results leading to the implication of M&A being insignificant, studies analyzing the long-term effects imply a rather negative influence of M&A on the market-based performance.

In contrast to acquisitive growth, i.e., M&A, divestitures show different effects on market-based performance measures. However, the number of studies analyzing the performance implications of divestitures is less comprehensive compared to M&A. In addition to the previously introduced elimination of negative synergies and their influence on the long-term accounting-based performance, theory provides two additional reasons for divestitures influencing the market-based performance of firms. First, divestitures reduce the cost of managerial discretion and asymmetric information. Divestitures eliminate information asymmetries regarding the respective assets between managers and shareholders, since the true value of the assets is revealed. Shareholders experience additional benefits, if the freed capital is distributed to shareholders or used for debt down payments. However, these are just one-time beneficial effects and do not improve the firm performance in the long-run (Hanson & Song, 2003). The second additional factor relates back to the efficient deployment argument. According to this argument, divested assets are moved to better uses and thus create higher value by managing these assets more efficiently or combing them with complementary assets. The divesting company gets a share of this added value via effective bargaining (Hite, Owers, & Rogers, 1987). However, this argument again represents only a one-time, short-term effect to the divesting company's shareholders and does not suggest a necessary improvement of firm performance in the long-run (Hanson & Song, 2003).

Besides these theoretical arguments, a number of academic studies empirically assessed the influence of divestures on the market-performance of firms. Although research on this topic provides a large range of outcomes, the majority share of studies empirically found divestitures to be positively linked to these market-based performance measures.

Among the first study to assess the performance effects of divestitures, Miles and Rosenfeld (1983, pp. 1600-1602) analyzed a sample of 92 US companies between 1963 and 1980 and found a significantly positive impact on the divesting company's market performance. However, the statistical significance was only identified for the days before and shortly after the announcement date. Shortly after, Klein (1986) analyzed a sample of 215 divestitures between 1970 and 1979. The results of the study as well indicate a significantly positive influence of divestitures on a firm's market performance. The results however are only significant in the short-run and for cases in which the respective deal value is disclosed (pp. 688-692). Another well-cited study by Mulherin and Boone (2000) covered a sample consisting of 1305 companies across 50 industries and corresponding data for the period from 1990 to 1999. The analysis confirms a significantly positive influence of divestitures in the short-term on the market performance of the selling company (pp. 133-135). Finally, Hanson and Song (2003) found a positive and significant relationship between divestitures and the long-term market performance of the divesting companies. The authors mention the elimination of negative synergies as the major driver behind this effect (pp. 14-17). Additional studies to identify a positive relation between divestiture activity and market-based firm performance are, e.g., Lang, Poulsen, and Stulz (1995), Krishnaswami and Subramaniam (1999), and Linn and Rozeff (2006). Contrary to these studies, Masulis and Korwar (1986) as well as Schill and Zhou (2001) found the relation to be insignificant and negative, respectively. In summary, the majority of empirical research suggests divestitures to have a positive impact on the market-based performance of the divesting company (Owen, Shi, & Yawson, 2010).

Overall, the literature review on the performance implications of inorganic firm growth on market-based measures is rather negative. M&A, i.e., acquisitive firm growth, seems to have an insignificant effect in the short-run and a rather negative impact in the long run on the acquiring firm's market performance. Additionally, divestitures are primarily associated with positive developments of the divesting firm's market-based performance measures.

5.3.2 Effect of Organic Firm Growth on Firm Performance

Whereas the previous subchapter elaborated on the firm performance of inorganic growth, this chapter illustrates the academic literature on the performance implications of organic firm growth. In comparison to the coverage of inorganic growth, in particular M&A, among academic studies, focused and specific research on the performance effects of organic firm growth is rather limited. More precisely, research specifically elaborating on the influence of organic growth on firm performance has been mostly neglected among academic researchers (Aktas et al., 2008). In general, organic firm growth is regarded as a positive phenomenon among researchers and practitioners (D. R. Dalton & Dalton, 2006; McKelvie & Wiklund, 2010).

Theory provides some arguments about the potential effects of organic growth on the performance of firms. In comparison to firm growth via M&A, researchers name a number of reasons for organic growth having a positive impact on firm performance in general. First, organic growth benefits from the familiarity between a firm and its management as well as other employees. The management of a company possesses an extensive knowledge about a firm's asset and resources and the respective interlinks. As a consequence of this deep knowledge, internal growth investments are likely to experience a better and more efficient level of planning and thus yield higher returns than external investments (Hess & Kazanjian, 2006). Additionally, internal growth is supposed to benefit from the compatibility of management styles within an organization. Different management styles characterized, e.g., by differences risk aversion or tolerance for change, may result in conflicts and thus inefficiencies within an organization (Datta, 1991). Compared to acquisitive firm growth, internal growth leverages better rehearsed management teams thus potentially leading to higher returns. Furthermore, organic firm growth is believed to help companies to create superior competitive advantage. This believe is based on a rationale of a higher privacy level of organic growth strategies. Since competitive positions and value-creation processes are developed from a company's inner resources itself, organic growth initiatives are less likely to be imitated or replicated by competitors. This superior ability to create a competitive advantage finally is supposed to result in superior performance (Aktas et al., 2008).

On the contrary, academic theory provides some potential negative implications of organic firm growth potentially harming firm performance. First, organic firm growth is regarded as a slow process, particularly in comparison to acquisitive firm growth. Consequently, organic firm growth slows down companies to react to changes in their market and competitive environment and thus negatively affects firm performance (Levie, 1997; McKelvie, Wiklund, & Davidsson, 2006). Moreover, researchers provide reason for organic growth negatively influencing a firm's ability of future organic growth and thus potentially inferior performance. Organic growth creates the need for a company to either bring in new resources and or use existing resources alternatively resulting in adjustment costs (Penrose, 1995). Furthermore, organic growth is characterized by a firm's decreasing marginal ability to combine its resources and thus create further growth. Firms develop routines within a narrow scope over time (Nelson & Winter, 2009). Particularly managers' business practices are based on improving and correcting the identical actions repeatedly (Winter & Szulanski, 2001). This routine dependence of managers limits companies to use a firm's resources alternatively (Levinthal & March, 1993). Thus, organic growth results in the recurring exploitation of the same resources potentially leading to inertia of a company (Vermeulen & Barkema, 2001). Particularly in an environment characterized by a high level of dynamism, this repeated use of existing resources potentially limits the future organic growth ability (Lockett, Wiklund, Davidsson, & Girma, 2011) and thus the performance potential of companies. However, since the impact of organic growth itself on firm performance is yet to be extensively explored, the effects of a future limitation of organic growth on firm performance are particularly questionable.

In summary, academic theory provides arguments implying positive as well as negative performance implications of organic firm growth. However, positive theoretical performance effects from organic growth seem to outbalance its potential drawbacks. Additionally, as illustrated, researchers in particular assign organic firm growth some advantages over inorganic growth as the second major mode of firm growth.

As previously mentioned, organic firm growth is often viewed as a positive determinant of firm performance by researchers and practitioners (D. R. Dalton & Dalton, 2006; McKelvie & Wiklund, 2010). However, the number of studies to empirically and comprehensively assess the relationship between organic firm growth in total and firm performance is substantially limited to our knowledge. Meer (2005) analyzed a sample of 107 companies purely focusing on organic growth, i.e., firms that did not engage in inorganic growth via M&A. Firms with high organic growth rates showed substantial superior market-based performance as measured by TSR (p. 13). In addition, Kling, Ghobadian, and O'Regan (2009) conducted a case-based analysis of three large-scale insurance companies and their growth strategies. The authors isolated the respective organic growth share of the three companies and assessed the impact on firm performance. For this limited sample, the authors found organic growth to be a positive driver of market-based firm performance in the long run. The authors however stressed the potentially limited representation of the study due to the small number of firms under analysis (pp. 281-282). Furthermore, Davidsson et al. (2009) analyzed a sample of more than 3,000 small Australian and Swedish firms. Since the firm sample solely focuses on small companies, the hypothesis of the analyzed firm growth being achieved organically can be made. Contrarily, the results of the study imply high organic firm growth to have a negative impact on financial performance measured in terms of profitability in the following years (pp. 396-397). Two further studies empirically assess the effect of organic firm growth on firm performance. However, both studies focus on metrics different from sales growth as an indicator of firm growth. Xia (2007a) applies the growth in assets as the corresponding indicator to measure firm growth. Analyzing more than 1,500 companies, the results imply a significantly positive relationship between organic growth in a firm’s asset base and its accounting-based as well as market-based performance (p. 18). Furthermore, Aktas et al. (2008) use the growth in employment as their firm growth indicator. Their results suggest a positive influence of organic employment growth on market-based performance in the short-run and accounting performance in the long-run (Aktas et al., 2008, pp. 25-26).

In summary, the empirical studies assessing the impact of organic firm growth on firm performance give a tendency for a positive relationship between both parameters. These empirical findings are consistent with the initially illustrated theoretical arguments considering the potential performance implications of organic growth. Nevertheless, the number and comprehensiveness of these empirical analyses is, to our knowledge, substantially limited. As illustrated in chapter 2, a more fine-grained detailing of organic growth into market share gain or loss and growth from market momentum is possible. In order to better understand the impact of these two sub-modes of organic growth, a review of the academic literature on the firm performance implications of these two growth modes is provided in the subsequent subchapters.

5.3.2.1 *Effect of Market Momentum on Firm Performance*

As introduced in chapter two, market momentum as part of organic firm growth stems from the market growth of a firm's portfolio of markets or segments, respectively, it decides to compete in. Hence, a firm's market momentum growth equals the weighted growth rate of the markets or segments a firm is active in. As furthermore illustrated in chapter four, industry or market growth is regarded as a major determinant of a firm's growth. Additionally, the market momentum of firm growth is closely linked to a firm's corporate strategy, since the corporate strategy defines a firm's selection of markets or segments to compete in. Consequently, in order to derive a perspective on the potential effects of a firm's growth from market momentum on its performance, the academic literature on the effects of the industry per se and an industry's growth in particular on firm performance is reviewed. Initially, theoretical arguments are illustrated followed by an overview of the results of empirical studies.

To start with a comprehensive and broad scope from a theoretical perspective, a number of arguments suggest industry-level factors to influence the performance of companies (Short, McKelvie, Ketchen, & Chandler, 2009). A long tradition of academic studies within the field of industrial organization focuses on structural industry or market characteristics and their respective influence on the performance of individual companies. Researchers within the field of industrial economics relate the performance of a firm mainly to its industry or segment membership (Mauri & Michaels, 1998). Having its seeds in the works of Mason (1939) and Bain (1956), the economics-based structure-conduct-performance (SCP) framework represents a key theoretical contribution to this field of study[14]. According to the traditional SCP framework, elementary technical and economic circumstances define the structure of an industry. The primary factors characterizing the structure of an industry in the traditional view comprised entry barriers, the product differentiation level, the number of sellers and buyers, the concentration level of the industry, or the degree of vertical integration. This resulting structure of an industry is believed to influence the conduct of companies. A firm's conduct consists of its decisions regarding R&D, investments, legal tactics, marketing activities, pricing, or product offerings (Faulkner & Campbell, 2006). Consequently, conduct refers to the strategy applied by companies within the industry (Lipczynski & Wilson, 2004). These strategic choices contribute to the performance of companies, traditionally defined as the level of profitability in the industry (Faulkner & Campbell, 2006). Based on the influence of industry structure on conduct and furthermore conduct on performance, the traditional SCP view described a direct relation between industry structure and its influence on performance, since conduct was considered as a reflection of the industry structure (Faulkner, 2002). Based on this, primarily Porter (1981) enhanced the traditional framework and adapted it from a more economic-based orientation to a stronger focus on business strategy. A major advancement was the renunciation from the one-directed and deterministic traditional approach. Porter introduced potential back-coupling effects from performance and conduct influencing the industry structure (Scherer & Ross, 1990). This theoretical advancement requires companies to analyze their competitive environment in addition to their overall strategic environment (Faulkner & Campbell, 2006). Despite the introduction of the importance of the competitive environment, researchers still stressed the importance of industry characteristics as drivers of firm performance (McGahan & Porter, 1997). Since the publication of the traditional SCP framework, researchers further detailed the existing and introduced additional characteristics of the industry structure potentially influencing

[14] For more detailed information on the SCP framework see, e.g., Schmalensee (1989).

firm performance. These additional characteristics comprise, e.g., the industry asset utilization level, the industry imports and exports, the advertising intensity, the degree of employee unionization, or the industry or market growth rate (Buzzell & Gale, 1987; Choi & Weiss, 2005; C. M. Grimm, Lee, & Smith, 2006; Ravenscraft, 1983) as the focus variable of firm growth via market momentum in this thesis.

In addition to the more comprehensive considerations of industry attributes in general driving performance, academics mention a number of specific theoretical arguments for the rate of industry or market growth being a determinant of firm performance. First, high growth markets may constitute a highly dynamic environment for firms characterized by multiple opportunities for performance improvements for individual companies. Market growth is a key element of market attractiveness for companies of all sizes (McDougall et al., 1994). These opportunities may arise from certain characteristics of high growth markets, e.g., a higher level of buyer spending or an increase in productivity (Buzzell & Gale, 1987). Consistently, researchers found opportunities for companies in an industry to be more numerous in the presence of strongly increasing demand and thus market growth (Hambrick & Lei, 1985; Hofer, 1975). Secondly, a higher industry growth rate results in less rivalry among the companies in the respective industry positively affecting firm performance. In industries characterized by high growth, firms are less likely to be immediately affected by competitive actions, since every company benefits from the increase in the market size. Hence, competitive response time is higher in high growth industries positively impacting performance (C. M. Grimm et al., 2006). Thirdly, high growth markets allow companies to be less competitive with respect to their pricing strategy. Higher price levels positively affect the performance of the respective companies. However, this argument only holds true in case of high entry barriers keeping further competitors out of the market (Choi & Weiss, 2005). The second and third argument are consistent with the view of Porter (1980), who defines the likelihood of competitive reactions of incumbent firms and entry barriers as the primary factors to define the favorability of an industry to company performance. According to his work, the likelihood of strong competitive reactions is determined by a small number of elements of an industry with slow market growth being one of them. Reversely, high growth industries are less likely to be characterized by strong competitive reactions and thus higher firm performance. This argument still holds in in case of new market entrants. High market growth enables companies to still sustain a strong performance even if new firms in the market take market share. Additionally, industry growth is among the key criteria for investors to evaluate investments in ventures (MacMillan, Siegel, & Narasimha, 1986). In contrast to these potentially positive arguments, industry growth may have an undesirable effect on firm performance. As illustrated, industry growth acts as an indicator of attractiveness to companies. In case of low entry barriers, firms outside of the market might enter and thus increase the level of competition resulting in lower individual firm performance (Berry-Stölzle, Weiss, & Wende, 2011; Choi & Weiss, 2005). However, in summary academic theory provides arguments for an influence of industry or market growth on firm performance. The majority of these arguments hypothesize a positive effect of industry growth on firm performance.

Empirically, the effects of industry characteristics in general and industry or market growth in particular on firm performance have been analyzed by a number of academic studies. The majority of studies analyzing the effects of industry in general on firm performance focuses on decomposing performance into industry-specific and firm-specific effects (Caloghirou, Protogerou, Spanos, & Papagiannakis, 2004). Overall, although the magnitude and the relative importance in comparison to firm-specific effects as well as the analyzed variables are varying, all studies empirically confirmed an influence of the industry or market a firm competes in on its respective performance (Goddard, Tavakoli, & Wilson, 2009; Ravenscraft, 1983). The academically most acknowledged studies within this field of research comprise, e.g., Schmalensee (1985), Hansen and Wernerfelt (1989), Rumelt (1991), McGahan and Porter (1997), and Hawawini, Subramanian, and Verdin (2003). A detailed literature review by Goddard et al. (2009) identifies industry characteristics to account between one and 29 percent of firm performance comprising accounting-based as well as market-based measures. However, as exemplified, these studies analyze a wide range of industry attributes.

In addition to the studies analyzing the effect of industry characteristics in general, several academic studies analyze the influence of industry or market growth, as the driving factor of firm growth from market momentum, on firm performance. The majority of empirical studies found industry growth to be positively related to firm performance. Among the first studies to analyze the impact of industry growth on firm performance, Gutmann (1964) examined a sample of 53 successful, defined in terms of growth in sales, profits, and profits per share, US manufacturing firms. Although the study does not provide information about the underlying empirical method applied and potential reasons, the author particularly mentions the selection of high-growth markets and submarkets as key success factors of these high-performing companies (pp. 31-32, 36) and thus indirectly establishes a positive relation between market growth and firm performance. Bass, Cattin, and Wittink (1978) examined a sample of 63 cosmetic, food, and tobacco firms and data for the years 1957, 1963, and 1970. Their results indicate a significantly positive influence of industry growth on individual firm performance defined as the ratio of the five-year average net income to shareholders' equity in case of the fully constrained model. The partially constrained model as an effort to solve the problem of heterogeneity still revealed a positive, yet statistically insignificant relationship between both parameters. The authors regarded these results as a confirmation of the arguments provided by the industrial organization theory (pp. 5-7). Moreover, Ravenscraft (1983) analyzed a sample of 3,186 business lines of US manufacturing businesses and corresponding data of 1975. Out of 23 independent variables, industry growth was identified as the second most important driver of operating profit with a significantly positive impact (pp. 25-26). Furthermore, C. A. Montgomery (1985) confirmed these results. In her study of 128 of the Fortune 500 companies, the growth rate of the industry a company competes in showed a significantly positive effect on the company's return on invested capital (ROIC) (pp. 793-794). Additionally, in an frequently-cited study analyzing the Profit Impact of Market Strategy (PIMS) database, Buzzell and Gale (1987) found a statistically positive influence of market growth on firm performance defined as Return on Investment (ROI) as well as ROS. Their sample comprised 2,600 firms across all industries (pp. 45-47). In their comprehensive meta-analysis regarding the determinants of firm performance, Capon et al. (1990) found a significantly positive relation between both parameters in the 59 studies under review analyzing market growth as a determinant of a firm's performance (p. 1149). Furthermore, Brush et al. (2000) found market growth to have an ambiguous effect on firm performance in their analysis of 1,570 firm year data points across eight years. Whereas industry growth has shown a significantly positive effect on stockholder returns, the influence on a firm's ROA was negative, but insignificant. Delios and Beamish (2001) analyzed 399 multinational Japanese firms and confirmed a statistically positive effect of industry growth on firm performance defined as a composite indicator of accounting-based measures comprising ROS, ROE, and ROA. Caloghirou et al. (2004) analyzed a sample of 267 Greek manufacturing companies and data from 1999. Whereas their results show a significant and positive influence of industry growth on firm profitability for large companies, the results for small companies, defined as companies firms with less than 250 employees, were insignificant (pp. 234-236). Further studies identifying industry growth to be a positive determinant of firm performance, some particularly focusing on smaller firms, comprise, e.g., Gale (1972), Biggadike (1979), Lumpkin and Dess (1996), and Park, Li, and David (2006).

Contrarily, a small number of studies found market growth to have an insignificant or negative influence on firm performance. In an analysis of 97 US food manufacturing companies, J. A. Dalton and Penn (1976) identified a negative, but statistically insignificant relationship between market growth and ROE (pp. 137-139). Additional studies focusing on small business ventures found the relationship between industry growth and firm performance to be negative. Stuart and Abetti (1987) examined a sample of 24 technical start-up ventures. The authors found ventures active in markets characterized by slow growth rates to experience a higher performance (p. 215). Furthermore, Tsai, MacMillan, and Low (1991) analyzed sample of 161 small business and identified market growth to have a negative, but insignificant effect on ROI.

In conclusion, academic theory as well as empirical studies consistently establish a positive relationship between the growth rate of a market a firm competes in and its respective performance. Empirical studies identifying a negative relationship between both parameters had insignificant results and focused on small business ventures in particular.

5.3.2.2 *Effect of Market Share Gain on Firm Performance*

As introduced in chapter two, firm growth via changes in market share represents the second sub-mode of organic firm growth next to growth from market momentum. Analogue to the previous subchapters elaborating on the other modes of firm growth, i.e., inorganic growth, organic growth, and market momentum growth, this subchapter focuses on the performance effects of firm growth via changes in market share. First, the literature on the theoretical background is illustrated followed by corresponding empirical studies on the relationship of market share and firm performance.

From a theoretical perspective, a number of academic studies provide arguments for a general relationship between a firm's market share or gain in market share and its performance (Brush et al., 2000). As previously illustrated in chapter four, a firm's growth is, amongst others, determined by a large range of its internal resources, e.g., the management team, R&D skills, advertising skills, and financial capital, and the particular usage of these resources. Analogue to firm growth via market momentum and its relation to the industrial economic research, firm growth via market share gain relates back to a theoretical research stream in management, the resource-based view (RBV) of the firm. The RBV is based on the definition of a firm as a compilation of resources. This compilation of resources and their respective usage are believed to impact the performance of a firm (Barney, 2001; Wernerfelt, 1984)[15]. Contrary to the industrial economics theory, the RBV believes firm performance to be primarily dependent on firm-internal resources rather than environmental factors, i.e., the industry and the competitive environment (Mauri & Michaels, 1998). Furthermore, the RBV believes a firm's major resources to be the major determinant of its market share (C. A. Montgomery & Wernerfelt, 1991). Since market share, from a theoretical perspective, is determined by a firm's resources, an illustration of the theoretical relationship between these resources and their performance effect is valuable in the context of this thesis. According to the RBV, the central element causing differences in performance among firms are a firm's characteristics and their ability to produce essential resources difficult to copy by competitors (Barney, 1986; Peteraf, 1993; Wernerfelt, 1984). These essential resources are developed firm-internally (Dierickx & Cool, 1989) and cannot be externally acquired, since the benefits of these resources would be fully reflected in the market prize (Barney, 1986). Core sources of difficult-to-copy resources are, e.g., management teams dedicated to irreversible strategies (Ghemawat, 1991) or continued investments (Barney, 1986). These core or essential resources generate features, which protect a firm's competitive advantage against forms of imitation by competitors (Lippman & Rumelt, 1982; Reed & DeFillippi, 1990). Consequently, the heterogeneity of resources results in performance differences among competing firms ac-

[15] For more detailed information on the RBV see, e.g., Wernerfelt (1995).

cording to the RBV of the firm (Mauri & Michaels, 1998). Hence, as an interim conclusion, academic theory suggests firm-internal resources, as the major underlying driver of a firm's market share, to have an impact on the corresponding firm's performance.

As illustrated, firm-internal resources are regarded as the primary driver of a firm's market share (C. A. Montgomery & Wernerfelt, 1991). In addition to the more basic theoretical relationship between firm-internal resources and performance, researchers provide theoretical arguments specifically for the relationship between a firm's market share and its performance. Several of these studies establish market share as a positive driver of firm performance in theory. Researchers closely linked to the PIMS database refer to four potential factors for market share being a positive determinant of firm performance (Buzzell & Gale, 1987). First, firms with higher market shares benefit from economies of scale across varying functions including marketing, R&D, manufacturing, and procurement and thus an increase in firm performance (Buzzell, Gale, & Sultan, 1975). These economies of scale are the most direct factor linking a firm's market share to its performance (Buzzell & Gale, 1987). The argument is closely linked to the experience curve developed by the Boston Consulting Group. The concept hypothesizes a constant decline of cost per unit for each duplication in output volume resulting in higher firm performance (Buzzell et al., 1975). Secondly, firms with large market shares are able to be part of an oligopolistic market group and jointly limit output. By jointly limiting the output of the industry, the participating firms are able to increase the overall price level and hence increase their performance (Gale, 1972). Thirdly, firms with high market shares benefit from high bargaining powers towards their suppliers and competitors. Fourthly, firms with high market shares benefit from risk-averse customers, since these prefer a product from high market share companies to a product from low market share companies. This may result from positive network externalities or increased brand recognition (Hellofs & Jacobson, 1999). This fact enables companies with high market shares to sell higher volumes or sell at higher price levels thus increasing performance (Buzzell & Gale, 1987).

In contrast to these positive theories about market share and firm performance, some academics provide a number of potential performance drawbacks of market share for firms. Some researchers question the positive causality between market share and firm performance in the first place. Since some academics doubt the potential positive effects from scale economies (Scherer & Ross, 1990) and market power (Gale & Branch, 1982), the relationship between a firm's market share and its performance level may not be causal.

Instead, a third factor, e.g., the quality of the management team, influences both parameters simultaneously. Hence, these researchers regard the effect of market share on firm performance as potentially insignificant (Jacobson & Aaker, 1985). In addition to the general challenge of the causality between market share and performance, higher market share may result in a decrease of a product's perceived quality by consumers based on negative network externalities. Large market shares may overburden limited resources and thus decrease perceived quality by customers (Hellofs & Jacobson, 1999). Additionally, customers may regard a large market share as an indication of missing exclusivity of a certain product or service and thus a lower level of quality (Porter, 1980). Hence, firms may target a low market share in order to keep the status or prestige of their offerings high (Hellofs & Jacobson, 1999). Consequently, market share may result in a deterioration of firm performance. Furthermore, regulatory changes are another potentially performance harming aspect of a high market share. Regulatory bodies may consider intervening in an industry or market, in case one or more firms achieve too high market shares resulting in suffering of several small companies and drawbacks for the customers. The regulatory bodies hence may install regulations shifting rents from higher market share companies to lower share companies in the market and thus decreasing performance of high market share firms (Fruhan, 1972). In addition to the regulatory bodies, consumer advocate groups are a potential risk to high market share companies. A larger market share results in higher visibility in the public. Consumer advocate groups may use this higher publicity and preferably make these companies the target of their demonstrations, complaints, and most importantly lawsuits. These actions may lock-up resources or result in costly litigation driving down a company's performance level (Bloom & Kotler, 1975). Additionally, companies focusing on maximizing their market share and realizing the potential benefits, e.g., a reduction in unit costs due to economies of scale, may experience a reduction in their ability to innovate and react to innovations by competitors. Firms in this case may lose flexibility and capability for innovation, since the focus is primarily on market share increase and hence limits a firm's ability, e.g., due to its fixed cost structures or investments in manufacturing technology, to innovate and make strategic changes finally resulting in performance deterioration (Abernathy & Wayne, 1974). Moreover, as previously illustrated, market share can be defined as a measure of organizational success. In case a firm outperforms its aspired market share level, firms potentially develop a state of complacency resulting in lower degree of competitiveness and performance (Boulding

& Staelin, 1993). Further and less intensely studied factors with potentially performance harming implications are an increase in a company's market-specific risk as well as a rise in exposure to systematic risk (Uslay, Altintig, & Winsor, 2010). Additionally, high market share companies face a risk in mature industries. In case of decreasing demand, high market share companies, e.g., bear the disadvantage of excess capacity and respective costs driving down relative performance (Rainey, 2010). In addition to as well as closely related to the studies analyzing the relationship between market share and firm performance, other studies focus on assessing the influence of growth in market share on performance measures. These studies analyze, if the cost to gain additional market share are justified in comparison to the potential benefits. However, the academic literature concentrating on the performance implications of market share growth instead of market share is substantially limited (Brush et al., 2000). From a theoretical perspective, Rumelt and Wensley (1981) question the ability of market share gains, i.e., firm growth via increase in a firm's market share, to positively affect a firm's performance level. In case of equilibrium, in this case defined as a situation not considering unexploited profit opportunities, the authors expect additional market share to have a price equaling its fair market value. Consequently, the costs for investments by companies in additional market share gain equal the expected gains from it in the long run. This is based on the fact of intense competition for the asset of market share by firms of the same industry zeroing returns (C. A. Montgomery & Wernerfelt, 1991). Furthermore, an increase in market share may require firms to attract new customers, which initially are loyal to other competitors or brands. The attraction of these loyal customers involves high acquisition costs, which may go beyond their corresponding customer lifetime value. Thus, an acquisition of these customers and an increase in market share results in a performance decline of the company (Bloom & Kotler, 1975).

Summarized, academic theory emanates from a positive influence of market share or market share gain on firm performance. However, as illustrated, a substantial number of theoretical arguments questioning this causality among researchers exist.

In addition to theoretical contributions, several academic studies empirically analyzed the influence of the firm-internal resources as well as market share on a firm's performance. Analogue to the firm performance implications of industry effects, studies analyzing the performance contribution of firm resources focus on decomposing performance into industry-specific and firm-specific effects (Caloghirou et al., 2004). Overall, it can be noted that firm-internal effects do have an impact on firm performance (Goddard et al., 2009). Analogue to industry effects, the most accredited academic studies analyzing the respective relationship between firm effects and firm performance comprise, e.g., Schmalensee (1985), Hansen and Wernerfelt (1989), Rumelt (1991), McGahan and Porter (1997), and Hawawini et al. (2003). The studies focusing on this research field identify firm-internal effects to be responsible for magnitudes between one and 66 percent of a firm's performance (Goddard et al., 2009).

In addition to these studies, a large body of research specifically conducted empirical analyses of the relationship between market share and firm performance. Correspondent to the theoretical arguments, the findings of these empirical studies are heterogeneous. A number of studies, primarily based on the PIMS database, found market share to be a positive driver of firm performance. Among the first empirical analysis, Gale (1972) assessed a sample of US 106 companies and corresponding data for the years 1963 until 1967. The results indicate a significantly positive influence of market share on firm performance defined as the five-year average ROE. The positive effect is relatively stronger in case of large firms and moderate industry growth. In addition, W. G. Shepherd (1972) analyzed a sample of 231 US manufacturing companies from 1956 to 1969. A firm's performance defined as ROE is positive and highly significant with respect to its market share according to the results of the study. The results are confirmed for every subsample varying in time frame and focus industry of the analysis (pp. 29-32). In her analysis of 128 of the Fortune 500 companies, C. A. Montgomery (1985) as well found market share highly significant and positively related to a firm's ROIC. Market share was identified as the second-strongest driver of firm performance after the level of industry profitability within the analysis (p. 1985). In one of the most-cited studies of this research field, Buzzell and Gale (1987) found a strong relation between market share and profitability defined as ROI. The database comprises data of more than 2,600 firms. The analysis reveals market share leaders to have ROIs three times higher than companies with the fifth highest market share in a market or worse (Buzzell & Gale, 1987, pp. 34, 72-75). The results of market share being a significant driver of firm performance were as well confirmed in the meta-analyses of Capon et al. (1990, p. 1149) as well as Szymanski, Bharadwaj, and Varadarajan (1993, pp. 10-12). Ailawadi, Farris, and Parry (1999) as well found a significantly positive influence of market share on firm profitability in their analysis. The authors found the purchasing costs to sales ratio to be the most important profitability driver for high market share firms. Thus, only firms with the ability to exploit opportunities resulting from a high market share position to lower procurement costs show higher levels of profitability (pp. 20, 32). Further empirical analyses confirming a positive relationship between a firm's market share and its performance comprise, e.g., Buzzell et al. (1975), J. A. Dalton and Penn (1976), and Hildebrandt and Buzzell (1991).

In contrast, a number of empirical studies found market share and market share gains to be insignificant or negatively related to firm performance. In their analysis of 1,200 business lines of the PIMS database, Rumelt and Wensley (1981) found market share gains over a period of four years to have no significant effect on firm performance defined as ROI. According to the authors, market share has no inherent value and its importance to firm performance thus has been exaggerated in previous studies (pp. 4-6). Woo and Cooper (1981) analyzed 649 business lines of US manufacturing companies and corresponding data from 1972 to 1975. The authors identified a substantial number of low market share firms in their sample with a strong performance and thus indirectly contradict a positive relationship between market share and performance. The high performing low market share companies were identified to operate in specific market environments characterized by only sporadic product changes and slow real growth rates (pp. 308, 314). Additionally, Boulding and Staelin (1990) analyzed a sample of 340 business units and 3,250 corresponding annual data sets. The authors estimate the effect of market share on firm performance defined as revenue and costs as the underlying drivers of firm profitability. The results contradict previous findings and do not per se indicate a positive relationship between market share and firm performance. Higher market share is not found to be related to bargaining power over customers or suppliers as well as price setting power. The authors found companies to benefit from higher market shares operating in favorable market environments characterized by low competition and high entry threats (pp. 1172-1175). In their often cited study covering six US brewing companies from 1969 to 1979, C. A. Montgomery and Wernerfelt (1991) found gains in market share to have a significantly negative impact on firm performance defined as TSR. The authors conclude that companies fight too aggressively for market share resulting in a destruction of firm value within the period of study (pp. 957-958). Furthermore, Schwalbach (1991) found no general support for a positive relationship between market share and firm performance defined as ROI. Based on an analysis of 2,744 business units, the author rejects the previously identified linear relationship between both parameters. In the analysis, large market share businesses were not per se more profitable. Particularly business units with very high market shares were characterized by a lower level of profitability (p. 306). Moreover, Boulding and Staelin (1993) highly restrict the effect of market share on firm performance depending on a range of factors. By analyzing data for 1,736 business units and corresponding data from 1970 to 1987, the authors found market share to have a positive impact on cost performance only under certain market conditions. Beyond that, the authors found a too high market share to have a negative impact on cost performance, e.g., as a result of less motivation and focus on performance. Consequently, market share can even be harming a firm's performance level (pp. 161-163). Armstrong and Collopy (1996) assessed a sample of 20 US companies. Their empirical results show a significantly negative relationship between increases in a firm's market share and its performance defined as ROI (Armstrong & Collopy, 1996, pp. 18-19). Slade (2004) finds no systematic connection between a firm's market share and its profitability. Her results indicate market share to not be a driving factor of firm performance with small market share firms being as profitable as high market share firms (pp. 304-207).

In summary, consistent to the theoretical arguments, empirical analysis finds heterogeneous evidence for the relationship between market share and its effects on firm performance. It can be stated that there is no conclusive perspective on the relationship between these two parameters (Uslay et al., 2010). Overall, the performance effects of market share gains can be assumed to be insignificant or slightly positive under certain circumstances.

5.4 Derivation of Research Hypotheses for Empirical Analysis

The previous subchapters illustrated the different modes of firm growth and the respective theoretical arguments as well as empirical findings with respect to their effects on firm performance. Research on the firm performance implications of the different firm growth modes is substantially limited and would be of extreme importance to the second research stream of firm growth focusing on its corresponding outcomes (McKelvie & Wiklund, 2010). Based on this, the analysis presented in this dissertation contributes a number of new aspects to the research on firm growth and the outcomes of firm growth modes in particular as followed:

- First, the analysis decomposes firm growth into organic and inorganic growth based on a firm's sales. Whereas previous studies distinguishing between organic and inorganic growth used growth in a company's employees (Aktas et al., 2008) or growth in a company's asset base (Xia, 2007a) as the underlying firm growth metric, this analysis focuses on firm growth with respect to sales as the dominant firm growth metric among researchers and practitioners as illustrated in chapter 2. Hence, this dissertation is the, to our knowledge, first academic study to integratively analyze the effects of organic and inorganic firm growth with respect to sales.
- In addition to distinguishing between organic and inorganic growth, this analysis further decomposes organic sales growth into its two different sub-modes, growth via market momentum and growth via market share gains, and thus provides new research insights by analyzing the respective performance effects. This differentiation between growth from market momentum and growth via market share gains is enabled by access to historical market data on all segments of the chemical industry as the industry in focus of the empirical analysis.
- Moreover, whereas previous research on performance implications of firm growth often focused on small firms, e.g., Roper (1999), Cox et al. (2002), or Davidsson et al. (2009), this analysis focuses on a sample of large, multi-national firms. Since the prioritization of growth modes are believed to differ between small and large firms, e.g., large firms are believed to show a higher level of inorganic growth activity (Penrose, 1995), this analysis provides a new, large-firm-perspective on the outcomes of firm growth and its growth modes.
- Additionally, as referred to by Weinzimmer et al. (1998) as a valuable research contribution, this analysis focuses not only on a large time frame of firm growth as, e.g., Aktas et al. (2008), but applies a year-over-year firm growth decomposition perspective enabling a panel regression analysis of the performance effects of firm growth modes.

Summarized, this dissertation provides a number of new contributions to the research on the performance implications of firm growth. In order to define the research hypotheses to be tested in the empirical analysis, the performance effects of the individual firm growth modes can be summarized as following.

Despite the general positive perception of firm growth, theory and empirical analysis provide a mixed picture of the corresponding firm performance implications. In order to further understand these varying performance outcomes of firm growth, a breakdown of firm growth into different growth modes may provide further insights. As illustrated in subchapter 5.3.1, the firm performance effects of inorganic firm growth are on average at best zero. Contrarily, although research is yet limited, organic firm growth is believed to have on average a positive impact on firm performance as illustrated in subchapter 5.3.2. This is further supported by the performance implications of the two sub-modes of organic firm growth, growth via market momentum and growth via market share change. The performance effects of firm growth stemming from market momentum growth are almost exclusively believed to be positive as illustrated in subchapter 5.3.2.1. Performance effects from market share gains are ranging between insignificance and slightly positive as presented in subchapter 5.3.2.2. Nevertheless, the combination of both effects of these sub-modes suggests a positive impact of organic firm growth on firm performance. Based on these contents, the following research hypotheses on the influence of firm growth modes on firm performance can be derived.

As illustrated, inorganic firm growth on average is believed to have at best an insignificant effect on firm performance, whereas organic firm growth shows positive implications. Consequently, organic firm growth is believed to have a more positive effect on firm performance compared to inorganic firm growth leading to the first research hypothesis H1:

H1: Organic firm growth has a more positive effect on firm performance than inorganic firm growth.

Additionally, the decomposition of organic growth reveals market momentum growth to have positive performance implications. Hence, market momentum growth can be hypothesized to have better performance effects than inorganic growth leading to the second research hypothesis H2:

H2: Market momentum growth has a more positive effect on firm performance than inorganic firm growth.

Furthermore, as illustrated, the performance effects of growth via market share changes are mixed ranging between insignificance and slightly positive. Consequently, growth via market momentum growth is believed to dominate firm growth via organic market share gains with respect to the performance effects resulting in the third research hypothesis H3.

H3: Market momentum growth has a more positive effect on firm performance than market share change growth.

Finally, combining the at best zero performance implications of inorganic growth with the insignificant to slightly positive performance effects of organic market share change growth leads to the fourth research hypothesis H4:

H4: Market share change growth has a more positive effect on firm performance than inorganic growth.

These hypotheses all constitute new contributions to the research field of the performance effects of firm growth and will be empirically tested in the following chapters.

6 An Introduction to the Chemical Industry

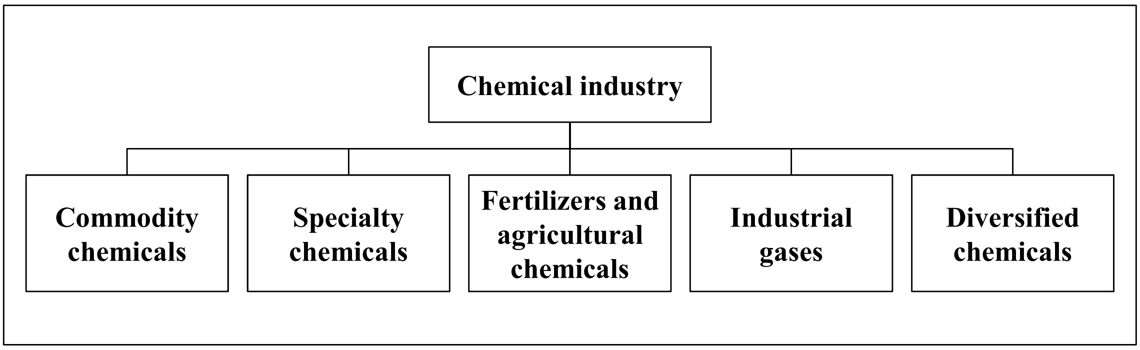
In order to test the derived research hypotheses, an empirical analysis of chemical companies headquartered in either Northern America or Western Europe is conducted. To facilitate an understanding of the industry and firms in focus of the analysis, this chapter aims at providing a basic set of knowledge of the chemical industry. First, the major processes and segments of chemical industry are introduced. Secondly, the economic relevance of the chemical industry is elaborated. Finally, the overall rationale for focusing the empirical analysis on chemical companies is explained.

6.1 Business Purpose and Segments of the Chemical Industry

The major purpose of companies in the chemical industry is to transform raw materials into industrial chemical substances. The raw materials converted comprise, e.g., natural gas, oil, metals, minerals, and water. Chemical processes including refining and reaction in different types of chemical vessels are responsible for the transformation of these raw materials. In order to separate the resulting substances from each other, techniques such as absorption, filtration, distillation, sublimation, and drying are applied. The resulting materials cover liquid, gaseous, and solid forms and are primarily used as production input factors in several industries, e.g., construction, manufacturing, and agriculture. In addition to their primary use as input factors in various industries, a small share of chemical materials is used directly by end consumers, e.g., in the form of pesticides, solvents, and washing soda (Morgan Stanley, 2011).

The chemical industry is substantially diverse consisting of a significantly large variety of market segments across all regions (Budde & Frankemölle, 2008). The majority of companies in the industry are active across the majority of these segments as well as regions. Several different approaches to structure the segments in the chemical industry exist. In accordance to the sample selection of this thesis, the segment definition of Standard & Poor's is introduced. Standard & Poor's defines four segments on a first level in the chemical industry: commodity chemicals, specialty chemicals, fertilizers and agricultural chemicals, and industrial gases. Additionally, diversified chemicals is defined as a fifth segment comprising companies which are active in more than one of the four segments simultaneously (Standard & Poor's, 2014).

Figure 2. Overview of Chemical Industry Segments.



Note. Own illustration based on Standard & Poor's (2014).

The commodity chemicals segment comprises basic or bulk chemicals usually sold in large volumes. Sub-segments of commodity chemicals are, e.g., synthetic fibers, plastics, films, paints, petrochemicals, and explosives. Contrarily, specialty chemicals represent low-volume, high-value-added products. Examples include additives, adhesives, advanced polymers, and fine chemicals (Innovest, 2007). The fertilizers and agricultural chemicals segment comprises chemical materials to support planting, growing, and harvesting of agricultural crops. Sub-segments comprise plant seeds, fertilizers, e.g., nitrogen, phosphate, and potassium, and crop protection chemicals, i.e., herbicides, insecticides, and fungicides (Morgan Stanley, 2011). Finally, the industrial gases segment represents gaseous chemical substances primarily used in other industries to increase the efficiency of manufacturing processes (Downie, 1997). Atmospheric gases such as oxygen, argon, and nitrogen, specialty gases such as silane and helium, and hydrogen represent the major sub-segments for industrial gases (Morgan Stanley, 2011).

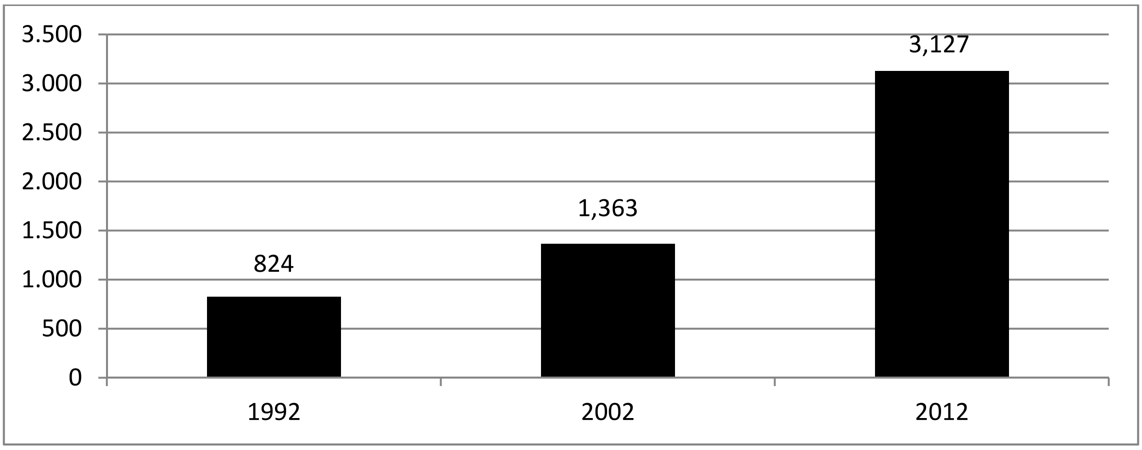
6.2 The Role of the Chemical Industry

Whereas the previous subchapter provided an overview of the chemical industry's purpose and segments, this subchapter elaborates on the general economic role of the chemical industry.

Chemicals are a central part of the world economy. The chemical industry is among the major industries, since its substances are used across all important industrial sectors and the industry provides employment to millions of people (United Nations, 2013). In 2012, global sales of the chemical industry amounted to 3,127 billion Euro representing a 12.8%

increase in comparison to 2011. Overall, the chemical industry experienced substantial growth over the past two decades.

Figure 3. Global Chemical Industry Sales 1992, 2002, 2012, Euro billion.



Note. Own calculation. Data obtained from Cefic (2013).

Global sales in the chemical industry in 1992 equaled 824 billion Euro. By 2002, global sales volume of the industry increased by 539 billion Euro to 1,363 billion Euro. This increase equaled a global sales growth of 5.2% p.a. from 1992 to 2002. Between 2002 and 2012, the sales growth of the global chemical industry was even stronger. Global sales of the industry more than doubled to 3,127 billion Euro in 2012 equaling an annual growth rate of 8.7% since 2002.

Table 6. Regional Distribution of Chemical Industry Sales, 2012.

Region	**Sales** [Euro billion]	**Share** [Percentage]
North America	526	16.8%
Latin America	144	4.6%
Western Europe	558	17.8%
Eastern Europe	115	3.7%
China	952	30.4%
Japan	176	5.6%
South Korea	124	4.0%
Rest of Asia	472	15.1%
Rest of the World	60	1.9%
Total	**3,127**	**100.0%**

Note. Own illustration. Data obtained from Cefic (2014).

From a regional perspective, China, Northern America and Western Europe represent the major sales markets for chemical products. As exemplified in Table 6, 2012 sales of the chemical industry in China amounted to 952 billion Euro equaling 30.4% of global sales. Western Europe represented the second largest market with sales of 558 billion Euro equaling 17.8% followed by Northern America with sales of 526 billion Euro equaling 16.8%.

The relative importance of regions as sales markets is partially reflected in the origin countries of the leading chemical companies. Regarding the companies with sales in the chemical industry of more than 50.0% in 2013, the major share of the leading companies is headquartered in Western Europe. Among the globally leading chemical companies with respect to sales in 2013, eight companies were headquartered in Western Europe, six in Asia, primarily Japan, four in North America, as well as one company from Latin America and the Middle East, respectively (see Table B1).

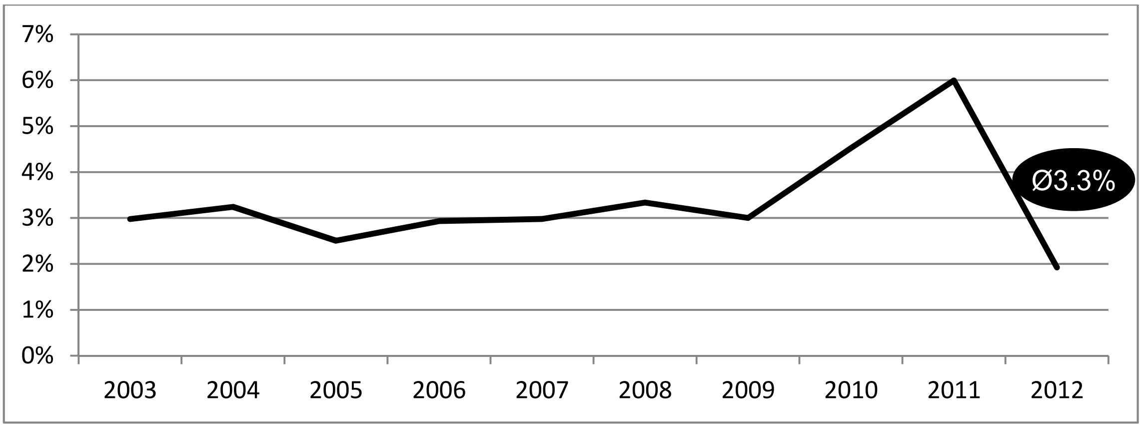
Focusing on Western Europe and Northern America as developed regions, the chemical industry plays an important economic role. In Western Europe, the chemical industry's share in total GDP amounts 1.1%. In addition to that, the economic importance is expressed by the direct employment of 1.19 million people in the chemical industry in Western Europe by 2012 (Cefic, 2013). Similar to Western Europe, the chemical industry is of high economic importance in North America. In 2014, the chemical industry directly employs 793,000 people in the US and thus is of major economic importance (American Chemistry Council, 2014).

6.3 Rationale for Chemical Industry Focus of the Empirical Analysis

Subsequent to the introduction to the purpose and economic role of the chemical industry, the following subchapter elaborates on the rationale for selecting the chemical industry as the focus industry for analyzing the different modes of growth and their respective influences on firm performance.

Firstly, since one particular mode of growth is a company's acquisition and divestment activity, i.e., inorganic growth, the importance of M&A within the chemical industry represents one specific reason. Especially in the chemical industry, M&A is regarded as a very important strategic vehicle and has shaped the industry significantly in the recent decade (Booz & Company, 2013). Major indicators for the strategic importance of M&A in the chemical industry were portfolio optimizations and industry consolidation efforts by Western European and Northern American chemical companies as well as geographic expansion activities by companies from emerging markets, e.g., the Middle East (Accenture, 2013).

Figure 4. Overview of Chemical Industry's Share in Global M&A Activity based on Deal Volume, 2003-2012, Percent.



Note. Own calculation based on A.T. Kearney (2014) and Thomson Reuters (2014).

Additionally, as illustrated in Figure 4, the chemical industry maintained a constant share in global M&A activity averaging 3.3% from 2003 to 2012. Thus, M&A represents a constant contributor to the growth performance of companies in the chemical industry.

In addition to the important role of inorganic growth, the variety of market segments in the chemical industry is a key factor for focusing on the chemical industry. As illustrated previously, the choice of industry or market and the corresponding firm growth stemming from the underlying market portfolio is a key determinant of a company's organic growth. As illustrated in previous subchapters, the chemical industry is characterized by a substantial number of segments across all regions. All of these segments show different growth developments over time and consequently provide a solid basis for a differentiated analysis of the performance effects of growth from market momentum across companies based on their market segment choice.

An additional factor for focusing on chemical firms in the empirical analysis is the relevance of economies of scale within the industry. As explained in chapter 5, economies of scale are considered a crucial theoretical argument in the relationship between firm growth modes, particularly inorganic growth and growth via market share gains, and firm performance. The chemical industry is characterized by high capital investments in production facilities and thus high fixed costs. The larger these production facilities and thus the potential output, the higher the potential to spread these fixed costs and thus reduce overall unit costs. Consequently, economies of scale play a major role in the chemical industry (Chenier, 2002; J. A. Kent, 2010).

Combined, these factors particularly enable the chemical industry to be analyzed for the effects of different modes of growth and their respective effects on firm performance metrics.

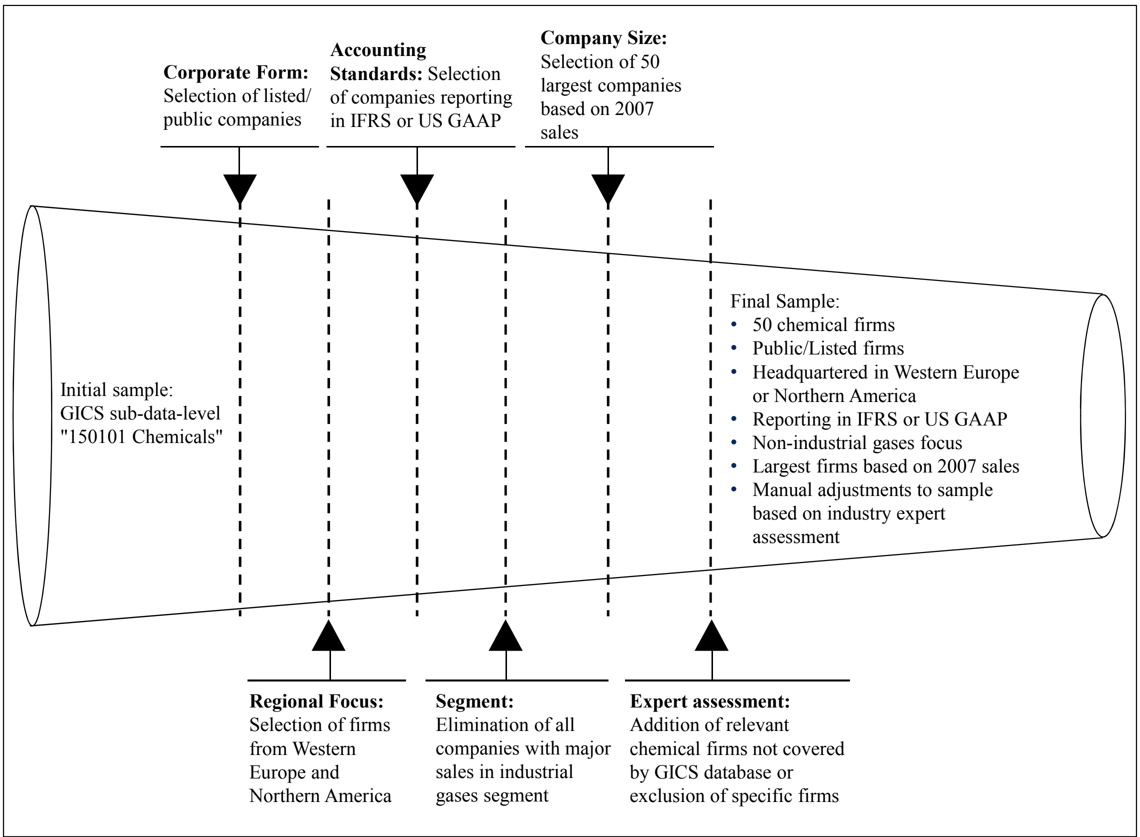
7 Introductory Methodology of the Empirical Analysis

The following chapter introduces the general methodology applied for the empirical analysis within this thesis. First, the selection of the firm sample is described followed by an overview of the data sources used. Afterwards, the methodology for decomposing a firm's growth rate into its different growth modes is exemplified followed by the determination of firm performance measures applied in the analysis. Finally, the general determinants of firm performance are discussed and, based on this, the corresponding control variables for the regression analysis derived.

7.1 Selection of Firm Sample

Chapter 6 previously discussed the rationale for focusing the empirical analysis on the chemical industry. Based on this, the following subchapter illustrates the selection process of the firm sample of chemical companies used for the empirical analysis of the previously derived hypotheses.

Figure 5. Selection Process of Firm Sample for Empirical Analysis.



Note. Own illustration.

The initial list of companies in the sample was obtained from the Standard & Poor's Global Industry Classification Standard (GICS) database. This database is structured along industry clusters. Each company contained in the database is allocated to its respective industry cluster based on their revenues and thus their sales markets. Hence, companies active in several industries are allocated to the industry cluster corresponding to the industry in which they generate the highest share of sales. Since the focus of the empirical analysis is on the chemical industry, all companies of the database's sub-data-level "150101 Chemicals" of the data-level "15 Materials" were selected. The sub-data-level "150101 Chemicals" comprises all chemical companies divided into the five previously introduced sub-clusters: commodity chemicals, diversified chemicals, fertilizers and agricultural chemicals, industrial gases, and specialty chemicals. Based on this classification of the GICS database, an initial sample was downloaded.

Subsequently, as illustrated in Figure 5, the firm selection proceeds by applying the following filters to the database sample.

First, we focused our analysis on public, i.e., listed companies, since our analysis relies on publicly available data and these listed companies have a disclosure requirement. Thus, we excluded any private companies in the sample.

Secondly, in order to focus the analysis on developed markets, only companies with a headquarter in Western Europe, including Switzerland, Scandinavia, as well as the United Kingdom, and Northern America, including the United States and Canada, were selected from the sample. Thus, we excluded any companies headquartered in Eastern Europe, the Middle East, Africa, Asia, Australia, Oceania, Central America, and Southern America.

Thirdly, in order to avoid any major bias from differences in accounting standards, we focused our analysis on companies reporting in either the International Financial Reporting Standards (IFRS) or the United States Generally Accepted Accounting Principles (US GAAP). The general comparability of the sales figures between both accounting standards is given (Bender, 2005). Thus, any companies reporting in local GAAP, e.g. the Canadian GAAP, were excluded from the sample.

Fourthly, the companies of the industrial gases sub-segment are excluded from the sample based on two reasons. First, although industrial gases companies belong to the chemical company cluster of the GICS database, these companies are considered significantly different from companies of the other sub-clusters with respect to their business models and operations. Second, high quality market data required for the analysis of growth stemming from market momentum for industrial gases companies are not available. Thus, these companies are excluded from the final firm sample.

In addition to applying these formal selection criteria, we conducted a chemical industry expert assessment of the intermediate sample. By this, we want to ensure not to miss any of the relevant chemical companies not indicated as this by the GICS database.

Finally, in order to avoid any survivor bias, the year 2007 was selected to be the center year of analysis. Since a firm's sales are defined as the respective measure of firm size and thus firm growth, the remaining companies within the sample were ranked according to their 2007 sales. Based on this ranking, the 50 largest companies, based on their 2007 sales, were selected. Since the GICS database allocates companies to industry clusters based on their predominant revenue share, companies with minor shares but large absolute sales in the chemical industry, e.g., Royal Dutch Shell, are not part of the sample. After this step, the firm sample is finalized.

Summarized, the final sample comprises 50 chemical companies. These 50 firms are the largest chemical companies based on their 2007 sales figures, are headquartered in either Western Europe or Northern America, are publicly traded, are non-industrial gases firms, and report in either IFRS or US GAAP.

The empirical analysis comprises absolute sales data for a time frame of ten years from 2003 to 2012. Consequently, a time frame of ten years covers a maximum number of 500 annual observations equaling ten years of observation for each of the 50 sample firms. Since firm growth measures the change in sales between two points in time, this maximum number of 500 absolute sales data points equals a theoretical maximum number of 450 year-over-year firm growth observations. From the theoretical maximum of 500 annual absolute sales observations, some data points were excluded from the dataset. First, annual sales data of companies not reported in IFRS or US GAAP were eliminated from the sample to ensure consistency across the dataset. This was particularly the case for reported sales data in the years before the adoption of IFRS by European sample firms in the early years of the data sample. Secondly, all datasets not comparable on a year-over-year basis were dismissed as well. This was particularly relevant for non-comparable changes in segment reporting by individual sample firms. These eliminatory steps finally result in 404 year-over-year firm growth observations for the entire firm sample and the time frame of analysis (see Figure B2).

From an econometric point of view, the empirical analysis is based on a panel or longitudinal data set. Panel data combines the structure of cross-sectional and time-series data sets (Frees, 2004). Whereas cross-sectional data sets consist of data for several observation units, e.g., individuals, households, or firms, at a particular point in time, time-series data consists of a series of observations of a variable for chronologically ordered points in time. Panel data sets combine the structural characteristics of cross-sectional and time-series data and thus comprise several observation units each with a series of observations across time (Asteriou & Hall, 2011). The cross-sectional data is denoted with the subscript i, with i=1, 2, 3 …, N, and N being the number of observation units. The time-series data is denoted with the subscript t, with t=1, 2, 3, …, T, and T being the number of points in time. Consequently, each data point in the panel data set is labeled with a subscript i for the unit of observation and a subscript t for the point in time (Schmidheiny & Basel, 2011). Hence, the panel data set at hand for the empirical analysis of this dissertation can be characterized with N=50 for the number of sample firms and T=9 for the nine years of growth mode information available for each of the sample firms. As the number of time observations varies across the individual units of observation, the data panel present is referred to as unbalanced (C. F. Baum, 2006).

Whereas this subchapter illustrates the selection process and definition of the firm and data sample for the empirical analysis, the following subchapter elaborates on the respective data sources used for the analysis.

7.2 Data Sources

This subchapter exemplifies the different data sources used for conducting the empirical analysis in this thesis. First, the data sources for the growth mode analysis of each company are explained. Secondly, the data sources for the respective firm performance metrics and control variables are illustrated.

With regard to analyzing the different modes of growth for each company over time, different sources of data were consistently combined for each individual company. Each company's individual annual reports from 2003 to 2012 provide the basis for the growth mode analysis for each company. Every annual report for the companies in scope was manually analyzed in order to extract the respective sales data on a segment and sub-segment level. Additionally, if provided, the respective currency effects comprised in the sales figures as well as the impact on sales by acquisitions and divestitures on an annual basis for the time period covered were derived from annual reports. The companies' annual reports were preferred over financial database data, e.g., Standard & Poor's, as the data source for two reasons. First, the use of annual report data avoids biases from *restated*[16] segment sales data potentially provided in financial databases. The use of restated data generates wrong results for the growth mode analysis, since, e.g., the effects of acquisitions and divestments are already reflected in restated sales figures making an analysis of the respective effects impossible. Secondly, manually analyzing annual report data allows discovering and understanding changes in the segment reporting of each company. Changes in the segment reporting, e.g., refer to simple changes in segment names or more substantial organizational changes, e.g., the combination of segments. Financial database data does not always correctly reflect these segment-reporting changes generating wrong results for the year-over-year growth analysis. Consequently and with respect to the size of the sample covered, more than 500 annual reports were manually analyzed to derive the respective data providing the basis for the empirical analysis of growth modes by company.

Furthermore, to assess the impact of inorganic growth for each company, a comprehensive list of acquisitions and divestitures for each sample company was obtained from the Standard & Poors Capital IQ database in addition to the data provided by annual reports. The respective data download comprised a full list of all acquisitions and divestitures by sample firm from 2003 to 2012 including the specific date, corresponding deal value, and sales figures of the respective target company.

In case the target company's sales were not available in the S&P Capital IQ database, corresponding valuation multiples were used to calculate the corresponding sales of the target. The respective multiples were obtained from Dealogic on an annual basis and by

[16] Restated data refers to retrospectively adjusted data based on events post to the initial publication date of the annual report.

the respective market segment. To derive at the target company's sales figure, the enterprise value of the transaction as given in the database was divided by the corresponding sales-to-enterprise-value multiple for the respective year and segment of the target company's business.

In order to determine a company's underlying market momentum growth, the market growth rates from 2003 to 2012 are necessary. The respective market growth rates were obtained by sub-segment and underlying regions from the most reputable industry databases available. In total, market growth rates for 20 segments and underlying regions were obtained resulting in 169 segment-region growth rate series between 2003 and 2012 on an annual basis.

In addition to the data required data for the analysis of growth modes by company, the corresponding performance as well as further financial metrics with respect to control variables by firm were obtained from COMPUSTAT.

7.3 Methodology for Firm Growth Mode Analysis

The following subchapter illustrates the methodology for determining the different modes of firm growth for a company.

An analysis of the growth modes over time of each company constitutes the initial analytical element of the empirical analysis. The methodology applied to derive the growth modes of a company in this thesis primarily enhances the approaches of Kling et al. (2009) and Viguerie et al. (2011). In line with these studies, the determination of a firm's different modes of growth follows several analytical steps.

In a first step, a company's total sales growth rate is determined by applying the respective relative firm growth formula. As illustrated, a firm's growth rate in the period between the year t and the year t-n is defined as follows:

$$(Eq.3) \quad FGR_t = \frac{FS_t - FS_{t-n}}{FS_{t-n}} = \frac{FG_t}{FS_{t-n}}$$

where FS_t and FS_{t-n} denote the absolute amount of sales of the firm in year t and year t-n, respectively, and FG_t the absolute sales growth between year t and year t-n. In order to being able to analyze the effects of a firm's market or industry portfolio within the course of the empirical analysis, the determination of the firm growth rate is conducted for the aggregated sales of a company as well as for each of its reporting segments individually. The intermediate result of this first step is the growth rate of a firm in total as well as for each of its reporting segments individually. The sales data are manually extracted from the respective annual reports on a firm as well as segment level.

In a second step, these growth rates are decomposed into the shares from inorganic growth and organic firm growth activities, respectively. As illustrated in chapter 2, the sum of a firm's organic and inorganic growth equals its total growth. Thus follows:

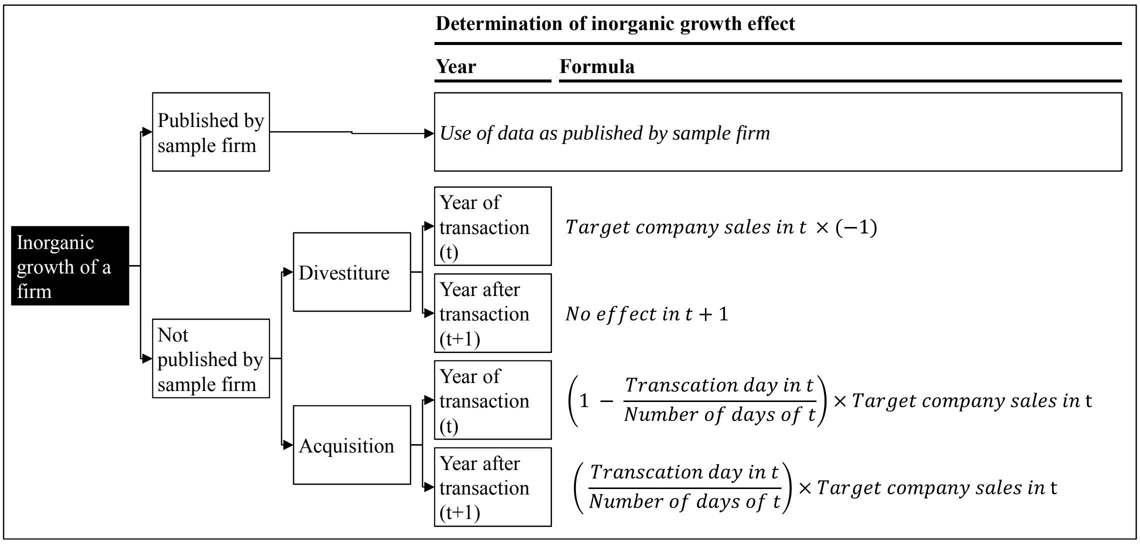
$$(Eq. 4) \quad FGR_t = IGR_t + OGR_t$$

where IGR_t and OGR_t denote the sales growth stemming from inorganic and organic growth activities between the year t and the year t-n, respectively. To decompose the firm growth rate into both growth modes, the inorganic sales growth effects resulting from acquisitions and divestitures are identified in the next step. The inorganic sales growth effects between year t and year t-n are defined as follows:

$$(Eq. 5) \quad IGR_t = \frac{IG_t}{FS_{t-n}}$$

where IG_t equals the absolute sales effect of a firm from inorganic activities between year t and year t-n. The derivation of the inorganic sales effects follows a systematic approach and varies depending on the availability of data by sample firm.

Figure 6. Methodology for the Determination of the Inorganic Firm Growth Effect.



Note. Own illustration based on Viguerie et al. (2011).

As illustrated in Figure 6, if published by the sample firm, the sales effects of inorganic growth activities are extracted directly from the respective annual reports. If a sample firm does not publish the effects on its sales from its acquisition and divestiture activities, the inorganic growth effects were derived by analyzing data on acquisitions and divestitures of the S&P Capital IQ database. First, a list of all acquisitions and divestitures was compiled from S&P's Capital IQ database for each company. The respective list of acquisitions and divestitures contained data on seller, acquirer, target company, transaction date, transaction value, target company's sales, and narrative information for each transaction of each sample firm. Second, the sales data of the respective target company were used to determine the respective inorganic effect of a transaction on the sales of the sample firm. Analogue to accounting principles, the methodology for considering the effect on sales differs between acquisitions on the one hand and divestitures on the other hand as exemplified in Figure 7. In case of a divestiture, the sales of the target company completely represent a negative sales effect for the selling company in the respective year of the transaction. Consequently, a divestiture results in a negative inorganic growth effect for the divesting firm. This inorganic growth effect equals the total sales of the divested company in year t multiplied by -1. Contrarily, in case of an acquisition, the target company's sales and thus the inorganic effect on sales of the acquirer are distributed between the year of the transaction date and the subsequent year. Based on the actual date of a transaction, the target firm's sales are split proportionally between both years. The sales effect from inorganic activities for the year of the transaction is determined by multiplying the target company's sales in the year of the transaction by the fraction of remaining days in the transaction year to the total number of days of the transaction year. The residual of the target company's sales will represent the inorganic effect on sales of the respective transaction in the year after the transaction. All inorganic growth activities based on the S&P Capital IQ database were additionally quality-checked by reviewing narrative information on the respective annual reports of the sample firms. The result of this second analytical step is a firm's sales growth rate from its inorganic activities.

Subsequent to the determination of the inorganic growth effect, the organic growth effect is derived as follows:

$$(Eq. 6) \quad OGR_t = FGR_t - IGR_t = \frac{FG_t - IG_t}{FS_{t-n}}$$

where the organic growth rate represents the residual between a firm's total growth rate and the effect from inorganic growth activities.

As illustrated throughout the thesis, organic firm growth comprises growth stemming from the underlying momentum of a firm's markets or segments and growth via the gain or loss in market share. Hence, organic growth is defined as follows:

$$(Eq. 7) \quad OGR_t = MMGR_t + MSCGR_t$$

where $MMGR_t$ refers to the weighted market momentum growth rate in year t measured in the firm's reporting currency, i.e., the weighted growth rate of the markets or segments a firm competes in, and $MSCGR_t$ equals the weighted market share change growth rate across a firm's markets or segments in year t. To decompose a firm's organic growth rate, the growth rate stemming from a firm's market momentum is determined first.

To derive the growth from the underlying market portfolio of a sample firm, several analytical steps were conducted. The sales growth rate stemming from the selection of markets or segments is defined as follows:

$$(Eq. 8) \quad MMGR_t = \frac{MMG_t}{FS_{t-n}} = \frac{\sum_{1 \dots m}(SS_{t-n}^{1 \dots m} \times SMGR_t^{1 \dots m})}{FS_{t-n}}$$

where MMG_t refers to the absolute growth from a firm's market momentum across all segments in year t, $SS_{t-n}^{1 \dots m}$ equals the respective sales in year t-n for every segment of the sample firm, and $\mathrm{SMGR}_t^{1\ldots m}$ gives the corresponding market growth rate of each of the firm's segments in year t. Thus, the market momentum growth rate is determined by multiplying each segment's sales in year t-n by the corresponding market growth rate in year t and dividing the sum by the firm's total sales in year t-n. As illustrated, the data on segment sales is manually extracted from the sample firms' annual reports. Subsequently, each reporting segment is assigned a corresponding market segment and thus market growth rate based on the respective business focus of the segment. The assignment of corresponding market segments to the business segments of each company is based on the analysis of annual report information on each segment combined with the assessment of chemical industry experts. As described in subchapter 7.2, the market data used for the market growth rates was sourced from well-known, specialist market databases. This analytical step provides a firm's sales growth rate stemming from its underlying market momentum.

Subsequent to deriving the growth from market momentum, this part refers to the currency effect in a firm's sales growth. By selection of different regions as sales market, a company exposes its sales to changes in currency exchange rates. Since this selection of regional sales markets is considered as a strategic portfolio choice of a company, these currency effects can be considered as growth effects resulting from the underlying strategic market portfolio of a company as illustrated in chapter 2. However, in order to avoid biases in sales growth and the evaluation of growth performance resulting from changes in the exchange rates between a company's reporting currency and the local currencies of its sales markets, these currency effects are isolated and presented separately as part of the empirical analysis. A firm's sales growth from market momentum thus can be further decomposed as follows:

$$(Eq. 9) \quad MMGR_t = DCMMGR_t + CEGR_t$$

where DCMMGR_t refers to the weighted growth rate from market momentum in the respective domestic currencies of a firm's sales markets between year t and year t-n and CEGR_t equals the weighted currency effect in a firm's sales between year t and year t-n. The currency effect growth rate in sales is defined as follows:

$$(Eq. 10) \quad CEGR_t = \frac{\sum_{1...m} SCEG_t^{1...m}}{FS_{t-n}}$$

where $SCEG_t^{1...m}$ refers to the absolute currency effect in sales for each of the firm's segments between year t and year t-n. The sum of these absolute currency effects in sales is divided by the firm's total sales in year t-n to derive at the growth in sales from changes in the exchange rates between a firm's reporting currency and the domestic currencies of its sales markets. The currency effects in sales are directly sourced from the sample firms' annual reports, if published. 31 out of the 50 sample firms publish data on the currency effects in sales. In case a sample firm does not publish data on currency effects in sales, the analysis refrains from deriving these effects alternatively due to a potential inaccuracy of the results. The end product of this analytical step is the currency effect within a firm's growth rate.

Subsequent to the determination of this currency effect in sales growth, the share of a firm's growth stemming from the market momentum in domestic currencies of the respective sales markets is derived as the residual between the growth rate from market momentum in a firm's reporting currency and the corresponding currency effect in sales and thus is defined as follows:

$$(Eq. 11) \quad DCMMGR_t = MMGR_t - CEGR_t$$
$$= \frac{\sum_{1...m}(SS_{t-n}^{1...m} \times SMGR_t^{1...m} - SCEG_t^{1...m})}{FS_{t-n}}$$

This analytical step finalizes the decomposition of organic growth from market momentum into currency effects and growth from market momentum in the domestic currencies of the sales markets.

In the final step of the decomposition of a firm's growth rate into its different modes, the share in growth stemming from gains or losses in market share is derived. As previously illustrated, a firm's organic growth rate comprises growth stemming from the growth momentum of its underlying market or segment portfolio on the one hand and gains or losses in market share on the other hand. Consequently, the organic growth stemming from changes in market share is defined as follows:

$$(Eq. 12) \quad MSCGR_t = OGR_t - MMGR_t = \frac{OG_t - \sum_{1...m}(SS_{t-n}^{1...m} \times SMGR_t^{1...m})}{FS_{t-n}}$$

where the growth rate from market share changes is determined as the residual between the overall organic growth rate and growth from market momentum.

By summarizing all these analytical steps, the decomposition of a firm's growth rate in year t along the different growth modes introduced in chapter 2 is defined as follows:

$$(Eq. 13) \quad FGR_t = IGR_t + MMGR_t + MSCGR_t$$

where a firm's growth rate consists of the effects from (1) inorganic activities, (2) the growth momentum of its underlying market or segment portfolio, and (3) changes in market share across these markets or segments.

Considering the effects of changes in currency exchange rates comprised in sales, the growth decomposition can even be more detailed as follows:

$$(Eq. 14) \quad FGR_t = IGR_t + DCMMGR_t + \ CEGR_t + MSCGR_t$$

where the growth from market momentum is further detailed into currency effects between the reporting currency and the domestic currencies of a firm's sales markets on the one hand and market momentum in these respective local currencies on the other hand. This growth decomposition is conducted for all 50 sample firms on a year-over-year basis. The derived firm growth mode rates will be the primary independent variables within the empirical analysis.

The analysis of the derived research hypotheses requires the application of two different analytical models as part of the empirical analysis: a two-growth-modes-model and a three growth-modes-model. The two-growth-modes-model refers to equation 4 and distinguishes between inorganic growth and organic growth as the modes of firm growth. The two-growth-modes-model enables the analysis of the first research hypothesis H1. To analyze the research hypotheses H2, H3, and H4, the application of the three-growth-modes-model is required. The three-growth-modes-model is based on equation 13 and distinguishes between inorganic growth, growth from market momentum, and growth from market share changes as the three modes of firm growth. Consequently, the three-growth-modes-model enables a more detailed analysis of the effects of firm growth modes and thus the assessment of the hypotheses H2, H3, and H4. For the remaining part of the dissertation, the terms two-growth-modes-model and three-growth-modes-model refer to the definition just provided.

7.4 Determinants of Firm Performance

Besides the different modes of growth a firm applies, a range of additional factors is considered to determine the performance of a company. In analyzing the effects of firm growth modes on firm performance, these additional factors need to be considered as well in order to generate unbiased results for the respective influence of firm growth modes on the performance. This is particular the case for the regression analysis.

Factors influencing firm performance are frequently grouped into firm-specific and industry-specific factors (Hawawini et al., 2003; Rumelt, 1991) as presented in chapter 5. In order to avoid a misleading assignment of performance effects of these additional factors to the different modes of growth, these additional performance determinants are included in the empirical model as control variables. In the following, these respective control variables are introduced and explained in detail.

With respect to firm-specific factors, researchers list several factors influencing a company's performance. First, the size of a company is considered to be a determinant of its performance. Researchers provide a number of reasons to establish a relationship between both parameters. The major theoretical arguments for this relationship have been discussed previously. Some academics mention economies of scale and scope as major advantages of larger firms resulting in, e.g., lower costs per unit and thus increasing margins in comparison to small-scale firms (Scherer, 1973; W. G. Shepherd, 1972). Moreover, researchers believe larger firms to benefit from higher market control and better access to financial capital with respect their performance (Baumol, 1959). Contrarily, some academics mention performance-harming factors within large-scale firms. Large-scale firms may be characterized by higher levels of bureaucracy and thus a lower level of flexibility and higher organizational inertia decreasing performance (Haveman, 1993). Furthermore, larger firm size has been found to be a predictor of higher levels of diversification, which has been found to be negatively related to performance (Porter, 1987; Wernerfelt & Montgomery, 1988). Empirically, evidence for both theoretical perspectives can be found. However, the majority of studies found firm size to be a significantly positive determinant of firm performance (J. Lee, 2009). Academic studies identifying firm size to be a positive determinant of firm performance comprise, e.g., M. Hall and Weiss (1967), Scherer (1973), and more recently J. Lee (2009) as well as Stierwald (2009). Contrarily, W. G. Shepherd (1972) and Whittington (1980) found firm size to be negatively related or unrelated to firm performance, respectively. Since our firm sample comprises firms with substantial differences with respect to firm size measured in sales and thus they may differently benefit from, e.g., economies of scale, we control for firm size within our empirical analysis. This is consistent with the approach applied by, e.g., Chari, Devaraj, and David (2008) and Servaes and Tamayo (2013), who as well controlled for firm size in their analysis of certain factors influencing firm performance. Analogue to Chari et al. (2008) and Kale, Reis, and Venkateswaran (2009), firm size is defined as a firm's sales in year t. This definition is consistent with the importance of sales as an indicator of firm size over other metrics, e.g., total assets or the number of employees, introduced in chapter 2.

Closely related to firm size, the age of a firm is considered to be a determinant of its performance level as well. Two major theoretical concepts establish a relationship between both parameters. As a first reason, a firm's performance is believed to increase with firm age as a result of organizational learning effects. Firms are able to increase their level of productivity as they learn from past problems they faced and incorporate these learnings into higher performance levels (Coad, Segarra, & Teruel, 2013). In facing recurring problems, older firms can benefit from previous encounters and their respective problem solving strategies and thus substantially reduce the required resources with respect to time and labor involved for solving these problems (Garnsey, 1998). In contrast to these learning effects, other researchers establish a negative impact of firm age on firm performance as a consequence of increasing organizational inertia. With increasing age, firms may experience a decrease in productivity and thus performance due to higher inflexibility of the organization (Coad et al., 2013). According to Hannan and Freeman (1984), older companies do not have the ability to show the same pace of change as their environment and thus are not able to exploit new opportunities resulting in lower levels of performance. Empirically, a number of researchers found evidence of firm age being a determinant of firm performance. Considering firm growth as a metric of firm performance, a large number of academic studies found firm age to impact the growth rate of a firm and thus a rejection of Gibrat's law as illustrated in chapter 4. Additionally, several researchers found firm age to positively affect the survival probability of companies (Evans, 1987a, 1987b; Mata & Portugal, 2004). Moreover, further researchers found empirical evidence for a significantly positive influence of firm age on firm performance with respect to operational or accounting measures (Coad et al., 2013; Haltiwanger, Lane,

& Spletzer, 1999). Since the firm sample of the empirical analysis shows a high range of firm ages and thus the companies may differently be affected by learning or inertia effects, the analysis controls for age of the sample firms. This approach is consistent to, e.g., the studies of Zaheer and Bell (2005) and Brown and Caylor (2006), who as well control for firm age when analyzing the effects of certain factors on firm performance. Analogue to Anderson and Reeb (2003), firm age is defined as the number of years since a company's inception.

Furthermore, academics name the R&D intensity of a company as a determinant of its performance level. From a theoretical perspective, academics assume a positive relationship between investments in R&D and firm performance. R&D is an investment of companies into intangible assets. These intangible assets aim at increasing a firm's competitiveness, e.g., in form of new product innovations or a decrease in cost positions and thus positively influence a firm's performance in the mid- to long-term and is valued by the financial markets (Long & Ravenscraft, 1993; Mansfield, 1994). R&D expenses increase a firm's level of dynamism and flexibility supporting a faster adaption to environmental changes than competitors with lower R&D intensities (K. D. Miller & Bromiley, 1990). Contrarily, R&D investments pressurize a firm's performance in the short-term as it results in costs associated to the R&D process (Shy, 1995). Empirically, the majority of academic studies analyzing the effects between both parameters found a positive influence of R&D investments on firm performance. R&D expenditures were found to be positively related to accounting performance (Branch, 1974; Capon et al., 1990; Hitt, Hoskisson, Johnson, & Moesel, 1996; Long & Ravenscraft, 1993) as well as market performance (Bae, Park, & Wang, 2008; Chan, Martin, & Kensinger, 1990; Doukas & Switzer, 1992; Ho, Keh, & Ong, 2005). Contrarily, a small number of studies e.g., Erickson and Jacobson (1992) and Quo, Wang, and Shou (2004), found R&D to have no or a negative influence on firm performance. However, several researchers mention a time lag, i.e., an adjustment time, between expenses on R&D and the performance effect, particularly in accounting measures (Branch, 1974; Coad & Rao, 2008). Since R&D expenditures represent a key theme for chemical companies (Finger, 2008) and our sample firms show a high variety of R&D expenses, we control for R&D intensity and potential differences in the benefit from their R&D activities in terms of performance. This is consistent with the approach applied by, e.g., Demsetz and Villalonga (2001) and Chari et al. (2008), who as well controlled for R&D intensity in their analysis of certain factors influencing firm performance. Analogue to these two studies, R&D intensity is defined as the ratio of R&D expenses in year t to sales in year t.

Additionally, a firm's capital structure is believed to be a determinant of firm performance by several researchers. From a theoretical perspective, Modigliani and Miller (1958), assuming, amongst others, no taxes nor transaction costs, consider the value of a firm to be independent from its capital structure. However, in their correction article five years later, the authors introduce taxes and thus the tax shield of debt capital costs into their model resulting in a positive influence of a firm's debt level on its market value (Modigliani & Miller, 1963). Trade off-costs resulting from, e.g., personal taxes and bankruptcy costs, prevent companies from applying a 100% debt ratio. In addition to the tax shield, agency theory provides further theoretical support for a positive influence of debt on firm performance. According to Jensen (1986), debt is an instrument to narrow the interest of managers and shareholders. In case of low debt levels, managers potentially spend free cash flows on low return yielding projects. Contrarily, high debt levels result in higher debt interest payments and thus lower free cash flows forcing managers to more effective spending. Furthermore, Grossman and Hart (1982) assume higher levels of equity to equal a lower probability of bankruptcy. In this case, low profit levels are not penalized and thus lower pressure to increase performance exists. Hence, higher levels of debt incentivize managers to increase firm performance. Contrarily, agency problems between debt holders and stockholders may result in lower performance with increasing levels of debt. Whereas debt holders prefer low risk investments, stockholders require higher return-yielding and thus riskier investments (Jensen & Meckling, 1976). Consequently, firms with high levels of debt will conduct lower risk investments. However, this could lead to underinvestment pressurizing firm performance (Myers, 1977). Empirically, a large number of studies confirmed a positive influence of indebtness on firm performance comprising, e.g., S. N. Kaplan (1989), A. J. Smith (1990), A. N. Berger and Di Patti (2006), and Margaritis and Psillaki (2007). Since our sample firms show great variation in their capital structures, we include a control variable for the respective leverage ratio. This is consistent with the approach applied by, e.g., Demsetz and Villalonga (2001) and Kale et al. (2009), who as well controlled for the capital structure in their analysis of firm performance determinants. Analogue to Kale et al. (2009), we define leverage as the ratio of the year-end book value of total debt in year t to the year-end book value of total assets in year t.

In addition to these firm-specific effects, additional industry-effects are considered by researchers to determine firm performance. The major industry effects identified by researchers comprise, e.g., industry concentration, industry entry barriers, and overall industry profitability (Hawawini et al., 2003; Rumelt, 1991). Since our firm sample for the empirical analysis entirely consists of companies from the same industry, a detailed discussion of industry-related performance determinants is not provided. Based on this and analogue to the approach discussed by Dess, Ireland, and Hitt (1990) and applied by J. R. Baum et al. (2001), we do not control for industry effects within the analysis.

As previously introduced, these factors will be included as control variables as part of the regression analysis (see Table C1 for specific definitions).

7.5 Dependent Variables

As the empirical analysis aims at identifying the implications of the different firm growth modes on firm performance, the dependent variables of the analysis respectively represent firm performance metrics. As introduced in subchapter 2.4, the dissertation focuses the analysis on a market-based performance metric. Analogue to, e.g., Chari et al. (2008), we measure market performance by Tobin's Q as one of the primary applied market-based performance metrics among researchers in finance and strategic management as illustrated in chapter 2. In line with Demsetz and Villalonga (2001), we define Tobin's Q as the ratio of the year-end market value of common equity in year t plus the year-end book value of preferred stock in year t plus the year-end book value of debt in year t to the year-end book value of total assets of a company. In line with the results of Aktas et al. (2008), we expect a potential time lag between certain firm growth activities as well as control variables such as R&D and their materialization in performance indicators. Accordingly, we apply four time-varying, lagged versions of Tobin's Q. For a given firm year observation in year t=0, these four versions represent the corresponding Tobin's Q of the company in year t=0 (TQ_0), in year t=1 (TQ_1), in year t=2 (TQ_2), and year t=3 (TQ_3). We choose a period of three years as this is a timeframe in which the real performance effects of, e.g., R&D expenses (Ernst, 2001) and synergies after acquisitions (Harrison, Hitt, Hoskisson, & Ireland, 1991), become observable to the financial market and thus being reflected in the performance metrics. Consequently, we apply a total of four performance measures as dependent variables in the analysis (see Table C2). All of these applied versions of Tobin's Q as dependent variables can be classified as metric data[17].

[17] For an overview statistical data scales see, e.g., Hornsteiner (2012).

8 The Empirical Analysis

The previous chapter provided the basic, introductory set of information for the empirical analysis. The following subchapters apply this basic set of information and conduct the empirical analysis starting with the descriptive statistics of the sample. Subsequently, an indicative mean comparison of the performance effects across growth modes is conducted. Afterwards, the performance effects of firm growth modes are analyzed via a panel regression analysis. Finally, the analytical results are summarized and evaluated with respect to the research hypotheses.

8.1 Descriptive Statistics

As the introductory part of the results of the empirical analysis, this chapter focuses on illustrating the descriptive statistics of the data set applied.

Table 7. Descriptive Statistics of Entire Data Set.

Variable	Obs.	Mean	Std. Dev.	Min	Max
IG	404	1.3%	12.7%	-50.1%	166.1%
OG	404	6.1%	14.1%	-41.0%	70.0%
MMG	404	6.0%	8.1%	-25.3%	30.4%
MSCG	404	0.1%	10.7%	-48.0%	41.7%
FAGE	404	107	54	6	254
FSIZE	404	9,962	14,852	972	87,926
R&D	404	2,8%	2,6%	0,0%	13,6%
LEV	404	24.9%	11.7%	0.1%	86.6%
TQ_0	394	1.27	0.56	0.29	4.84
TQ_1	395	1.30	0.58	0.29	4.84
TQ_2	393	1.33	0.59	0.29	4.65
TQ_3	345	1.34	0.60	0.29	4.65

Note. Own illustration.

First, Table 7 provides an overview of the descriptive statistics for the entire data sample. As previously mentioned, the data sample covers 404 firm year observations and the corresponding decomposition of firm growth into its different modes as well as control variables. Depending on data availability, the number of observations for the dependent variables, i.e., time variations of Tobin's Q as a firm performance indicator, ranges between 345 and 394.

With respect to the firm growth performance, the sample firms grew by an average of 7.4% p.a. across the sample years. The firm growth decomposition analysis reveals an average contribution of 1.3% p.a. by inorganic growth and 6.1% p.a. by organic growth. These figures confirm the relevance of M&A within in the chemical industry as introduced in chapter 6. Furthermore, the decomposition analysis reveals organic growth to be primarily driven by market momentum growth representing 6.0% p.a. on average compared to 0.1% p.a. on average stemming from market share changes. Two aspects provide an explanation for the, on average, low contribution of gains in market share to firm growth. First, market share on average is a zero sum game in general, i.e., if a company gains market share, one or more other company in the market need to lose the corresponding market share (Baghai et al., 2007). Since the firm sample covers a major portion of the entire chemical industry, changes in market share may be reflected in the growth mode performance of another company in the sample. In addition to the zero-sum aspect of market share changes, the chemical industry experienced a rise of companies from emerging market regions not covered in the sample, e.g., Asia, Latin America, and the Middle East. Primarily state-owned companies, e.g., SABIC from Saudi Arabia, Braskem from Brazil, or Sinochem from China, strongly entered the chemical markets backed by access to natural resources and thus pressurizing the market shares of the established chemical companies from developed markets as covered in the data sample (ICIS, 2013; KPMG, 2011).

In addition to the general descriptive statistics, Table 8 provides an overview of the pairwise correlation coefficients between the respective variables used in the empirical analysis. Correlation coefficients generate a quantitative value for the relationship of two variables with respect to strength and direction (Peck, Olsen, & Devore, 2015). The most commonly used Pearson correlation coefficient analyzes the linear relation between two variables assuming a normal distribution of both variables. However, in case the variables are not normally distributed, outliers may have a substantial impact on the correlation results. Contrarily, non-parametric correlation coefficients, e.g., the Spearman coefficient, mitigate the effects of non-normally-distributed variables by a rank transformation of the data and thus generate more robust results with respect to correlation in this case (Dormann, 2013). We focused on the Spearman correlation coefficients, since some of the variables used in the empirical analysis have a slight tendency to not be normally distributed[18]. However, the results of the Pearson coefficients approach are very consistent to the results of the Spearman correlation illustrated below (see Table D1).

Table 8. Spearman Correlation Matrix.

	IG	OG	MMG	MSCG	FAGE	FSIZE	R&D	LEV	TQ0	TQ1	TQ2	TQ3
IG	1.000											
OG	0.033	1.000										
MMG	-0.035	-	1.000									
MSCG	0.051	-	0.036	1.000								
FAGE	0.009	-0.067	-0.088	0.016	1.000							
FSIZE	0.012	0.027	-0.007	0.062	0.254	1.000						
R&D	-0.049	-0.121	-0.010	-0.140	0.244	0.168	1.000					
LEV	-0.059	-0.130	-0.101	-0.090	-0.180	-0.153	0.103	1.000				
TQ0	0.118	0.160	0.178	0.088	0.053	0.109	0.233	-0.082	1.000			
TQ1	0.151	0.054	0.113	0.000	0.073	0.111	0.227	-0.044	0.802	1.000		
TQ2	0.129	0.170	0.238	0.068	0.079	0.123	0.250	-0.041	0.702	0.803	1.000	
TQ3	0.135	0.053	0.095	0.018	0.086	0.114	0.260	-0.080	0.672	0.723	0.838	1.000

Note. Own illustration. Coefficients based on Spearman correlation. Pairwise correlation coefficient for MMG/OG and MSCG/OG are not displayed as these distinguish the two-growth-modes-model from the three-growth-modes-model.

The correlation coefficients between the independent variables, i.e., the firm growth mode rates as well as control variables, do not show any high pairwise correlations and thus signs of multicollinearity. Analogue to Kennedy (2003), the critical amount for the correlation coefficients to be indicators of multicollinearity is set to -0.8 and +0.8, respectively. The question of multicollinearity among the independent variables will be covered in more detail in an upcoming subchapter assessing the assumptions of the linear regression model. As mentioned previously, these results are consistent for the Spearman and Pearson correlation coefficients.

8.2 Mean Comparison of Performance Effects of Firm Growth Modes

In order to provide a first indication of the accuracy of the derived research hypotheses, an initial mean comparison of the performance effects of the different firm growth modes is conducted. At first, the respective analytical methodology is illustrated. Subsequently,

[18] For a detailed comparison of the Pearson and Spearman correlation coefficients see, e.g., Hauke and Kossowski (2011).

the corresponding results are discussed in detail differentiated between the two-growth-modes-model and the three-growth-modes-model.

8.2.1 Mean Comparison Methodology

To start this analysis, each of the 404 firm year observations is assessed with respect to its predominant firm growth mode. Subsequently, the observations for each of the two or three growth modes, respectively, are grouped and the averages of the corresponding firm performance indicators are compared and tested for significance. The performance metric mean comparison for the different firm growth modes follows the approach of a one-way analysis of variance (ANOVA). In contrast to a two-way ANOVA, a one-way ANOVA compares the means for only one type of grouping characteristic or treatment (Chalmer, 1986), in this case the different firm growth modes. The ANOVA tests the null hypothesis that no differences between the means of a specific dependent variable, in case of this dissertation the performance variables, of different groups, i.e., categorical predictors, exists (Coolidge, 2012). The ANOVA tests for differences between the group means in both directions, i.e., negative and positive differences, and thus is referred to as a two-tailed test (Chalmer, 1986). The ANOVA identifies how much of the variability in Tobin's Q is attributable to group membership and thus firm growth mode. To test this null hypothesis of equality among the different group means, the ANOVA divides the between-group mean square by the within-group mean square resulting in the F-ratio. Mean square refers to the sum of squares divided by the respective degrees of freedom. Since all groups are assumed to have the same variance, the within-group mean square is equal to the general population variance. Furthermore, if the null hypothesis holds, the between-group variance as well is expected to equal the overall population variance as variability between the group means should only be a product of chance. Hence, the F-ratio is expected to range around the value of one, if the null hypothesis holds. In order to analyze if the variability between the means is a result of chance, the derived F-ratio is compared to the corresponding critical value of the F-distribution. The F-distribution is a continuous probability density function providing the maximum and thus critical value to be expected by chance. It is a function of the degrees of freedom from both the between- as well as the within-group mean square. If the derived F-ratio exceeds the critical F-value provided by the F-distribution, the null hypothesis can be rejected and thus a significant difference between the group means exists (Coolidge, 2012; C. F. Lee, Lee, & Lee, 2000; Wooldridge, 2012).

The ANOVA is based on two major assumptions. First, the dependent variable shows a normal distribution within each group or category of the comparison. Second, as previously stated, the populations show homogeneous variances across groups (Heiman, 2010). Violations of these assumptions may lead to errors in interpreting the results of the ANOVA (Osborne, 2008). To test the validity of the underlying assumptions, the following procedure is applied. The assumption of homogeneity of variances across groups is tested via Bartlett's test of equal variances (Snecdecor & Cochran, 1991). However, since Bartlett's test of equal variances is susceptible to violations in the assumption of normal distribution of the dependent variable, the Levene's test of variance homogeneity is additionally conducted. Levene's test is considered robust against violations of the normality assumption (Levene, 1961). The assumption of a normal distribution of the dependent variable within each category is tested via visual inspection of histograms displaying the distribution of the dependent variable in each group.

In case, the assumptions are violated, two further analytical steps are implemented. First, a transformation of the dependent variable is conducted as transforming the data potentially leads to a non-violation of the data without substantially affecting the implications drawn from it (Osborne, 2008). As suggested by McDonald and Delaware (2009), if the variable is free of values equal to or smaller than zero as in the case of Tobin's Q, a logarithmic transformation is applied. In addition to a transformation, potential outliers of the dependent variable are removed from the dataset. Analogue to Sheskin (2003), the outlier removal is conducted by trimming of the dataset and thus removing a fixed percentage, in this case 1%, of the highest and lowest values of the variable in focus. If the normal distribution assumption of the ANOVA is still violated after implementing the previously introduced measures, the Kruskal-Wallis-H-test is conducted as the non-parametric equivalent of the ANOVA. In contrast to the one-way ANOVA, the Kruskal-Wallis-H-test is robust against violations of the normality assumption of the dependent variable. Analogue to the one-way ANOVA test, if the result of the Kruskal-Wallis-H-test is significant, the dependent variable differs significantly across the groups of analysis (Sheskin, 2003). To check for robustness of the results, the mean comparison is conducted with all combinations of adjustments to the data set, i.e., data transformation and outlier removal.

The information provided in this subchapter so far defines the statistical methodology used to conduct the mean comparison. In the following, the approach for grouping the firm year observations based on the firm growth modes is illustrated. The definition of the predominant firm growth mode for each year and thus the grouping of firm year observations was conducted along two alternative approaches. In the following, these two approaches are discussed in detail.

(1) The first approach compares the magnitude of the growth mode rates in each firm year observation and identifies the maximum growth mode. Hence, according to this approach, the growth mode with the highest growth rate represents the predominant firm growth mode for each firm year observation. Firm year observations with negative growth rates for all two or three firm growth modes, respectively, are grouped separately, since none of the growth modes contributes to a positive firm growth in the specific year of observation.

(2) In addition to the first, rather basic grouping approach, the second approach analyses the relative importance of firm growth modes within firm year observations in a more detailed method. The identification of the predominant firm growth mode for each firm year observation follows several steps.

First, the grouping of firm years based on the predominant firm growth mode by firm year requires the identification of the relatively most important firm growth modes in a firm year observation. In the second approach, in order to allow for an unbiased comparison between growth modes, firms, and years, the relative share of each growth mode's rate in each firm year observation is determined by dividing each growth mode's rate by the total growth of a firm for the respective year. Hence, we express each growth mode as a share of a firm's total growth in a respective year and is thus defined as follows:

$$(Eq. 14) \quad \frac{FGR_t}{FGR_t} = \frac{IGR_t}{FGR_t} + \frac{OGR_t}{FGR_t} = \frac{IGR_t}{FGR_t} + \frac{MMGR_t}{FGR_t} + \frac{MSCGR_t}{FGR_t}$$

The sum of shares representing all growth modes, naturally, equals 100%. For firm year observations with a total growth rate of less than 0.0%, the corresponding growth mode shares are multiplied by -1 to ensure the comparability of firm year observations.

In a second step, the 25%-quartile of all growth mode shares across all firm year observations is determined. Analogue to Viguerie et al. (2011), a growth mode within a specific firm year observation is defined as predominant, if it lies within the previously defined 25%-quartile. The firm year observations with none of the two or three growth mode shares, respectively, situated in the 25%-quartile are grouped separately in a cluster labeled "non-dominant". Furthermore, in case two growth mode shares of one firm year observation are part of the 25%-quartile simultaneously[19], the respective firm year observation is doubled in the dataset and each of the growth modes in the 25%-quartile defined as predominant in one of the two versions of the firm year observation in focus. The simultaneous presence of two growth mode shares of the 25%-quartile in one firm year observation appears in 15 and 22 cases for the two- and the three-growth-modes-model, respectively. Hence, the number of firm year observations increases by 15 and 22 from 404 to 419 and 426 in total, respectively. Analogue to the first approach, firm year observations with all growth mode contributions being negative are grouped separately.

In the following subchapter, the results of these two grouping approaches are used as the basis for the mean comparison analysis. For both grouping approaches, observations grouped as "negative" were excluded from the analysis as the number of observations in both cases is substantially below the minimum required number of 30 observations per group for the ANOVA (Walker & Almond, 2010).

8.2.2 Mean Comparison Results

Based on the methodology introduced in the previous subchapter, the following subchapter provides the corresponding results of the mean comparison analysis. First, the results of the two-growth-modes-model are illustrated followed by the results of the three-growth-modes-model.

[19] Theoretically, in case of the three-growth-modes-model, all three growth mode shares can be part of the 25%-quartile. However, the dataset at hand provides no firm year observations with these characteristics.

8.2.2.1 *Results of Two-Growth-Modes Mean Comparison*

This subchapter exemplifies the results of the mean comparison analysis for the two-growth-modes-model according to both grouping approaches introduced in the previous subchapter.

At first, the results of the first grouping approach are discussed. The frequency distribution of grouping the firm year observations with respect to growth modes is consistent to the results of the descriptive statistics provided in subchapter 8.1, which indicate organic growth to be the predominant firm growth mode.

Table 9. Two-Growth-Modes: Mean Comparison Results (First Grouping Approach).

	Dependent Variable							
	TQ_0		TQ_1		TQ_2		TQ_3	
Group	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**
IG	101	1.21	102	1.32	101	1.30	81	1.35
OG	278	1.30	277	1.29	276	1.35	252	1.34
Total	379	1.27	379	1.30	377	1.33	333	1.34
F-Test (p-value)	1.59(0.208)		0.20(0.655)		0.57(0.449)		0.01(0.934)	
Kruskal Wallis ($\chi 2$)	0.265(0.607)		1.445(0.229)		0.343(0.558)		0.424(0.515)	
Levene (p-value)	0.017*		0.177		0.254		0.203	

Note. Own illustration. Analysis excludes observations grouped as „negative“. Level of significance: *: $p/\chi 2<0.05$; **: $p/\chi 2<0.01$: ***: $p/\chi 2<0.001$.

As illustrated in Table 9, the mean comparisons for the two-growth-modes-model show heterogeneous results across variables. The means in case of TQ_0 and TQ_2 express higher values for organic growth and thus are in line with hypothesis H1. Contrarily, the results for TQ_1 and TQ_3 show a higher mean performance for inorganic growth. However, as the ANOVA as well as the Kruskal Wallis test show test statistics substantially higher than 0.05, the mean differences between the different growth modes are statistically insignificant and thus can only be regarded as indicative. To test the robustness of these results, the same analysis was conducted after trimming the data set by 1% for the highest and lowest values of the respective dependent variable.

As exemplified in Table 10, the results of the mean comparison for the two-growth-modes model and the first grouping approach are robust for the correction of outliers. TQ_0 and TQ_2 show higher means for organic growth, whereas TQ_1 and TQ_3 contrarily show higher means for inorganic growth. Consistent to the results before the elimination of outliers, the mean differences are statistically insignificant according to the ANOVA as well as the Kruskal Wallis test. Moreover, the results are robust for a logarithmic transformation of the dependent variables, both before and after the elimination of outliers (see Table D2 and Table D3). Hence, the results of the two-growth-modes mean comparison based on the first grouping approach of firm growth modes only provides limited insights with respect to hypothesis H1.

Table 10. Two-Growth-Modes: Mean Comparison Results (First Grouping Approach) After Outlier Elimination.

	Dependent Variable							
	TQ_0		**TQ_1**		**TQ_2**		**TQ_3**	
Group	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**
IG	101	1.21	102	1.32	100	1.27	81	1.35
OG	272	1.28	271	1.28	271	1.34	247	1.32
Total	373	1.26	373	1.29	371	1.32	328	1.32
F-Test (p-value)		1.20(0.273)		0.60(0.437)		1.23(0.269)		0.21(0.648)
Kruskal Wallis ($\chi 2$)		0.275(0.600)		1.501(0.221)		0.645(0.422)		0.515(0.473)
Levene (p-value)		0.062		0.494		0.150		0.530

Note. Own illustration. Analysis excludes observations grouped as „negative“. Dataset is trimmed by 1% of the highest and lowest value for each dependent variable. Level of significance: *: $p/\chi 2<0.05$; **: $p/\chi 2<0.01$: ***: $p/\chi 2<0.001$.

Subsequent to the first grouping approach, the results of the second grouping approach for the two-growth-modes-model are illustrated in the following.

As exemplified in Table 11, organic growth shows consistently higher mean values than firm year observations classified as inorganic growth or non-dominant across all performance variables. Hence, the results are in line with hypothesis H1. For TQ_0 and TQ_2, the results are statistically significant according to the ANOVA and the Kruskal Wallis test. For TQ_2 the mean differences are resilient, as the Levene’s test is not significant implying homoscedasticity of variances. The results are robust to a logarithmic transformation of the dependent variables (see Table D4).

Table 11. Two-Growth-Modes: Mean Comparison Results (Second Grouping Approach).

	Dependent Variable							
	TQ0		TQ1		TQ2		TQ3	
Group	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**
IG	30	1.11	30	1.16	31	1.18	29	1.19
OG	167	1.37	167	1.36	165	1.42	153	1.38
Non-dominant	196	1.21	196	1.28	196	1.29	165	1.33
Total	393	1.27	393	1.30	392	1.34	347	1.34
F-Test (p-value)	5.12(0.006)**		1.93(0.146)		3.30(0.038)*		1.32(0.269)	
Kruskal Wallis (χ2)	9.797(0.008)**		3.413(0.182)		7.631(0.022)*		1.517(0.468)	
Levene (p-value)	0.028*		0.135		0.102		0.029	

Note. Own illustration. Analysis excludes observations grouped as „negative“. Level of significance: *: p/χ2<0.05; **: p/χ2<0.01: ***: p/χ2<0.001.

Analogue to the first grouping approach, the results are tested for robustness to the elimination of outliers. The results are presented in the following.

Table 12. Two-Growth-Modes: Mean Comparison Results (Second Grouping Approach) After Outlier Elimination.

	Dependent Variable							
	TQ0		TQ1		TQ2		TQ3	
Group	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**
IG	30	1.11	30	1.16	31	1.18	29	1.19
OG	162	1.32	162	1.34	161	1.41	148	1.34
Non-dominant	193	1.23	193	1.27	193	1.26	165	1.33
Total	385	1.26	385	1.29	385	1.32	342	1.32
F-Test (p-value)	3.11(0.046)*		1.81(0.165)		4.42(0.013)*		1.03(0.360)	
Kruskal Wallis (χ2)	7.677(0.022)*		3.606(0.165)		8.362(0.015)*		1.413(0.494)	
Levene (p-value)	0.218		0.279		0.060		0.050	

Note. Own illustration. Analysis excludes observations grouped as „negative“. Dataset is trimmed by 1% of the highest and lowest value for each dependent variable. Level of significance: *: p/χ2<0.05; **: p/χ2<0.01: ***: p/χ2<0.001.

The results of the mean comparison after the elimination of outliers are consistent to the results before outlier removal as previously presented. Organic growth shows constantly higher performance means than inorganic growth. Additionally, the mean differences for TQ0 and TQ2 are statistically significant at the 0.05 level implying organic growth to have better performance effects than inorganic growth. The results are robust for a logarithmic transformation of the dependent variables (see Table D5).

In summary, the mean comparison for the two-growth-modes-model shows heterogeneous results for the first grouping approach and significantly better performance effects of organic growth compared to inorganic growth in the more differentiated second grouping approach. Consequently, the results of the second grouping approach are indicatively in line with the research hypothesis H1.

8.2.2.2 *Results of Three-Growth-Modes Mean Comparison*

The following subchapter discusses the results of the mean comparison analysis for the three-growth-modes-model and thus provides initial analytical information with respect to research hypotheses H2, H3, and H4. Analogue to the two-growth-modes-model, the results based on the first grouping approach are illustrated at the start followed by the results of the second grouping approach.

Table 13. Three-Growth-Modes: Mean Comparison Results (First Grouping Approach).

	Dependent Variable							
	TQ0		**TQ1**		**TQ2**		**TQ3**	
Group	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**
IG	65	1.12	66	1.21	65	1.14	60	1.23
MMG	246	1.30	246	1.32	246	1.39	213	1.39
MSCG	77	1.32	77	1.33	76	1.29	66	1.27
Total	388	1.27	389	1.30	387	1.33	339	1.34
F-Test (p-value)	3.06(0.048)*		1.05(0.353)		4.93(0.008)**		2.14(0.120)	
Kruskal Wallis (χ2)	4.811(0.090)		0.411(0.814)		7.251(0.027)*		0.943(0.624)	
Levene (p-value)	0.003**		0.009**		0.000***		0.000***	

Note. Own illustration. Analysis excludes observations grouped as „negative". Level of significance: *: p/χ2<0.05; **: p/χ2<0.01: ***: p/χ2<0.001.

Table 13 presents the mean comparison results for the three-growth-model based on the first grouping approach. For all dependent variables, the means for market momentum growth and market share change growth both show higher values compared to inorganic growth and thus are in line with the hypotheses H2 and H4. The results for comparing market momentum growth and market share change growth are heterogeneous with superior performance of market share change growth in the short-term for TQ_0 and TQ_1 and contrary results long-term for TQ_2 and TQ_3. The mean differences are significant in case of TQ_0 and TQ_2 according to the ANOVA and/or the Kruskal Wallis test, respectively. However, as the significant Levene's test in both cases indicates heterogeneity of variances across groups for TQ_0 and TQ_2, the validity of these test results needs to be questioned. To check for robustness and mitigate the effects of heteroskedasticity across groups, the dependent variables were transformed based on their natural logarithm. The results remained similar after the transformation (see Table D6). To further test the robustness of these results, the same analysis was conducted after trimming the data set by 1% for the highest and lowest value of the respective dependent variable analogue to the two-growth-modes-model.

As exemplified in Table 14, the results of the mean comparison for the three-growth-modes-model and the first grouping approach are robust for the removal of outliers. Both, growth from market momentum and market share change growth, constantly show higher performance means than inorganic growth. With respect to hypothesis H3, the outlier elimination results in market momentum growth having higher mean values in the majority of cases compared to market share change growth. Consistent to the results before the elimination of outliers, the mean differences are statistically significant according to the ANOVA and/or the Kruskal Wallis test for TQ_0 and TQ_2. However, as Levene's statistic shows significance for heteroskedasticity across groups in both cases, the validity of these test results can be questioned. The results are robust for a logarithmic transformation of the dependent variables (see Table D7).

Table 14. Three-Growth-Modes: Mean Comparison Results (First Grouping Approach) After Outlier Elimination.

	Dependent Variable							
	TQ0		TQ1		TQ2		TQ3	
Group	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**
IG	65	1.12	66	1.21	65	1.14	60	1.23
MMG	241	1.29	241	1.31	240	1.37	208	1.36
MSCG	76	1.29	76	1.29	76	1.29	65	1.28
Total	382	1.26	383	1.29	381	1.32	333	1.32
F-Test (p-value)	3.13(0.045)*		0.98(0.376)		4.92(0.008)**		1.56(0.211)	
Kruskal Wallis (χ2)	4.614(0.100)		0.516(0.773)		7.511(0.023)*		0.800(0.670)	
Levene (p-value)	0.003**		0.014*		0.000***		0.000***	

Note. Own illustration. Analysis excludes observations grouped as „negative". Dataset is trimmed by 1% of the highest and lowest value for each dependent variable. Level of significance: *: p/χ2<0.05; **: p/χ2<0.01: ***: p/χ2<0.001.

Summarized, the results of the three-growth-modes mean comparison based on the first grouping approach of firm growth modes constantly show higher performance means for market momentum growth and market share change growth over inorganic growth. The mean comparison of both modes of organic growth is inconsistent. The tests indicate significance of these mean differences for two of the four dependent variables. However, as heteroskedasticity is present, the explanatory power of these results is challengeable.

Subsequent to the first grouping approach, the results of the second grouping approach for the three-growth-modes-model are illustrated in the following.

Table 15. Three-Growth-Modes: Mean Comparison Results (Second Grouping Approach).

	Dependent Variable							
	TQ0		TQ1		TQ2		TQ3	
Group	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**
IG	38	1.15	38	1.19	39	1.27	31	1.15
MMG	203	1.31	203	1.32	204	1.38	177	1.39
MSCG	55	1.24	55	1.32	54	1.26	46	1.22
Non-dominant	113	1.26	114	1.30	111	1.30	100	1.34
Total	409	1.27	410	1.30	408	1.33	354	1.33
F-Test (p-value)		0.99(0.398)		0.54(0.657)		1.06(0.367)		2.09(0.101)
Kruskal Wallis (χ2)		1.159(0.763)		1.294(0.731)		1.614(0.656)		3.111(0.375)
Levene (p-value)		0.017*		0.072		0.020*		0.000***

Note. Own illustration. Analysis excludes observations grouped as „negative". Level of significance: *: p/χ2<0.05; **: p/χ2<0.01: ***: p/χ2<0.001.

Table 15 shows consistent mean comparison results across all variations of Tobin's Q. Across all dependent variables, market momentum growth experiences the highest mean performance. These findings are in line with research hypotheses H2 and H3. Additionally, growth via market share change shows superior performance means compared to inorganic growth except for TQ_2. These findings are in line with research hypothesis H4. However, according to the ANOVA as well as the Kruskal Wallis test, these observed mean differences are statistically insignificant. The results are robust for a logarithmic transformation of the performance metrics (see Table D8). To further test the robustness, outliers are removed from the dataset leading to the following results.

Table 16. Two-Growth-Modes: Mean Comparison Results (Second Grouping Approach) After Outlier Elimination.

	Dependent Variable							
	TQ0		TQ1		TQ2		TQ3	
Group	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**
IG	37	1.17	38	1.19	38	1.20	31	1.15
MMG	198	1.30	199	1.32	199	1.37	173	1.37
MSCG	55	1.24	53	1.22	54	1.26	45	1.24
Non-dominant	111	1.22	112	1.28	110	1.27	99	1.32
Total	401	1.26	402	1.29	401	1.31	348	1.32
F-Test (p-value)		1.05(0.373)		1.00(0.395)		1.73(0.160)		1.90(0.129)
Kruskal Wallis (χ2)		0.916(0.822)		2.073(0.558)		2.646(0.450)		2.740(0.433)
Levene (p-value)		0.005**		0.044*		0.005**		0.000***

Note. Own illustration. Analysis excludes observations grouped as „negative". Dataset is trimmed by 1% of the highest and lowest value for each dependent variable. Level of significance: *: p/χ2<0.05; **: p/χ2<0.01: ***: p/χ2<0.001.

As illustrated in Table 16, the mean comparison results remain the same after trimming the dataset. Market momentum growth shows superior mean performance compared to the other firm growth modes. Additionally, inorganic growth is characterized by lower mean performance values across all variables compared to market share change growth.

However, again, both mean comparison tests indicate the mean differences to be statistically insignificant. The results are robust to a logarithmic transformation of the Tobin's Q variations (see Table D9).

Summarized, although the mean differences are statistically insignificant, the results of the second grouping approach for the three-growth-modes-model are indicatively in line with the previously defined research hypotheses H2, H3, and H4.

8.3 Panel Regression Analysis

As the mean comparison of the previous subchapter only represents an indicative analysis with respect to the research hypotheses, this chapter focuses on the analysis of the dataset via multivariate regression as an additional analytical element. First, the choice of the suitable regression model is discussed followed by a specification of the analyzed regression equations. Subsequently, tests of the underlying assumptions of the regression models are illustrated. Afterwards, the results of the regression analysis with respect to the research hypotheses are illustrated and finally checked for robustness.

8.3.1 Choice of Panel Regression Model

Following the results of the descriptive statistics, in particular the analysis of the firm growth modes and the corresponding mean comparison in the previous subchapters, this subchapter as well focuses on determining the effects of the different firm growth modes on firm performance applying a multiple regression analysis. In general, a multiple regression analysis aims at explaining the variation of a dependent variable by employing a linear function of two or more independent variables (Allen, 2007)[20]. Consistent to the previously introduced descriptive statistics, the regression analysis is based on the same unbalanced panel data sample covering the 50 sample firms, i.e., N=50, with a maximum of nine growth modes observations, i.e., T=9, resulting in 404 firm growth observations in total. The panel data set has a number of advantages in comparison to differently structured data sets, e.g., purely cross-sectional or purely time-series data. First, panel data sets

[20] For a general introduction to multiple regression analysis see, e.g., Backhaus, Erichson, Plinke, and Weiber (2006) or Greene (2011).

contain a higher sample variability, lower collinearity between the independent variables, and a larger number of degrees of freedom and thus enable an improvement in efficiency, i.e., lower variance of the standard errors, of econometric estimates (Hsiao, Mountain, & Illman, 1995; Ullah, 1998). Second, panel data sets allow for controlling the effects of omitted variables. Panel data comprises information on individual-specific, in case of this dissertation sample firm specific, characteristics and intertemporal dynamics and allows controlling for this unobserved heterogeneity. The presence of heterogeneity across these factors could result in biased estimators of the econometric regression analysis. The ability to control for the effects of unobserved heterogeneity helps to ensure the exogeneity assumption, i.e., the non-correlation of the error term and the explanatory variables (Hsiao, 2007; Wooldridge, 2012). Further, however in this case less relevant, advantages of panel data comprise the better fit to capture human behavior complexity or the simplification of statistical interference and computation (Hsiao, 2007).

For the analysis of panel data sets, a range of different regression models exists. As the dependent variables of the data panel set are of metrical scale, four different panel regression models are theoretically applicable to analyze the data set at hand: (1) Pooled regression, (2) between effects regression, (3) fixed effects regression, and (4) random effects regression (Cameron & Trivedi, 2005; Giesselmann & Windzio, 2012; Greene, 2011; Wooldridge, 2012). The ordinary least square (OLS) regression acts as the basis of all of these approaches[21]. However, in comparison to the general OLS regression, the panel regression approaches conduct a transformation of the data in order exploit the advantages of panel data sets. Consequently, the differences between the respective panel regression approaches relate back to the diverging methods of transforming the respective panel data set at the beginning of the analysis (Cameron & Trivedi, 2005). In the following, the respective panel regression approaches are introduced followed by a discussion of their appropriateness for the empirical analysis of the data set of this dissertation.

(1) In contrast to the other regression model options, the pooled OLS regression analyzes the data set at hand without any transformation to the data. Pooled OLS regression combines all the data and ignores the grouped nature of the data, i.e., more than one observation stemming from the same unit of observation (Petersen, 2004). Consequently, the

[21] For more detailed information on OLS regression see, e.g., Fox (1991) or D. C. Montgomery, Peck, and Vining (2012).

model generates consistent estimators only in case of no correlation between the independent variables and the error term as well as no correlation between the independent variables and the intercept (Giesselmann & Windzio, 2012). Consistency refers to convergence of a regression coefficient to its true value in case of an increasing number of observations (Georgii, 2015; Wooldridge, 2012). Thus, the application of a pooled OLS regression in the context of a panel data set assumes constant coefficients across the units of observation, i.e., in case of this dissertation the different sample firms, and across the points in time or vice versa no heterogeneity between subjects and time periods (Gujarati, 2014).

(2) The between effects regression or regression-on-group-means regression model is based on firm-specific means of the independent variables over the period of investigation. To conduct the analysis, the determination of firm-specific means across time represents the relevant transformation of the data for the between effects regression model (Hassett & Paavilainen-Mäntymäki, 2013). As a consequence of this data transformation, the between effects regression disregards variation in the data over time and only considers variation between the respective subjects of observations, i.e., firms in case of this dissertation. Hence, the between effects regression generates estimators purely based on cross-sectional comparisons (Cameron & Trivedi, 2005). The between effects regression results are consistent in case of strict exogeneity of the independent variables and their non-correlation with the intercept. Exogeneity refers to non-correlation of the independent variables with the error term (Wooldridge, 2012). Conversely, the between effects regression estimators are inconsistent in case of correlation between unobserved individual effects and the independent variables (Brich & Hasenbalg, 2013).

(3) Whereas the between effects regression analyses the variance between the subjects of observation, the fixed effects regression model focuses on the variance between the individual observations for each subject over time. In order to be able to perform this regression model, a transformation of the panel data referred to as demeaning needs to be conducted (Wooldridge, 2012). Demeaning determines the difference between each firm year observation and the corresponding firm mean of a variable resulting in an elimination of any unobserved, time-invariant, and firm-specific heterogeneity (Brooks, 2008). Consequently, the fixed effects regression model is based entirely on the within variance of the data set. Fixed effects regression models consider the unobserved effects as potentially

correlated to the independent variables. This results in inconsistent estimators of, e.g., the pooled OLS in the presence of fixed effects (Cameron & Trivedi, 2005). The model generates consistent estimators in case of strict exogeneity of the independent variables. However, the fixed effects regression results in a decrease in degrees of freedom as for every unit of observation an additional variable estimating the respective mean needs to be introduced to the model (Wooldridge, 2012). Nevertheless, the fixed effects regression model is the most commonly applied approach by researchers analyzing panel data (Cameron & Trivedi, 2005; Clark & Linzer, 2015).

(4) In contrast to the fixed effects regression model, the random effects regression model assumes unobserved individual effects to be independent, i.e., uncorrelated, of the independent variables. Consequently, the error term as well as the unobserved effects are assumed to be independent random variables (Cameron & Trivedi, 2005). The random effects model is based on a complex transformation of the data. The estimators constitute a weighted average of the estimators of the between effects regression model and the fixed effects regression model as the firm-specific mean is subject to uncertainty. The weighting factor between the between effects estimator and the fixed effects estimator is based on the number of observations by subject of analysis, i.e., the firm, as well as the ratio of the within variance to the total variance. If the assumption of non-correlation between the unobserved effects and the independent variables holds, the random effects model generates more efficient estimators than the fixed effects model. However, the assumption of full independence between the independent variables and the individual error terms is violated frequently resulting in biased estimators of the random effects regression (Baltagi, 2008; Giesselmann & Windzio, 2012; Hassett & Paavilainen-Mäntymäki, 2013; Wooldridge, 2012).

These four different models represent the options for analyzing the panel data set at hand. Based on their individual characteristics, the best model with respect to consistency and efficiency of the regression estimators needs to be selected (Giesselmann & Windzio, 2012). In the following, each model and its corresponding appropriateness with respect to the panel data set of this dissertation is discussed.

As illustrated, the pooled OLS regression is based on the assumption of homogeneity between the objects of analysis and the time periods covered. This assumption does not hold in case of the panel data set to be analyzed in the empirical analysis of this dissertation. However, as the independent as well as control variables differ substantially over time for individual companies, the existence of heterogeneity across the time periods covered seems plausible. Consequently, the pooled OLS regression model is not appropriate to be applied in this context.

In addition to the pooled OLS regression, the between effects regression model as well is not appropriate for analyzing the panel data set at hand. As previously illustrated, the data set for the analysis has an unbalanced structure, i.e., it contains an unequal number of firm year observations across the sample firms. Hence, the determined firm-specific means used in the between effects regression contain a varying number of data points and thus varying degrees of information resulting in biased estimators. Additionally, the firm-specific means of independent variables are difficult to interpret in a meaningful way (Giesselmann & Windzio, 2012). Both factors argue against the application of the between effects regression model in the context of this dissertation.

The exclusion of the pooled OLS regression as well as the between effects regression leaves the fixed effects and random effects regression models as the two potential options for analyzing the data set at hand.

Both models, the fixed as well as the random effects model, consider unobserved heterogeneity (Good & Hardin, 2012). In a direct comparison of both regression models, the random effects model generates more efficient regression estimators. This is based on the fact that the random effects model does not require a within transformation or the introduction of dummy variables. Consequently, less parameters need to be estimated thus saving degrees of freedom resulting in a higher efficiency of the coefficient estimates (Brooks, 2008). However, as illustrated previously, the random effects model requires the individual error term, i.e., the unobserved variables, to not be correlated with the observed independent variables of the regression (Allison, 2009). As introduced, if this assumption is violated, the random effects model, contrary to the fixed effects model, generates inconsistent results (Wooldridge, 2012). In order to decide between the application of the fixed and the random effects regression model in the context of this dissertation, theoretical and statistical arguments are considered. From a theoretical perspective, the question arises, if additional, unobserved variables, which are correlated with the observed independent variables, exist. In case of this dissertation, e.g., the corporate culture (Cartwright

& Schoenberg, 2006; Teece, 1996) or the top-management gender diversity (Bugeja, Ghannam, Matolcsy, & Spiropoulos, 2012) may influence a firm's choice of growth mode, e.g., M&A, and thus potentially influence firm performance. Hence, from a theoretical perspective, the necessary assumption for the random effects model is potentially violated favoring the application of the fixed effects regression model. In addition to these theoretical considerations, the specification test according to Hausman (1978) provides a statistical decision instrument for the choice between the two models. The Hausman test analyses the correctness of the assumption of non-correlation between the unobserved variables on the one hand and the independent variables on the other hand made in case of the random effects model. If this assumption is not violated, the coefficient estimates generated by the random effects model should be similar to the estimates of the fixed effects model. Consequently, the Hausman test focuses on the difference between the two models' coefficient estimates. The test's null hypothesis states no significant differences between the estimates of the two models. Hence, if the test reveals a significant difference between the coefficient estimates, the null hypothesis is rejected indicating a correlation between the individual error terms and the independent variables supporting the application of the fixed effects model. In case, the Hausman test fails to reject the null hypothesis, it is an indication of statistical independence of the unobserved and independent variables favoring the application of the random effects model (Clark & Linzer, 2015; Greene, 2011). In the specific context of this dissertation, the results of the Hausman test vary depending on the application of dependent and independent variables in the respective regression model as illustrated in each regression table. Since in the majority of cases the Hausman test supports the use of the fixed effects model in addition to the theoretical arguments provided above, the regression results presented in the following subchapters are based on the fixed effects regression model. However, in order to provide a comprehensive analysis, the results of each corresponding random effects regression model are illustrated in the appendix. The regression results between the fixed and random effects model are consistent across the different analyses. Hence, the regression results are not dependent on the choice of regression methodology.

8.3.2 Regression Equations

Whereas the previous subchapter elaborates on the selection of the panel regression method applied in general within this thesis, this subchapter specifically defines the regression equations used within the regression analysis. Based on the previously defined dependent variables and research hypotheses, the regression analysis comprises several regression equations. The analysis and thus the regression equations are based on the two- as well as the three-growth-modes-models in order to analyze the derived research hypotheses. Consequently, each dependent variable, i.e., TQ_0, TQ_1, TQ_2, and TQ_3, is regressed via both models resulting regression equations as presented in the following.

Two-growth-modes-model:

$$\text{(Eq. 15)} \quad TQ_0 = \alpha + \beta_1 * IGR_{it} + \beta_2 * OGR_{it} + \beta_3 * FSIZE_{it} + \beta_4 * FAGE_{it} + \beta_5 * R\&D_{it} + \beta_6 * LEV_{it}$$

$$\text{(Eq. 16)} \quad TQ_1 = \alpha + \beta_1 * IGR_{it} + \beta_2 * OGR_{it} + \beta_3 * FSIZE_{it} + \beta_4 * FAGE_{it} + \beta_5 * R\&D_{it} + \beta_6 * LEV_{it}$$

$$\text{(Eq. 17)} \quad TQ_2 = \alpha + \beta_1 * IGR_{it} + \beta_2 * OGR_{it} + \beta_3 * FSIZE_{it} + \beta_4 * FAGE_{it} + \beta_5 * R\&D_{it} + \beta_6 * LEV_{it}$$

$$\text{(Eq. 18)} \quad TQ_3 = \alpha + \beta_1 * IGR_{it} + \beta_2 * OGR_{it} + \beta_3 * FSIZE_{it} + \beta_4 * FAGE_{it} + \beta_5 * R\&D_{it} + \beta_6 * LEV_{it}$$

Three-growth-modes-model:

$$\text{(Eq. 19)} \quad TQ_0 = \alpha + \beta_1 * IGR_{it} + \beta_2 * MMG_{it} + \beta_3 * MSCG_{it} + \beta_4 * FSIZE_{it} + \beta_5 * FAGE_{it} + \beta_6 * R\&D_{it} + \beta_7 * LEV_{it}$$

$$\text{(Eq. 20)} \quad TQ_1 = \alpha + \beta_1 * IGR_{it} + \beta_2 * MMG_{it} + \beta_3 * MSCG_{it} + \beta_4 * FSIZE_{it} + \beta_5 * FAGE_{it} + \beta_6 * R\&D_{it} + \beta_7 * LEV_{it}$$

$$\text{(Eq. 21)} \quad TQ_2 = \alpha + \beta_1 * IGR_{it} + \beta_2 * MMG_{it} + \beta_3 * MSCG_{it} + \beta_4 * FSIZE_{it} + \beta_5 * FAGE_{it} + \beta_6 * R\&D_{it} + \beta_7 * LEV_{it}$$

$$\text{(Eq. 22)} \quad TQ_3 = \alpha + \beta_1 * IGR_{it} + \beta_2 * MMG_{it} + \beta_3 * MSCG_{it} + \beta_4 * FSIZE_{it} + \beta_5 * FAGE_{it} + \beta_6 * R\&D_{it} + \beta_7 * LEV_{it}$$

The above listed equations represent the basis for the regression analysis. In addition to these equations, variations of these equations will be part of the analysis in order to check for the robustness of the results.

8.3.3 Test of Regression Model Assumptions

The previous subchapter illustrated the regression equations applied within the empirical analysis. Based on this, the following subchapter focuses on testing the regression model assumptions as an essential part of every multivariate regression analysis (Backhaus, Erichson, Plinke, & Weiber, 2013). As for every OLS regression, the regression analysis of panel data sets requires five assumptions to hold in order to generate unbiased and efficient estimates with the smallest variance possible. These five assumptions comprise (1) the linearity of parameters, (2) a zero conditional mean of the error term, (3) homoscedasticity of the error term, (4) no perfect multicollinearity between the independent variables, and (5) no autocorrelation of the error terms (Backhaus et al., 2013; Greene, 2011; Wooldridge, 2012). Since outlier potentially impact the regression results in a panel data context substantially (Hair, Black, Babin, & Anderson, 2013; Kohler & Kreuter, 2008), the regression model is as well tested for the impact of (6) multivariate outliers in addition to the five general assumption to be tested for the OLS.

Table 17. Overview of Regression Diagnostic.

Assumption	Diagnostic test	Result	Countermeasure
Linearity of parameters	▪ Empirical studies covering the respective relationships of the variables ▪ Visual inspection of scatter plots	Fulfilled	-
Zero conditional mean of error term	▪ Visual inspection of residual plot	Fulfilled	-
Homoscedasticity of error terms	▪ Modified Wald test according to Greene (2011)	Violated	Application of robust regression estimators according to Huber (1967)/White (1980)
No perfect multicollinearity between independent variables	▪ Correlation matrix ▪ Variance inflation factor	Fulfilled	-
No autocorrelation of the error terms	▪ Lagrange multiplier test according to Wooldridge (2010) ▪ Visual inspection of residuals versus estimated values	Violated	Application of robust regression estimators according to Huber (1967)/White (1980)
Multivariate outliers	▪ Standardized residuals analysis	Violated	Exclusion of observations with standardized residuals < -2 or > 2

Note. Own illustration based on Backhaus et al. (2013), Chatterjee and Hadi (2015), Kohler and Kreuter (2008).

Table 17 provides a summary of the regression diagnostic including the tests conducted, the corresponding results, as well as the adaption mechanism applied in case of a violation of the assumptions. In the following, the six assumptions are briefly introduced and assessed individually. The regression diagnostic is conducted for all regression models applied in the analysis. Since some of the usual regression diagnostic tests are not applicable in the context of a panel data set, the regression tests applied represent panel data set-compatible approaches for testing the regression assumptions (Baltagi, 2008; Greene, 2011; Wooldridge, 2010).

The basic prerequisite for the linear regression model is a linear relationship between the dependent and the independent variables. Hence, the change in the mean value of the dependent variable in response to a change in one independent variable, while holding all other variables fixed, is the same independent from the value of the independent variable (Berry & Feldman, 1985). Nonlinearity of the parameters may, e.g., arise from growth or saturation trends (Backhaus et al., 2013). In the specific case of this dissertation, chapter

5 as well as subchapter 7.4 provided detailed information about a large number of academic empirical studies who have identified a linear relationship between the independent variables and firm performance metrics. In addition to comparable empirical studies, the visual inspection of the scatter diagram of the respective variables can be used to test the assumption of linearity (Wolf & Best, 2011). In case of this dissertation, the scatter diagram inspection shows linear relationships between the parameters. Consequently, the assumption of linearity is considered as fulfilled.

Additionally, linear regression models assume a zero conditional mean of the error term. Consequently, the error term only expresses random effects, which explain the deviations between the actual and estimated values. In case of a violation, the estimates of the intercept are biased (Berry & Feldman, 1985; Gordon, 2015). The visual inspection of a plot displaying the estimated error terms of the regression is an instrument to test this assumption (Kohler & Kreuter, 2008). In case of this dissertation, the visual inspection of the residual plot confirms a mean value of zero of the error term. Hence, the assumption is regarded as fulfilled in this case.

Furthermore, linear regression models assume a homogeneous variance of the error term referred to as homoscedasticity (Hackl, 2008). A homogeneous variance refers to a constant variance of the error term independent of the value of the independent variables. Hence, the assumption is violated in case the error term does not have a constant variance referred to as heteroskedasticity (Berry & Feldman, 1985). The presence of heteroskedasticity results in inefficient coefficient estimates. A first diagnostic instrument to test for heteroskedasticity is to visually inspect the residuals plot (Backhaus et al., 2013). In addition to the visual inspection, the modified Wald-test according to Greene (2011) is applied to test for heteroskedasticity. In case of this dissertation, the modified Wald-test indicates the existence of heteroskedasticity in every model applied in the analysis. To overcome the violation of the homoscedasticity assumption, the application of robust regression approaches generates efficient coefficient estimators (Jann, 2010). Since the dataset comprises more than 20 units of observation (Rogers, 1994), i.e., companies, the prerequisite for the application of robust regression estimators is fulfilled. The robust regression used in this dissertation follows the approach suggested by Huber (1967) and White (1980), also referred to as the Huber-White-sandwich estimator (Freedman, 2006). The Huber-White-sandwich estimator generates robust standard errors in the presence of heteroskedasticity (C. F. Baum, 2006). The homoscedasticity tests consistently indicate the existence of heteroskedasticity of the error terms across regressions. Since this assumption is consistently violated, the regression results of all models are based on the robust regression estimators.

Moreover, linear regression models assume a linear independency of the independent variables. A strong or perfect linear relation between the independent variables is referred to as multicollinearity (Albers, Klapper, Konradt, Walter, & Wolf, 2009). The presence of multicollinearity results in increased standard errors potentially leading to less reliable estimators (Backhaus et al., 2013). To test for the existence of multicollinearity, the analysis of a correlation matrix for the independent variables involved represents an initial diagnostic instrument to test for the existence of multicollinearity. A high correlation coefficient, according to Kennedy (2003) defined as less than -0.8 or more than +0.8, is an indicator for the presence of multicollinearity. As previously illustrated in the descriptive statistics, the data set at hand shows no indication of multicollinearity based on the analysis of the correlation matrix. In addition to the correlation matrix, the variance inflation factor represents a frequently used instrument to test for multicollinearity in panel data sets. It is derived as the inverse tolerance of the regression model and values of more than 10 are regarded as critical, i.e., are a sign for the presence of multicollinearity (Belsley, Kuh, & Welsch, 2005; Marquaridt, 1970). In case of this dissertation, the variance inflation factor indicates no multicollinearity of concern. As illustrated in Table 18, the variance inflation indicators are consistently below the, according to Belsley et al. (2005), critical value of 10 averaging a value of 1.09. Consequently, the assumption of no multicollinearity is considered as fulfilled.

Table 18. Overview of Multicollinearity Diagnostics.

	Two-Growth-Modes-Model			Three-Growth-Modes-Model		
Variable	**VIF**	**SQRT VIF**	**Tolerance**	**VIF**	**SQRT VIF**	**Tolerance**
IG	1.07	1.03	0.935	1.07	1.03	0.935
OG	1.01	1.01	0.988			
MMG				1.03	1.02	0.966
MSCG				1.04	1.02	0.962
FAGE	1.15	1.07	0.868	1.15	1.15	0.866
FSIZE	1.04	1.02	0.963	1.04	1.02	0.958
R&D	1.07	1.04	0.933	1.10	1.05	0.912
LEV	1.12	1.06	0.896	1.13	1.06	0.888
Mean	**1.08**			**1.08**		

Note. Own illustration. Analysis based on 394 firm year observations for the analysis of TQ_0. The VIFs for all other regression models show consistent results.

Additionally, linear regression models assume independency, i.e., no correlation, of the error terms. A violation of these premises is referred to as autocorrelation. Autocorrelation results in biased estimates of the standard errors for the regression coefficients (Backhaus et al., 2013). To test for autocorrelation, a visual inspection of plotting the residuals against the estimates of the independent variables can be conducted (Argyrous, 2011; Auer & Rottmann, 2014). Furthermore, the Lagrange multiplier test according to Wooldridge (2010) is applied to test for autocorrelation. The test is valid for fixed as well as random effects regressions (Drukker, 2003). In case of this dissertation, the visual inspection as well as the Lagrange multiplier test indicate the existence of autocorrelation across the regression models applied. However, the previously introduced application of robust Huber-White-sandwich estimators also controls for autocorrelation (C. F. Baum, 2006) and thus are utilized in this case.

Finally, multivariate outliers are defined as observations comprised in the data set deviating considerably from the remaining data points and thus influence the estimation results substantially (Auer & Rottmann, 2014; Schendera, 2007). Within the data set of this dissertation, all observations with standardized residuals greater than 2 or lower than -2 are classified as multivariate outliers following the approach of Jann (2006). Depending on the dependent variable, the dataset comprises up to 21 multivariate outliers. In order to check for robustness, the regression analysis is conducted before and after excluding the identified outliers from the analysis.

8.3.4 Results of Panel Regression

The following subchapter presents the results of the panel regression analysis. Analogue to the mean comparison analysis, the results of the two-growth-modes-model are discussed first followed by the outcomes of the three-growth-modes-model.

8.3.4.1 *Results of the Two-Growth-Modes-Model Panel Regression*

This subchapter discusses the panel regression results of the two-growth-modes-model. Consequently, this subchapter in particular analyzes hypothesis H1, which assumes organic growth to have better performance effects compared to inorganic growth. First, the regression results before the removal of multivariate outliers are exemplified. Subsequently, the results after eliminating these outliers are discussed.

Table 19 reports the results from the regressions exploring the effects of inorganic and organic growth on firm performance. As introduced in subchapter 7.4, the dependent variables are different time variations of Tobin's Q representing one column each. Firm age (FAGE), firm size (FSIZE), R&D intensity (R&D), and the leverage ratio (LEV) are included as control variables. The arrangement of variables is consistent across all tables of regression results. Deviations from this arrangement are explained individually in each case.

Table 19. Two-Growth-Modes-Model: OLS Fixed Effects Regression Results.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.227 (0.2564)	-0.186 (0.2534)	-0.343* (0.0435)	-0.196 (0.0791)
OG	0.247 (0.0777)	-0.057 (0.5781)	0.440*** (0.0000)	0.080 (0.3914)
FAGE	0.008 (0.4713)	0.023 (0.0736)	0.048** (0.0021)	0.068*** (0.0006)
FSIZE	-0.000 (0.0701)	-0.000 (0.3281)	-0.000 (0.6603)	-0.000** (0.0056)
R&D	-4.727 (0.4309)	-2.126 (0.6451)	0.361 (0.9329)	5.463 (0.2424)
LEV	-0.622 (0.0964)	0.334 (0.5656)	0.273 (0.4787)	-0.244 (0.4810)
CONSTANT	0.792 (0.5014)	-1.109 (0.4009)	-3.888* (0.0187)	-5.855** (0.0045)
N	394	395	393	345
R^2 (within)	0.053	0.034	0.150	0.177
R^2 (between)	0.000	0.002	0.008	0.008
R^2 (overall)	0.000	0.002	0.006	0.007
Hausman (χ^2)	0.164	0.293	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Across all model specifications, organic growth shows more positive coefficients than inorganic growth. In case of TQ_2 as the dependent variable, the coefficient of organic growth (OG) is positive and statistically significant whereas the inorganic growth (IG) coefficient is negative and statistically significant. These findings from estimating the fixed effects model, especially for TQ_2, considerably support the hypothesis H1 of organic firm growth having better performance effects than inorganic firm growth. Among the control variables, firm age has positive coefficients across all models with statistical significance for TQ_2 and TQ_3. The results for firm size show no effects on Tobin's Q in all model specifications. The effect of R&D intensity on firm performance is negative yet statistically insignificant in the short-run, i.e., TQ_1 and TQ_2, and positive yet statistically insignificant in the long-term, i.e., for TQ_2 and TQ_3. The leverage ratio shows heterogeneous and statistically insignificant coefficients for all models. The results for firm age and R&D intensity are generally in line with those documented in prior literature. Moreover, the low R^2 values are common for studies analyzing firm performance as seen, e.g., in Brav, Jiang, Partnoy, and Thomas (2008) or Kale et al. (2009). The random effects model estimates are consistent to the results of the above presented fixed effects model results. Organic growth consistently shows more positive coefficients than inorganic growth. In addition to the significant results for TQ_2, the model reports statistical significance for TQ_0 as well. Consequently, the results of the random effects model consistently offer strong support for hypothesis H1 stating better performance effects of organic compared to inorganic growth (see Table E1). To check for robustness of the results, the regression analysis is repeated after the elimination of multivariate outliers.

Table 20. Two-Growth-Modes-Model: OLS Fixed Effects Regression Results, Excluding Multivariate Outliers.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.051 (0.7660)	0.023 (0.8413)	-0.331* (0.0388)	-0.284* (0.0126)
OG	0.217 (0.0560)	-0.044 (0.5998)	0.402*** (0.0000)	0.044 (0.6164)
FAGE	0.015 (0.1031)	0.032** (0.0011)	0.045*** (0.0004)	0.061*** (0.0000)
FSIZE	-0.000* (0.0312)	-0.000 (0.6945)	0.000 (0.8695)	-0.000* (0.0490)
R&D	-3.604 (0.5209)	-0.779 (0.8684)	2.520 (0.6297)	2.038 (0.5119)
LEV	-0.602* (0.0217)	0.001 (0.9963)	0.289 (0.3400)	0.053 (0.8545)
CONSTANT	-0.071 (0.9406)	-2.199* (0.0319)	-3.690** (0.0047)	-5.273*** (0.0006)
N	373	376	377	329
R^2 (within)	0.075	0.088	0.193	0.225
R^2 (between)	0.003	0.009	0.013	0.008
R^2 (overall)	0.009	0.016	0.019	0.015
Hausman (χ^2)	0.003**	0.000***	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table 20 reports the results for the two-growth-modes fixed effects model after eliminating multivariate outliers. The results after elimination of outliers are consistent to the results for the unadjusted data set. Except for TQ_1, organic growth shows more positive coefficients than inorganic growth. For TQ_2 and TQ_3, the results are statistically significant. Consequently, the results after elimination of multivariate outliers as well offer considerable support for hypothesis H1. The results for the estimates of the control variables as well are consistent to the results before the elimination of outliers. Firm age shows significantly positive coefficients in most cases, the effects of firm size is negligible, R&D intensity shows increasingly positive yet statistically insignificant coefficients, and the leverage ratio shows heterogeneous effects across the variations of TQ[22]. Additionally, the corresponding random effects model reports consistent results and thus support for hypothesis H1 (see Table E2).

Summarized, the reported results of the two-growth-modes regression model considerably support hypothesis H1 stating more positive performance effects for organic compared to inorganic growth, especially for TQ_2 and TQ_3.

8.3.4.2 *Results of the Three-Growth-Modes-Model Panel Regression*

In addition to the two-growth-modes-model discussed in the previous subchapter, this subchapter discusses the panel regression results of the three-growth-modes-model. Consequently, this subchapter in particular focuses on the research hypotheses H2, H3, and H4. As previously discussed, these hypotheses compare the performance effects of inorganic firm growth and the two sub-modes of organic firm growth, i.e., market momentum growth and growth via market share change. First, the regression results before the removal of multivariate outliers are exemplified. Subsequently, the results after eliminating these outliers are discussed.

Table 21 reports the three-growth-modes-model regression results examining the effects of firm growth modes on firm performance. Analogue to the two-growth-modes-model, the dependent variables are different time variations of Tobin's Q representing one column each. The control variables comprise firm age, firm size, R&D intensity, and the leverage ratio. The results offer substantial support for the derived hypothesis. Except for TQ_1, market momentum growth reports the most positive coefficients of all three growth modes. Furthermore, market share change shows higher coefficients than inorganic

[22] For the remainder of his dissertation, the estimation results for the control variables are not discussed in detail as these are mostly consistent to the results presented in this subchapter.

growth across all model specifications. In case of TQ_0, market momentum has a considerably positive and statistically significant coefficient, whereas inorganic growth and market share change growth show insignificantly negative and slightly positive coefficients, respectively. For TQ_1, all growth modes report negative, yet statistically insignificant coefficients. With respect to TQ_2, market momentum growth has a considerably positive and statistically significant coefficient, whereas inorganic growth in contrast is significantly negative.

Table 21. Three-Growth-Modes-Model: OLS Fixed Effects Regression Results.

	Dependent Variable			
	TQ0	TQ1	TQ2	TQ3
IG	-0.240 (0.2267)	-0.184 (0.2567)	-0.340* (0.0342)	-0.193 (0.0842)
MMG	0.576* (0.0189)	-0.115 (0.5450)	0.895*** (0.0001)	0.231 (0.2002)
MSCG	0.030 (0.9261)	-0.018 (0.9203)	0.141 (0.2261)	-0.029 (0.7975)
FAGE	0.008 (0.4882)	0.023 (0.0719)	0.047** (0.0021)	0.068*** (0.0006)
FSIZE	-0.000* (0.0471)	-0.000 (0.3301)	-0.000 (0.6156)	-0.000** (0.0044)
R&D	-4.433 (0.4607)	-2.177 (0.6396)	0.696 (0.8665)	5.543 (0.2330)
LEV	-0.588 (0.1335)	0.328 (0.5693)	0.340 (0.3917)	-0.221 (0.5273)
CONSTANT	0.797 (0.4886)	-1.109 (0.4025)	-3.867* (0.0180)	-5.851** (0.0045)
N	394	395	393	345
R^2 (within)	0.062	0.035	0.166	0.179
R^2 (between)	0.000	0.002	0.008	0.008
R^2 (overall)	0.000	0.002	0.007	0.007
Hausman (χ^2)	0.322	0.387	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Market share change growth in this case is insignificant. Finally, market momentum growth has a positive coefficient, whereas inorganic growth and market share change growth are statistically insignificant and negative. The results, especially in case of TQ_0 and TQ_2, offer considerable support for the research hypotheses H2 and H3 assuming market momentum growth to have superior performance effects compared to inorganic growth and market share change growth, respectively. With respect to hypothesis H4, only the results for TQ_2 offer statistically significant support. The corresponding results of the random effects model are consistent to the fixed effects estimates (see Table E11). The analysis was repeated after excluding multivariate outliers as illustrated below.

Table 22. Three-Growth-Modes-Model: OLS Fixed Effects Regression Results, Excluding Multivariate Outliers.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.053	0.021	-0.329*	-0.282*
	(0.7591)	(0.8562)	(0.0321)	(0.0133)
MMG	0.251	0.017	0.742***	0.080
	(0.1381)	(0.9202)	(0.0000)	(0.5837)
MSCG	0.194	-0.084	0.181	0.018
	(0.1847)	(0.5608)	(0.1056)	(0.8735)
FAGE	0.015	0.032**	0.044***	0.061***
	(0.1048)	(0.0011)	(0.0003)	(0.0000)
FSIZE	-0.000*	-0.000	0.000	-0.000*
	(0.0299)	(0.6858)	(0.8934)	(0.0467)
R&D	-3.565	-0.721	2.805	2.052
	(0.5245)	(0.8777)	(0.5844)	(0.5087)
LEV	-0.598*	0.008	0.342	0.054
	(0.0245)	(0.9742)	(0.2693)	(0.8531)
CONSTANT	-0.069	-2.203*	-3.666**	-5.253***
	(0.9424)	(0.0316)	(0.0042)	(0.0006)
N	373	376	378	330
R^2 (within)	0.075	0.089	0.206	0.225
R^2 (between)	0.003	0.009	0.013	0.008
R^2 (overall)	0.009	0.016	0.018	0.014
Hausman (χ^2)	0.009**	0.000***	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table 22 exemplifies the results of the three-growth-modes-model after excluding multivariate outliers. Except for TQ_1, market momentum growth reports the most positive coefficients of all three growth modes. Consistently, except for TQ_1, market share change growth shows higher coefficients than inorganic growth. In case of TQ_0, market momentum growth as well as market share change growth have positive, yet statistically insignificant coefficients, whereas inorganic growth is insignificantly negative. For TQ_1, all growth modes have statistically insignificant coefficients with market share change growth being negative and market momentum and inorganic growth being slightly positive. With respect to TQ_2, market momentum growth has a positive and statistically significant coefficient, whereas inorganic growth contrarily is significantly negative. Market share change growth in this case is insignificant. For TQ_3, market momentum and market share change growth have positive, yet statistically insignificant coefficients, whereas inorganic growth is statistically significant and negative. The results, especially in case of TQ_2, coffer considerable support for the research hypotheses H2 and H3 and thus are consistent to the results before the elimination of outliers. Additionally, the results for TQ_3 offer statistically significant support for H3 and H4. The results of the random effects model are consistent to the results illustrated above (see Table E12).

Summarized, the results of the three-growth-modes-model provide substantial support for research hypotheses H2 and H3. Furthermore, the results as well offer some evidence for hypothesis H4.

8.3.5 Robustness of Results

To check the robustness of the results presented in the previous subchapters, the regression analysis was repeated using alternative measures and model specifications. The results of these robustness checks are discussed in detail in the following. At first, the robustness of the two-growth-modes-model is tested followed by the three-growth-modes-model.

8.3.5.1 *Robustness of Results of the Two-Growth-Modes-Model*

To check the robustness of these results, the regression analysis was repeated using alternative measures and specifications. The results of these robustness checks are discussed in detail in the following.

As discussed in subchapter 7.4, firm age is considered a determinant of firm performance and thus included in the analysis as a control variable. The majority of academic studies define firm age as the number of years since its inception, e.g., Anderson and Reeb (2003). However, a number of academic studies uses firm age defined as years since the initial public offering (IPO)[23], e.g., Loderer and Waelchli (2010). To check the robustness of the results against variations in the definition of firm age, the regression analysis is repeated replacing firm age defined as years since inception by years since IPO. The results before and after the elimination of outliers are illustrated below.

Table 23. Two-Growth-Modes-Model: OLS Fixed Effects Regression Results with Firm Age Variable based on Year of IPO.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.227	-0.186	-0.343*	-0.196
	(0.2564)	(0.2534)	(0.0435)	(0.0791)
OG	0.247	-0.057	0.440***	0.080
	(0.0777)	(0.5781)	(0.0000)	(0.3914)
FAGE(IPO)	0.008	0.023	0.048**	0.068***
	(0.4713)	(0.0736)	(0.0021)	(0.0006)
FSIZE	-0.000	-0.000	-0.000	-0.000**
	(0.0701)	(0.3281)	(0.6603)	(0.0056)
R&D	-4.727	-2.126	0.361	5.463
	(0.4309)	(0.6451)	(0.9329)	(0.2424)
LEV	-0.622	0.334	0.273	-0.244
	(0.0964)	(0.5656)	(0.4787)	(0.4810)
CONSTANT	1.416***	0.639	-0.215	-0.655
	(0.0002)	(0.1015)	(0.6561)	(0.2579)
N	394	395	393	345
R^2 (within)	0.053	0.034	0.150	0.177
R^2 (between)	0.012	0.001	0.004	0.007
R^2 (overall)	0.004	0.000	0.005	0.008
Hausman (χ^2)	0.199	0.443	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses firm age based on year of IPO instead of year of inception. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table 23 reports the regression results for the two-growth-modes-model controlling for firm age measured in years since the IPO of a company before the elimination of outliers. The results are consistent to the original regression estimates. Across all model specifications, organic growth shows more positive coefficients than inorganic growth. For TQ_2, the coefficients are statistically significant. These findings as well considerably support

[23] An IPO refers to the first offering of stocks by a privately held company to a public security market (Brealey, Myers, & Allen, 2011).

hypothesis H1 of organic firm growth being superior to inorganic firm growth with respect to the performance effects, especially in case of TQ_2. The corresponding random effects model shows consistent estimates. In addition to TQ_2, the organic growth coefficient for TQ_1 is statistically significant further supporting hypothesis H1. The analysis was repeated after the elimination of multivariate outliers illustrated below.

Table 24. Two-Growth-Modes-Model: OLS Fixed Effects Regression Results with Firm Age Variable based on Year of IPO, Excluding Multivariate Outliers.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.050 (0.7710)	0.023 (0.8413)	-0.341* (0.0290)	-0.285* (0.0130)
OG	0.217 (0.0560)	-0.044 (0.5998)	0.405*** (0.0000)	0.045 (0.6084)
FAGE(IPO)	0.015 (0.1047)	0.032** (0.0011)	0.044*** (0.0004)	0.060*** (0.0000)
FSIZE	-0.000* (0.0312)	-0.000 (0.6945)	0.000 (0.8795)	-0.000* (0.0483)
R&D	-3.602 (0.5211)	-0.779 (0.8684)	2.588 (0.6198)	2.073 (0.5019)
LEV	-0.604* (0.0215)	0.001 (0.9963)	0.276 (0.3594)	0.054 (0.8518)
CONSTANT	1.098*** (0.0004)	0.277 (0.3791)	-0.237 (0.5302)	-0.508 (0.2233)
N	372	376	377	329
R^2 (within)	0.075	0.088	0.189	0.216
R^2 (between)	0.005	0.000	0.003	0.002
R^2 (overall)	0.000	0.000	0.008	0.008
Hausman (χ^2)	0.005	0.000***	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses firm age based on year of IPO instead of year of inception. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table 24 exemplifies the two-growth-modes-model regression results controlling for firm age since IPO and after the elimination of outliers. The results again provide evidence for better performance consequences of organic firm growth compared to inorganic firm growth. Except for TQ_1, the organic growth coefficients are more positive than the coefficients for inorganic growth. For TQ_2 and TQ_3, the coefficients are statistically significant. In case of TQ_2, the coefficient for inorganic growth is negative and statistically significant, whereas the organic growth coefficient is positive as well as statistically significant. For TQ_3, the inorganic growth coefficient is negative and statistically significant, whereas organic growth is insignificantly positive. The results for the random effects model consistently confirm these estimates (see Table E4). Consequently, the regression results can be considered robust against varying definitions of firm age as a control variable.

The second robustness check is based on a logarithmic transformation of the firm age and firm size control variables. Instead of using the original data for firm age and firm size, a number of academic studies transforms the data by using the corresponding natural logarithms in order to achieve a stronger normal distribution of the variable, e.g., Anderson and Reeb (2003) or Kale et al. (2009). Although the independent variables show normal distribution, the regression analysis is repeated by replacing the original data on firm age and firm size by the corresponding natural logarithms before and after the elimination of multivariate outliers.

Table 25. Two-Growth-Modes-Model: OLS Fixed Effects Regression Results with Natural Logarithm of Firm Age and Firm Size.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.324	-0.059	-0.369	-0.220
	(0.0883)	(0.6809)	(0.0682)	(0.1283)
OG	0.157	-0.001	0.381***	0.018
	(0.2719)	(0.9928)	(0.0002)	(0.8578)
LnFAGE	-0.299	1.250**	1.691***	2.405**
	(0.4866)	(0.0035)	(0.0009)	(0.0039)
LnFSIZE	0.053	-0.260	0.063	-0.113
	(0.6621)	(0.2472)	(0.6978)	(0.5950)
R&D	-4.343	-3.024	0.047	3.888
	(0.4419)	(0.5219)	(0.9896)	(0.3702)
LEV	-0.615	0.494	0.375	-0.184
	(0.1029)	(0.4202)	(0.3417)	(0.6041)
CONSTANT	2.434	-2.144	-6.943**	-8.576*
	(0.2075)	(0.3375)	(0.0067)	(0.0195)
N	394	395	393	345
R^2 (within)	0.043	0.043	0.109	0.107
R^2 (between)	0.047	0.005	0.018	0.020
R^2 (overall)	0.021	0.004	0.016	0.017
Hausman (χ^2)	0.681	0.019*	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses the natural logarithm of firm and firm size. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table 25 reports the two-growth-modes-model results of the regression analysis after transforming the firm age and firm size data. As stated in hypothesis H1, organic firm growth consistently shows more positive coefficients compared to inorganic growth. However, only for TQ_2 the more positive effect is statistically significant. The corresponding random effects model shows consistent results providing support for hypothesis H1.

Table 26. Two-Growth-Modes-Model: OLS Fixed Effects Regression Results with Natural Logarithm of Firm Age and Firm Size, Excluding Multivariate Outliers.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.166 (0.3095)	0.005 (0.9620)	-0.354* (0.0483)	-0.296* (0.0372)
OG	0.104 (0.3991)	-0.096 (0.3374)	0.344*** (0.0001)	-0.011 (0.8978)
LnFAGE	-0.136 (0.7101)	1.104** (0.0044)	1.589*** (0.0008)	2.188** (0.0036)
LnFSIZE	0.090 (0.4114)	0.073 (0.5458)	0.108 (0.3714)	-0.052 (0.7537)
R&D	-3.156 (0.5367)	-0.898 (0.8278)	2.262 (0.6321)	1.155 (0.6728)
LEV	-0.587* (0.0427)	0.070 (0.8152)	0.354 (0.2558)	0.070 (0.8301)
CONSTANT	1.255 (0.4839)	-4.368* (0.0221)	-6.996** (0.0020)	-8.169* (0.0116)
N	372	376	376	329
R^2 (within)	0.046	0.062	0.152	0.152
R^2 (between)	0.072	0.018	0.026	0.016
R^2 (overall)	0.035	0.022	0.033	0.020
Hausman (χ^2)	0.501	0.004**	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses the natural logarithm of firm and firm size. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Additionally, Table 26 exemplifies the corresponding results after excluding multivariate outliers. Except for TQ_1, organic growth reports better performance coefficients than inorganic growth. For TQ_2, inorganic growth has a significantly negative impact, whereas organic growth is significantly positive. In case of TQ_3, inorganic growth as well is significantly negative, whereas organic growth is insignificant. The results of the random effects regression are again consistent to these estimates (see Table E6). Hence, the original regression results are robust against a logarithmic transformation of the firm size and the firm age variables.

In addition to variations of control variable definitions, the following robustness check focuses on companies with sales in segments other than the chemical industry. As illustrated in subchapter 7.1, the empirical analysis focuses on companies of the chemical industry. Since the firm sample is based on the GICS database's sub-data-level "150101 Chemicals", the companies within the sample generate the majority of their sales within the chemical industry. However, the sample firms still might have smaller shares of their total sales in industries other than chemicals. As these firms partially operate in other industries, effects emanating from these industries might bias the regression results. Firm year observations with sales of more than ten percent of the respective total sales in other industries than chemicals according to the GICS definition were excluded from the analysis resulting in the exclusion of up to 25 firm year observations depending on the dependent variable. The regression results after excluding these firm year observations are illustrated below before and after the elimination of outliers.

Table 27. Two-Growth-Modes-Model: OLS Fixed Effects Regression Results Excluding Firm Year Observations With Non-Chemical-Industry-Sales.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.289	-0.247	-0.362*	-0.226*
	(0.1635)	(0.1420)	(0.0406)	(0.0496)
OG	0.220	-0.049	0.464***	0.098
	(0.1195)	(0.6497)	(0.0000)	(0.3089)
FAGE	0.011	0.026*	0.051**	0.069***
	(0.3370)	(0.0474)	(0.0019)	(0.0009)
FSIZE	-0.000**	-0.000	-0.000	-0.000**
	(0.0098)	(0.1344)	(0.2436)	(0.0015)
R&D	-14.252**	-8.528	-2.000	4.976
	(0.0063)	(0.0855)	(0.7430)	(0.5305)
LEV	-0.489	0.478	0.360	-0.154
	(0.1971)	(0.4373)	(0.3708)	(0.6658)
CONSTANT	0.772	-1.251	-4.055*	-5.937**
	(0.5054)	(0.3464)	(0.0171)	(0.0058)
N	369	370	368	322
R^2 (within)	0.082	0.051	0.158	0.181
R^2 (between)	0.020	0.000	0.009	0.010
R^2 (overall)	0.012	0.000	0.006	0.008
Hausman (χ^2)	0.000***	0.001**	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression excludes firm year observations with company sales of >10% in non-chemical-industry segments according to GICS. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table 27 reports the two-growth-modes-model regression results after excluding firm year observations with sales in non-chemical-industry-segments. Again, the organic growth coefficients are consistently more positive compared to inorganic growth. Consistent to the previous results, the estimates for TQ_2 and TQ_3 are statistically significant.

TQ_2 reports a significantly negative coefficient for inorganic firm growth and a significantly positive coefficient for organic firm growth. In case of TQ3, organic firm growth is insignificant, whereas inorganic firm growth is significantly negative. These results provide evidence for hypothesis H1 further supported by consistent results of the corresponding random effects model (see Table E7).

Table 28. Two-Growth-Modes-Model: OLS Fixed Effects Regression Results Excluding Firm Year Observations With Non-Chemical-Industry-Sales, Excluding Multivariate Outliers.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.097	-0.008	-0.354*	-0.321**
	(0.5797)	(0.9411)	(0.0287)	(0.0050)
OG	0.197	-0.038	0.429***	0.045
	(0.0853)	(0.6640)	(0.0000)	(0.6134)
FAGE	0.018	0.035***	0.046***	0.065***
	(0.0505)	(0.0003)	(0.0004)	(0.0000)
FSIZE	-0.000**	-0.000	-0.000	-0.000**
	(0.0021)	(0.2328)	(0.5554)	(0.0069)
R&D	-12.675**	-8.176	1.815	-2.613
	(0.0066)	(0.1043)	(0.8217)	(0.6039)
LEV	-0.496	0.149	0.348	0.143
	(0.0606)	(0.5941)	(0.2649)	(0.6290)
CONSTANT	-0.062	-2.307*	-3.757**	-5.418***
	(0.9453)	(0.0186)	(0.0047)	(0.0006)
N	350	352	353	310
R^2 (within)	0.122	0.110	0.199	0.237
R^2 (between)	0.003	0.003	0.014	0.007
R^2 (overall)	0.000	0.008	0.019	0.011
Hausman (χ^2)	0.000***	0.000***	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression excludes firm year observations with company sales of >10% in non-chemical-industry segments according to GICS. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

In addition, Table 28 illustrates the regression results after excluding firm year observations with non-chemical-industry sales as well as multivariate outliers. These results as well indicate better performance implications of organic growth in comparison to inorganic growth with statistically significant coefficients for TQ_2 and TQ_3. Again, the random effects model generates consistent estimates (see Table E8). Summarized, as the regression results are consistent, the original regression can be considered robust against potential biases from firm year observations with sales in non-chemical-industry-segments.

The final robustness check to the results of the two-growth-modes-model focuses on replacing a market-based performance metric, i.e., Tobin's Q, by an accounting performance metric. As discussed in chapter 5, in addition to market-based performance, prior research has also investigated the performance effects of individual firm growth modes on accounting-based performance indicating similar relations. Hence, the performance effects of individual firm growth modes potentially are similar in nature for accounting-based performance indicators. To test the robustness of results, the market-based dependent variable Tobin's Q is replaced by ROA as an accounting-based performance metric. Analogue to, e.g., Healy et al. (1992), ROA is defined as the ratio of the operating cash flow (OCF) in year t to the year-end total assets in year t. The OCF in year t is derived as sales in year t minus cost of goods sold in year t minus selling, general, and administrative expenses in year t plus depreciation and amortization in year t. Analogue to Tobin's Q, ROA is used as a dependent variable for the years 1, 2, and 3 after the corresponding firm year observations. Year 0 is excluded for two reasons. First, the year 0 figures are potentially affected by one-time merger costs causing potential biases. Second, the hypothesized effects of individual growth modes, in particular M&A, require time to be represented in accounting figures. E.g., firms need time to achieve the realization of cost synergies and the corresponding effects being reflected in the ROA figures. The results for the regression analysis with ROA as the dependent variable are illustrated in the following before and after excluding multivariate outliers.

Table 29. Two-Growth-Modes-Model: OLS Fixed Effects Regression Results for ROA as Dependent Variable.

	Dependent Variable		
	ROA_1	**ROA_2**	**ROA_3**
IG	-0.003 (0.8490)	-0.024 (0.1623)	-0.026 (0.0775)
OG	0.031 (0.2038)	-0.026 (0.1503)	-0.019 (0.2612)
FAGE	-0.000 (0.8910)	-0.001 (0.3309)	-0.001 (0.3645)
FSIZE	-0.000 (0.2894)	0.000 (0.9561)	0.000 (0.1020)
R&D	0.120 (0.7934)	0.186 (0.5263)	0.021 (0.9458)
LEV	-0.076 (0.1432)	-0.010 (0.8374)	0.005 (0.9101)
CONSTANT	0.218* (0.0439)	0.307* (0.0278)	0.304 (0.0625)
N	404	401	352
R^2 (within)	0.034	0.019	0.018
R^2 (between)	0.008	0.005	0.012
R^2 (overall)	0.012	0.003	0.004
Hausman (χ^2)	0.631	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses ROA as dependent variable. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table 29 exemplifies the two-growth-modes-model regression results for ROA as the dependent variable. In contrast to the regression based on Tobin's Q as the dependent variable, these results show no specific differences between the performance effects of organic and inorganic firm growth on ROA. For ROA_1, inorganic growth has a slightly negative coefficient, whereas organic growth is slightly positive. For ROA_2 and ROA_3, coefficients are slightly negative for both growth modes. Across all model specifications, the growth modes' coefficients are insignificant. The corresponding random effects model shows consistent results (see Table E9). Consequently, the regression analysis with ROA as the dependent variable does not provide support for hypothesis H1.

Table 30. Two-Growth-Modes-Model: OLS Fixed Effects Regression Results for ROA as Dependent Variable, Excluding Multivariate Outliers.

	Dependent Variable		
	ROA_1	**ROA_2**	**ROA_3**
IG	0.023 (0.2592)	-0.015 (0.2706)	-0.009 (0.5318)
OG	0.020 (0.2369)	-0.013 (0.2797)	-0.016 (0.3298)
FAGE	-0.000 (0.6293)	-0.001 (0.4194)	-0.001 (0.4479)
FSIZE	-0.000 (0.9725)	-0.000 (0.9404)	0.000 (0.2364)
R&D	0.055 (0.8918)	0.168 (0.5711)	-0.097 (0.7322)
LEV	-0.087* (0.0106)	0.009 (0.8408)	0.047 (0.1151)
CONSTANT	0.246* (0.0197)	0.257* (0.0196)	0.243* (0.0396)
N	388	387	338
R^2 (within)	0.043	0.011	0.021
R^2 (between)	0.007	0.002	0.008
R^2 (overall)	0.006	0.001	0.002
Hausman (χ^2)	0.010	0.039*	0.005**

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses ROA as dependent variable. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table 30 reports the corresponding results for ROA as the dependent variable after excluding multivariate outliers from the analysis. Again, the results do not indicate any differences in the performance effects of firm growth modes across all variations of ROA. Whereas the coefficients are slightly positive in case of ROA_1, the coefficients are slightly negative for both growth modes for ROA_2 and ROA_3. All growth mode coefficients are statistically insignificant. The random effects model results are again consistent (see Table E10). Summarized, contrary to Tobin's Q, the regression analysis with ROA as the dependent variable does not offer support for differences in the performance effects between firm growth modes and thus hypothesis H1.

8.3.5.2 *Robustness of Results of the Three-Growth-Modes-Model*

The robustness checks for the three-growth-modes-model comprise the same tests as for the two-growth model-model. In addition, the three-growth-modes-model and in particular the robustness of the results for market momentum growth is tested for the currency effect in sales. The results of these robustness checks are discussed in the following.

At first, the robustness of the results against replacing firm age defined as years since inception by years since IPO is tested and discussed below.

Table 31. Three-Growth-Modes-Model: OLS Fixed Effects Regression Results with Firm Age Variable based on Year of IPO.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.240	-0.184	-0.340*	-0.193
	(0.2267)	(0.2567)	(0.0342)	(0.0842)
MMG	0.576*	-0.115	0.895***	0.231
	(0.0189)	(0.5450)	(0.0001)	(0.2002)
MSCG	0.030	-0.018	0.141	-0.029
	(0.9261)	(0.9203)	(0.2261)	(0.7975)
FAGE(IPO)	0.008	0.023	0.047**	0.068***
	(0.4882)	(0.0719)	(0.0021)	(0.0006)
FSIZE	-0.000*	-0.000	-0.000	-0.000**
	(0.0471)	(0.3301)	(0.6156)	(0.0044)
R&D	-4.433	-2.177	0.696	5.543
	(0.4607)	(0.6396)	(0.8665)	(0.2330)
LEV	-0.588	0.328	0.340	-0.221
	(0.1335)	(0.5693)	(0.3917)	(0.5273)
CONSTANT	1.391***	0.643	-0.246	-0.665
	(0.0002)	(0.1067)	(0.6087)	(0.2525)
N	394	395	393	345
R^2 (within)	0.062	0.035	0.166	0.179
R^2 (between)	0.010	0.001	0.004	0.007
R^2 (overall)	0.002	0.000	0.006	0.008
Hausman (χ^2)	0.372	0.524	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses firm age based on year of IPO instead of year of inception. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table 31 reports the regression results of the three-growth-modes-model including firm age defined as years since IPO. The results are consistent to the original regression results supporting the derived research hypotheses. For TQ_0, market momentum has a considerably positive and statistically significant coefficient, whereas inorganic growth and market share change growth show insignificantly negative and slightly positive coefficients, respectively. Additionally for TQ_2, market momentum growth has a considerably positive and statistically significant coefficient, whereas inorganic growth contrarily is significantly negative with market share change growth in this case being insignificant. The results for TQ_1 and TQ_3 are statistically insignificant. These results, in particular for TQ_0 and TQ_2, offer considerable support for the research hypotheses H2 and H3. In case of hypothesis H4, the results in case of TQ_2 offer statistically significant support. Again, the results of the random effects model are consistent to the fixed effects results (see Table E13). The analysis was repeated after excluding multivariate outliers as presented below.

Table 32. Three-Growth-Modes-Model: OLS Fixed Effects Regression Results with Firm Age Variable based on Year of IPO, Excluding Multivariate Outliers.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.053 (0.7591)	0.021 (0.8562)	-0.340* (0.0232)	-0.284* (0.0133)
MMG	0.251 (0.1381)	0.017 (0.9202)	0.749*** (0.0000)	0.086 (0.5584)
MSCG	0.194 (0.1847)	-0.084 (0.5608)	0.183 (0.1016)	0.015 (0.8901)
FAGE(IPO)	0.015 (0.1048)	0.032** (0.0011)	0.043*** (0.0004)	0.060*** (0.0000)
FSIZE	-0.000* (0.0299)	-0.000 (0.6858)	0.000 (0.9040)	-0.000* (0.0455)
R&D	-3.565 (0.5245)	-0.721 (0.8777)	2.877 (0.5740)	2.088 (0.4989)
LEV	-0.598* (0.0245)	0.008 (0.9742)	0.328 (0.2867)	0.060 (0.8384)
CONSTANT	1.097*** (0.0003)	0.271 (0.3899)	-0.256 (0.4890)	-0.511 (0.2227)
N	373	376	378	329
R^2 (within)	0.075	0.089	0.202	0.216
R^2 (between)	0.005	0.000	0.003	0.002
R^2 (overall)	0.000	0.002	0.008	0.008
Hausman (χ^2)	0.009**	0.000***	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses firm age based on year of IPO instead of year of inception. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table 32 exemplifies the results after excluding multivariate outliers from the analysis and replacing firm age in years since inception by firm age in years since IPO. The results are consistent to the estimates before the change in the firm age variable and excluding multivariate outliers. Market momentum growth shows the most positive coefficients of all three growth modes with the exception of TQ_1. Consistently, market share change shows higher coefficients than inorganic growth except for TQ_1. In case of TQ_2, the coefficients for inorganic growth and growth from market momentum are significantly negative and significantly positive, respectively. For TQ_3, inorganic growth is significantly negative with market momentum and market share change growth being insignificant. The random effects results are consistent (see Table E14). Hence, the results of the original regression can be considered robust against variations in firm age definition offering support for the defined research hypotheses, especially H2 and H3.

Table 33. Three-Growth-Modes-Model: OLS Fixed Effects Regression Results with Natural Logarithm of Firm Age and Firm Size.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.330	-0.059	-0.355	-0.213
	(0.0794)	(0.6827)	(0.0631)	(0.1334)
MMG	0.488*	-0.010	0.905***	0.264
	(0.0471)	(0.9595)	(0.0001)	(0.1249)
MSCG	-0.052	0.004	0.053	-0.148
	(0.8654)	(0.9850)	(0.7343)	(0.3124)
LnFAGE	-0.270	1.249**	1.743***	2.441**
	(0.5129)	(0.0036)	(0.0005)	(0.0031)
LnFSIZE	0.040	-0.259	0.035	-0.129
	(0.7266)	(0.2400)	(0.8273)	(0.5452)
R&D	-4.091	-3.030	0.360	3.997
	(0.4719)	(0.5242)	(0.9182)	(0.3518)
LEV	-0.578	0.493	0.453	-0.144
	(0.1421)	(0.4188)	(0.2639)	(0.6855)
CONSTANT	2.376	-2.143	-7.001**	-8.631*
	(0.2111)	(0.3411)	(0.0061)	(0.0184)
N	394	395	393	345
R^2 (within)	0.052	0.043	0.129	0.112
R^2 (between)	0.047	0.005	0.019	0.020
R^2 (overall)	0.018	0.004	0.018	0.018
Hausman (χ^2)	0.885	0.033*	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses the natural logarithm of firm and firm size. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

The second test checks the robustness of results against a logarithmic transformation of firm age and firm size as previously introduced. Table 33 reports the three-growth-modes-model regression results after transforming firm age and firm size. Again, the results are consistent for superior performance effects of market momentum growth over inorganic growth and market share change growth, particularly in case of TQ_2 and TQ_3 showing statistically significant coefficients. Although market share change reports more positive coefficients across all model specifications compared to inorganic growth, the coefficients for both growth modes are statistically insignificant providing only little evidence for hypothesis H4. The results of the random effects model confirm these findings (see Table E15). The analysis was again conducted after excluding multivariate outliers as discussed below.

Table 34. Three-Growth-Modes-Model: OLS Fixed Effects Regression Results with Natural Logarithm of Firm Age and Firm Size, Excluding Multivariate Outliers.

	Dependent Variable			
	TQ0	TQ1	TQ2	TQ3
IG	-0.169 (0.3015)	0.004 (0.9694)	-0.345* (0.0443)	-0.293* (0.0370)
MMG	0.140 (0.4360)	-0.012 (0.9446)	0.735*** (0.0000)	0.093 (0.5065)
MSCG	0.080 (0.5949)	-0.150 (0.3415)	0.103 (0.4328)	-0.081 (0.5020)
LnFAGE	-0.133 (0.7165)	1.112** (0.0044)	1.628*** (0.0005)	2.204** (0.0032)
LnFSIZE	0.090 (0.4190)	0.070 (0.5621)	0.087 (0.4752)	-0.059 (0.7221)
R&D	-3.119 (0.5406)	-0.827 (0.8407)	2.524 (0.5859)	1.190 (0.6633)
LEV	-0.581* (0.0482)	0.080 (0.7891)	0.414 (0.1898)	0.085 (0.7968)
CONSTANT	1.246 (0.4865)	-4.386* (0.0222)	-7.030** (0.0017)	-8.190* (0.0112)
N	373	376	377	330
R^2 (within)	0.046	0.063	0.168	0.153
R^2 (between)	0.070	0.018	0.028	0.016
R^2 (overall)	0.034	0.022	0.034	0.019
Hausman (χ^2)	0.510	0.008	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses the natural logarithm of firm and firm size. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table 34 reports the corresponding regression results after eliminating multivariate outliers. The results are consistent to the original regression coefficients after the exclusion of multivariate outliers. TQ_2 and TQ_3 report statistically significant support for superior performance effects of market momentum growth over inorganic growth and market share change growth as well as inorganic growth alone, respectively. Additionally, the results of TQ_3 show inferior performance effects of inorganic growth compared to market share change growth. The coefficients for TQ_0 and TQ_1 are statistically insignificant. Again, the random effects model estimates are consistent (see Table E16). Consequently, the original results can be considered robust against a logarithmic transformation of the firm age and firm size variables.

Table 35. Three-Growth-Modes-Model: OLS Fixed Effects Regression Results excluding Firm Year Observations With Non-Chemical-Industry-Sales.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.305	-0.244	-0.360*	-0.224
	(0.1376)	(0.1434)	(0.0297)	(0.0541)
MMG	0.567*	-0.100	0.994***	0.304
	(0.0365)	(0.6241)	(0.0000)	(0.0905)
MSCG	-0.004	-0.015	0.124	-0.043
	(0.9908)	(0.9363)	(0.3119)	(0.7002)
FAGE	0.011	0.026*	0.050**	0.069***
	(0.3355)	(0.0475)	(0.0019)	(0.0009)
FSIZE	-0.000**	-0.000	-0.000	-0.000***
	(0.0040)	(0.1331)	(0.2291)	(0.0009)
R&D	-13.932**	-8.572	-1.606	5.102
	(0.0084)	(0.0857)	(0.7849)	(0.5167)
LEV	-0.453	0.473	0.438	-0.123
	(0.2548)	(0.4383)	(0.2930)	(0.7319)
CONSTANT	0.749	-1.247	-4.073*	-5.939**
	(0.5047)	(0.3526)	(0.0154)	(0.0058)
N	369	370	368	322
R^2 (within)	0.092	0.051	0.178	0.184
R^2 (between)	0.020	0.000	0.009	0.010
R^2 (overall)	0.011	0.000	0.007	0.009
Hausman (χ^2)	0.002**	0.003**	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression excludes firm year observations with company sales of >10% in non-chemical-industry segments according to GICS. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Furthermore, results of the three-growth-modes-model are tested against biases from sales in non-chemical-industry-segments. Table 35 illustrates the regression results of the three-growth-modes-model after excluding firm-year-observations with sales in non-chemical-industry-segments. Again, the results are consistent to the original regression results before eliminating multivariate outliers. TQ_0 and TQ_2 offer considerable and statistically significant support for better performance effects of market momentum growth in comparison to inorganic firm growth and growth via market share change. Additionally, TQ_2 reports statistically significant evidence for inferior performance effects of inorganic growth compared to market share change growth. For all other model specifications, the coefficients are as well in favor of market share change growth compared to inorganic growth, but statistically insignificant. In addition to confirming the results of the fixed effects regression, the random effects estimates report a statistically significant negative coefficient and thus inferior performance effects for inorganic growth (see Table E17). The regression was again conducted after excluding multivariate outliers exemplified below.

Table 36. Three-Growth-Modes-Model: OLS Fixed Effects Regression Results excluding Firm Year Observations With Non-Chemical-Industry-Sales, Excluding Multivariate Outliers.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.096	-0.011	-0.343*	-0.318**
	(0.5841)	(0.9249)	(0.0303)	(0.0056)
MMG	0.190	0.030	0.831***	0.167
	(0.2962)	(0.8656)	(0.0000)	(0.2442)
MSCG	0.202	-0.081	0.168	-0.038
	(0.1855)	(0.6020)	(0.1488)	(0.7371)
FAGE	0.018	0.035***	0.046***	0.065***
	(0.0509)	(0.0003)	(0.0002)	(0.0000)
FSIZE	-0.000**	-0.000	-0.000	-0.000**
	(0.0022)	(0.2209)	(0.4900)	(0.0049)
R&D	-12.685**	-8.121	2.065	-2.559
	(0.0065)	(0.1056)	(0.7945)	(0.6101)
LEV	-0.497	0.157	0.424	0.157
	(0.0637)	(0.5760)	(0.1889)	(0.6010)
CONSTANT	-0.062	-2.316*	-3.849**	-5.446***
	(0.9455)	(0.0185)	(0.0031)	(0.0006)
N	350	352	353	309
R^2 (within)	0.122	0.110	0.220	0.239
R^2 (between)	0.003	0.003	0.015	0.007
R^2 (overall)	0.000	0.008	0.020	0.012
Hausman (χ^2)	0.000***	0.000***	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression excludes firm year observations with company sales of >10% in non-chemical-industry segments according to GICS. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table 36 illustrates the three-growth-modes-model regression results after excluding firm year observations with non-chemical-industry-sales as well as multivariate outliers. Again, the results are consistent to the original regression model. The growth mode coefficients in case of TQ_0 and TQ_1 are statistically insignificant. TQ_2 reports a statistically positive coefficient for market momentum growth, a statistically negative coefficient for inorganic growth, as well as insignificance for market share change growth. For TQ_3, inorganic growth is significantly negative, whereas the two sub-modes of organic growth are insignificant. The results for the random effects regression are consistent (see Table E18). Hence, the results of the original regression can be considered robust against biases from non-chemical-industry-sales offering considerable support for the derived research hypotheses.

In addition, the original regression results are tested for robustness against replacing Tobin's Q as a market-based performance metric by ROA as an accounting-based performance metric. The corresponding results are illustrated and discussed in the following.

Table 37. Three-Growth-Modes-Model: OLS Fixed Effects Regression Results for ROA as Dependent Variable.

	Dependent Variable		
	ROA1	**ROA2**	**ROA3**
IG	-0.003 (0.8388)	-0.024 (0.1559)	-0.026 (0.0778)
MMG	0.047 (0.3148)	-0.006 (0.8626)	-0.024 (0.3505)
MSCG	0.020 (0.4508)	-0.040* (0.0496)	-0.016 (0.4730)
FAGE	-0.000 (0.8768)	-0.001 (0.3154)	-0.001 (0.3658)
FSIZE	-0.000 (0.2685)	0.000 (0.9767)	0.000 (0.1002)
R&D	0.131 (0.7742)	0.200 (0.4938)	0.019 (0.9515)
LEV	-0.073 (0.1536)	-0.007 (0.8955)	0.004 (0.9284)
CONSTANT	0.218* (0.0433)	0.308* (0.0270)	0.304 (0.0629)
N	404	401	352
R^2 (within)	0.036	0.021	0.019
R^2 (between)	0.007	0.005	0.012
R^2 (overall)	0.011	0.003	0.004
Hausman (χ^2)	-	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses ROA as dependent variable. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table 37 reports the regression results of the three-growth-modes-model with time variations of ROA as the dependent variable. Analogue to the two-growth-modes-model, the results substantially change after replacing Tobin's Q by ROA. For ROA_1 and ROA_3, all growth mode coefficients are statistically insignificant. In case of ROA_2, the coefficient for market share change is statistically significant and negative, whereas market momentum growth and inorganic growth are insignificant. The results for ROA_2 offer support for hypothesis H3 and contradict hypothesis H4. The corresponding results of the random effects model report insignificant coefficients for all growth modes across all three model specifications (see Table E19). The regression analysis with ROA as the dependent construct was conducted again after excluding multivariate outliers.

Table 38. Three-Growth-Modes-Model: OLS Fixed Effects Regression Results for ROA as Dependent Variable, Excluding Multivariate Outliers.

	Dependent Variable		
	ROA1	**ROA2**	**ROA3**
IG	0.023 (0.2588)	-0.016 (0.2620)	-0.009 (0.5319)
MMG	0.021 (0.2507)	0.003 (0.9133)	-0.018 (0.4325)
MSCG	0.019 (0.4464)	-0.023 (0.1731)	-0.014 (0.5206)
FAGE	-0.000 (0.6300)	-0.001 (0.4050)	-0.001 (0.4484)
FSIZE	-0.000 (0.9698)	-0.000 (0.9221)	0.000 (0.2352)
R&D	0.056 (0.8899)	0.178 (0.5463)	-0.098 (0.7288)
LEV	-0.086** (0.0099)	0.012 (0.7770)	0.047 (0.1144)
CONSTANT	0.246* (0.0197)	0.257* (0.0190)	0.244* (0.0401)
N	388	387	338
R^2 (within)	0.043	0.013	0.021
R^2 (between)	0.007	0.002	0.008
R^2 (overall)	0.006	0.001	0.002
Hausman (χ^2)	0.000***	-	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses ROA as dependent variable. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table 38 exemplifies the corresponding results after excluding multivariate outliers from the analysis. Across all three model specifications, the coefficients of the growth modes are statistically insignificant. Hence, the results do not indicate any differences in the performance effects of firm growth modes across all variations of ROA. Again, the random effects model results are consistent (see Table E20).

In summary, in contrast to Tobin’s Q, the regression results with ROA as the dependent variable do not offer support for differences in the performance effects between firm growth modes. Consequently, these results do not support the derived hypotheses H2, H3, and H4.

As a final check of robustness, the results of the three-growth-modes-model, in particular the performance effects of market momentum growth, are tested against biases from currency effects in sales. The identification of the currency effect in sales follows the approach introduced in subchapter 7.3. The corresponding results are illustrated and discussed below.

Table 39. Three-Growth-Modes-Model: OLS Fixed Effects Regression Controlling for Currency Effect in Sales.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.267 (0.3008)	-0.124 (0.3186)	-0.097 (0.6007)	-0.159 (0.3471)
MMGCE	0.419 (0.0825)	0.148 (0.5955)	1.032** (0.0082)	0.508 (0.0540)
CE	0.204 (0.6948)	-0.751 (0.1783)	0.481 (0.3130)	1.646** (0.0037)
MSCG	0.534* (0.0399)	-0.012 (0.9653)	0.221 (0.2487)	0.038 (0.8824)
FAGE	0.024* (0.0215)	0.046*** (0.0002)	0.076*** (0.0000)	0.108*** (0.0000)
FSIZE	-0.000* (0.0423)	-0.000 (0.1229)	-0.000 (0.1553)	-0.000*** (0.0002)
R&D	-1.064 (0.8939)	3.325 (0.3483)	5.321 (0.1185)	13.349* (0.0273)
LEV	-0.521 (0.2320)	0.343 (0.5060)	0.591 (0.4260)	-0.438 (0.5192)
CONSTANT	-1.159 (0.3191)	-4.160** (0.0029)	-7.754*** (0.0002)	-11.334*** (0.0000)
N	251	250	247	216
R^2 (within)	0.121	0.182	0.287	0.378
R^2 (between)	0.000	0.001	0.001	0.001
R^2 (overall)	0.000	0.000	0.001	0.001
Hausman (χ^2)	0.022*	0.000***	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression controls for currency effect in sales. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table 39 reports the regression results of the three-growth-modes-model controlling for currency effects in sales. The results offer some support for the defined research hypothesis. For TQ_0, market share change growth is significantly positive, whereas the performance effects of market momentum excluding currency effects and inorganic growth are insignificant. These results contradict hypothesis H3 and support hypothesis H4. For TQ_1, all growth mode coefficients are insignificant. With respect to TQ_2, market momentum excluding currency effects is significantly positive, whereas the other growth modes are insignificant. In case of TQ_3, all growth mode coefficients are insignificant, whereas the currency effect on performance is significant. The corresponding random effects estimates are consistent (see Table E21). The analysis excluding outliers follows below.

Table 40. Three-Growth-Modes-Model: OLS Fixed Effects Regression Controlling for Currency Effect in Sales, Excluding Multivariate Outliers.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.241 (0.3094)	-0.144 (0.2710)	-0.129 (0.4383)	-0.236 (0.1282)
MMGCE	0.470* (0.0171)	0.168 (0.4145)	0.734** (0.0010)	0.343 (0.1494)
CE	-0.111 (0.8520)	-0.721 (0.1294)	0.580 (0.2197)	1.154** (0.0061)
MSCG	0.345* (0.0454)	-0.102 (0.6510)	0.254 (0.1892)	0.051 (0.8435)
FAGE	0.019* (0.0429)	0.041*** (0.0002)	0.065*** (0.0000)	0.092*** (0.0000)
FSIZE	-0.000 (0.0544)	-0.000 (0.2343)	-0.000 (0.3123)	-0.000** (0.0017)
R&D	2.136 (0.7296)	6.092* (0.0153)	9.650 (0.1363)	5.357 (0.1339)
LEV	-0.665 (0.0902)	0.061 (0.8986)	0.068 (0.9028)	-0.370 (0.5209)
CONSTANT	-0.861 (0.4247)	-3.798** (0.0020)	-6.629*** (0.0001)	-9.403*** (0.0000)
N	237	236	236	207
R^2 (within)	0.133	0.203	0.312	0.418
R^2 (between)	0.011	0.003	0.004	0.000
R^2 (overall)	0.008	0.010	0.008	0.002
Hausman (χ^2)	0.159	0.000***	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression controls for currency effect in sales. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table 40 reports the corresponding results after excluding multivariate outliers. Across all model specifications, market momentum growth excluding currency effects has the most positive coefficient, whereas inorganic growth has the most negative. In case of

TQ_0, the coefficient estimates for market momentum as well as market share change growth are significantly positive supporting hypotheses H2, H3, and H4. TQ_2 provides additional support for hypotheses H2 and H3 with market momentum being significantly positive, whereas market share change and inorganic growth are insignificantly positive and negative, respectively. Consequently, even after controlling for currency effects in sales, the regression results still offer considerable support for the research hypotheses under review.

8.4 Summary of Empirical Results

The previous subchapters presented the results of the mean comparison as well as the regression analysis. Based on these results, this subchapter summarizes the major empirical findings and sets these into perspective of the research hypotheses under review.

Research hypothesis H1 assumes organic growth to have better performance effects compared to inorganic growth. The mean comparison only partially supports this hypothesis. Whereas the results for the first grouping approach are inconsistent, only the more differentiated, second grouping approach shows better performance effects of organic growth compared to inorganic growth. However, in addition to the indicative results of the mean comparison, the two-growth-modes regression analysis offers considerable support for hypothesis H1 reporting more positive and statistically significant performance effects for organic compared to inorganic growth, especially for TQ_2 and TQ_3. The results of the two-growth-modes regression analysis are robust against variations of the control variables and biases from non-chemical-industry-sales.

Research hypothesis H2 assumes growth from market momentum to have better performance effects than inorganic growth. Although the mean differences are statistically insignificant, the results of the second grouping approach for the three-growth-modes-model are indicatively in line with this hypothesis. In addition to these indicative results, the three-growth-modes regression analysis reports considerable statistical support. Especially, the regressions on TQ_2, but also TQ_0 as well as TQ_3 provide statistically significant evidence supporting hypothesis H2. The results are consistent in the corresponding random effects model. Furthermore, the results are robust against changes in the definition of control variables, biases from non-chemical-industry-sales, as well as currency effects in sales.

Research hypothesis H3 states market momentum growth to have better performance effects than market share change growth. Analogue to hypothesis H2, the mean comparison provides indicative evidence for this hypothesis. Consistently, the panel regression of the three-growth-modes-model as well offers further, statistically significant support for this hypothesis. This is particular the case for TQ_2, but also partially for TQ_0 and TQ_3. The results again are robust for the random effects model as well as the other changes in model parameters explained previously.

Finally, research hypothesis H4 assumes growth from market share change to have better performance effects than inorganic growth. Although not significant, the mean comparison results show indicative support for the hypothesis with constantly higher performance means for market share change growth. The three-growth-modes panel regression offers additional support for this hypothesis. The results for TQ_2 and to some extent for TQ_0 and TQ_3 offer statistically significant support for this hypothesis. Again, these results are consistent in the random effects estimates and robust to changes in control variable definitions, biases from non-chemical-industry-sales, as well as currency effects in sales.

In summary, whereas the mean comparison provides only indicative evidence for all four research hypotheses, the panel regression analysis offers considerable and statistically significant support for all of these hypotheses.

The effects are most observable and consistent for TQ_2 as the dependent variable, i.e., two years after the respective growth decomposition. As it is a market-based performance metric and the EMH is assumed, the performance effects of individual firm growth modes should be reflected immediately, i.e., in TQ_0. However, as the real performance consequences of the growth modes, in particular for inorganic growth, only become visible over time and thus are reflected in the performance metrics, e.g., in TQ_2. These performance effects comprise, e.g., estimates of synergies subsequent to M&A activity. These arguments support that the performance effects of individual growth modes are in particular observable in the subsequent years of the growth mode decomposition.

As indicated, the empirical results show statistically significant differences in the corresponding performance effects for the individual growth modes. The results may be considered as an initial set of guidelines for executives supporting them in defining their growth strategies. However, in order to develop a proven set of instruments supporting executives in their decision-making processes with respect firm growth modes, additional research needs to be conducted.

9 Conclusion

Firm growth represents one of the major constructs of interests to researchers and practitioners comparably (Coad & Hölzl, 2012; Wennekers & Thurik, 1999). Across all interest groups, firm growth itself is almost exclusively regarded as a positive phenomenon. In addition to firm growth, firm performance is in the center of strategic management research. The primary purpose of strategic management research is to identify the determinants of firm performance (Meyer, 1991; Rumelt et al., 1994). Correspondingly, several researchers identified firm growth to be a determinant of firm performance (Capon et al., 1990; Cho & Pucik, 2005). However, despite the overall positive perception of firm growth, its effects on firm performance remain ambiguous from a theoretical as well as empirical perspective. This ambiguity of performance consequences is on the one hand related to a relatively slow theoretical development in the research field of firm growth (Delmar et al., 2003; D. Shepherd & Wiklund, 2009) and on the other hand to a focus of firm growth research on the determinants of firm growth rather than its consequences (McKelvie & Wiklund, 2010). In order to better understand its consequences, a more detailed analysis of firm growth is necessary. One perspective of a more differentiated analysis of firm growth is to consider the different modes of growth and the corresponding performance consequences. Hence, the primary objective of this dissertation is to create transparency on the status quo of academic research on the performance effects of the individual firm growth modes and to empirically analyze the corresponding performance effects. According to McKelvie and Wiklund (2010, p. 279), an integrated analysis of the financial performance effects of the individual firm growth modes would be of "utmost value" to the field of firm growth research.

Firm growth can be differentiated into organic growth, i.e., based on its existing assets and resources, and inorganic growth, i.e., via the acquisition of other companies (Hess & Kazanjian, 2006). Organic firm growth can be further decomposed into growth from market momentum and growth via market share changes. In order to be able to analyze the performance effects of firm growth modes from an integrated perspective, a review of the literature on the individual performance effects of the firm growth modes is conducted. Based on this review, the following research hypotheses are derived:

H1: Organic firm growth has a more positive effect on firm performance than inorganic firm growth.

H2: Market momentum growth has a more positive effect on firm performance than inorganic firm growth.

H3: Market momentum growth has a more positive effect on firm performance than market share change growth.

H4: Market share change growth has a more positive effect on firm performance than inorganic growth.

To test these hypotheses, an empirical analysis focusing on companies from the chemical industry is conducted. The chemical industry was selected as a focus industry of the empirical analysis due to the constant importance of M&A within the industry, the relevance of economies of scale for chemical firms, and the large number of segments allowing for a differentiated view on market momentum. The empirical analysis comprises the 50 largest Western European and Northern American public chemical companies with respect to sales in 2007. The analysis covers data from 2003 to 2012. In a first step, the respective firm growth data points are decomposed into the different firm growth modes. The resulting growth decomposition data set is subsequently analyzed with respect to its performance effects. First, a mean comparison analysis is conducted by grouping the firm year observations with respect to the predominant firm growth mode and comparing the corresponding performance means. In addition to the mean comparison analysis, a panel regression analysis is conducted. The panel regression is based on a fixed effects regression model, but the corresponding random effects estimates are reported as well. The regression results are additionally checked for robustness. The firm performance metric of focus within the analysis is Tobin's Q as it is the predominant market-based performance metric in academic research, particularly in corporate finance and strategic management.

The results of the empirical analysis considerably support the derived research hypotheses. With respect to the research hypotheses, the mean comparison only finds indicative, in most cases statistically insignificant differences in the performance effects between growth modes. However, the fixed effects panel regression analysis finds considerable, statistically significant support for all four research hypotheses. The results of the corresponding random effects estimates are consistent. Furthermore, the results of the regression analysis are robust against changes in the definition of control variables, biases from non-chemical-industry-sales of the sample firms, as well as currency effects in sales.

Based on the results of the empirical analysis, it can be concluded that the different firm growth modes differently affect the performance of companies. Based on the results of the data analyzed, organic firm growth has better effects on firm performance than inorganic growth. Additionally, in the three-growth-modes-model, market momentum growth reports the most positive effects on firm performance of all three growth modes. Furthermore, the results provide evidence for better performance implications of market share change growth compared to inorganic growth.

These results provide initial insights for researchers and practitioners on the performance effects of growth modes. Based on these results, managers may need to be more concerned about their choice of modes and thus their way of firm growth. These results may act as an initial set of guidelines for managers in defining their growth strategies.

However, when evaluating the results of this dissertation, one needs to bear in mind the relatively low progress in the research of the effects of firm growth and firm growth modes in particular. Up to date and to our knowledge, this dissertation provides the most detailed analysis of the performance effects firm growth modes. In order to receive a higher explanatory power for the performance effects of the individual firm growth modes, additional research needs to be conducted. Additional value to the existing research would be provided by widening the scope of the empirical analysis.

First of all, the results of this dissertation should be confirmed for additional industries next to companies from the chemical industry. Furthermore, instead of analyzing individual industries, additional insights would be generated by analyzing the performance implications of firm growth modes for cross-industry samples. The empirical analysis of cross-industry samples bears the challenge of mitigating the effects of industry-specific biases.

Second, an analysis of growth modes and corresponding performance measures over longer time periods would potentially yield valuable, additional insights. Growth patterns and thus the composition of growth modes in the growth strategies of firms might be more long-term oriented. Hence, decompositions of firm growth rates over longer time horizons and an analysis of the corresponding performance effects might reveal different results.

In addition to variations in the time horizon covered, additional empirical analyses should analyze the performance effects of firm growth modes on performance indicators other than Tobin's Q in more detail. As indicated in the robustness checks of the panel regression results, the respective effects observed for Tobin's Q were not consistent for ROA as the dependent variable. Consequently, analyzing the causality between firm growth modes and additional performance metrics may result in diverging results. These performance metrics may comprise the entire range of indicators introduced in chapter 2 of this dissertation consisting of market-based metrics, accounting metrics, firm survival measures, growth indicators, and operational measures.

Moreover, enlarging the scope of firm growth modes under analysis would be another topic of interest. The analysis at hand focuses on the three major growth modes, i.e., market momentum growth and market share change growth as the two sub-modes of organic growth and inorganic growth. However, as introduced in chapter 2, hybrid growth, e.g., via joint ventures, is a less commonly applied mode of firm growth. A review of the literature on the managerial advantages and challenges of hybrid growth modes and deriving as well as analyzing the performance implications would be of interest to the field of firm growth research.

As illustrated, research in the field of the firm performance effects of firm growth modes has been largely neglected in academic research. This dissertation provides an initial and integrated perspective on the performance effects of a company's firm growth modes. The results can be considered as an initial set of insights for managers and practitioners. In order to develop a proven set of best practices supporting executives in their decision making processes with respect firm growth modes and thus their growth strategies, additional research needs to be conducted as outlined within this chapter.

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Appendix

Table A1. Choice of Firm Growth Indicator in 35 Empirical Studies Under Review.

Growth Indicator	**Appearances of Indicator** [Number of Studies]	**Share of Studies** [Percentage]
Sales/Revenues	29	82.9%
Number of Employees	7	20.0%
Assets	2	5.7%
EPS	2	5.7%
Dividends	2	5.7%
Profit	2	5.7%
Market Share	1	2.9%
Customers	1	2.9%
Return on Investment	1	2.9%
Total	**47**	**N/A**

Note. Own illustration. Data obtained from Weinzimmer et al. (1998, pp. 255-256). Share of Studies derived by own calculation. Total appearances of indicators (47) exceed number of studies under review (35) due to usage of more than one indicator in some studies.

Table A2. Choice of Firm Growth Formula in 55 Empirical Studies Under Review.

Growth Formula	**Appearances of Formula** [Number of Studies]	**Share of Studies** [Percentage]
Relative	28	50.9%
Absolute	16	29.1%
Log absolute	6	10.9%
Log relative	3	5.5%
Not reported	2	3.6%
Total	**55**	**100.0%**

Note. Adapted from Delmar (2006, p. 68).

Table A3. Choice of Firm Growth Formula in 35 Empirical Studies Under Review.

Growth Formula	**Appearances of Formula** [Number of Studies]	**Share of Studies** [Percentage]
Relative	21	60.0%
Absolute	3	8.6%
Other	8	22.9%
Not reported	3	8.6%
Total	**35**	**100.0%**

Note. Adapted from Weinzimmer et al. (1998, pp. 255-256). Share of studies based on own calculation.

Table A4. Choice of Firm Growth Time Frame in 55 Empirical Studies Under Review.

Time Frame	**Appearances of Time Frame** [Number of Studies]	**Share of Studies** [Percentage]
5 years	13	23.6%
1 year	12	21.8%
3 years	9	16.4%
2 years	4	7.3%
4 years	2	3.6%
Subtotal 5 years or less	**40**	**72.7%**
6	1	1.8%
7	1	1.8%
8	1	1.8%
Not reported	12	10.7%
Total	**55**	**100.0%**

Note. Adapted from Delmar (2006, p. 70). Share of Studies partially derived by own calculation.

Table A5. Choice of Firm Growth Time Frame in 35 Empirical Studies Under Review.

Time Frame	**Appearances of Time Frame** [Number of Studies]	**Share of Studies** [Percentage]
1 year	4	11.4%
2 years	4	11.4%
3 years	8	22.9%
4 years	1	2.9%
5 years	11	31.4%
Subtotal 5 years or less	**28**	**80.0%**
Other	4	11.4%
Not reported	3	8.6%
Total	**35**	**100.0%**

Note. Data obtained from Weinzimmer et al. (1998, pp. 255-256).

Table B1. Overview of Leading Chemical Companies by Sales, 2013, EUR million.

#	Company	Sales [Euro million]	Region of headquarter
1	BASF	76,729	Western Europe
2	Dow Chemical	42,993	North America
3	Saudi Basic Industries	37,964	Middle East
4	LyondellBasell	33,187	Western Europe
5	DuPont	27,066	North America
6	Mitsubishi Chemical	24,697	Asia
7	Linde	17,275	Western Europe
8	INEOS	17,242	Western Europe
9	Air Liquide	15,989	Western Europe
10	Sumitomo Chemical	15,612	Asia
11	Akzo Nobel	15,134	Western Europe
12	Evonik	13,354	Western Europe
13	Braskem	13,066	Latin America
14	Toray Industries	12,732	Asia
15	Johnson Matthey	12,271	Western Europe
16	Agrium	11,846	North America
17	Lotte Chemical	11,729	Asia
18	PPG Industries	11,379	North America
19	SK Global Chemical	11,346	Asia
20	Mitsui Chemicals	11,244	Asia

Note. Own illustration based on Standard & Poor's (2014).

Table B2. Overview of Number of Firm Year Observations Across Sample Years.

Year	Number of Firm Year Observations	Source Share [Percent]
2004	31	7.7%
2005	36	8.9%
2006	44	10.9%
2007	49	12.1%
2008	50	12.4%
2009	50	12.4%
2010	49	12.1%
2011	48	11.9%
2012	47	11.6%
Total	**404**	**100%**

Note. Own illustration based on data sample.

Table C1. Overview of Control Variables.

Control Variable	Abbreviation	Definition	Previous Studies
Firm Size	*FSIZE*	Sales in year t	Kale et al. (2009)
Firm Age	*FAGE*	Age in year t measured since the year of inception	Anderson and Reeb (2003)
R&D Intensity	*R&D*	Ratio of R&D expenses in year t to sales in year t	Hitt, Hoskisson, and Kim (1997)
Capital Structure	*LEV*	Ratio of year-end book value of total debt in year t to year-end book value of total assets at the end of year t	Hitt et al. (1997)

Note. Data obtained from COMPUSTAT. Data for firm age obtained from annual reports and company websites.

Table C2. Overview of Dependent Variables.

Performance measure	Abbreviation	Definition	Definition source
Tobin's Q in year t_0	*TQ_0*	Ratio of year-end market value of common equity, the year-end book value of preferred stock, and the year-end book value of debt in year to the year-end book value of assets in year t_0	Demsetz and Villalonga (2001)
Tobin's Q in year t_1	*TQ_1*	Ratio of year-end market value of common equity, the year-end book value of preferred stock, and the year-end book value of debt in year to the year-end book value of assets in year t_1	
Tobin's Q in year t_2	*TQ_2*	Ratio of year-end market value of common equity, the year-end book value of preferred stock, and the year-end book value of debt in year to the year-end book value of assets in year t_2	
Tobin's Q in year t_3	*TQ_0*	Ratio of year-end market value of common equity, the year-end book value of preferred stock, and the year-end book value of debt in year to the year-end book value of assets in year t_2	

Note. Own illustration.

Table D1. Pearson Correlation Matrix.

	IG	OG	MMG	MSCG	FAGE	FSIZE	R&D	LEV	TQ_0	TQ_1	TQ_2	TQ_3
IG	1.000											
OG	-0.037	1.000										
MMG	-0.014	-	1.000									
MSCG	-0.039	-	0.131	1.000								
FAGE	-0.052	-0.036	-0.049	-0.010	1.000							
FSIZE	-0.002	0.084	0.019	0.100	0.176	1.000						
R&D	0.026	-0.065	0.048	-0.128	0.249	0.050	1.000					
LEV	0.086	-0.115	-0.109	-0.068	-0.212	-0.026	0.016	1.000				
TQ_0	0.024	0.151	0.181	0.060	0.024	-0.016	0.277	-0.135	1.000			
TQ_1	0.062	0.057	0.064	0.026	0.050	-0.015	0.296	-0.099	0.749	1.000		
TQ_2	0.046	0.158	0.209	0.046	0.067	-0.014	0.349	-0.086	0.694	0.795	1.000	
TQ_3	0.036	0.028	0.091	-0.035	0.066	-0.023	0.327	-0.115	0.645	0.701	0.855	1.000

Note. Own illustration. Coefficients based on Spearman correlation. Pairwise correlation coefficient for MMG/OG and MSCG/OG are not displayed as these distinguish the two-growth-modes-model from the three-growth-modes-model.

Table D2. Two-Growth-Modes: Mean Comparison Results (First Grouping Approach) after logarithmic transformation.

	Dependent Variable							
	$LnTQ_0$		$LnTQ_1$		$LnTQ_2$		$LnTQ_3$	
Group	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**
IG	101	0.131	102	0.212	101	0.183	81	0.234
OG	278	0.167	277	0.162	276	0.207	252	0.199
Total	379	0.157	379	0.175	377	0.201	333	0.208
F-Test (p-value)		0.55(0.459)		1.11(0.292)		0.25(0.620)		0.44(0.508)
Kruskal Wallis (χ^2)		0.265(0.607)		1.445(0.229)		0.343(0.558)		0.424(0.515)
Levene (p-value)		0.136		0.159		0.479		0.100

Note. Own illustration. Analysis excludes observations grouped as „negative". Dependent variables are transformed based on their natural logarithm. Level of significance: *: $p/\chi2<0.05$; **: $p/\chi2<0.01$: ***: $p/\chi2<0.001$.

Table D3. Two-Growth-Modes: Mean Comparison Results (First Grouping Approach) after logarithmic transformation, excluding outliers.

	Dependent Variable							
	$LnTQ_0$		$LnTQ_1$		$LnTQ_2$		$LnTQ_3$	
Group	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**
IG	101	0.131	102	0.213	100	0.171	81	0.234
OG	272	0.168	271	0.163	271	0.212	247	0.196
Total	373	0.158	373	0.176	371	0.201	328	0.205
F-Test (p-value)	0.67(0.413)		1.21(0.272)		0.79(0.376)		0.61(0.433)	
Kruskal Wallis (χ^2)	0.275(0.600)		1.501(0.221)		0.645(0.422)		0.515(0.473)	
Levene (p-value)	0.358		0.400		0.602		0.240	

Note. Own illustration. Analysis excludes observations grouped as „negative". Dependent variables are transformed based on their natural logarithm. Dataset is trimmed by 1% of the highest and lowest value for each dependent variable. Level of significance: *: $p/\chi2<0.05$; **: $p/\chi2<0.01$: ***: $p/\chi2<0.001$.

Table D4. Two-Growth-Modes: Mean Comparison Results (Second Grouping Approach) after logarithmic transformation.

	Dependent Variable							
	LnTQ0		LnTQ1		LnTQ2		LnTQ3	
Group	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**
IG	30	0.049	30	0.095	31	0.107	29	0.127
OG	167	0.229	167	0.214	165	0.263	153	0.225
Non-dominant	196	0.115	196	0.161	196	0.167	165	0.208
Total	393	0.158	393	0.178	392	0.203	347	0.208
F-Test (p-value)	4.83(0.009)**		1.40(0.248)		3.32(0.037)*		0.71(0.494)	
Kruskal Wallis (χ^2)	9.797(0.008)**		3.413(0.182)		7.631(0.022)*		1.517(0.468)	
Levene (p-value)	0.341		0.484		0.310		0.041	

Note. Own illustration. Analysis excludes observations grouped as „negative". Dependent variables are transformed based on their natural logarithm. Level of significance: *: $p/\chi2<0.05$; **: $p/\chi2<0.01$: ***: $p/\chi2<0.001$.

Table D6. Two-Growth-Modes: Mean Comparison Results (Second Grouping Approach) after logarithmic transformation, excluding outliers.

	Dependent Variable							
	LnTQ0		LnTQ1		LnTQ2		LnTQ3	
Group	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**
IG	30	0.331	30	0.095	31	0.107	29	0.127
OG	162	0.211	162	0.216	161	0.267	148	0.220
Non-dominant	193	0.133	193	0.163	193	0.160	165	0.208
Total	385	0.159	385	0.180	385	0.200	342	0.206
F-Test (p-value)	3.36(0.036)*		1.65(0.193)		4.36(0.013)*		0.72(0.488)	
Kruskal Wallis (χ^2)	7.677(0.022)*		3.606(0.165)		8.362(0.015)*		1.413(0.494)	
Levene (p-value)	0.454		0.716		0.432		0.085	

Note. Own illustration. Analysis excludes observations grouped as „negative". Dependent variables are transformed based on their natural logarithm. Dataset is trimmed by 1% of the highest and lowest value for each dependent variable. Level of significance: *: p/χ2<0.05; **: p/χ2<0.01: ***: p/χ2<0.001.

Table D7. Three-Growth-Modes: Mean Comparison Results (First Grouping Approach) after logarithmic transformation.

	Dependent Variable							
	LnTQ0		LnTQ1		LnTQ2		LnTQ3	
Group	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**
IG	65	0.630	66	0.140	65	0.079	60	0.160
MMG	246	0.165	246	0.181	246	0.230	213	0.222
MSCG	77	0.205	77	0.187	76	0.201	66	0.181
Total	388	0.158	389	0.175	387	0.199	339	0.203
F-Test (p-value)	2.31(0.101)		0.29(0.750)		3.45(0.033)*		0.64(0.527)	
Kruskal Wallis (χ^2)	4.811(0.090)		0.411(0.814)		7.251(0.027)*		0.943(0.624)	
Levene (p-value)	0.043*		0.058		0.002**		0.000***	

Note. Own illustration. Analysis excludes observations grouped as „negative". Dependent variables are transformed based on their natural logarithm. Level of significance: *: p/χ2<0.05; **: p/χ2<0.01: ***: p/χ2<0.001.

Table D8. Three-Growth-Modes: Mean Comparison Results (First Grouping Approach) after logarithmic transformation, excluding outliers.

	Dependent Variable							
	LnTQ0		LnTQ1		LnTQ2		LnTQ3	
Group	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**
IG	65	0.630	66	0.140	65	0.079	60	0.160
MMG	241	0.171	241	0.188	240	0.230	208	0.219
MSCG	76	0.190	76	0.168	76	0.201	65	0.194
Total	382	0.156	383	0.176	381	0.199	333	0.203
F-Test (p-value)	2.44(0.088)		0.42(0.660)		3.94(0.020)*		0.55(0.577)	
Kruskal Wallis (χ^2)	4.614(0.100)		0.516(0.77)		7.511(0.023)*		0.800(0.670)	
Levene (p-value)	0.089		0.107		0.011*		0.000***	

Note. Own illustration. Analysis excludes observations grouped as „negative“. Dependent variables are transformed based on their natural logarithm. Dataset is trimmed by 1% of the highest and lowest value for each dependent variable. Level of significance: *: p/χ2<0.05; **: p/χ2<0.01: ***: p/χ2<0.001.

Table D9. Three-Growth-Modes: Mean Comparison Results (Second Grouping Approach) after logarithmic transformation.

	Dependent Variable							
	LnTQ0		LnTQ1		LnTQ2		LnTQ3	
Group	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**
IG	38	0.760	38	0.110	39	0.160	31	0.102
MMG	203	0.169	203	0.182	204	0.221	177	0.221
MSCG	55	0.151	55	0.170	54	0.170	46	0.146
Non-dominant	113	0.164	114	0.189	111	0.184	100	0.225
Total	409	0.157	410	0.175	408	0.199	354	0.202
F-Test (p-value)	0.58(0.628		0.38(0.768)		0.45(0.719)		1.13(0.336)	
Kruskal Wallis (χ^2)	1.159(0.763)		1.294(0.731)		1.614(0.656)		3.111(0.375)	
Levene (p-value)	0.057		0.072		0.035*		0.000***	

Note. Own illustration. Analysis excludes observations grouped as „negative“. Dependent variables are transformed based on their natural logarithm. Level of significance: *: p/χ2<0.05; **: p/χ2<0.01: ***: p/χ2<0.001.

Table D10. Three-Growth-Modes: Mean Comparison Results (First Grouping Approach) after logarithmic transformation, excluding outliers.

	Dependent Variable							
	LnTQ0		LnTQ1		LnTQ2		LnTQ3	
Group	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**
IG	37	0.105	38	0.109	38	0.128	31	0.102
MMG	198	0.177	199	0.196	199	0.227	173	0.222
MSCG	55	0.151	53	0.125	54	0.170	45	0.164
Non-dominant	111	0.145	112	0.190	110	0.174	99	0.214
Total	401	0.158	402	0.177	401	0.195	348	0.202
F-Test (p-value)	0.47(0.707)		0.93(0.426)		1.02(0.382)		1.06(0.368)	
Kruskal Wallis (χ^2)	0.916(0.822)		2.073(0.558)		2.646(0.450)		2.740(0.433)	
Levene (p-value)	0.041*		0.064		0.058		0.001**	

Note. Own illustration. Analysis excludes observations grouped as „negative". Dependent variables are transformed based on their natural logarithm. Dataset is trimmed by 1% of the highest and lowest value for each dependent variable. Level of significance: *: p/χ2<0.05; **: p/χ2<0.01: ***: p/χ2<0.001.

Table E1. Two-Growth-Modes-Model: Random Effects Regression Results.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.227	-0.157	-0.388*	-0.270
	(0.1720)	(0.2592)	(0.0172)	(0.0549)
OG	0.259*	-0.061	0.376***	-0.052
	(0.0423)	(0.5571)	(0.0000)	(0.4130)
FAGE	-0.000	0.000	0.001	0.001
	(0.9629)	(0.7037)	(0.3556)	(0.4965)
FSIZE	-0.000	-0.000	0.000	0.000
	(0.1073)	(0.9069)	(0.2616)	(0.8860)
R&D	3.317	4.490	5.140	5.890
	(0.1166)	(0.0628)	(0.0654)	(0.0520)
LEV	-0.678*	0.081	0.222	-0.210
	(0.0441)	(0.8443)	(0.5152)	(0.5414)
CONSTANT	1.353***	1.102***	0.947***	1.127***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
N	394	395	393	345
R^2 (within)	0.029	0.002	0.044	0.022
R^2 (between)	0.122	0.104	0.102	0.114
R^2 (overall)	0.094	0.075	0.083	0.094
Hausman (χ^2)	0.164	0.293	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E2. Two-Growth-Modes-Model: Random Effects Regression Results, Excluding Multivariate Outliers.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.087	-0.015	-0.359*	-0.326*
	(0.5510)	(0.9186)	(0.0215)	(0.0163)
OG	0.203	-0.066	0.354***	-0.044
	(0.0771)	(0.4353)	(0.0000)	(0.4628)
FAGE	0.000	0.001	0.001	0.001
	(0.7111)	(0.5116)	(0.4254)	(0.4442)
FSIZE	-0.000	0.000	0.000	0.000
	(0.2013)	(0.3566)	(0.1364)	(0.6581)
R&D	3.475	4.743*	6.311*	5.222*
	(0.0936)	(0.0272)	(0.0231)	(0.0127)
LEV	-0.500*	-0.034	0.208	0.019
	(0.0405)	(0.8912)	(0.4310)	(0.9493)
CONSTANT	1.204***	1.027***	0.914***	1.046***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
N	373	376	377	329
R^2 (within)	0.025	0.002	0.061	0.027
R^2 (between)	0.141	0.178	0.185	0.134
R^2 (overall)	0.136	0.155	0.187	0.142
Hausman (χ^2)	0.003**	0.000***	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E3. Two-Growth-Modes-Model: Random Effects Regression Results with Firm Age Variable based on Year of IPO.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.226	-0.155	-0.368*	-0.247
	(0.1717)	(0.2685)	(0.0207)	(0.0776)
OG	0.260*	-0.061	0.384***	-0.043
	(0.0437)	(0.5573)	(0.0000)	(0.5005)
FAGE(IPO)	0.000	0.001	0.003	0.003
	(0.9271)	(0.7037)	(0.1911)	(0.1784)
FSIZE	-0.000	-0.000	0.000	-0.000
	(0.1286)	(0.8802)	(0.3985)	(0.8794)
R&D	3.292	4.597*	5.348	5.970*
	(0.0910)	(0.0425)	(0.0550)	(0.0470)
LEV	-0.678*	0.063	0.172	-0.253
	(0.0361)	(0.8762)	(0.5931)	(0.4434)
CONSTANT	1.343***	1.128***	0.987***	1.133***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
N	394	395	393	345
R^2 (within)	0.030	0.002	0.052	0.035
R^2 (between)	0.120	0.103	0.095	0.101
R^2 (overall)	0.093	0.076	0.081	0.088
Hausman (χ^2)	0.199	0.443	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses firm age based on year of IPO instead of year of inception. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E4. Two-Growth-Modes-Model: Random Effects Regression Results with Firm Age Variable based on Year of IPO, Excluding Multivariate Outliers.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.071	-0.010	-0.354*	-0.297*
	(0.6258)	(0.9430)	(0.0186)	(0.0275)
OG	0.207	-0.064	0.361***	-0.034
	(0.0740)	(0.4468)	(0.0000)	(0.5701)
FAGE(IPO)	0.001	0.001	0.002	0.002
	(0.6156)	(0.4136)	(0.2441)	(0.1813)
FSIZE	-0.000	0.000	0.000	0.000
	(0.2387)	(0.3904)	(0.1853)	(0.7633)
R&D	3.772*	4.896*	6.437*	5.439**
	(0.0389)	(0.0149)	(0.0191)	(0.0087)
LEV	-0.522*	-0.063	0.160	-0.029
	(0.0259)	(0.7933)	(0.5261)	(0.9196)
CONSTANT	1.211***	1.063***	0.949***	1.070***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
N	372	376	377	329
R^2 (within)	0.024	0.003	0.067	0.035
R^2 (between)	0.156	0.172	0.172	0.123
R^2 (overall)	0.146	0.148	0.175	0.134
Hausman (χ^2)	0.005	0.000***	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses firm age based on year of IPO instead of year of inception. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E5. Two-Growth-Modes-Model: Random Effects Regression Results with Natural Logarithm of Firm Age and Firm Size.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.239	-0.151	-0.390*	-0.271*
	(0.1540)	(0.2655)	(0.0172)	(0.0499)
OG	0.243	-0.053	0.376***	-0.053
	(0.0674)	(0.6214)	(0.0000)	(0.4193)
LnFAGE	0.006	0.106	0.149*	0.115
	(0.9344)	(0.1592)	(0.0341)	(0.1309)
LnFSIZE	0.012	-0.021	0.050	0.020
	(0.7838)	(0.7022)	(0.3477)	(0.7448)
R&D	3.274	4.226	4.874	5.743*
	(0.1114)	(0.0740)	(0.0692)	(0.0486)
LEV	-0.670*	0.131	0.250	-0.186
	(0.0446)	(0.7536)	(0.4584)	(0.5848)
CONSTANT	1.183*	0.845	-0.003	0.536
	(0.0225)	(0.0863)	(0.9957)	(0.3625)
N	394	395	393	345
R^2 (within)	0.026	0.005	0.052	0.029
R^2 (between)	0.132	0.095	0.104	0.112
R^2 (overall)	0.095	0.071	0.088	0.093
Hausman (χ^2)	0.681	0.019*	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses the natural logarithm of firm and firm size. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E6. Two-Growth-Modes-Model: Random Effects Regression Results with Natural Logarithm of Firm Age and Firm Size, Excluding Multivariate Outliers.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.083	-0.020	-0.359*	-0.325*
	(0.5650)	(0.8913)	(0.0191)	(0.0138)
OG	0.190	-0.067	0.354***	-0.044
	(0.1153)	(0.4319)	(0.0000)	(0.4706)
LnFAGE	0.021	0.089	0.117*	0.104
	(0.7412)	(0.1378)	(0.0469)	(0.1056)
LnFSIZE	0.026	0.044	0.052	0.032
	(0.4713)	(0.2855)	(0.2499)	(0.5324)
R&D	3.779	4.539*	6.016*	5.100*
	(0.0501)	(0.0274)	(0.0241)	(0.0105)
LEV	-0.495*	-0.011	0.233	0.042
	(0.0400)	(0.9636)	(0.3751)	(0.8877)
CONSTANT	0.888*	0.342	0.059	0.402
	(0.0260)	(0.3708)	(0.8820)	(0.3506)
N	372	376	376	329
R^2 (within)	0.020	0.008	0.071	0.037
R^2 (between)	0.166	0.167	0.181	0.130
R^2 (overall)	0.157	0.150	0.191	0.139
Hausman (χ^2)	0.501	0.004**	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses the natural logarithm of firm and firm size. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E7. Two-Growth-Modes-Model: Random Effects Regression Results excluding Firm Year Observations With Non-Chemical-Industry-Sales.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.276 (0.1115)	-0.208 (0.1473)	-0.399* (0.0184)	-0.289* (0.0498)
OG	0.241 (0.0635)	-0.056 (0.6014)	0.392*** (0.0000)	-0.042 (0.5314)
FAGE	0.000 (0.9091)	0.001 (0.6076)	0.001 (0.3389)	0.001 (0.4935)
FSIZE	-0.000 (0.1134)	-0.000 (0.8389)	0.000 (0.3443)	0.000 (0.8875)
R&D	2.897 (0.2460)	4.954 (0.0754)	6.636* (0.0260)	7.465* (0.0217)
LEV	-0.650 (0.0590)	0.131 (0.7567)	0.255 (0.4613)	-0.174 (0.6183)
CONSTANT	1.356*** (0.0000)	1.080*** (0.0000)	0.918*** (0.0000)	1.099*** (0.0000)
N	369	370	368	322
R^2 (within)	0.027	0.001	0.045	0.024
R^2 (between)	0.125	0.124	0.150	0.153
R^2 (overall)	0.093	0.088	0.120	0.123
Hausman (χ^2)	0.000***	0.001**	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression excludes firm year observations with company sales of >10% in non-chemical-industry segments according to GICS. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E8. Two-Growth-Modes-Model: Random Effects Regression Results excluding Firm Year Observations With Non-Chemical-Industry-Sales, Excluding Multivariate Outliers.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.125	-0.041	-0.374*	-0.363**
	(0.4094)	(0.7919)	(0.0172)	(0.0090)
OG	0.187	-0.060	0.373***	-0.053
	(0.1079)	(0.4924)	(0.0000)	(0.4097)
FAGE	0.001	0.001	0.001	0.001
	(0.6433)	(0.4190)	(0.4133)	(0.4117)
FSIZE	-0.000	0.000	0.000	0.000
	(0.1557)	(0.4975)	(0.1986)	(0.7276)
R&D	3.216	5.161*	7.979**	6.361**
	(0.2126)	(0.0308)	(0.0051)	(0.0042)
LEV	-0.528*	0.012	0.222	0.043
	(0.0374)	(0.9624)	(0.3951)	(0.8872)
CONSTANT	1.230***	1.010***	0.889***	1.034***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
N	350	352	353	310
R^2 (within)	0.021	0.001	0.066	0.026
R^2 (between)	0.160	0.224	0.247	0.185
R^2 (overall)	0.152	0.200	0.234	0.174
Hausman (χ^2)	0.000***	0.000***	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression excludes firm year observations with company sales of >10% in non-chemical-industry segments according to GICS. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E9. Two-Growth-Modes-Model: Random Effects Regression Results for ROA as Dependent Variable.

	Dependent Variable		
	ROA1	**ROA2**	**ROA3**
IG	0.002	-0.002	0.006
	(0.9041)	(0.9277)	(0.6923)
OG	0.031	-0.019	-0.006
	(0.1789)	(0.2164)	(0.6919)
FAGE	-0.000	-0.000	-0.000
	(0.1943)	(0.2534)	(0.1801)
FSIZE	-0.000	0.000	0.000
	(0.7594)	(0.7532)	(0.3127)
R&D	0.040	0.098	0.129
	(0.7889)	(0.5274)	(0.4224)
LEV	-0.077	-0.039	-0.027
	(0.0942)	(0.4390)	(0.5272)
CONSTANT	0.211***	0.197***	0.190***
	(0.0000)	(0.0000)	(0.0000)
N	404	401	352
R^2 (within)	0.029	0.010	0.004
R^2 (between)	0.055	0.017	0.037
R^2 (overall)	0.038	0.012	0.016
Hausman (χ^2)	0.631	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses ROA as dependent variable. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E10. Two-Growth-Modes-Model: Random Effects Regression Results for ROA as Dependent Variable, Excluding Multivariate Outliers.

	Dependent Variable		
	ROA1	**ROA2**	**ROA3**
IG	0.026 (0.1758)	-0.002 (0.8326)	0.014 (0.2857)
OG	0.023 (0.1523)	-0.007 (0.5396)	-0.005 (0.7164)
FAGE	-0.000 (0.2026)	-0.000 (0.3583)	-0.000 (0.3806)
FSIZE	0.000 (0.4467)	0.000 (0.6697)	0.000 (0.2686)
R&D	0.082 (0.5352)	0.178 (0.1850)	0.166 (0.2752)
LEV	-0.068* (0.0205)	-0.004 (0.8874)	0.021 (0.3074)
CONSTANT	0.197*** (0.0000)	0.177*** (0.0000)	0.167*** (0.0000)
N	388	387	338
R^2 (within)	0.039	0.004	0.008
R^2 (between)	0.042	0.016	0.062
R^2 (overall)	0.033	0.012	0.028
Hausman (χ^2)	0.010	0.039*	0.005**

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses ROA as dependent variable. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E11. Three-Growth-Modes-Model: Random Effects Regression Results.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.239	-0.156	-0.381*	-0.265
	(0.1432)	(0.2640)	(0.0127)	(0.0570)
MMG	0.611*	-0.092	0.887***	0.149
	(0.0105)	(0.6244)	(0.0000)	(0.3535)
MSCG	0.026	-0.041	0.037	-0.197
	(0.9306)	(0.8358)	(0.7871)	(0.1275)
FAGE	-0.000	0.000	0.001	0.001
	(0.9817)	(0.7084)	(0.3420)	(0.4862)
FSIZE	-0.000	-0.000	0.000	0.000
	(0.0919)	(0.9062)	(0.2378)	(0.8721)
R&D	3.230	4.508	5.008	5.828
	(0.1249)	(0.0635)	(0.0691)	(0.0543)
LEV	-0.648	0.077	0.287	-0.186
	(0.0588)	(0.8513)	(0.4102)	(0.5886)
CONSTANT	1.324***	1.105***	0.897***	1.108***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
N	394	395	393	345
R^2 (within)	0.040	0.002	0.064	0.025
R^2 (between)	0.121	0.104	0.102	0.115
R^2 (overall)	0.096	0.075	0.091	0.096
Hausman (χ^2)	0.322	0.387	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E12. Three-Growth-Modes-Model: Random Effects Regression Results, Excluding Multivariate Outliers.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.089	-0.018	-0.358*	-0.330*
	(0.5420)	(0.9050)	(0.0163)	(0.0138)
MMG	0.287	0.027	0.729***	0.034
	(0.0956)	(0.8706)	(0.0000)	(0.7948)
MSCG	0.148	-0.128	0.105	-0.099
	(0.3303)	(0.3682)	(0.3693)	(0.3347)
FAGE	0.000	0.001	0.001	0.001
	(0.7132)	(0.5052)	(0.3945)	(0.4413)
FSIZE	-0.000	0.000	0.000	0.000
	(0.1998)	(0.3509)	(0.1163)	(0.6638)
R&D	3.496	4.714*	6.145*	5.178*
	(0.0905)	(0.0281)	(0.0270)	(0.0128)
LEV	-0.492*	-0.024	0.263	0.041
	(0.0447)	(0.9237)	(0.3227)	(0.8899)
CONSTANT	1.196***	1.019***	0.875***	1.038***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
N	373	376	378	330
R^2 (within)	0.026	0.003	0.078	0.028
R^2 (between)	0.144	0.178	0.179	0.135
R^2 (overall)	0.136	0.154	0.182	0.138
Hausman (χ^2)	0.009**	0.000***	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E13. Three-Growth-Modes-Model: Random Effects Regression Results with Firm Age Variable based on Year of IPO.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.238	-0.153	-0.360*	-0.242
	(0.1435)	(0.2739)	(0.0157)	(0.0809)
MMG	0.613**	-0.091	0.892***	0.155
	(0.0093)	(0.6299)	(0.0000)	(0.3416)
MSCG	0.027	-0.039	0.047	-0.186
	(0.9280)	(0.8389)	(0.7275)	(0.1460)
FAGE(IPO)	0.000	0.001	0.003	0.003
	(0.9176)	(0.7087)	(0.1925)	(0.1795)
FSIZE	-0.000	-0.000	0.000	-0.000
	(0.1167)	(0.8794)	(0.3720)	(0.8928)
R&D	3.220	4.620*	5.236	5.917*
	(0.0960)	(0.0428)	(0.0575)	(0.0487)
LEV	-0.648*	0.058	0.235	-0.230
	(0.0494)	(0.8848)	(0.4765)	(0.4863)
CONSTANT	1.316***	1.131***	0.942***	1.117***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
N	394	395	393	345
R^2 (within)	0.041	0.002	0.071	0.038
R^2 (between)	0.120	0.104	0.097	0.103
R^2 (overall)	0.096	0.076	0.089	0.090
Hausman (χ^2)	0.372	0.524	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses firm age based on year of IPO instead of year of inception. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E14. Three-Growth-Modes-Model: Random Effects Regression Results with Firm Age Variable based on Year of IPO, Excluding Multivariate Outliers.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.087	-0.013	-0.353*	-0.295*
	(0.5519)	(0.9297)	(0.0140)	(0.0274)
MMG	0.288	0.029	0.742***	0.034
	(0.0931)	(0.8649)	(0.0000)	(0.7972)
MSCG	0.149	-0.125	0.109	-0.083
	(0.3298)	(0.3734)	(0.3498)	(0.4222)
FAGE(IPO)	0.001	0.001	0.002	0.002
	(0.6211)	(0.4110)	(0.2309)	(0.1829)
FSIZE	-0.000	0.000	0.000	0.000
	(0.1931)	(0.3849)	(0.1681)	(0.7568)
R&D	3.570	4.872*	6.295*	5.417**
	(0.0543)	(0.0153)	(0.0219)	(0.0085)
LEV	-0.510*	-0.054	0.213	-0.022
	(0.0315)	(0.8252)	(0.4056)	(0.9396)
CONSTANT	1.217***	1.055***	0.915***	1.065***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
N	373	376	378	329
R^2 (within)	0.026	0.004	0.085	0.035
R^2 (between)	0.144	0.172	0.168	0.124
R^2 (overall)	0.136	0.147	0.170	0.134
Hausman (χ^2)	0.009**	0.000***	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses firm age based on year of IPO instead of year of inception. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E15. Three-Growth-Modes-Model: Random Effects Regression Results with Natural Logarithm of Firm Age and Firm Size.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.250 (0.1288)	-0.149 (0.2726)	-0.382* (0.0128)	-0.266 (0.0522)
MMG	0.597* (0.0115)	-0.080 (0.6608)	0.887*** (0.0000)	0.150 (0.3516)
MSCG	0.010 (0.9742)	-0.034 (0.8624)	0.041 (0.7729)	-0.198 (0.1324)
LnFAGE	0.008 (0.9097)	0.105 (0.1632)	0.156* (0.0299)	0.118 (0.1239)
LnFSIZE	0.011 (0.8074)	-0.021 (0.7037)	0.048 (0.3800)	0.019 (0.7614)
R&D	3.196 (0.1182)	4.256 (0.0739)	4.738 (0.0735)	5.677 (0.0512)
LEV	-0.639 (0.0602)	0.126 (0.7616)	0.315 (0.3595)	-0.161 (0.6351)
CONSTANT	1.160* (0.0243)	0.848 (0.0890)	-0.051 (0.9277)	0.519 (0.3789)
N	394	395	393	345
R^2 (within)	0.037	0.005	0.072	0.032
R^2 (between)	0.133	0.096	0.106	0.114
R^2 (overall)	0.100	0.072	0.096	0.100
Hausman (χ^2)	0.885	0.033*	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses the natural logarithm of firm and firm size. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E16. Three-Growth-Modes-Model: Random Effects Regression Results with Natural Logarithm of Firm Age and Firm Size, Excluding Multivariate Outliers.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.099	-0.022	-0.358*	-0.330*
	(0.4911)	(0.8789)	(0.0142)	(0.0113)
MMG	0.270	0.025	0.734***	0.034
	(0.1247)	(0.8818)	(0.0000)	(0.7961)
MSCG	0.132	-0.129	0.104	-0.099
	(0.3992)	(0.3654)	(0.3820)	(0.3364)
LnFAGE	0.021	0.090	0.125*	0.106
	(0.7423)	(0.1346)	(0.0356)	(0.0985)
LnFSIZE	0.024	0.044	0.052	0.031
	(0.5199)	(0.2890)	(0.2577)	(0.5444)
R&D	3.590	4.514*	5.841*	5.051*
	(0.0664)	(0.0281)	(0.0283)	(0.0107)
LEV	-0.484*	-0.002	0.288	0.065
	(0.0467)	(0.9948)	(0.2751)	(0.8264)
CONSTANT	0.905*	0.332	-0.008	0.391
	(0.0286)	(0.3879)	(0.9842)	(0.3677)
N	373	376	377	330
R^2 (within)	0.022	0.009	0.088	0.038
R^2 (between)	0.159	0.168	0.179	0.131
R^2 (overall)	0.150	0.150	0.186	0.134
Hausman (χ^2)	0.510	0.008	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses the natural logarithm of firm and firm size. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E17. Three-Growth-Modes-Model: Random Effects Regression Results excluding Firm Year Observations With Non-Chemical-Industry-Sales.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.294	-0.208	-0.398*	-0.286*
	(0.0836)	(0.1494)	(0.0121)	(0.0497)
MMG	0.611*	-0.100	0.942***	0.188
	(0.0199)	(0.6235)	(0.0000)	(0.2472)
MSCG	-0.002	-0.029	0.033	-0.203
	(0.9954)	(0.8898)	(0.8222)	(0.1156)
FAGE	0.000	0.001	0.001	0.001
	(0.8720)	(0.6056)	(0.3104)	(0.4700)
FSIZE	-0.000	-0.000	0.000	0.000
	(0.0933)	(0.8362)	(0.3097)	(0.8757)
R&D	2.669	4.924	6.366*	7.348*
	(0.2868)	(0.0805)	(0.0332)	(0.0251)
LEV	-0.616	0.132	0.332	-0.145
	(0.0803)	(0.7553)	(0.3520)	(0.6795)
CONSTANT	1.324***	1.083***	0.858***	1.074***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
N	369	370	368	322
R^2 (within)	0.040	0.002	0.069	0.028
R^2 (between)	0.116	0.124	0.140	0.151
R^2 (overall)	0.091	0.088	0.118	0.122
Hausman (χ^2)	0.002**	0.003**	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression excludes firm year observations with company sales of >10% in non-chemical-industry segments according to GICS. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E18. Three-Growth-Modes-Model: Random Effects Regression Results excluding Firm Year Observations With Non-Chemical-Industry-Sales, Excluding Multivariate Outliers.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.127	-0.045	-0.369*	-0.355**
	(0.4018)	(0.7717)	(0.0168)	(0.0098)
MMG	0.239	0.020	0.768***	0.105
	(0.1900)	(0.9112)	(0.0000)	(0.4571)
MSCG	0.154	-0.114	0.106	-0.154
	(0.3364)	(0.4614)	(0.3837)	(0.1945)
FAGE	0.001	0.001	0.001	0.001
	(0.6376)	(0.4063)	(0.3595)	(0.4167)
FSIZE	-0.000	0.000	0.000	0.000
	(0.1500)	(0.4953)	(0.1634)	(0.7124)
R&D	3.165	5.069*	7.759**	6.371**
	(0.2228)	(0.0354)	(0.0075)	(0.0036)
LEV	-0.524*	0.023	0.296	0.058
	(0.0407)	(0.9279)	(0.2658)	(0.8470)
CONSTANT	1.226***	1.001***	0.836***	1.020***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
N	350	352	353	309
R^2 (within)	0.022	0.000	0.086	0.028
R^2 (between)	0.158	0.221	0.237	0.188
R^2 (overall)	0.150	0.197	0.230	0.179
Hausman (χ^2)	0.000***	0.000***	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression excludes firm year observations with company sales of >10% in non-chemical-industry segments according to GICS. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E19. Three-Growth-Modes-Model: Random Effects Regression Results for ROA as Dependent Variable.

	Dependent Variable		
	ROA1	**ROA2**	**ROA3**
IG	0.002 (0.9066)	-0.002 (0.9147)	0.005 (0.7185)
MMG	0.042 (0.3258)	-0.007 (0.8302)	-0.015 (0.5552)
MSCG	0.024 (0.3297)	-0.027 (0.1116)	0.000 (0.9926)
FAGE	-0.000 (0.1935)	-0.000 (0.2613)	-0.000 (0.1784)
FSIZE	-0.000 (0.7540)	0.000 (0.7528)	0.000 (0.3158)
R&D	0.036 (0.8134)	0.094 (0.5415)	0.134 (0.4045)
LEV	-0.075 (0.0869)	-0.037 (0.4718)	-0.029 (0.5241)
CONSTANT	0.210*** (0.0000)	0.196*** (0.0000)	0.191*** (0.0000)
N	404	401	352
R^2 (within)	0.030	0.012	0.004
R^2 (between)	0.052	0.013	0.039
R^2 (overall)	0.038	0.011	0.016
Hausman (χ^2)	-	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses ROA as dependent variable. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E20. Three-Growth-Modes-Model: Random Effects Regression Results for ROA as Dependent Variable, Excluding Multivariate Outliers.

	Dependent Variable		
	ROA1	**ROA2**	**ROA3**
IG	0.026 (0.1747)	-0.003 (0.8183)	0.014 (0.2967)
MMG	0.024 (0.1592)	0.002 (0.9181)	-0.010 (0.6570)
MSCG	0.022 (0.3568)	-0.013 (0.4202)	-0.002 (0.9103)
FAGE	-0.000 (0.2027)	-0.000 (0.3645)	-0.000 (0.3773)
FSIZE	0.000 (0.4428)	0.000 (0.6693)	0.000 (0.2686)
R&D	0.082 (0.5400)	0.174 (0.1949)	0.167 (0.2741)
LEV	-0.067* (0.0191)	-0.003 (0.9271)	0.020 (0.3220)
CONSTANT	0.197*** (0.0000)	0.176*** (0.0000)	0.168*** (0.0000)
N	388	387	338
R^2 (within)	0.039	0.005	0.008
R^2 (between)	0.043	0.013	0.063
R^2 (overall)	0.033	0.011	0.029
Hausman (χ^2)	0.000***	-	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression uses ROA as dependent variable. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E21. Three-Growth-Modes-Model: Random Effects Regression Controlling for Currency Effect in Sales.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.369	-0.283	-0.351	-0.337
	(0.1167)	(0.0562)	(0.1190)	(0.2176)
MMGCE	0.486*	0.290	1.283***	0.503*
	(0.0382)	(0.2795)	(0.0010)	(0.0461)
CE	-0.197	-1.465*	-0.622	0.514
	(0.7126)	(0.0257)	(0.3354)	(0.3755)
MSCG	0.422	-0.213	-0.111	-0.310
	(0.1774)	(0.4681)	(0.6463)	(0.2376)
FAGE	0.000	0.001	0.001	0.001
	(0.8316)	(0.5757)	(0.3699)	(0.4161)
FSIZE	-0.000	0.000	0.000*	0.000
	(0.2942)	(0.3425)	(0.0436)	(0.8701)
R&D	4.885*	6.968***	7.340*	7.761*
	(0.0313)	(0.0001)	(0.0139)	(0.0337)
LEV	-0.503	0.262	0.479	-0.469
	(0.2544)	(0.5594)	(0.4336)	(0.4645)
CONSTANT	1.204***	0.880***	0.707*	1.044***
	(0.0000)	(0.0001)	(0.0110)	(0.0004)
N	251	250	247	216
R^2 (within)	0.057	0.049	0.074	0.041
R^2 (between)	0.217	0.256	0.182	0.191
R^2 (overall)	0.185	0.196	0.140	0.140
Hausman (χ^2)	0.022*	0.000***	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression controls for currency effect in sales. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Table E22. Three-Growth-Modes-Model: Random Effects Regression Controlling for Currency Effect in Sales, Excluding Multivariate Outliers.

	Dependent Variable			
	TQ0	**TQ1**	**TQ2**	**TQ3**
IG	-0.342 (0.1130)	-0.285 (0.0545)	-0.348 (0.0633)	-0.411 (0.1112)
MMGCE	0.477* (0.0322)	0.284 (0.1854)	0.942*** (0.0000)	0.397 (0.1212)
CE	-0.419 (0.5031)	-1.219* (0.0329)	-0.231 (0.6892)	0.194 (0.7131)
MSCG	0.231 (0.3129)	-0.290 (0.2240)	-0.032 (0.8869)	-0.191 (0.4345)
FAGE	0.000 (0.8628)	0.000 (0.9205)	0.001 (0.6498)	0.001 (0.5394)
FSIZE	-0.000 (0.5097)	0.000* (0.0479)	0.000** (0.0043)	0.000 (0.7794)
R&D	6.339*** (0.0005)	7.931*** (0.0000)	9.130** (0.0024)	6.677*** (0.0008)
LEV	-0.486 (0.1793)	0.004 (0.9910)	0.066 (0.8853)	-0.324 (0.5594)
CONSTANT	1.086*** (0.0000)	0.937*** (0.0000)	0.835*** (0.0001)	1.075*** (0.0000)
N	237	236	236	207
R^2 (within)	0.068	0.066	0.073	0.029
R^2 (between)	0.361	0.347	0.368	0.296
R^2 (overall)	0.280	0.353	0.346	0.263
Hausman (χ^2)	0.159	0.000***	0.000***	0.000***

Note. Own illustration. Regression based on robust estimates according to Huber (1967)/White (1980) due to the existence of heteroskedasticity and/or autocorrelation. Regression controls for currency effect in sales. Regression excludes multivariate outliers with standardized residuals greater/less than +2/-2. Level of significance (p-values in parentheses): *p<0.05; **p<0.01; ***p<0.001.

Declaration

I certify that:

(a) the thesis being submitted for examination is my own account of my own research

(b) my research has been conducted ethically

(c) the data and results presented are the genuine data and results actually obtained by me during the conduct of the research

(d) where I have drawn on the work, ideas and results of others this has been appropriately acknowledged in the thesis

(e) where any collaboration has taken place with other researchers, I have clearly stated in the thesis my own personal share in the investigation

(f) the thesis has not been presented to any other examination committee before

(g) the thesis has not been published before.

Berlin, September, 2015

Stephan Tingler