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**Master's Thesis
(Diplomarbeit)**

**Top Management Team Diversity and Firm Performance
- investigating German Companies**

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LIST OF ABBREVIATIONS

AG	Joint-Stock Company, Corporation
AktG	German Stock Corporation Act
BS	Total Assets
CEO	Chief Executive Officer
Coeff.	Coefficient
Conf. Int.	Confidence Interval
Corp.	Corporation
CV	Coefficient of Variation
DAX	Blue-Chip Index of Deutsche Börse
EBIT	Earnings before Interest and Tax
et al.	And Others
etc.	Et Cetera
e.g.	For Example
EU	European Union
FWB	Frankfurter Stock Exchange
FY	Financial Year
HGB	German Commercial Code
IAS	International Accounting Standard
i.e.	That Is
Inc.	Incorporation
IQR	Inter-Quartiles Range
JUE	Profit/Income
KGaA	Limited Partnership for/on Stocks
M & A	Mergers and Acquisitions
MDAX	Index of Deutsche Börse for Mid-Sized Companies
N	Number of Observations within the Sample
No.	Number
OLS	Ordinary Least Square
PLC	Public Limited Company
ROA	Return on Assets
R&D	Research and Development
resp.	Respectively
Std. Dev.	Standard Deviation
TMT	Top Management Team
vs.	Versus

1. Introduction

The question about the determinants of firm performance is an important inquiry which confronts us on a daily basis in both scientific researches and also in news and reports. Mismanagement and miscalculations of the Top Management Team (TMT) are, along general economic cycle arguments, the most often proposed determinants in this respect. Concerning the top management argument, the composition of the TMT is seen as a crucial variable in shaping organizational outcomes. This research adds to the investigation of this relationship. Specifically, it aims to investigate the relationship between TMT demographic diversity and financial firm performance of German companies by using empirical quantitative analysis methods.

Within the last few decades, there has been a growing interest in diversity and its effects. This can be mainly attributed to two reasons. Firstly, the growing multiculturalism within societies. In the United States this was particularly backed by the introduction of laws against discriminations. The Civil Rights Act (1964), Pregnancy Discrimination Act (1978), Age Discrimination Act (1967), Americans with Disabilities Act (1990) (Cox 1993:12) and the Affirmative Action Programmes (Sepehri 2002:244) have forced American companies to consider ways in which diverse teams with regards to age, gender or race can effectively work together. The vast extent of multiculturalism and legal affairs seemed to be for a long time elusively American phenomena. However, recently European countries, including Germany are facing these challenges as well, pushed by European Union Treaties (e.g. Treaty on European Union (Article 13)). In particular, the present discussions and negotiations in the German parliament (spring 2005) of the so called "Antidiskriminierungsgesetz" (anti-discrimination law) cast a glance on the growing importance for German employers to consider ways to ensure that rising diversity can be used as a positive force.

Secondly, the growing entrepreneurial interest in diversity is due to increasing internationalisation, globalisation, turbulent environments and hypercompetition (Stumpf & Thomas 1999:36-37, Sepehri 2002:4, Gebert 2004:176). Although globally operating companies are more affected by these tendencies than their nationally orientated counterparts, the scope of these market changes are profoundly far-reaching. Many companies are experiencing the consequences of these environmental tendencies in pressure for innovation and competitive advantages. In an adaptation process to these external demands, companies are frequently responding by introducing new organizational forms (e.g. project groups, cross-functional teams, etc.)

from within. By the same token, companies are also responding by enhancing new organizational forms between companies, for instance, “Mergers & Acquisitions” (M&A), “Virtual Organizations” or “Joint Ventures”. Both responses rely on the synergetic effects of teams, whereby it is anticipated, that the team should produce better solutions than the best individual. However, by combining people from various departments or organizations, a substantial ground work needs to be done in order to gain cooperation and integration of all members (Sepehri 2002:3).

Whilst the first reason stresses the necessity to act (in terms of assimilation) as a result of laws and is also labelled the “Fairness and Discrimination Paradigm” (Sepehri 2002:133-142), the second reason must be considered as a consciously chosen action by companies who want to meet market demands (“Market-access and Legitimacy Paradigm” and “Learning and Effectiveness Paradigm” (Sepehri 2002:142-154)). The latter is based on the idea that people with differing backgrounds, experiences and knowledge will generate new, more innovative and better ideas which will lead to increased flexibility and better decisions. This in turn can help the company to gain or maintain its competitive advantage.

Although diversity research is relatively new in management (originating in the 1980s and 1990s), a vast amount of literature already exists. This body of literature is further enhanced by research findings on the functioning of teams or groups from social psychology and industrial and occupational psychology. These researches have explored different aspects of diversity and its effects on integration, cohesion and performance. Whilst most of these researches are based on samples with work groups, mainly R&D groups, one specific line of organizational management research considers diversity in TMT¹ and its impact on the organization. As the TMT is at the upper echelon of the organization, the distribution of characteristics amongst the team, the functioning within the team and the ability to arrive at both comprehensive and competitive decisions is of great importance for the organization and its performance. Diversity can thereby accelerate or restrict comprehensiveness in decisions making.

However, it is unclear if the overall effects of diversity in TMT for organizational outcomes are positive or negative. Some argue in favour of very positive expectations, assuming that diversity within TMTs would throughout result in better decisions and performance. In contrast, others argue for negative effects, stating that diversity increases differences between group members, which are immensely difficult to overcome. Consequently, if the latter theoretical proposition is correct, then decisions

¹ Here and thereafter, the terminology ‘top management team’ is equivalent in German to “Vorstand” (board of managing directors).

and performance should be worse. Empirical data has produced mixed results and thus do not strongly favour any of the two competing theoretical propositions. Furthermore, these studies were predominantly conducted in the United States (Sepehri 2002:25) and therefore suffer from external validity. These problems regarding TMT diversity and performance research provide the starting points of this investigation.

This investigation explores the relationship between TMT demographic diversity and firm performance by integrating the two competing theoretical approaches and by proposing an explanation for the mixed empirical results. Based on an outline of the team process, a curvilinear relationship between TMT demographic diversity and firm performance is hypothesized. In this research field, simple linear relationships inquiries are commonplace. The idea of testing a curvilinear relationship has only occasionally been mentioned. In fact, there is no article, which presents empirical findings on the possibility of a curvilinear relationship between the two constructs. This study is special in its design as it will try to fit a curvilinear model and it is also based on data from a German sample. Moreover, the impact of environmental conditions, namely turbulent vs. stable environmental conditions, on this relationship will be investigated.

Chapter 2 presents theoretical reflections on which a relationship between diversity and performance is assumed. Firstly, the general impact of top managers on firm performance will be outlined. Thereby two theories, namely “Upper-Echelons Theory” and “Organizational Demography”, will be briefly summarized. Secondly, two approaches (“Process Theory” and “Resources Theory”) with completely different expectations on the effects of diversity on performance will be presented. Moreover, previous empirical investigations into the topic of TMT diversity and firm’s strategic choices and performance will be summarized. This section will close with an outline of major shortcomings found in these studies.

Chapter 3 will then propose a theoretical model of TMT demographic diversity and firm performance, which will also integrate the unmeasured variables of cognitions, team process and strategic choice. Demographic diversity will be defined and the major dimensions of the concept will be outlined. Thereafter, insights into the so called “Black Box” will be given. However, there are many intervening processes and potentially functional or dysfunctional effects. Within the scope of this research, only the most apparent constructs and aspects will be highlighted. This section will be the theoretical baseline for all hypotheses and tests which will be outlined and conducted in due course.

Chapter 4 will present the empirical investigation of this thesis. The study design and results will be outlined in detail. Assumptions, hypotheses as well as empirical expectations, which will be tested in this study, will be explored. An excursus will highlight the institutional and historical differences between Germany and the United States. Next, measurement choices, which were made with regard to the demographic diversity and performance constructs, the sample and the data collection methods, will be described. In the results section, the hypotheses and assumptions will be tested by using descriptive statistics and regression analysis. Central to the research are tests on the plausibility of a curvilinear relationship between TMT demographic diversity and financial firm performance. The chapter concludes by summarizing the findings and also outlining the potential methodological problems and their implications for future research.

Chapter 5 will provide a comprehensive conclusion covering the intricacies and far-reaching implications of the dynamic relationship between TMT demographic diversity and firm performance.

2. Previous Research in Top Management Team (TMT) Diversity and Firm Performance

2.1. Theoretical Background

The question of how diversity in TMTs relates to financial outcomes of organizations is dominated by two main theoretical streams. One emphasises the potential positive effects while the other claims that negative effects are more predominant. Before elaborating these theories, a general outline of top managers work conditions and responsibilities will be given.

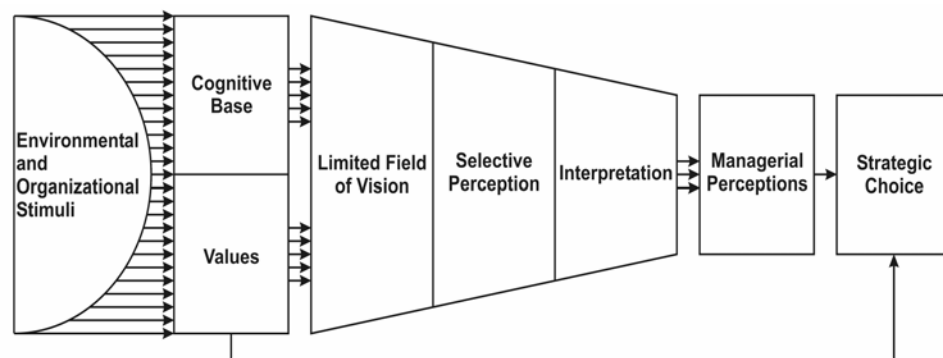
The first question which comes to mind is: do top managers matter at all? There are various research standpoints on this topic. Some deny the influence of managers on organizational outcomes. They see external factors as being the only determinants or at least as being the most influential determinants for the organization and the strategic choices. School of thoughts which follow this approach are known as: Contingency Theory, Resource-Dependency-Approach, Population-Ecology-Approach and Industrial Economics (Finkelstein & Hambrick 1996:20-22, Henke 1998:31-36). These purely external determined approaches have been criticised on a number of grounds. Thus, in the mid 1980s managers got back into the focus of organizational and strategic research (Henke 1998:41, Jackson 1992:346). Since then, top managers have again been seen as an influential and shaping factor with crucial impact on organizational actions, decisions and outcomes (Jackson 1992:346, Huber & Glick 1993, Finkelstein & Hambrick 1996:22-26).

The second important question is: how and why do top managers shape organizational outcomes? One answer to this question is position related. Top Managers operate at the apex of a company. The position of these managers is labelled as "Strategic Leadership", indicating that it is this part of the organization that important information is filtered and major strategic directions and principles are decided (Hambrick 1989:6, O'Reilly et al. 1993:150-151, Henke 1998:20-24, Cannella 2001:38). In short, *"hierarchy is generally greatly predictive of power and influence. The hierarchically top ten individuals in an organization will almost invariably have more influence on the course of the firm - through their actions, inactions, behaviours - than any other ten people in the organization"* (Hambrick 1994:174).

Another explanation to the question of why managers shape organizational outcomes is task related and based on the work conditions which top managers do face. Their

everyday work confronts them with non-routine problems and tasks. They face a heavy overload of information everyday. Such information is often ambiguous, complex and unstructured (March & Simon 1958, Hambrick & Mason 1984, Hambrick 1994, Henke 1998, O'Reilly et al. 1998, Edmondson et al. 2003). In many ways, managers are forced to deal with this situational ambiguity. Carnegie theorists (March & Simon 1958, Cyert & March 1963) have argued in this manner that the “bounded rationality” of managers brings the cognitive bases² of managers into play. Based on their values, perceptions and attitudes, they will interpret the information and sources (Finkelstein & Hambrick 1996:40-45) and this in turn will influence their decisions (Figure 1).

Figure 1: Managers Bounded Rationality and Strategic Choice



Source: Hambrick & Mason (1984:195)

One of the most influential theories of TMT diversity research takes the concept of bounded rationality as a starting point for introducing their conceptual article about how the organization is a reflection of its top managers. What is now known in literature as Hambrick & Mason’s “Upper-Echelons-Theory” has subsequently been investigated by more than 40 studies (Finkelstein & Hambrick 1996). The centre piece of Hambrick & Mason’s (1982; 1984)³ conceptual paper is that “*organizational outcomes - both strategies and effectiveness - are viewed as reflections of the values and cognitive bases of powerful actors in the organization*” (Hambrick & Mason 1984:193). Instead of assessing values and cognitive basis directly, they suggest the use of observable managerial variables, like sex, age, tenure in the organization, functional background, socioeconomic roots and financial position. They assume that these demographic

² Hambrick & Mason (1984) state the cognitive base as “1. Knowledge or assumptions about future events; 2. Knowledge of alternatives; 3. Knowledge of consequences attached to alternatives” and their values (Hambrick & Mason 1984:195).

³ Hambrick and Mason twice published an article to introduce their views and their “Upper-Echelons-Theory” (Hambrick & Mason 1982, Hambrick & Mason 1984). Both articles make the same statements, whilst the second is slightly more detailed. Normally, the second published article is cited. However, for describing the beginning of “Upper-Echelons-Theory”, the first publication seems to be more appropriate.

indicators can serve as proxies for the cognitive bases of managers. Hambrick & Mason (1984) favour this approach for reasons of simplicity of access and measurement and reliability. In other words, they believe that strategic choices can be predicted by situational variables (e.g. the environment) and demographic variables. In turn, performance can be predicted by demographics and strategic choices. Their work considers the TMT as a whole, as this adds greater predictive power than the investigation of single TMT members (Hambrick & Mason 1984:196). Other authors have confirmed this on several occasions (Hambrick 1987:91, Bantel & Jackson 1989:107, Finkelstein & Hambrick 1990:485, Papadakis & Barwise 2002:87). Hambrick & Mason (1984) formulated propositions about the demographic composition of the TMT and its effects on strategic choice and performance. They mostly used measures of central tendencies at the aggregate level. Finally, they also formulated propositions about the effects of homogeneity and heterogeneity within TMTs on organizational outcomes (Hambrick & Mason 1984:202-203). They state that “...for any variable that influences an individual's strategic choice, it can be said that the range of the group's scores on that variable also influences strategic choice through its effects on conflict and the generation of alternatives” (Hambrick & Mason 1984:203). In line with this argument is Pfeffer's (1983) article on “Organizational Demography”⁴. He emphasized that the distributional properties are of importance. The mere use of single descriptive statistics is not sufficient to explain organizational outcomes. He claimed that demographic effects are not simply the sum of individual variants. According to Pfeffer (1983:303/307) for one to understand the effects of demography on organizational outcomes, the distribution of demographic characteristics (compositions with regards to: sex, race, age, length of service, the educational level, socioeconomic origins, etc.) of any social entity is essential. In using demographics he offered, just as Hambrick & Mason (1984) did, a parsimonious, comprehensive, testable and objectively measurable model. He argued that the use of demographics can potentially account for a broad variety of hypothetical constructs (e.g. attitudes), which might be related to organizational outcomes. Whilst these hypothetical, underlying constructs have in the past been difficult to measure and therefore suffered validity and reliability problems, using demographics to predict organizational outcomes is straightforward (Pfeffer 1983:301/352). Pfeffer concluded that the dispersed aggregate demography measure is an important causal variable that affects a number of intervening variables and processes and through them a number of organizational outcomes (Pfeffer 1983:350).

⁴ Nienhüser (1991:765) states that “Organizational Demography” can either refer to a research approach or to the composition of the firm's personnel according to social attributes. Here and thereafter, its use refers to the former.

This distributional measure of demography can on the aggregate level be summarized as “diversity”.

The next important question is: does diversity in TMTs influence overall performance positively or negatively? This question deserves two outlines: a simple theoretical one which follows next and an empirical investigation into previous studies which examined this relationship (see Section 2.2).

2.1.1. Process Theory

The basic premise underlying process theory is that diversity influences group processes, like communication or conflict. In turn these group processes do influence strategic decisions and performance (Williams & O’Reilly 1998:83, Jans 2004:5). The theory rests on two major findings which have been shown in empirical studies as influential factors. On the one hand is the “Similar-Attraction-Theory” (Schneider 1987) and on the other hand is “Social Categorization Theory” (Turner 1987). The similar-attraction thesis suggests that people are on their personal attributes attracted to an organization on the basis of the organization’s “character” (i.e. structure, culture, strategy). Furthermore, organizations tend to choose the people who fit best to their organization’s character. This selection increases homogeneity within employees, especially homogeneity at the upper management level (Schneider 1987, Schneider et al. 1998:463). On the basis of attraction of similarity, diversity must be assumed as being a disruptive factor which negatively influences group processes and outcomes (Williams & O’Reilly 1998:83, Gebert 2004:186, Jans 2004:5).

Social categorization refers to “*a process of thinking about someone as a member of a meaningful social group*” (Stangor 2004:112). Social categorization can thereby be based on various characteristics including also demographics. These characteristics help to build on a social identity that refers to others in terms of in-group-members (a group we belong to) and out-group-members (a group we do not belong to). If social categorization occurs between groups, this should positively influence the within group process. However, social categorization can also occur within a group (e.g. among racial characteristics). As people prefer to interact with people who belong to their in-group, social categorization within a group is likely to affect a group’s interaction negatively. Out-group-members are seen with suspicion and mistrust. If people prefer to interact with people that they define as in-group members and if demographics are a possible characteristics on which social identity builds upon, then diversity within the

team should enhance social categorization and lead to a negative group process (Gebert 2004:186).

Both similar-attraction and social categorization theses emphasise that increasing heterogeneity within teams will influence group processes negatively. As a result, performance should also decrease.

2.1.2. Resources Theory

In contrast to the above is resource theory, which is sometimes titled as “Information and Decision Making Theory” (e.g. Williams & O’Reilly 1998). The supporters of this theoretical approach suggest that based on resources, a positive impact of diversity on performance can be expected. Resources are thereby seen in terms of the general understanding of “human capital”. Moreover, diversity itself is interpreted as a major resource. Demographic diversity is assumed to be directly related to cognitive diversity. As a result, demographic diversity within a team should also lead to an increased amount of cognitions, skill abilities, information and knowledge (Williams & O’Reilly 1998:87, Jans 2004:4). With reference to Hambrick & Mason (1984), one can argue that it increases the variation in the cognitive bases. If information is added as diversity increases, this should also lead to better decisions and better performance than in homogeneous groups (Jans 2004:4). In a long research tradition, it has already been stated in the resource-based approach that “*the heterogeneity of resources suggests the uniqueness of a firm and a source of competitive advantage...*” and “*...top management resources may be an important source of rent generation*” (Mahoney 1992:126-127).

Diversity is in the light of resource theory seen as a positive factor, which increases cognitive diversity. Diversity leads, therefore, to an increase of group processes, like communication. This should lead to better decision making and increased firm performance.

2.2. Previous Empirical Research

Resource theory and process theory provided condensed insights in the various effects, which can be expected, when diversity within a group is present. Thereupon the question rises of how the empirical picture presents itself. Do the results of empirical investigations support process theoretical arguments of negative overall

effects or do they rather support resource theoretical arguments, with positive overall effects?

The next sections aim to give an overview and summary of empirical investigations which researched the relationship between demographic diversity and performance. This selection is very narrow in scope. It focuses on empirical TMT research on the relationship between demographic cohort diversity, namely age, firm tenure and TMT tenure and their effect(s) on strategic choice or performance of companies. These variables were selected as they will be in the main focus of this empirical investigation and analysis (Section 4). Other, more comprehensive summaries can be found, for instance, in Finkelstein & Hambrick (1996), Williams & O'Reilly (1998), Sepehri (2002), Carpenter et al. (2004), Gebert (2004), Jans (2004).

2.2.1. Age Diversity and Organizational Outcomes

Many authors have included variables of the top managers' age in their studies. Mostly these variables have been used as a measure of central tendency (e.g. average) or as a control variable on the individual level. Some studies estimated age diversity in the sense of its distributional properties within TMTs. These studies are of interest here.

For example, Bantel & Jackson (1989) hypothesized, in their investigation of 199 American TMTs in the banking sector, that age diversity could either be positively or negatively associated with innovation. In this specific case, innovation was used as a performance measure. Their results, however, show in this regard non-findings and lead to the rejection of both hypotheses. In another very comprehensive investigation, Murray (1989) combined composite measures of age, firm tenure and TMT tenure based on a factor analysis to form an index he labelled "temporal heterogeneity". He hypothesized that temporal heterogeneity would be negatively related to efficiency based measures of performance (short term performance), whilst temporal heterogeneity will be positively related to adaptability-based measures of performance (long-term performance). For his sample of 84 Fortune 500 companies of the food and oil sector, he found in correlations a significant negative relationship between temporal heterogeneity and short term performance. The correlation between "temporal heterogeneity" and long-term performance was not significant. In a short-term performance regression analysis, he found no significant effects of temporal heterogeneity. The coefficients, however, differed in the way that there were positive coefficients for the oil industry and negative ones for the food industry. The long-term performance regression revealed positive significant effects for the oil industry and

negative non-significant effects for the food companies. One can argue that Murray, found partial support for his hypothesis. Moreover, he found that the effects might be branch dependent. Simons et al. (1999) investigated the TMTs of 57 electronic manufacturing firms. They found significant negative main effects between TMT age diversity and change in profits. For age diversity and change in sales, their study revealed no significant relationship. Tihany et al. (2000) hypothesized in their sample of 126 companies in the electronic industry a positive association between heterogeneity among the TMT with respect to age and the degree of a firm's international diversification. The coefficients they found were near to zero and therefore did not support their hypothesis.

The empirical results with regards to age diversity have been positive, negative and nil. There is some support for effects of environmental conditions on the relationships. A summary of the studies investigating age diversity and its effects is given in Table 1.

Table 1: Summary of Studies Investigating Effects of Age Diversity

Authors	Sample	Dependent Variables/Concepts	Result
Bantel & Jackson (1989)	199 U.S. Banks	Innovation	n.s.
Murray (1989)	84 U.S. Fortune 500 Companies in the Food and Oil Industry	Short- and Long-Term Performance	→ n.s. for short-term performance → sig. pos. for oil industry on long-term performance → n.s. for food industry on short-term performance
Simons et al. (1999)	57 U.S. Companies in the Electronic manufacturing Industry	Change in Profits and Change in Sales	→ sig. neg. for Change in Profits → n.s. for Change in Sales
Tihany et al. (2000)	126 U.S. Companies in the Electronic Industry	International Diversification	n.s.

2.2.2. Firm Tenure Diversity and Organizational Outcomes

Most studies which examined the effects of demographic diversity on performance have included a measure of tenure. This shows that tenure diversity is a crucial variable in organizational demography diversity research. In this and the next section,

two tenure measures with regards to diversity are discussed: firm tenure diversity and TMT tenure diversity (Section 2.2.3).

Bantel & Jackson (1989) hypothesized that tenure heterogeneity can either have a positive or a negative effect on innovation. Just as before with age diversity, their analysis showed zero coefficients, which were statistically insignificant. On the basis of their data, both hypotheses were rejected. Smith et al. (1994) included in an “experience index” two measures of tenure diversity: months within the industry and months within the company. They hypothesized that “experience diversity” would influence performance. Their results found partial support for their hypothesis. A significantly negative relationship was found between “experience diversity” and return on investment (ROI). However, no significant relationship was found between “experience diversity” and sales growth. In a thorough investigation into the relationship of heterogeneity and strategic choice and performance, Hambrick et al. (1996) conducted a research on 32 U.S. airlines. In such a turbulent industry, they expected that TMT heterogeneity would be positively related to the overall performance improvements. One part of their operationalisation of heterogeneity included the TMTs firm tenure heterogeneity. Investigating a linear relationship, they found that tenure heterogeneity was significantly positive with regards to performance improvement in market share and profitability. In conclusion, they stated that despite the lack of propensity and speed in strategic responses, the benefits of heterogeneity, clearly appear to outweigh the negative effects (Hambrick et al. 1996:678). In their study of 57 electronic manufacturing firms, Simons et al. (1999) found no significant main effects of firm tenure diversity on either changes in sales or profit.

The findings of these various empirical studies, show positive, negative and zero coefficients. Once again, the results are mixed. An overview of these results between firm tenure and performance is given in Table 2.

Table 2: Summary of Studies Investigating Effects of Firm Tenure Diversity

Authors	Sample	Dependent Variables/Concepts	Result
Bantel & Jackson (1989)	199 U.S. Banks	Innovation	n.s.
Smith et al. (1994)	53 U.S. High Technology Companies	Performance (ROI, Sales Growth)	→ neg. sig. for ROI → n.s. for Sales Growth
Hambrick et al. (1996)	32 U.S. Companies in the Airline Industry	Growth in Market Share and Profits	→ sig. pos. for Growth in Market share → sig. pos. for Growth in Profits
Simons et al. (1999)	57 U.S. Companies in the Electronic Manufacturing Industry	Change in Profits and Change in Sales	n.s.

2.2.3. TMT Tenure Diversity and Organizational Outcomes

Scholars such as Micheal & Hambrick (1992), Keck (1997), Tihany et al. (2000) have investigated TMT tenure diversity and its effects on organizational outcomes. A non-finding between tenure dispersion and performance is stated in Michael & Hambrick's (1992) study. Although the main topic of their article was concerned with diversification postures, interdependence and cohesion, they also investigated in a hierarchical step regression, the main effects of tenure homogeneity on return on assets (ROA). However, they found no significant patterns. The coefficients of tenure homogeneity on ROA were near to zero. Keck (1997) expected that functional heterogeneity and variation in team tenure are related positively to financial performance in turbulent contexts. She hypothesized that functional heterogeneity and variation in team tenure are negatively related to financial performance in stable contexts. In using a generalized linear model, she analysed TMTs in 56 cement firms and 18 minicomputer firms. Performance was measured as return on assets (ROA). She found that variation in team tenure is significantly negative related to high financial performance in the cement industries at turbulent times. At stable times within the cement industry, team tenure is significantly positive related to financial performance. For the microcomputer industry, tenure variation led significantly positive to higher ROA. Her hypotheses were therefore partially rejected and partially supported. Tihany et al. (2000) investigated 126 firms in electronics industry in the United States. They hypothesized that there would be a positive association between heterogeneity among the TMT with respect to

tenure and the degree of a firm's international diversification posture. Indeed they found moderate effects between high tenure heterogeneity to be positively related to a firm's international diversification. This coefficient was on the $p < 0.1$ level significant.

For TMT tenure diversity, the results from the single studies do not indicate a general trend, but there is some evidence for environmental condition dependency. The studies which investigated TMT tenure diversity are summarized in Table 3.

Table 3: Summary of Studies Investigating Effects of TMT Tenure Diversity

Authors	Sample	Dependent Variables/Concepts	Result
Micheal & Hambrick (1992)	134 U.S. Fortune 500 Companies	Return on Assets (ROA)	n.s.
Keck (1997)	74 U.S. Companies in the Cements and Microcomputer Industry	Return on Assets	→ sig. neg. in turbulent times in the Cement Industry → sig. pos. in stable times in the Cement Industry → sig. pos. for Microcomputer Industry
Tihany et al. (2000)	126 U.S. Companies in the Electronic Industry	International Diversification	→ sig. pos. to International Diversification

2.2.4. TMT Demographic Diversity and Performance: A Double Edged Sword

The empirical outline showed that firstly, these previous empirical studies were all conducted in the United States. Secondly, in turbulent environments, the statistical association between diversity and organizational outcomes seems to be more apparent than in stable environments, which is in line with other research (Pitcher & Smith 2001:16). Thirdly, each of the demographic variables included in various studies, have produced mixed results. There were positive, negative and non-findings⁵. This led many researchers to conclude that 'diversity is a double edged sword' (Hambrick et al. 1996:668, Milliken & Martins 1996:403, Lawrence 1997, Pitcher & Smith 2001, Carpenter et al. 2004). The studies presented here cannot be seen as a random sample. Nonetheless, the mixed results are representative of studies at large, which do

⁵ More inquiries conducted in this field are likely to have found non-findings. However, as it is very difficult to get non-findings published, the number that is accessible to us is likely to be underestimated.

not point towards a clear theoretical position supporting either overall positive or negative effects of diversity on performance.

In line with this finding is also Jans (2004) meta-analysis. In investigating the empirical support of resource vs. process theory, he also found mixed results.⁶ With regards to age, organizational tenure and team tenure, results were especially mixed (Jans 2004:20-36). In 21 studies, in which a negative relationship according to process theory was hypothesized, the results showed that in 61% out of 238 predictions, process theory was supported. However, similar results are found for resource theory: in 9 studies, 66% of the 96 predictions supported the positive association. These findings led Jans (2004) to conclude that neither resource nor process theory can be rejected.

This begs the question of how these mixed empirical results can be explained. There are two lines of explanations. The first refers to methodological problems (Nienhüser 1991, West & Schwenk 1996, Priem et al. 1999, Pitcher & Smith 2001, Carpenter et al. 2004). In particular data and models were flawed and operationalisations of diversity and of organizational outcome variables differed. This makes comparisons between the studies difficult. Moreover, there have hardly been any systematic replications.

The second explanation is that the theory is wrong or incomplete (Micheal & Hambrick 1992, Priem et al. 1999, Pitcher & Smith 2001). Some have interpreted these mixed results as indicating that there is no relationship between these variables of TMT diversity and performance at all. This would suggest stopping further investigations into this topic. Others have argued that studies which do not explicitly include team process variables (e.g. communication) at all, and which do not control for moderating effects (e.g. environment) run the risk of producing statistical artefacts (e.g. Priem et al. 1999). Jehn et al. (1999) stated that a critical determinant of the outcome is whether there are constructive or destructive effects which influence the team process. The process chain as such is highly complex and infested with competing effects.

In the following sections, a theoretical model will be proposed. A special focus is on age and tenure diversity as these variables will be the independent variables in the hypotheses which will be tested in the quantitative section later. Integrated in the model will be the potential competing effects within the team process. These competing effects and problems will lead to the hypothesis of a curvilinear overall effect. However, the process effects will not be examined in the empirical part of this study.

⁶ He included many kinds of investigations, so that performance must be seen on a wider level, for instance, team performance and turnover.

3. A Theoretical Model of TMT Demographic Diversity and Firm Performance

3.1. Concept Specification: Diversity

Before investigating demographic diversity and its effects on the team process and in turn on performance, this section tries to resolve the issue of what specifically is meant by “diversity”. Thereby we have to define the concept and identify its dimensions.

In general, diversity refers to a “*variety*” or a “*point or respect in which things differ*” (Oxford Advanced Learners Dictionary 1989, Webster’s Dictionary of the English Language 1992). A more specific definition of diversity is “... *an aggregate level index of interpersonal similarity [or dissimilarity] along one or several dimensions*” (Murray 1989:126).

One implication of the above is clearly the emphasis to describe the composition of the group on the basis of its dispersion of the respective characteristics. In literature, the distinction between different categories of composite measures is not always made clear. Jackson (1992:347) and Hambrick (1994:177) state that measures of central tendency and measures of dispersion can both be used to describe a group’s composition. The difference is that hypotheses including measures of central tendency can be formulated parallel to hypotheses at the individual level (‘if someone is young, s/he is willing to take high risks’ and ‘a group with a young age average, is willing to take high risks’). However, measures of dispersions cannot just be formulated as a group restatement (Jackson 1992:347). A second implication is that diversity refers to nominal differences between individuals, which cannot be ranked (Blau 1977:77). A third implication of the above adopted definition of diversity is that homogeneity and heterogeneity refer to the extremes of the diversity scale. They are used as anchoring points. However, sometimes these anchoring points are found in literature to be continua themselves (“less heterogeneous”, “more heterogeneous”, “less homogenous”, “more homogenous”). As this view would only allow relative statements between teams to be made, it is omitted here. By using diversity as an absolute measure, homogeneity refers to a diversity score equal to zero. Zero refers to the complete absence of dissimilarities with regards to the included dimension(s). In other words, zero is assigned to complete similarities between individuals with regards to the included dimension(s). Heterogeneity refers to the complete dissimilarities between

individuals with regards to the included dimensions. However, there is no quantitative upper limit for heterogeneity as the scope of dispersion is very wide.

Various attempts have been made to specify dimensions of diversity. Distinctions have been made between observable (e.g. race, ethnic background, nationality, gender, age, etc.) and less visible attributes (e.g. education, tenure in the organization, socioeconomic background, personality characteristics, values, etc.) (Milliken & Martins 1996). Also similar distinctions have been made between demographic attributes (e.g. gender), relational attributes (e.g. tenure), status attributes (e.g. marital status) and personal attributes (e.g. belief or values) (Lawrence 1997). A summary of dimensions is given by Jans (2004), in which he identifies four major categories: demographic (e.g. age, gender), organizational (e.g. group tenure, organizational tenure, cohorts), expertise and qualification (e.g. education and functional background) and cognitive attributes (e.g. values, beliefs, attitudes). Whilst there is no criterion for a “successful” concept specification (Schnell et al. 2005:128), the fact that many researchers identified similar dimensions can be seen as a quality criterion.

One robust aspect is the demographic dimension. Sometimes it is referred to as being a classic, traditional, hard dimension (Sepehri 2002) and also labelled as surface-level diversity (Harrison et al. 1998:97-98). Although demography refers to the general category of visible, objective attributes such as age, gender, ethnic group, it sometimes includes in a more general way the relational/organizational attributes, for instance, tenure (e.g. Glick et al. 1993:193). For the purpose of this study, “demographic diversity” will be referred to as including both the visible demographics as well as the relational attributes especially tenure.

Another robust aspect is the cognitive dimension or deep-level diversity (Harrison et al. 1998:98). It addresses differences in member’s attitudes, beliefs, values, preferences or perceptions (Glick et al. 1993, Lawrence 1997, Harrison et al. 1998, Jans 2004). These attributes belong to the category of underlying attributes (Milliken & Martins 1996). Information about these attributes cannot be obtained directly as they are not directly observable.

Whilst there are many more aspects to the general construct of “diversity” (e.g. affective diversity (Barsade et al. 2000), functional diversity (Bunderson & Sutcliffe 2002) and even more gradations within the already mentioned categories, this study is restricted to the demographic and cognitive dimensions. These two dimensions are of great importance and in diversity literature are often treated as being related to one another. Particularly in TMT diversity research, the assumption that demographic

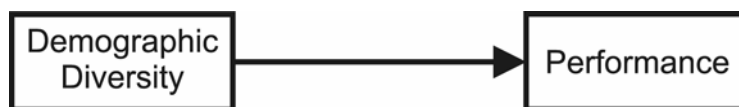
characteristics can approximate cognitions is widely assumed. This study will also draw upon this assumption in due course. Beforehand, a theoretical model of the relationship between TMT demographic diversity and firm performance will be proposed, in which it is acknowledged that cognitive diversity plays an important role.

3.2. Mechanisms linking TMT Demographic Diversity and Firm Performance

The empirical findings in Section 2.2 presented a mixed picture of the overall effect between demographic diversity and performance. This chapter tries to outline a comprehensive theoretical model. A more detailed and more differentiated insight into functional and dysfunctional effects between TMT demographic diversity, process variables and performance will thereby be given. The possibility of finding contradictory effects will also be considered. Special attention will be given to age and tenure diversity and their effects on cognitive diversity as they are empirically investigated later (Section 4).

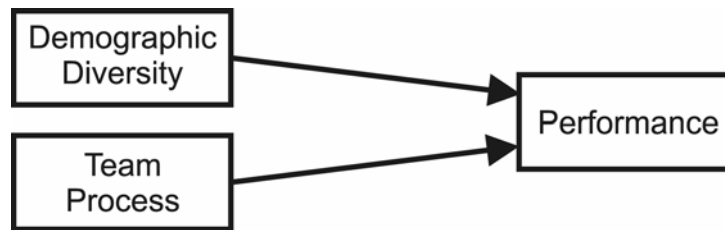
A widespread of models have been hypothesized and investigated between TMT demographic diversity and performance. The models differed in their assumptions about how the effects are translated. Three main traditions of models can be distinguished. The first claims that demographic diversity has a direct effect, which directly determines strategic decisions and performance (Figure 2).

Figure 2: Demographic Model



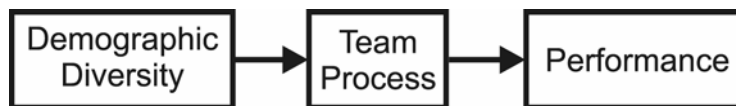
Source: Graphical display based on Smith et al. (1994:417)

A second model claims that demographic diversity as well as group processes influence strategic outcomes and in turn performance. This assumes that both kinds of variables have direct effects (Figure 3). In a modified version of this model it is further assumed that demographics have both, mediated and direct effects on organizational outcomes.

Figure 3: Process Model

Source: Graphical display based on Smith et al. (1994:419)

The third and presumably the most favoured model in this specific field of research is a so called intervening or mediated model (Figure 4). This model states that demographic diversity influences the team process and that this group process affects strategic decisions and performance.

Figure 4: Mediated Model

Source: Graphical display based on Smith et al. (1994:423)

Most investigations adopted this latter model as being the base of their theory. However, many of them did not directly examine the team processes nor did they outline the effects between diversity, team process and performance. This was labelled as treating the team process as being a “Black Box”.

The original models of Hambrick & Mason (1984) and Pfeffer (1983) must be seen as assuming a mediated model. However, they stated that although team processes are present, they could be ignored for explaining organizational outcomes. The originality of their papers resulted, amongst other things, from claiming that cognitions and the team process can be approximated by demographics.

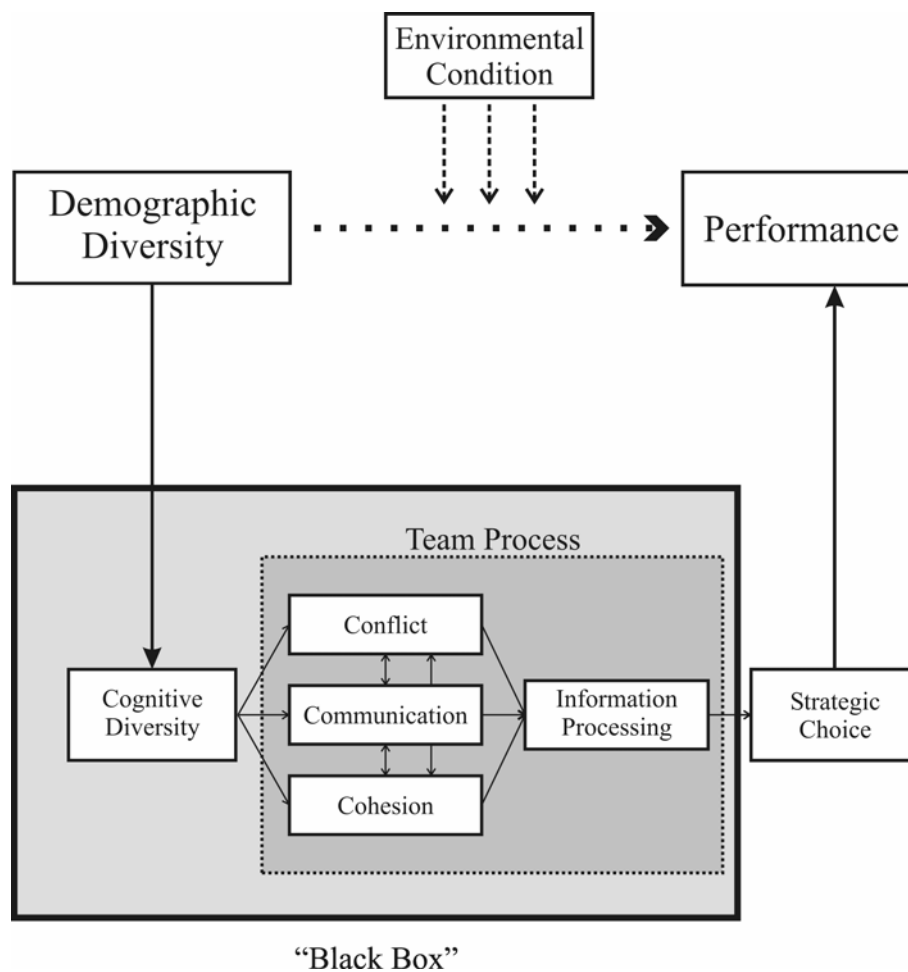
The above is true given that: (1) we have a measurement process without measurement errors, (2) each assumed step on the underlying mediating effects is straightforward and (3) the assumption of a mediating model is correct. Given these three assumptions are correct, we should indeed obtain a relationship between demographic diversity and performance, which should equal the model fit, as when including all relevant mediator variables and regress them on performance.

The mixed results (Section 2.2) and the fact that up to date no single investigation has found empirical support for the mediating model as being the only plausible, the assumptions are on vague grounds. In particular, the underlying mediating effects

seem to be more complicated, as they would allow for proposing simple linear relations between demographic diversity and performance.

Nevertheless, there are strong theoretical arguments for adopting a mediated model. Although the present empirical study (Section 4) will examine only the relationship between demographic diversity and performance while neglecting its mediating variables, the following sections will give a more detailed and concrete presentation of the assumed mediated model in this study (Figure 5). Each step of the model will be described. Theoretically and on the basis of previous investigations, three concepts of demographic diversity, process and performance will be outlined. The outline will lead to the proposition of a different relationship for demographic diversity and performance than a single linear one (Section 4.1).

Figure 5: The Proposed Theoretical Model of Demographic Diversity and Firm Performance



Source: Own model based on Glick et al. (1993), Williams & O'Reilly (1998)

3.2.1. Effects of Demographic Diversity on Cognitive Diversity

Generally, the assumption is made that demographic diversity can proxy cognitive diversity. Cognitive variables are usually variables of values, beliefs, perceptions, judgements, attitudes, norms, openness, commitment, or personality. These variables are by their nature hard to access and difficult to measure and therefore vulnerable to result in unreliable and invalid data (Pfeffer 1983:351, Hambrick & Mason 1984, Wiersema & Bantel 1992). The difficulty of access must be seen as a major shortcoming, especially in upper echelons research, as the target persons are usually not at the free disposal for being questioned. In any case, psychological instruments to assess cognitions use batteries of questions, which are very time consuming. Moreover, cognitive data would not be available on former top management members (Hambrick et al. 1996:663). In contrast to this are demographic variables: easy to access, objective, reliable, valid and easy to measure. Therefore, explanations using demographics offer the possibility of generating more parsimonious models, which are easier to test, than models, which include cognitive measures (Pfeffer 1983, Hambrick & Mason 1984). Demographic characteristics are in most of these models used as approximations for cognitive characteristics. This rests on the assumption that variations in demographics are reliable and powerful surrogates for variations in underlying cognitive variables (e.g. Pfeffer 1983, Hambrick & Mason 1984, Jackson et al. 1991:676, Glick et al. 1993:181, Finkelstein & Hambrick 1996:80, Hambrick et al. 1996:663). Consequently, the measurement of diversity in a team's demographics should be a measurement to what extent a team differs or shares a common set of these underlying attributes. This has also been titled as congruence assumption (Lawrence 1997:2) or demographic approach (Kilduff et al. 2000:22). The decisive question for the demographic approach is: does the assumption that demographics are good proxies for cognitive variables hold true? This central assumption underlies an implicit hypothesis which will now be outlined.

The hypothesis is that demographics are correlated with life or organizational experiences, for instance war experience or economic deprivation. These experiences in turn are reflected in people's cognitions (Knight et al. 1999:449, Hambrick et al. 1996:664). For example, a person who experienced war and also material hardships might be more risk averse than a person who has grown up under a safe and stable environment. Although this hypothesis seems plausible, there are some limitations.

Firstly, demographics are not only potential proxies for cognitions, but are also good proxies for a wider range of other variables (e.g. status). This is why they are also called “global variables”⁷. As a result, they can indeed include a lot of “noise” (Hambrick & Mason 1984, Lawrence 1997, Priem et al. 1999). An extreme position that one could take is that demographics should be abandoned. On the other hand, given that demographics rest on vague ground, if results can be obtained, the relationship between cognitive concepts and performance should even be stronger (Hambrick & Mason 1984).

Secondly, not all demographically similar people have had the same experiences and therefore would not have identical cognitions (Harrison et al. 1998, Flynn et al. 2001:415). However, one could argue that they are, on the basis of their observable characteristics, more likely to have shared experiences, than people who would have been randomly selected. Both sides of the argument find empirical supporting evidence (Jackson et al. 1991:676, Kilduff et al. 2000:31). Consequently, it is difficult to reach a concrete conclusion.

Thirdly, it is not clear which demographic proxy represents the desired aspect of cognitions (Priem et al. 1999:938-939, Kilduff et al. 2000:31). This shortcoming has been noticed by Jackson (1992:368-369) and Hambrick et al. (1996:663). They argue for greater distinctions and a theory between various types of demographics or demographic diversity and their relationship to cognitions or cognitive diversity, respectively. Needless to say, the lack of theoretical foundation between different types of demography and cognitions is a limitation. However, the interdependence of differing types of demography makes this a fruitless undertaking.

As this outline demonstrates, there is no clear cut answer whether the approximation of demographics on cognitions is appropriate, reliable and valid. Nevertheless, the ease of application and the widespread use of demographics, not only in diversity research but also in other areas (e.g. market research), prevent its abandonment.

In the further outline, the view is taken that demographics can proxy cognitions. In other words, demographic diversity is assumed to be positively related to cognitive diversity. Cognitive diversity is thereby a reference to the group’s ability to process information and to perceive and interpret varying stimuli differently (Milliken & Martins 1996:416). As a result, cognitive diversity within the team should lead to a wider range of perspectives (Bateman & Zeithaml 1993:386, Milliken & Martins 1996:403), more

⁷ For potential problems with global variables see Schnell et al. (1999:69).

creative ideas, a variety of requisites, more alternatives and a better quality of decisions (Milliken & Martins 1996:403/416).

Having outlined the general idea of demographic proxies, the more specific question of how age and tenure diversity⁸ affect cognitive diversity will be addressed. Both concepts seem to be very similar but there are noticeable differences (Pfeffer 1983). In actual fact age and tenure propositions can be formulated parallel to the demographic hypothesis. Age and tenure variables are likely to be more predictive of cognitive variations to the extent to which cohort differences reflect differences in experiences.

3.2.1.1. Effects of Age Diversity on Cognitive Diversity

Age might be influential if members of age cohorts experienced differences in societal conditions. Individuals who are similar in age are socialized in similar time periods/environments and are therefore likely to have similar values and perceptions (Pfeffer 1983, Murray 1989, Knight et al. 1999:449). Moreover, age is negatively related to risk taking (Jackson et al. 1991:677). Depending on the situation confronting them, diverse teams might be able to compensate the one or the other extreme of risk taking or aversion. Mixing a group of members with different ages should therefore yield different views and interpretations of external stimuli. Homogeneous groups with regards to age might not be aware of other interpretational opportunities of situational clues, so that these groups tend to be biased in their decision making.

3.2.1.2. Effects of Tenure Diversity on Cognitive Diversity

Tenure cohort arguments are based on two premises: the first is that people identify with others who entered the organization or the team at the same time. The second is that people who entered the organization or team at the same time are likely to have the same experiences. Therefore, the chances of them having similar perspectives are high. These facts are likely to affect their behaviours towards each other and create a similarity in their point of views about which actions should be taken (Wagner et al. 1984:77, Milliken & Martins 1996:423, Williams & O'Reilly 1998:93).⁹

⁸ Here firm tenure and TMT tenure diversity are taken together in order to avoid repetitions. The main arguments stay the same for both concepts.

⁹ There is an anomaly present regarding tenure: tenure homogeneity can come from similar previous experiences and therefore lead to homogeneity in cognitions. Also it has been stated that groups which share a socialization process within an organization or a team become by time more similar to each other. In other words, time facilitates a process of reduction in

Ever since organizational demography or diversity came into sight of research, tenure has always been seen as an important variable (Tsui & O'Reilly 1989:407, Carroll & Harrison 1998:637, Boone et al. 2004:633). It stands on firm theoretical and empirical grounds (Finkelstein & Hambrick 1990). The level of tenure is said to affect the commitment to the status quo (Jackson et al. 1991:677, Jackson 1992:365, Finkelstein & Hambrick 1996:85), the range of informational sources considered (Katz 1982:84, Finkelstein & Hambrick 1990:487, Finkelstein & Hambrick 1996:85) and routines (Finkelstein & Hambrick 1996:85). The higher the reliance on established achievements, the higher is the possibility that the decision might be worse, especially in environments which require a constant adaptation process. On the other hand, having no proven sources of good quality, having no routines at all and having no commitment to the status quo might not necessarily lead to better decisions. Diversity can hereby just as with age balance extremes. Tenure diversity will lead on the basis of different cognitions to a broader range of information and varying perceptions of the organizational status quo.

3.2.2. Effects of Cognitive Diversity on Process Variables

On the basis of what has just been established, we would expect that diversity has a solely positive impact on performance, as it raises multiple values, ideas, perceptions etc. But so far the team process has not been investigated. The team process and group decision making refers to a huge research area within social psychology. Based on member characteristics, we have expectations of the potential productivity of each person and of the team. The team process is likely to alter these expectations. Team process is defined as "*the events that occur while the group is working together on the task*" (Stangor 2004:189). Events can refer to communication, conflict, integration, cohesion and information processing (Glick et al 1993:178). Within these processes, there might be positive effects which are labelled as process gains (synergetic effects) and negative effects which result in process losses (Stangor 2004:189-190). The outcome can be formalized by:

$$\text{Actual Productivity} = \text{Potential Productivity} - \text{Process Loss} + \text{Process Gain}$$

Stangor (2004:190)

dissimilarities with regards to cognitions (Katz 1982:85). So no matter how diverse the team was it is likely to get more homogenous in cognitions, although they are still diverse with regards to tenure.

Teams do not by their nature derive at better decisions than individuals (Stumpf & Thomas 1999:40). A team's result may be worse when the team members are unable to work together or even hinder decision making (process loss). But teams will be more effective than individuals if they are able to pool together their experiences and ideas (process gain). The cognitions must thereby be regarded as an input into the process (West & Anderson 1996:681). Thereby, it is very important that all views of the team members are of equal importance and considered the same way. This requires effective communication.

3.2.2.1. Cognitive Diversity and Communication

Communication patterns within teams are influenced by group size, similarity of attraction and differences regarding actions. It has often been stated that team size is an influential factor in shaping communication behaviours (e.g. West & Anderson 1999:681, Gebert 2004:112). Small groups are unlikely to have as many competing ideas and perceptions as bigger groups. Team size is necessary to activate different cognitions and abilities. However, it is countered, that bigger groups lack effective interactions (West & Anderson 1996:682). Similarly, Gebert (2004) concludes that the optimal team size should on the one hand guarantee synergy potentials and on the other hand allow consensus. The more team members there are, the higher is the potential of generating better ideas. On the other hand, large groups tend to be inert, lack effective interaction and are unable to derive at general consensus (Hambrick 1994:201, Gebert 2004:113). Moreover, the distribution of speech becomes more unequal as the size of team increases (Gebert 2004:113). This limits the possibility of exchange and consideration of competing arguments. This exchange would be necessary to pool members experience and facilitate process gains within a team in order to derive at superior decisions. Therefore, a trade-off needs to be made with regards to the team size.

Similarity of attraction refers to the often observed fact that people who are more similar to each other are more likely to interact. Even more drastic: if people can choose with whom to communicate, they prefer those who are more similar to themselves to the possible extent of disregarding others. (Jans 2004:5). With regards to homogeneity and communication, this would suggest a positive relationship. In fact, Zenger & Lawrence (1989:368) found that age and tenure homogeneity are positively associated with the frequency of technical communication. In a comparison between more and less diverse tenure teams, O'Reilly et al. (1993:164) reported that less

diverse teams experience fewer problems when communicating. Communication is easier and more frequent, because it is easier to comprehend others in their views, their arguments and their line of thoughts (Zenger & Lawrence 1989, Stumpf & Thomas 1999:39). A shared amount of similar beliefs, values, perceptions, indicates a share in the same language (Glick et al. 1993:186). Information and competing ideas can be communicated easily if a set of communalities is present. In line with these findings, Glick et al. (1993:186) found that the amount of face to face or phone interaction decreased as cognitive diversity increases. Cho et al. (1994:13) state that diverse teams are likely to be hampered by diverse language. Diversity and communication seems therefore to be negatively related.

Age diversity is an obstacle because it proxies these fundamental cognitive differences, which also indicate a lack of shared communalities in language. Moreover, language changes with time. Tenure indicates a more narrow connection to the cohort experiences when entering an organization or team. Diversity with regards to tenure interrupts the mutual understanding of shared experiences and shared cognitions within the team, making the ease of communication between members disappear. On the basis of their cognitions, diverse teams will face major difficulties in communication (Hambrick 1994:201). Conversely, complete cognitive homogeneity can also be harmful. The mutual understanding of each other might lead to more frequent but less task-orientated communication. Moreover, the greater the similarity, the less difference in perceptions or ideas will be apparent, which in turn gives no need for communication or debate (Hambrick 1994:201). In this respect, Katz (1982:93-94) argues for a curvilinear relationship between mean project tenure as well as with the distribution of tenure and performance mediated by varying levels of communication. He found partial support for this model.

There seems to be no remedy. Diversity on the one hand facilitates communication as competing ideas demand exchange and a more comprehensive search (Glick et al. 1993:184). On the other hand, individuals by their nature prefer to communicate with those whom they share cognitions, experiences and language. Diversity does therefore trigger negative effects.

3.2.2.2. Cognitive Diversity and Conflict

Misunderstandings in the comprehension of language or cognitions might eventually lead to conflict. There are two main distinguishable types of conflict: cognitive conflict and affective conflict.

According to Amason & Sapienza (1997:495) “*cognitive conflict is task-orientated disagreement arising from differences in perspective*”. This sort of conflict includes conflict about goals, work orientated actions and implementation (West & Anderson 1996:). Generally, this is attributed to be an enhancing, functional and therefore positive communicative conflict, leading to a comprehensive consideration of different perceptions and as a result leading to better decisions (Amason 1996:127-128). Diversity should for this reason initiate cognitive conflict in a constructive way (Eisenhardt & Schoonhoven 1990, Amason 1996, Ferrier & Lyon 2004).

Affective conflict is “*...individual-orientated disagreement arising from disaffection*” (Amason & Sapienza 1997:495). Affective conflict is said to be harmful and dysfunctional to the group process. Commitment and the quality of decisions are likely to decline (Amason 1996:129, Amason & Sapienza 1997:497). Allowing cognitive disagreement and preventing affective conflict would maximize the quality of decision. Unfortunately, both cognitive and affective conflicts are interrelated (e.g. Amason 1996:129, Amason & Sapienza 1997:498). As diversity increases, the potential for cognitive conflict is also likely to break up affective conflict. This interrelationship is also reflected in empirical findings. Overall negative effects of diversity on conflict are reported (O’Reilly et al. 1989, Smith et al. 1994, Williams & O’Reilly 1998:95, O’Reilly et al. 1998:195). In a more thorough investigation, O’Reilly et al. (1998:198) found no effects between team conflict and creativity, but he detected a negative effect of conflict on implementation. Whilst in work groups there might be possibilities to prevent this interrelationship, for instance, by moderation, this does not apply to TMTs. There is either an atmosphere which allows disagreement on the cognitive level without it being taken personally or alternatively there is not. As a result, affective conflict will in the latter case most likely set the agenda. The flexibility of group members to accept disagreement and to accept compromises is largely dependent on how much the members value each other and the group at large.

3.2.2.3. Cognitive Diversity and Cohesion

Cohesion refers to the emotional attachment group members have with each other and to the perceived attraction of the group (Stangor 2004:24-25). As mentioned before, similarity is one source of attraction (Schneider 1987, Jans 2004). Demographic diversity and the resulting cognitive diversity should be of incremental influence on cohesion. Demographic dissimilarities are apparent. Cognitive dissimilarities are more profound. However, both kinds influence our perceived attractiveness of others, here

being other team members. Therefore, age and tenure diversity are likely to decrease cohesion within a team (e.g. Glick et al 1993:184, Williams & O'Reilly 1998:94).

Decreased or a complete lack of cohesion leads to highly fragmented groups, a common problem reported by CEOs (Hambrick 1995). Fragmentation leads to isolation, lack of cooperation, micro politics and it results in huge process loss. Opposed to this is the view that tenure homogeneity and thereby cognitive homogeneity within TMTs contribute to cohesion (e.g. Micheal & Hambrick 1992:18). Mutual understanding, acceptance and attraction will lead to higher engagement, less micro politics, no holding back of information or ideas. By this token, it seems as cohesion is a desired outcome of group interaction. There are, as in almost every case, pros and cons. Cohesion ensures that teams have the basic "skill" to work together. Contrary to the above, Janis (1972) reported a phenomenon which he labelled "groupthink". In a book of the same name, various political miscalculations (e.g. "Bay of Pigs Invasion") have been investigated under the point of seemingly "... *mindless conformity and collective misjudgement of serious risks*" (Janis 1972:3). More scientifically, groupthink can be defined as a process that occurs, when a group makes poor decisions as a result of flawed group process and strong conformity pressure (Stangor 2004:197). Cohesion is a process which accelerates groupthink. It establishes norms within a group, which usually will be obeyed by members in order to preserve a friendly atmosphere (Janis 1972:8). Outsiders will be ignored and deviant ideas or behaviours will be disregarded or even punished. Groupthink deteriorates "*mental efficiency, reality testing and moral judgement that result from in-group pressures*" (Janis 1972:9). As a result, the ability to make quality decisions will diminish, as alternatives are not given due considerations. In TMT research, groupthink is not an abstract concept. Beside fragmentation it is the other phenomenon which CEO's often complain most about (Hambrick 1995). Tenure homogeneity is one of the drivers of groupthink in TMTs (Hambrick 1995:119). Diversity could thereby help to minimize tendencies of groupthink (Bateman & Zeithaml 1993:386).

In summary, one can say that although cohesion is to some extent a source of ensuring members commitment to the goals and the team as such, it may also be a curse. A surplus of cohesion may lead to groupthink. A lack of cohesion may lead to fragmentation.

3.2.3. Interrelated Process Effects and Information Processing

The single team processes are not independent of each other. They mesh together and present themselves as competing effects. Communication can prevent conflict but it can also facilitate conflict. Conflict in turn influences cohesion, especially with regards to affective conflict which is likely to deteriorate cohesion. Cognitive conflict may finally lead to greater cohesion. High cohesion is likely to lead to a greater amount of task-related but also personal communication. The kind of communication might be influential for the level and sort of conflict. Conversely, communication can also enhance cohesion.

Altogether they influence the ability and the willingness of team members to share information, to process information and to derive at high-quality solutions within the team. The exhaustion of information, the inclusion of all possibilities and ideas are the most important factors in comprehensive decision making (Simons et al. 1999:663). These are necessary prerequisites for success.

3.2.4. Effects of Process Variables on Strategic Choice and Performance

Decision comprehensiveness has been investigated in conjunction with various team processes. It is most effective when the team has an open and proactive communication structure. In this manner, conflict stays task-orientated and cohesion is to some extent present. Decision comprehensiveness influences strategic choices. Strategic choice refers to deliberate decisions which can emphasize product differentiation or low cost, innovation or reliability, innovation timing or focus, domestic or international activity by using instruments of cooperation or M&A (Geletkanycz & Hambrick 1997:658). Strategic choices tie the company to pursue a particular path and action. Consequently, major blunders should be avoided, as miscalculated decisions could be very costly. Risks and costs of each alternative must be carefully balanced against the possible benefits. Better decisions might be derived in more heterogeneous teams, as a result of better problem sensing, better interpretation and “enactment” of environmental clues and in turn decision making that matches perceived problems with strategic solutions (Ferrier 2001:862). Cho et al. (1994:13) hypothesized that heterogeneous teams are likely to launch competitive actions more often and on a wider scope. Opposing this, Ferrier (2001:862) expected TMT heterogeneity to be negatively related to competitive attack volume and its duration. However, he expected

a positive relationship between TMT heterogeneity and attack complexity and attack unpredictability. His data yielded partial support. The latter dimensions of competitive attacks are more on a breadth of cognitions and experiences than on efficiency and speed (Ferrier 2001:862).

An illustrated example of such strategic decision making is the 'bidding war' of the German SAP AG and Oracle Corp. about the acquisition of Retek Inc., an American software company. SAP AG tried to overtake Retek Inc. to enlarge its market share in the U.S. software market. Moreover, this strategic move would have given SAP AG great credibility in the U.S. market. SAP AG offered a bid of \$8.50 per share, which was outbid by Oracle Corp. by \$9, as they tried to prevent SAP AG from making further inroads into the U.S. market. Finally, SAP AG raised its bid to \$11 per share, which was again outbid by Oracle Corp. with \$11.25 who finalised the deal.

This example demonstrates that superior strategic decisions do not always lead to superior performance. Although in this case, SAP's withdrawal was in the end voluntary and they received financial compensation, they did not succeed in implementing their original strategic choice.

Strategic objectives encounter occasional problems in the implementation stage (e.g. Ancona & Caldwell 1992, Cho et al. 1994:15, Hambrick et al. 1996:680, Williams & O'Reilly et al. 1998:95, Ferrier 2001:862). Heterogeneous teams tend to be less successful in time pressured decision making and effective implementation. With bids on acquisitions, speed in calculations, the estimation of the far-reaching consequences of higher bids or withdrawals are also important strategic decisions, which may enormously impact the organization. Diversity can in such process be an obstacle as each point of view needs to be considered and discussed. Trying to achieve unanimity, diverse TMT are in such circumstances likely to run out of time. Therefore, in situations which demand quick and straightforward decisions, homogeneity within a team might be favourable (Eisenhardt 1989, Eisenhardt & Schoonhoven 1990, Cho et al. 1994:15). The interdependence of a firm's comprehensive decision making, its actions and a firm's performance have been stated in a long tradition of theory and have recently been empirically demonstrated (Eisenhardt 1989, Hambrick & Mason 1984, Carpenter et al. 2004).

On a more general level, the assumed relationship between strategy and performance is outlined by Ferrier (2001). He describes that the more actions a firm carries out and the greater the speed of execution, the better its profitability and market share. Moreover, firms that carry out a broad complex repertoire of actions experience better

profitability and market share than firms that carry out a narrow and simple repertoire. In sum, one could argue that 'aggressive' competitive behaviour is related to better organizational performance (Ferrier 2001:859).

3.2.5. Context Effects

On many occasions, the influence of contextual factors on the relationship between TMT diversity and firm performance have been noted (e.g. Hambrick & Mason 1984, Bantel & Jackson 1989, Eisenhardt 1989, Eisenhardt & Schoonhoven 1990, Halebian & Finkelstein 1993, Huber & Glick 1993, Wiersema & Bird 1993, Finkelstein & Hambrick 1996, Keck 1997, Simons et al. 1999, Carpenter et al. 2004). Team processes, cultural and societal aspects, industry and company specifics have been suggested as moderating effects. The most influential factor hypothesized and investigated have been environmental conditions, namely stable vs. turbulent environment. This is why it is given attention here.

Some researchers argued that turbulent environments would require of TMTs a more thorough assessment of advantages and disadvantages, combined with the need for speed in decisions, especially when reacting to competitors moves. Fast changing environments are challenging because of poor information, costly mistakes and difficulties in recovery from missed opportunities (Eisenhardt 1989). Heterogeneity within a team would thereby be of a positive influence as it broadens perspectives. In addition, it can also be of negative influence as it can slow down the speed of decision. Speed is a decisive factor in decision making when operating in turbulent environments. It has been previously discussed, that heterogeneous teams are more likely to lack the critical capacity of speed of decision making. This is even more evident in turbulent environments. However, based on arguments of cognitive advantages, heterogeneity has overall been more often expected to influence performance positively when strategic situations are unclear and the environment is fast changing (Hambrick 1987, Bantel & Jackson 1989, Ferrier 2001). Eisenhardt (1989) investigated the recipe for success in the computer branch, an industry which is widely known for its turbulences. Under these conditions, she found that successful TMTs use more real time information on their environment and on firm operations. This allows them to access and interpret stimuli rapidly when major challenges arise and have to be met by important decisions. Moreover, they spread their risk by processing alternatives simultaneously. In their information processing, they are neither comprehensive nor non-comprehensive (Eisenhardt 1989:571). This prevents them

from being slow in decision making, as well as it keeps them considering multiple choices.

Homogeneous teams lack the different sources and cognitions. Under conditions of turbulence, they should, therefore, be outperformed by their heterogeneous counterparts. It has been argued that in stable environments homogeneous teams are of no apparent disadvantage. They have the necessary skills to compete in these industries, as these industries are generally more inert and predictable. Major changes develop usually with time and are, therefore, equally well solvable by homogeneous teams. Heterogeneous teams might instead be of major disadvantage under stable conditions, as they might launch strategic moves which might be costly and which in retrospect are unnecessary.

3.2.6. Contradictory Effects

The above gave a selective but more in-depth knowledge about the mechanisms involved and assumed when linking TMT demographic diversity and firm performance. Most of the mechanisms are interrelated. Some of them are contradictory. In most cases, the mixture between homogeneity and heterogeneity seemed to be most promising for high-quality solutions (Sepehri 2002:184-185). This can be traced back to the fact that a basic understanding of organizational goals is necessary. A communality of cognitions, namely values and norms, a common language are prerequisites to ensure process gains. In addition, diversity is required to arrive at comprehensive decisions (Sepehri 2002:185). Moreover, the possible impact of moderating effects, especially of turbulent vs. stable environments has been outlined. There, the overall expectation is that diverse teams would perform better in turbulent environments than in stable ones. The complexity of diversity, team process and the moderating effects indicates a more complex relationship on the upper level between the constructs of demographic diversity and firm performance than a simple linear one (Hambrick 1994:201). Moreover, competing effects can cancel each other out when using simple linear statistics which might result in non-findings (Williams & O'Reilly 1998, Gebert et al. 2001:205, Gebert 2004:182, Hambrick 1994:201). In this respect, Williams & O'Reilly (1998:90) posit a curvilinear relationship between diversity and performance.

The following section suggests an alternative mode of action. Holding on to the idea that diversity in TMTs influences organizational behaviour and outcomes, propositions and hypotheses will be outlined. Besides this, the model uses demographic proxies and tries to integrate possible competing functional and dysfunctional effects by

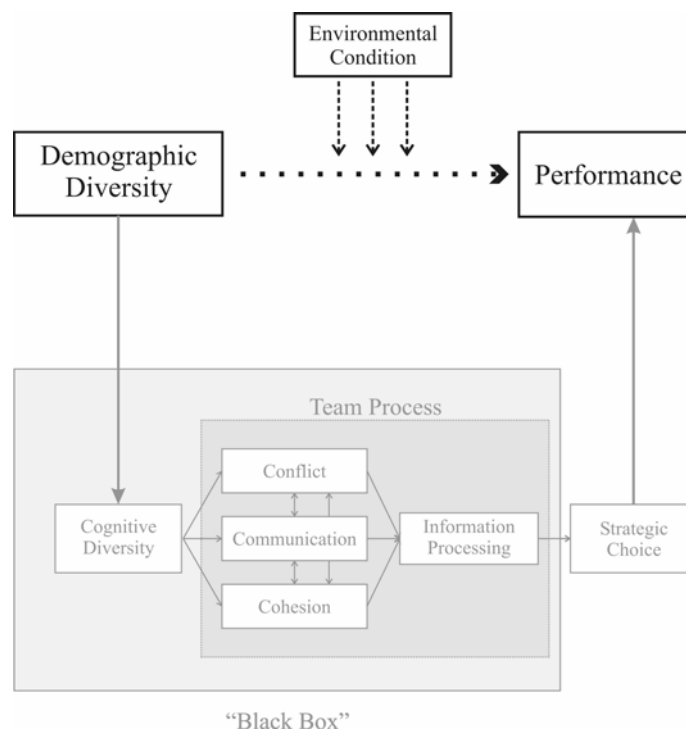
following Williams & O'Reilly's (1998) approach in suggesting a non-linear, curvilinear relationship.

4. The Present Empirical Investigation

4.1. Assumptions, Hypotheses and Empirical Expectations

There has been a broad outline of possible effects which appear to occur in the black box between demographic diversity and firm performance (Section 3). Whilst some of these effects seem to enhance resources within the group and therefore can lead to better decisions, others seem to dampen the effectiveness of the team. As a result, the decisions negatively influence performance. This pattern is also found in empirical studies investigating different aspects of diversity and outcome variables (Section 2.2). For this research, data is only available for demographic characteristics, namely age, firm tenure and TMT tenure and their distributional properties amongst the teams and on the firm performance and on environmental conditions. Therefore, this empirical research will only consider the most “macro level” of the originally proposed theoretical model. In other words, it will assess demographic diversity, performance and environmental conditions by integrating positive as well as negative effects from the underlying processes on the upper level (Figure 6).

Figure 6: The Proposed Empirical Model of Demographic Diversity and Performance



Source: Own model based on Glick et al. (1993) and Williams & O'Reilly (1998)

Various assumptions need to be made, some of which will be empirically evaluated. The basic premise underlying this research is that the TMT has at least in parts the opportunity to influence the performance of an enterprise (**Assumption 1**). If the outcome would solely be attributable to, for instance, environmental factors, this research could not impact our knowledge concerning firm performance. Another assumption is that demographic characteristics are good proxies for cognitive characteristics (**Assumption 2**). Furthermore, age, firm tenure and TMT tenure are demographic characteristics which influence the cognitive base of people (**Assumption 3**). There is relatively good evidence to suggest that age and tenure cohort experiences, for instance, economic deprivation can influence cognitive dispositions. These assumptions must be taken as a given and are based on previous empirical findings (Section 2.1, 3.2.1.1 and 3.2.1.2). Other assumptions can be tested with the available data. The following assumptions refer to demographic diversity and its antecedents whilst the hypotheses relate to the relationship between demographic diversity and firm performance.

It is expected that TMT are relatively homogenous in age diversity as in comparison to the tenure diversity variables (**Assumption 4**). This is due to promotion procedures. Either someone is promoted who has a high tenure in the company's record (within-promotion) or who has gained a lot of experience in other companies (outside-promotion). Both procedures are correlated with high age and therefore the age distribution should not scatter too far within the teams, as in comparison to firm or company tenure diversity. Moreover, bigger TMT are more diverse with regards to age, firm tenure and TMT tenure than small ones (**Assumption 5**). This is due to the fact that as the number of TMT members increases, so does the possibility of diversity within the group. With regards to each of the demographic variables, in turbulent environments, more diverse TMTs can be found than in stable environments (**Assumption 6**). This is expected as the need for more innovative and bold strategic manoeuvres, is higher, which is directly correlated with higher cognitive diversity.

It has already been outlined that the adopted theoretical model is an intermediated model. The view of Pfeffer (1983) that demographics are just as good as cognitive concepts and processes is not adopted. Nevertheless, the demographic approach (Kilduff et al. 2000:22) will be used. The view that one should try to simplify complex reality structures with a few valid and reliable mechanisms is embraced (King et al. 1994:10). Including all variables of potential importance may do justice to the social interaction complexity but linking the main concepts by simple mechanisms is a more promising way. Although it is expected that including cognitive variables or team

process variables would add to the understanding of the mechanisms involved, the idea of a good model, which can be obtained from demographics and performance, is not disregarded.

Previous research hinted at a possible non-linear relationship (Williams & O'Reilly 1998, Gebert et al. 2001, Gebert 2004). Some researchers have found promising results when investigating the relationship between diversity and process or different strategic outcomes (e.g. Katz 1982).

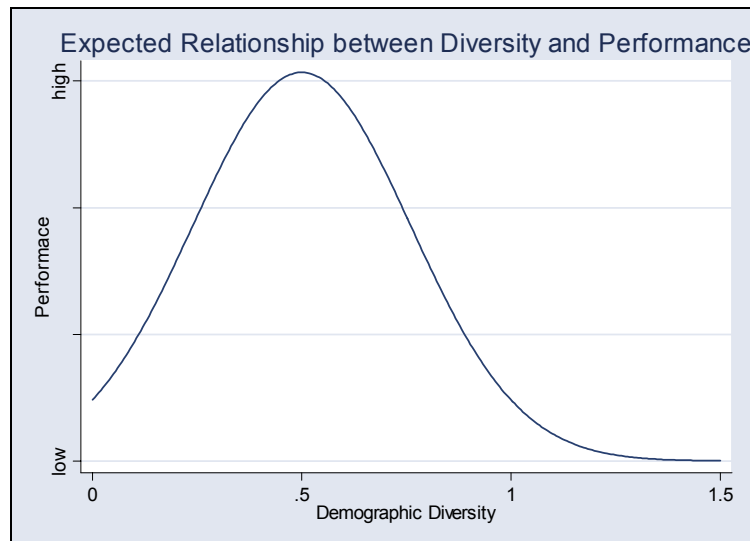
The hypotheses which postulate the relationships between the constructs and the empirical expectations which we have about the relationships between the concrete indicators will now for this investigation be outlined.

Hypothesis 1:

Homogeneous teams have a low firm performance. With ascending demographic diversity, firm performance will improve, but performance will reach its peak when demographic diversity is in the 'middle range' of the scale. With mounting demographic diversity, firm performance will reverse and descend.

Empirical expectation:

Demographic diversity in TMT, namely age diversity, firm tenure diversity and TMT tenure diversity relate to financial firm performance (here Earnings before Interest and Tax (EBIT) growth) by a non-monotonic curve, which can best be described by an inverted U-shape, mathematically speaking: a second-order polynomial. When estimating a curvilinear regression it is expected that the squared transformed predictor variables will turn negative. A graphical representation of the above is depicted in Figure 7.

Figure 7: Schematic Diagram of Hypothesis 1

Own diagram

Demographic homogenous teams share similar cognitive views. Although it increases cohesion, which is positive as it reduces the likelihood of conflict, it also decreases task-related communication and it is also likely to decrease the diversity of ideas and information within the group. The tendencies for “groupthink” in strong cohesive groups will undoubtedly accelerate the above phenomena. Therefore, the pool of different ideas regarding innovation or other strategic decision making becomes narrower. If decisions, which are taken, have a bad quality, it will lead to decreased firm performance. With increasing diversity, the necessity for task-related communication and information sharing increases and in fact manifests itself. This is due to the fact that cohesion within the team exists. People like to communicate as long as the team members still have a common base of values, attitudes and beliefs which bind them together and on which they can rely on. This makes communication easier and affective conflict and other dysfunctional effects less likely. As a result, the positive effects of diversity predominate. Better decisions will be made and the firm’s performance will increase. Whilst the possibility of relying on more and different ideas increases with diversity, the amount of common values, perceptions, attitudes and beliefs decreases. The likelihood of affective conflict, bad communication and fragmentation within the team increases. Coping with dysfunctional effects will therefore dominate the team’s activities. Consequently, performance will decrease.

Based upon the functional and dysfunctional facts of diversity which may occur within a team, it is withdrawn from assuming linear relationships between TMT diversity and firm performance. Instead it is suggested a second-order polynomial with a negative

coefficient for the squared term. Second-order polynomials of this kind can change direction once, so the curve has a maximum point.

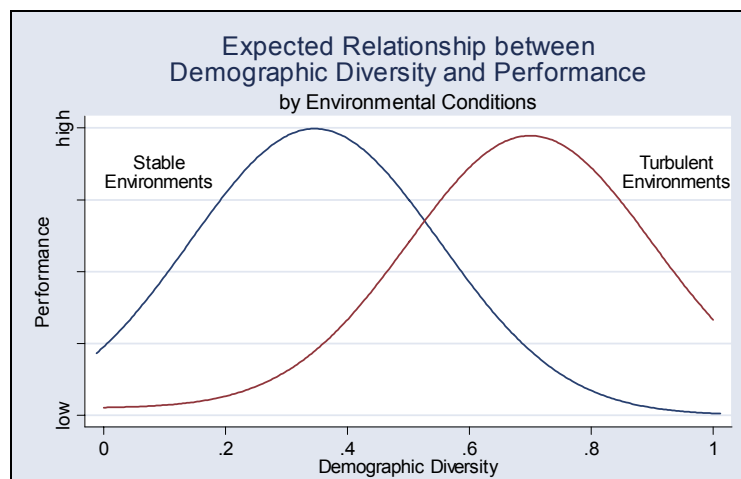
Hypothesis 2:

The relationship between TMT demographic diversity and firm performance is moderated by environmental conditions of stability or turbulence.

Empirical expectation:

Environmental conditions significantly impact the curvilinear regressions results between the demographic diversity variables, namely age diversity, firm tenure diversity and TMT tenure diversity, and financial firm performance, namely EBIT growth. Whilst the curvilinear pattern hypothesized (hypothesis 1) remains, we expect that the regression coefficients between the two sub-samples will significantly differ. Coefficients will be significantly higher in regressions of turbulent environments than in stable ones. This empirical expectation is graphically presented in Figure 8.

Figure 8: Schematic Diagram of Hypothesis 2



Source: Own diagram based on Priem (1990:474)

Environmental conditions have been stated as being an important factor on numerous occasions. To a large extent, the success of a diverse team depends on the necessity to use the varying cognitive bases in order to arrive at high quality solutions. In the absence of this necessity, diversity can be an obstacle. It is expected that more diverse TMTs perform better in turbulent environments than in stable ones. Turbulent environments require a vast amount of competing ideas, up to date information and better decisions in order to gain or maintain competitive advantage. Diversity within the

team increases the amount of information considered, the available alternatives explored and the increased necessity for task-related communication. Collectively, these factors improve the final decisions. In such rapidly changing environments, the positive effects of diversity on performance predominate. Dysfunctional effects might nonetheless be present.

In stable environments, the negative effects of diversity will dominate the scene as no external pressure imposes time and competition restrictions on the TMT. Opposed to this, it is expected that less diverse TMTs perform better in stable environments than in turbulent ones. In stable environments, the fact of pursuing one overall strategy instead of testing various competing ideas is of advantage. In these cases, the necessity to respond to others in form of strategic actions might not at all be given or not be as important as in turbulent environments at least not in form of creative counter-maneuvres. Tested procedures might be enough to maintain one's market position.

Excursus: Legal and Institutional Features regarding Germany

There are no apparent reasons to expect major sociocultural arguments like differences between individualistic vs. collectivistic cultures (Wiersema & Bird 1993) to influence the results of this German sample study. Nevertheless, it is a major shortcoming, that more than 90 percent of research on TMT diversity and performance has been conducted in the United States.

External validity is a concept which allows results under specific circumstances to be applied to a wider context (Schnell et al. 2005:219). Scientific research is concerned with finding general, valid and reliable mechanisms. External validity is therefore a necessity. Whilst single studies have limitations, the sum of research findings should be additive. It should give a more comprehensive view on the general mechanisms, resulting in external validity. In the case of TMT diversity, most research has thus far been conducted in the United States. Whether these results can be transferred to other contexts (i.e. TMTs in other countries) is speculative. Even more as others have demonstrated, there are different possible outcomes when major cultural differences come into play (e.g. Wiersema & Bird 1993, Chatman et al. 1998). Drawing upon this point, the question of what differences exist between Germany and the United States is unavoidable.

The differences are on the one hand historical, concerning the whole society and its coping with diversity. Blau (1977) argued that the effects of organizational demography may vary across countries because a society's general level of homogeneity affects how noticeably similarity and dissimilarity will be within the unit. Many authors have argued that Germany is a mono-cultural and very homogenous society (Sepehri 2002:39/63, Aretz & Hansen 2003:11, Stuber 2004:130), which has just recently 'opened' its doors for an ethnic diverse workforce. This also influences the understanding and the dealing with diversity in organizations and in TMTs. In this context, Sepehri (2002) states that there is hardly, if any, awareness of the problems arising from diversity. In addition, there is a great lack of awareness of the necessity to manage diversity in Germany. The most influential arguments associated with diversity in German companies are economic orientated, for instance, new market entries or internationalisation (Sepehri 2002:221/258, Tasler 2001:104). Fuelled by public campaigns against discriminations in the United States, diversity has been a long lasting phenomenon in society and in companies, so there is greater awareness of the necessity to integrate and to manage diversity. Germany is slowly shifting its attention to the growing share of foreigners in its society and workforce. Predictions state that in 20 years Germany will double its share of non-Germans within its labour market and will, therefore, be positioned where the United States are currently at (Stuber 2004:50). As a result of these conditions, German work teams are more likely to be less diverse than their American counterparts. Although these statements regard society and the workforce, top managers are also socialised within societies and cannot be seen as merely objective and rational. These important differences between the U.S. and Germany are likely to be reflected in top managers' cognitions. These cognitions can then in turn affect the team process. Whilst American top managers are used to dealing with diverse partners, their German counterparts might not be accustomed to this. Diversity in Germany is more likely to lead to inefficient decisions which in turn affect firm performance negatively.

On the other hand, there are concrete legal differences concerning the TMT between the United States and Germany. Corporations in the United States have a unipolar upper echelons conception (board of directors). The board of directors are responsible for controlling and leading the companies businesses. It consists of officers of the board and of outside officers (Henke 1998:25). In the United States, the Chief Executive Officer (CEO) has an omnipotent position, especially if s/he is also chairman of the board (CEO duality) (Henke 1998:26). S/he can then potentially take decision on his/her own accord (Henke 1998: 25-27). The German legal business affairs are written

down in the German Stock Corporation Act (AktG). Thereby, a distinction is made between the management board and the supervisory board. Sec. 76 para. 1 (AktG) states that “*the management board shall manage the company under its own responsibility*” and sec. 78 (AktG) states that “*the management board shall represent the company in and out of court*” (Wirth et al. 2004:301/303). The duty of the supervisory board is documented in sec.111 (AktG) which limits its role to supervision (Wirth et al. 2004:87/332). Not only is there a difference in “checks and balances” with regards to German and American upper echelons but there is also sec. 77 para. 1 (AktG), which recognizes the German board of management as a collective body so that the members of the board are only entitled to manage the company jointly (Henn 2002:276, Macharzina 2003: 148, Wirth et al. 2004:88/302). Although there are practical ways to circumvent the principle of joint authority (Wirth et al 2004:88), it nevertheless stresses the interaction necessity of the German board of manager members when taking decisions. This deteriorates in parts Hambrick’s (1994) argument that the TMT might not be working or behaving as a team but rather as a group.

The differences between Germany and the United States, namely the differences in society, “checks and balances” and “joint authority” can influence the mechanisms which are expected with regards to TMT diversity and firm performance. Teams which operate in less diverse societies are likely to have difficulties coping with diversity. As a result, the dysfunctional effects of diversity (high process losses) might under such conditions be more prevalent than the other way round.

4.2. Methodology and Study Design

This chapter provides the necessary information to assess the quality of this research and its design. In order to meet the scientific demand of making procedures public (King et al. 1994:8), design and data decisions as well as possible problems will be outlined. In this way transparency is created.

4.2.1. “Demographic Diversity in TMT”: Variables, Operationalisations

There is no universal, straightforward way of measurement, no obvious indicators for the general construct of “diversity in TMTs”. Within a bigger project conducted at the “Chair of Management, Especially Strategy and Leadership” at the University of

Konstanz, many variables have been collected to investigate further how different types of diversity relate to performance¹⁰. For many of these variables missing data problems emerged, which were not sufficiently solvable within the limitations of this research. To ease this inherent problem of data quality when investigating TMTs, this thesis is concerned with cohort variables (age, firm tenure and TMT tenure) which measure the demographic dimension of diversity in TMT. Cohort variables, especially tenure, have a long history in TMT diversity research (see Sections 3.2.1.1 and 3.2.1.2) and contradictory findings have been reported on each of them (see Section 2.2). In this research, data on the date of birth, the date of entry into the firm and the date of entry into the TMT were collected on the individual level. The data was then used to calculate age, firm tenure and TMT tenure of each top management member respectively. The data sampling mechanism was quite simple, as there were no inconsistencies about the date of birth or the date of entry into a company. Problems emerged in companies which had recently undergone an M&A. In these cases, information was gathered on the date of entry into the “old, original” company. The date of entry into the TMT was defined as starting from the new company’s existence.

All collected data is metric continuous data. To estimate diversity as a composite measure on the team level, the coefficient of variation (CV) is used. The coefficient of variation is defined as the standard deviation divided by the mean (Allison 1978:867).

Formally, it is written as: $CV = \frac{s}{x}$

Hence, one can see that it is divided by the mean, it is a scale invariant measure. Allison (1978:877) favoured the coefficient of variation for its simplicity of estimation and its satisfaction of all demands regarding statistical judgements of good measurements. His recommendation was followed by most researchers which included continuous demographic variables in TMT diversity research. Only a few used different measures. In most of these cases, this was necessary because of co-linearity between the independent and included control variables, e.g. when the mean average age was also included.

¹⁰ The variables collected were: age, TMT tenure, firm tenure, title, experience, school education, further education, supervisory board membership and responsibilities within the TMT.

4.2.2. “Firm Performance”: Variables, Operationalisations

Performance can be measured on different levels of the organisation as well as with monetary or non-monetary indicators (Klingebiel, 1999:20-24). As for this case, the aim is to investigate the influence of TMT demographic diversity on firm performance. The level of measurement of performance should therefore be on the organizational level. Traditionally, firm performance on this level is measured in financial terms. Monetary performance measures (e.g. return on investment, return on assets, growth) still play the dominating role. Maximising profits is a defined goal of most enterprises. Financial analysis is therefore at the heart of such companies. Moreover, these indicators are easy to access, in parts allow comparability between companies and can in turn be seen as a statistical summary of all ongoing processes within a company, including expansion, flexibility and innovation.

As in the case of independent variables, more variables than actually used in this study were collected. Sales, earnings before interest and tax (EBIT)¹¹, cash-flow, total assets, equity share, and net income (profit) were all variables which have been collected. The difficulties lied in choosing an appropriate measure of performance out of these variables. This choice was particularly difficult, as financial performance measures generally depend on branch economics and are by their nature difficult to compare between branches. This problem could not completely be solved. Tradeoffs had to be made. The final chosen measures are EBIT growth and growth in return on investment. EBIT is a measure of the more operative success of a company. Return on investment is probably the most frequently used measurements of performance as it indicates how well the company operated with the total capital. But instead of using absolute measures, it was decided to calculate the percentage of growth, respectively. Although growth is also branch dependent, it does not vary as much as absolute measures.

The EBIT growth formula used was:

$$\text{Growth} = ((\text{EBIT}(T_2) - \text{EBIT}(T_1)) / \text{EBIT}(T_1)) * 100$$

The formula to estimate return on investment was:

$$\text{ROI}(T_1) = (\text{Profit}(T_1) / \text{Total Assets}(T_1)) * 100$$

¹¹ EBIT is an ambiguous figure (Küting & Weber, 2004:306). It made it necessary to use an own clear-cut definition which would be estimated if necessary by hand. The definition used is according to §275 HGB equivalent to the “Betriebsergebnis”. A listing of the entries which are included or respectively excluded can be found in Küting & Weber (2004:225-226).

In the formulas, T_1 equals to point 1 in time and T_2 equals to point 2 in time. Growth in ROI was simply calculated by subtracting the ROI of T_1 of the ROI of T_2 . Both variables display therefore the percentage increase of millions.

4.2.3. Control Variables

Some potential control variables were also collected. On the team level, the size of the team was measured. Size is seen as being an antecedent of diversity. Bigger teams can be more heterogeneous than teams with only a few members. In addition, the size of the company was assessed by the number of its employees. The company's stock development (Xetra) on the Frankfurter Stock Market (FWB) was also sampled. Performance measures depend on the company's size and on the company's general economic situation. The stock development gives thereby insight in terms of previous performance and expected potential performance. On the environmental level, data was collected on the firms sector. Sectors were then assigned to similar categories, so that seven categories¹² remain. In a next step, the sectors were combined and identified as being turbulent or stable by the author's judgements. In this way, it is possible to adjust for environmental conditions.

4.2.4. Sample and Sample Size

A sample of companies was needed, where each company has a board of executives and which on a regularly bases makes official statements about financial key factors of the company. Other than this, the diversity and performance data for the chosen sample had to be within an easy access because of the limitations (time and financial support) of this thesis. Henke (1998) states that as the companies get bigger, it becomes more difficult to access top managers data directly. However, as previously mentioned, demographics and also performance data is relatively easy to access by documentary analysis (Hambrick et al. 1996). Therefore, a sample was chosen which fulfilled criterions of easy access and reliable data. Thereupon, the idea of a probability sample was not pursued. The resulting sample is chiefly based on availability criterions. It consists of 80 companies, which are either registered with the DAX or the

¹² The categories are: (1) information technology/technology/software/telecommunication; (2) chemical industry/pharmaceutical industry/health; (3) financial industry/insurance industry; (4) industry/construction industry/ automobile industry; (5) power/raw material/provider; (6) transport/logistics; (7) others

DAX¹³. The population, on which inference can be drawn on, are economically leading German companies which are trading on the German stock exchange in Frankfurt (FWB). There are only a few who fulfil the economic criteria but still reject to be members of the indices¹⁴. This happens for instance because they do not have admission to the Prime Standard¹⁵. Thus the chosen sample can be stated as being almost equal to the inference population. Moreover, the sample includes companies from various branches. Although this does potentially introduce difficulties, it also opens the door of finding a more general mechanism, making us more confident in the results. The 'diversity' of this sample with regards to branches makes it special to most previous investigations conducted, which only sampled one or two branches.

Although the unit of analysis are the teams (N=80), the first step was to collect individual data for all top managers of each company. In literature, there is no general consensus about what exactly constitutes TMT (e.g. O'Reilly et al. 1993:151, Finkelstein & Hambrick 1996:122, Henke 1998:75). Whilst some leave it to the CEO to define who belongs to the TMT (e.g. Bantel & Jackson 1989, Jackson 1992), others use formal titles as the defining characteristic (e.g. Murray 1989, Hambrick et al. 1996). For the purpose of this study, a clear cut definition was used. As the given sample consists exclusively of incorporated companies, therefore, they must comply with the German Stock Corporation Act (AktG) (Henn 2002, Wirth et al. 2004). In the Act, it is stated that the TMT is the management body (sec. 76 para. 1 AktG), which is elected by the supervisory board (sec. 84 AktG). Although there are other reporting and influential managers, all official statements of each company refer to the legal and responsible managers who are assigned the title by law as the top managers. This formal definition has therefore been adopted. The resulting gross sample consists of 400 top managers and 80 TMT.

Unfortunately, this study faced problems of missing data. Companies (N=11) were identified which have their business year unequal to the calendar's year, which caused

¹³ "DAX® is the blue-chip index of Deutsche Börse. It includes the largest German securities in terms of market capitalization and order book turnover from classic and technology sectors which are admitted to the Prime Standard segment of the Official Market or Regulated Market." "MDAX® is the selection index of Deutsche Börse for mid-sized companies (mid caps) from classic sectors; it starts directly below the DAX®. It has 50 constituents which are admitted to the Prime Standard segment of the Official Market or Regulated Market."

(URL: <http://deutsche-boerse.com>)

¹⁴ One example is Porsche AG.

¹⁵ In order to have admission to the Prime Standard at the FWB not only do legal requirements have to be fulfilled but also higher transparency standards, namely: quarterly reporting, application of international accounting standards, publication of a financial calendar, staging at least one analyst conference per year and publish also in English.

(URL: <http://deutsche-boerse.com>)

problems (see Section 4.2.5). Because the main objective is to investigate a clear one way relationship, it is necessary to keep the chronological order when collecting independent and dependent variable. This means that at least once the dependent variables should have been sampled after the sampling of the independent variables. For this reason, all companies who had not released a nine months report after September 2004 were eliminated (N=9)¹⁶ and the net sample size shrunk to 71 companies.

Further dropouts on the dependent variables occurred for two reasons (Table 4). Firstly, data for earnings before interest and tax (EBIT), sum of balance sheet or the profit for the nine months reports in September 2003 or September 2004 was unavailable. This happened partly because two companies had not been registered on the FWB in 2003 (e.g. Deutsche Postbank, Hypo Real Estate) or because they did not provide the necessary information (e.g. EADS NV). Secondly, there are missing values on the growth of EBIT variable as some of the companies had loss on EBIT in the nine months report of 2003 or 2004. These cases were coded as missing values. Strictly speaking, this had to be done as the growth of companies which balanced losses is not comparable to the growth of companies which balanced profits. The difficulties of minimizing loss from one year to the next must be valued differently than when a company just improves its profit. In order to obtain comparability in such circumstances, advanced economic adjustments mechanisms are necessary. As only three drop-outs occurred for this reason the adjustment procedure was neglected.

Table 4: Missings on EBIT Growth and ROI Growth

Variable	No. of Missings (Out of 71 Teams)	Company
EBIT Growth	4	Heidelberg Druck AG, Karstadt-Quelle AG, MG-Technologies, Aareal Bank
ROI Growth	4	Deutsche Postbank AG, EADS NV, Kronos AG, STADA Arzneimittel AG
Total	8	

For the independent variables the picture is a bit more complicated. Firstly, there are drop-outs on the individual level. As the diversity variables are an aggregated composite measure of the individual values of the team members, missing data

¹⁶ The companies were: Wincor Nixdorf, Norddeutsche Affinerie, Infineon Technologies, Douglas AG, Beru AG, Thyssen-Krupp, Siemens AG, Techem AG and IKB Deutsche Industriebank.

problems are drastic. Imputation procedures always involve the use of measures of central tendencies. As this study tries to identify the dissimilarity of distribution within and amongst teams, imputation techniques would undermine this objective. By definition they would make the team more similar. Imputation techniques also fail, as it is quite difficult to use such techniques for small teams. In addition, there are no sensible theoretical arguments to assume that the given distribution in a team makes the estimation of another team member's demographic variables likely. Therefore, the whole team needs to be excluded even if only one member has a missing value on a relevant variable. For a summary of the drop-outs of teams due to missing data on age, firm tenure or TMT tenure on the individual level, see Table 5.

Table 5: Missings of Age Diversity, Firm Tenure Diversity and TMT Tenure Diversity

Variable	No. of Missings (Out of 71 Teams)	Companies
Age Diversity	12	Aareal Bank AG, Depfa Bank plc, Fielmann AG, Fraport AG, Fresenius AG, Hugo Boss AG, Kronos AG, Leoni AG, Medion AG, Puma AG, Rhoen-Klinikum AG, Suedzucker AG
Firm Tenure Diversity	14	Aareal Bank AG, EADS NV, Fielmann AG, Fraport AG, Fresenius AG, Hugo Boss AG, Kronos AG, Leoni AG, MPC AG, Medion AG, Puma AG, Rhoen-Klinikum AG, Suedzucker AG, WCM AG
TMT Tenure Diversity	10	Aareal Bank AG, EADS NV, Fresenius AG, Kronos AG, Leoni AG, MPC AG, Medion AG, Muenchner Rueck AG, Rhoen-Klinikum AG, Suedzucker AG
Total	16	

4.2.5. Data Collection and Data Description

Two data sets have been constructed: one includes the independent manager variables and the other includes all firm variables. In both cases, secondary data from documentary analysis has been used.¹⁷

Most of the managerial data was collected via information on companies' web pages. Usually each company gives a short introduction into its business and its management. They also provide basic information on their board of executives. Thereafter, an email-inquiry was sent to companies which did not provide full information on their executive board members. From the email request, about half of the companies provided the

¹⁷ There are commercial secondary data sources which would provide all necessary information, e.g. Hoppenstedt Online Databases (<http://www.hoppenstedt.de>). Unfortunately, these sources are very expensive and suffer similar methodological problems.

required information. The others refused on the grounds of confidentiality. If the information up to that point was not sufficient, Munzinger Online database was scanned. Unfortunately, not many of the relevant managers are registered there, but if they are, the database provided very good information. Further information could still be found in business reports or press releases of the company. For single missing values within a team, general search engines (Google and Yahoo) were applied. The data was collected from July until the end of September 2004. Possible changes in the management after July have not been considered.

As all companies within the DAX and the MDAX have admission to the Prime Standard and have to fulfil the transparency requirements (which include quarterly financial releases), the performance data was collected through the annual and quarterly business reports. Thus, the statement of profit and loss, the balance sheets, the cash-flow statements as well as key figures tables were scanned for relevant data. All variables - other than the number of employees and stock price - were sampled in millions of euros. Only one company (Fresenius Medical Care AG) provided their financial details solely in U.S. dollars. The noon-buying rate of the Federal Reserve Bank of New York on the according date was therefore used to calculate the absolute value in euros. Stock prices were taken from "Wallstreet Online" and are portrayed in euros. Accordingly, the number of employees is portrayed in absolute numbers.

The data was collected for four different points in time: December 2002 (Annual Report), September 2003 (Q3 Report), December 2003 (Annual Report) and September 2004 (Q3 Report). In this way, the data of September 2004 allows one to carefully establish a causal relationship. The financial facts can - from a chronological view - be interpreted as a result of the management efforts, given that a relationship is found in the analysis part. The fact that only few data is available to establish indeed this causality makes it difficult. This difficulty is due to the fact that no sufficient data was available for previous top management compositions when using documentary sources and that the Annual Reports 2004 were not yet all released (17th April 2005). An additional problem arose with companies which finalise their business year not equal with the calendar year. Each of these companies had to have, for causality reasons, a nine months report after July 2004. If this was not the case and the Q3 report was only forthcoming, then these companies were excluded from the analysis.

Another topic which needs to be discussed here is secondary data. Using secondary data is in parts problematic. The process by which the data was generated is often not made explicit. Moreover, the primary goal of data production can bias the data (Schnell et al. 1999:240). For example, in this case the primary goal of the Annual Report data

is to transfer (financial) information to stakeholders. Additionally, different accounting procedures, especially the recent changes from HGB to IAS based on European Union regulations, make comparisons between companies difficult. Wherever key data is used, errors can be introduced via differing inclusion modes. In trying to exclude such errors, own definitions of some susceptible key data figures were used, for instance, EBIT. On the other hand, the advantages of secondary data usually outweigh its disadvantages. Using secondary data helps to save resources (Kiecolt & Nathan 1985:11).

4.3. Results

The analytical part should give indications whether the hypotheses formulated in Section 4.1 are supported in the data. It is this part of the research process that is the regeneration to theory. Thereafter, it can be decided whether it is necessary to adjust, reject or accept theory for the time being (Schnell et al. 2005:14).

Each analytical method will be shortly introduced and summarized. For more detailed information concerning the graphical instruments and the analytical methods, one can refer, for instance, to: Hamilton (1992), Schnell (1994), Kohler & Kreuter (2001), Kühnel & Krebs (2001), Hamilton (2003), Schnell et al. (2005:441-474). The software used here for purpose of analysis is STATA (Version 8)¹⁸. This section will start with simple descriptive statistics and graphical investigations into the data. Thereafter, various linear regressions are conducted.

4.3.1. Descriptive Statistics

This part aims to describe the datasets and give some first impressions about the data. It is divided into three sub-divisions. The first examines the distribution of the demographic variables on the individual level. The second assess the univariate distribution of the independent and dependent variables. The third evaluates the bivariate relationship between independent and dependent variables.

¹⁸ For commands and the commands syntax please see: StataCorp. 2003a, StataCorp. 2003b.

4.3.1.1. Distribution of Demographics on the Individual Level

Table 6 gives a summary of age, firm tenure and TMT tenure. It shows the number of observations, the means, the standard deviations, the quartiles and the minimum and maximum values of each variable on the individual level. In total, the sample consists of 400 managers. The reduced number of observations results from the missing data on the individual level for each variable, for instance, age has 57 missing values. The manager's age varies between 35 and 65 years. On average they are 52 years old and deviate by seven years. The age range here is quite restricted and does imply that top managers cannot be seen just as representatives of the general work force.

The number of years within the company disperses of the three variables most with a range of 43 years. Fifty percent of the top managers are thereby between four (Q_{25}) and 21 (Q_{75}) years within the company. The average firm tenure of the top managers is near 13 years.

TMT tenure disperses by 32 year. Although the range seems to be quite big, the mean (5 years) is relatively low, which points towards high TMT tenure as being exceptional. More robust measures of the distribution confirm this. The median (Q_{50}), which indicates the middle value of the distribution according to ranks is only four years. The lower Quartile₂₅ (Q_{25}) is two years. This means that 25 percent of the managers have TMT tenure equal or smaller than two years. The upper Quartile₇₅ (Q_{75}) is seven years, meaning that 75% of the managers have less than seven years within the TMT. The tenure distribution indicates frequent changes within the teams.

Table 6: Descriptive Statistics of Age, Firm Tenure and TMT Tenure

Variable	Observations	Mean	Std. Dev.	Min	Max	Q_{25}	Q_{50}	Q_{75}
Age	343	52.03	6.94	35	65	47	53	58
Firm Tenure	339	13.37	11.06	0	43	4	11	21
TMT Tenure	349	5.23	4.66	0	32	2	4	7

4.3.1.2. Distributions of Demographic Diversity Variables and Performance Variables

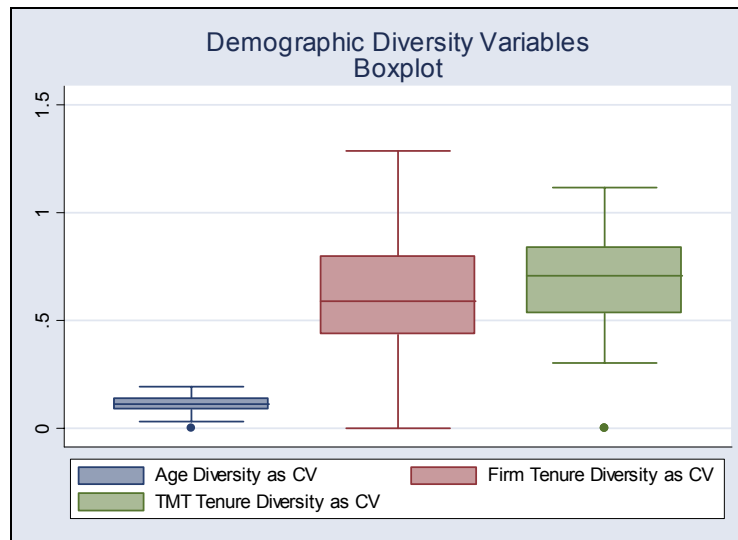
Having formed the first impression of the distribution of independent variables on the individual level, this section tries to get an idea of how the descriptive statistics distribute on the team's level or company's level. Moreover, the assumptions which were made in Section 4.1 are tested.

The average number of team members is six with a standard deviation of two members. In line with legal regulation (sec. 76 para. 2 AktG (Henn 2002:273)), each of the top teams must have a minimum of two members. The maximum number of team members in this sample is ten. The demographic diversity variables measured in the coefficient of variation (CV) have all zero values as minimum, indicating total homogeneity with regards to the respective characteristic. But these variables differ in all other respects. It is noticeable that age diversity is different from the other two variables. Firm tenure diversity and TMT tenure diversity seem to be more similar in their distributions and their central tendencies to each other (Table 7).

Table 7: Descriptive Statistics of Age, Firm Tenure and TMT Tenure Diversity Variables

Variable	Observations	Mean	Std. Dev.	Min	Max	Q ₂₅	Q ₅₀	Q ₇₅
Age Diversity	59	0.11	0.04	0	0.19	0.08	0.11	0.14
Firm Tenure Diversity	57	0.62	0.28	0	1.27	0.43	0.59	0.8
TMT Tenure Diversity	61	0.68	0.25	0	1.12	0.53	0.71	0.84
No of TMM	71	5.08	1.87	2	10	4	5	6

More illustrative is this finding in the graphical presentation of the three demographic diversity variables (Figure 9). The median (Q₅₀) is shown in the middle of each box. The box is fixed by Q₂₅ and Q₇₅. Within the box, there are 50% of all cases indicating the inter-quartiles-range (IQR). Age diversity does not disperse a lot and does not overlap even with its upper whisker, the boxes of the other two variables. In contrast, TMT tenure diversity and firm tenure diversity are quite similar in their distributions, as they have a big overlap. The first testable assumption (Assumption 4) can therefore be assumed to be supported by the present data. The TMTs are indeed most homogenous with regards to age.

Figure 9: Boxplots of Age Diversity, Firm Tenure Diversity and TMT Tenure Diversity

With regards to the diversity variables, one can see that age diversity does not really seem to relate to firm tenure diversity or TMT tenure diversity. A result which was also seen in an estimation of the correlation coefficients ($r=0.2$, $r=0.0$)¹⁹. Moreover, firm tenure diversity and TMT tenure diversity are positively related ($r=0.3$).

In order to test Assumption 5, which assumed that the size of the TMT is an antecedent of diversity, a strong positive correlation between the diversity variables and the size of the TMT is suggested. The results show that the correlation between the size of the team and each diversity variable is positive, but not strong. For TMT size and age diversity it is 0.1, for firm tenure diversity it is 0.1 and for TMT diversity it is 0.2, suggesting that Assumption 5 cannot really be supported with this data.

The sixth assumption, that TMTs in turbulent environments are more diverse than in stable environments, is tested by using two sample tests (t-tests)²⁰. In this way, it is tested, if we have to assume that the companies in stable environments differ in their level of diversity significantly from companies in turbulent environments or if the null hypothesis that there is no significant difference between the two groups must be accepted. In none of the tests could the null hypothesis be rejected. In other words, the results do not support the idea that the composition of the teams varies with stable or turbulent environmental conditions. Assumption 6 must therefore be rejected.

¹⁹ A table including all correlation coefficients between variables included here can be found in the Appendix II.

²⁰ Various tests have been conducted: two sample t-tests assuming equal variances, t-tests assuming unequal variances and a non-parametric Mann-Whitney U Test. The tests differ in the restrictions of their assumptions (see Hamilton 2003:113-115). However, as all results of each variable point towards the same direction, the details will be disregarded here.

The distributions of the dependent variables are summarized in Table 8. The big differences between mean and median for EBIT growth indicate that outliers cause the wide range. Regarding the IQR, the distribution seems not that extraordinary. ROI growth seems to be quite symmetrically distributed, which is indicated by almost identical values of the mean and the median. However, there is hardly any variation found for this variable.

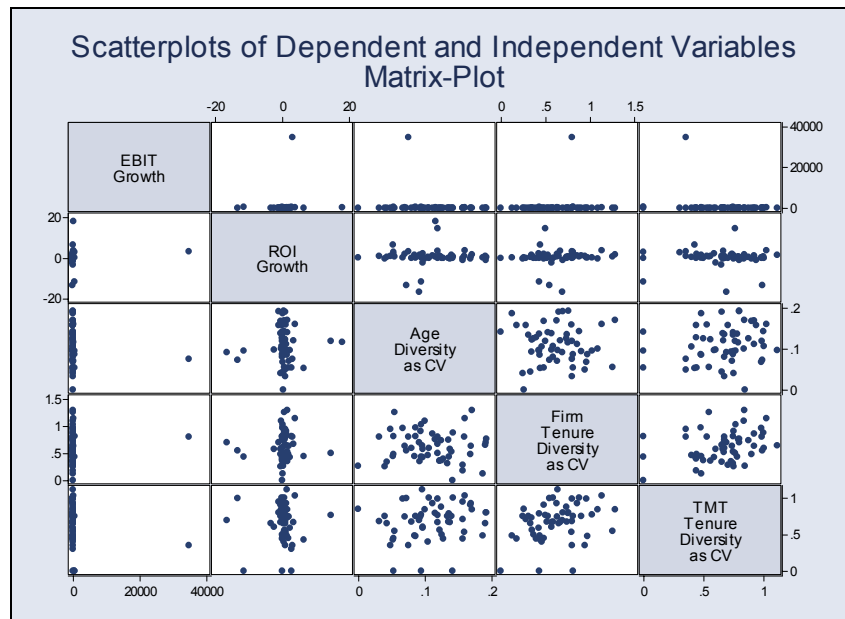
Table 8: Descriptive Statistics of EBIT Growth and ROI Growth

Variable	Observations	Mean	Std. Dev.	Min	Max	Q ₂₅	Q ₅₀	Q ₇₅
EBIT Growth	67	563.9	4247.39	-94.2	34800	-1.55	17.28	51.81
ROI Growth	67	0.44	4.37	-16.53	18.02	-0.12	0.3	1.28

4.3.1.3. Bivariate Relations between Diversity Variables and Performance Variables

Although later in regression analysis, the model tested will be a multivariate model, the bivariate relations between the independent and dependent variables can give first hints towards the possible problems and tendencies. Therefore, a matrix plot was generated, displaying all bivariate relations between all variables (Figure 10). These graphs show, for instance, EBIT in the first row on the y-axis of each graph. The variable displayed on the x-axis varies. In the first graph and in the first row, ROI growth is plotted against EBIT growth. The second graph in the first row displays age diversity against EBIT growth and so on. The other half of the matrix plot has changed axis.

Figure 10: Matrix-Plot of all Variables Displaying the Bivariate Relations

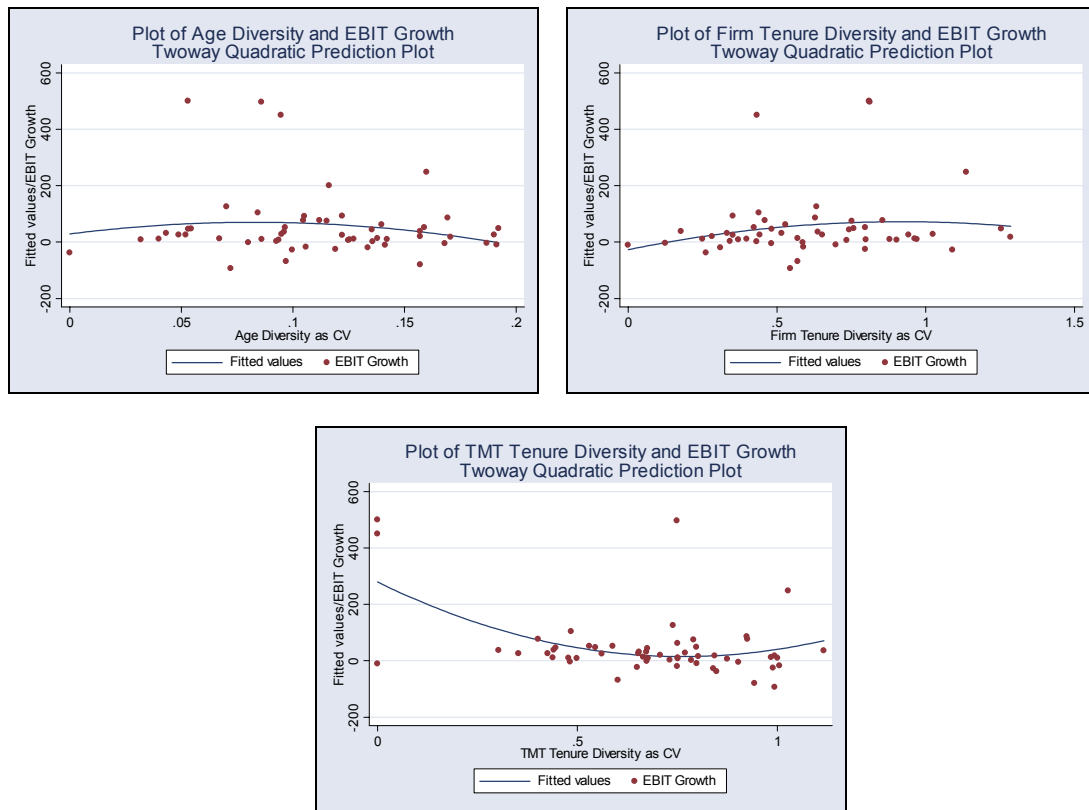


In the graphs between the independent diversity variables, one can see that age diversity does not really seem to relate to firm tenure diversity or TMT tenure diversity. This result was also seen in an estimation of the correlation coefficients (Appendix II). Moreover, firm tenure diversity and TMT tenure diversity seem to be positively related. The relationship between the independent and the dependent variables are difficult to determine. In particular, the relationships to EBIT growth are dominated by a single outlier, which does not allow the detection of any other patterns in the scatterplots. Between the diversity variables and EBIT growth, the same outlier was identified (“Lufthansa AG”) in all three bivariate relationships. The data of Lufthansa seems somewhat extreme. It was therefore checked for possible data errors. However, this can be ruled out. As this outlier would also most likely influence the multivariate analysis, this case was consequently eliminated.

A similar outlier problem emerges between ROI growth and the diversity variables. However, here the outliers are varying. Therefore, one cannot assume that the bivariate outliers will remain outliers in a multidimensional model as well. It has been noted before that the range of ROI growth is very restricted. Although not immediately apparent from the scatterplots, it is indeed the case. In order to find a clear pattern in such a restricted range, it would be necessary that outliers are not present and the relationship is very strong and straightforward, which seems not to be the case here.

In a next step, the graphical plausibility of a curvilinear relationship in form of an inverted U-shape in the bivariate relations was checked (Figure 11).

Figure 11: Scatterplots of each Independent Diversity Variable and EBIT Growth with a Fitted Quadratic Curve



The fitted curve displays the prediction for the EBIT growth variable²¹ based on a linear regression of each of the independent variable and its quadratic term. The formula is written as:

$$\hat{y}=b_0+b_1x_1+b_2x_2^2$$

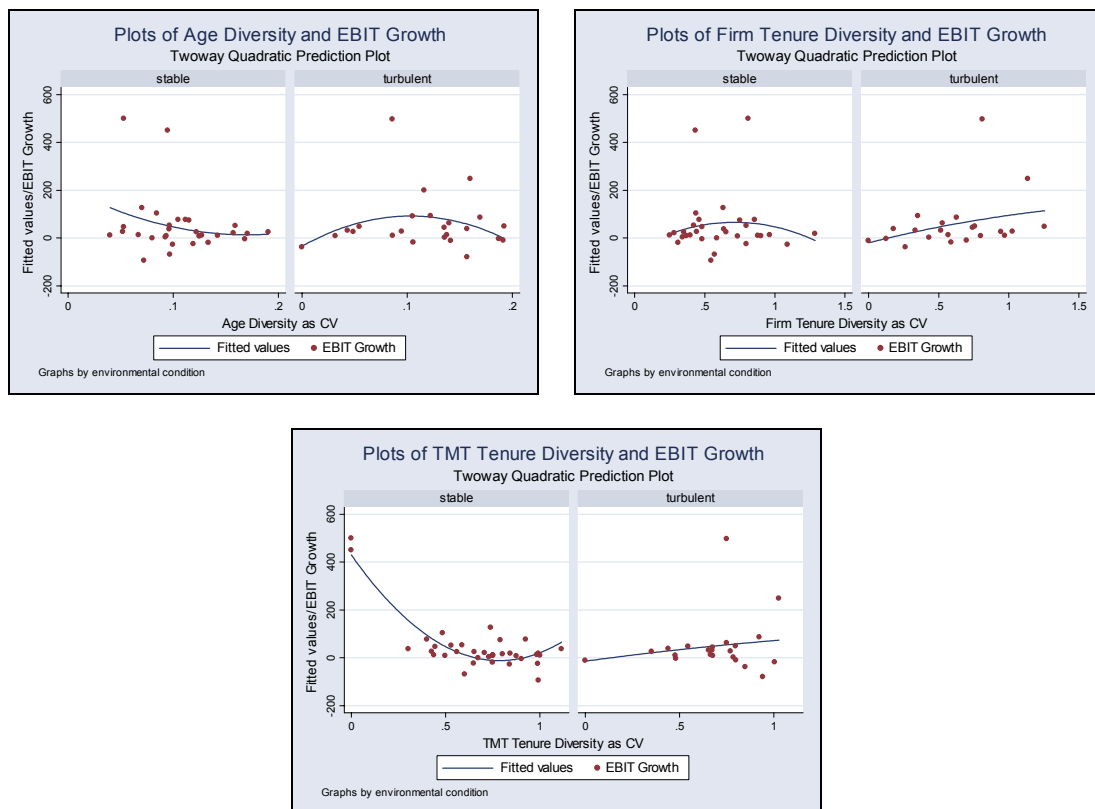
Each of the graphs shows substantial outliers. In a sample with such few observations this can be drastic as they are likely to shift the curve in their direction. Whether these observations also have a major impact on the multivariate estimation or if they are only bivariate outliers will be investigated in the regression diagnostics after each regression. It is worthwhile noting that the bivariate relationships between age diversity to EBIT growth and firm tenure diversity to EBIT growth show a curvilinear pattern of an inverted U-shape. The fit for the data between TMT tenure diversity and EBIT growth shows a positive curvilinear relation. To a great extent, this is certainly attributable to

²¹ The same was done for ROI growth and each of the diversity variables (see: Appendix III and Appendix IV). Unfortunately, the presentiments are true. Neither of the ROI and diversity graphs revealed a straightforward pattern. Further investigations led to more problems, as the variation on the dependent variable was just not enough. Subsequently, investigations on ROI growth will not be reported.

the two “outliers”²². These companies’ TMTs are homogeneous but have a high growth in EBIT and do therefore contradict the hypothesized relationship. By ignoring the three companies at the low end, it is possible to yield a curvilinear pattern with an inverted U-shape. In summary, the graphical bivariate demonstrations showed slight inverted U-shapes for age diversity and firm tenure diversity. For TMT tenure diversity, the curve was not in the hypothesized direction.

Generally speaking, the estimation at the far end of the diversity scale is prone to outliers, as the density of observations at the high and low end is very rare. This becomes clearer when comparing the diversity variables and their relationships to EBIT growth by environmental conditions (stable or turbulent) (Figure 12).

Figure 12: Scatterplots of each Independent Diversity Variable and EBIT Growth with a Fitted Quadratic Curve Separated by Environmental Conditions



For age diversity and EBIT growth an inverted U-shape pattern emerges in turbulent conditions. Under stable conditions, the curvilinearity changes and turns to a U-shape. This is likely to be caused by the two high outliers which are quite homogeneous but also high performers. A different picture is presented for firm tenure diversity and EBIT growth. In stable environments, a clear inverted curvilinear pattern is revealed.

²² Calling these two observations outliers might be misleading. However, these two observations account for 2/3 of the observations at the low end of the diversity scale. As they oppose our hypothesized expectations they are labelled as “outliers”.

However, the strength of this relationship might be caused by the high outliers with approximately average diversity and high performance. Even though a curvilinear model was fitted, an almost positive linear relationship emerged for firm tenure diversity and EBIT growth in turbulent environments. This is also true for TMT tenure diversity and EBIT growth for companies in turbulent conditions. However, in stable conditions, a clear positive curvilinear pattern was revealed for TMT tenure diversity and EBIT growth, once more clearly caused by outliers.

Outliers seem to be the dominating topic. Although most of the outliers support the hypothesis that the highest performing companies are in the middle of the diversity continua, the topic must be addressed here. Generally speaking, in any small sample investigation, the results are prone to be biased by outliers. Especially in parts of the estimations where the density of observations is very low, the influence of outliers' rises and confidence intervals are widespread. In the above graphs (Figure 12), the estimation at the far end of the diversity scale is prone to outliers, as the density of observations at the high and low end is very rare (e.g. TMT diversity on EBIT growth in stable conditions).

To sum it up: in stable conditions, the bivariate graphs display curvilinearity (U-shape and inverted U-shape) but rather point towards linearity amongst companies in turbulent conditions.

4.3.2. Regression Analysis

This section will use regression analysis to examine the multivariate relationships between the three demographic diversity variables and firm performance. Although the hypothesized relationship is a curvilinear one, linear regression models are estimated for the full sample and for sub-samples according to environmental conditions. This was done because firstly, regression diagnostics provide useful analytical instruments to check for the plausibility of curvilinearity in the data and secondly, it allows a comparison between linear and curvilinear model fits. Comparisons between these two models should provide us with good confidence if we can show that one or the other model is superior. In this way, we would add information to the present state of knowledge and understanding in diversity research.

To test for curvilinearity, linear models including second-order polynomial terms of the independent variables were estimated. This was done for the full sample and also for two sub-samples separated by environmental conditions. No further models were tested (e.g. third-order polynomial models), as the theoretical footing for assuming

higher-order relations is not documented anywhere. Moreover, the sample size is quite restricted so that including more variables is likely to cause problems in the estimation of the coefficients. This is in parts due to the fact that including higher-order polynomials often introduce problems of linear dependency between the independent variables (Hamilton 2003:151). In addition, the model would simply be 'underpowered' with such few observations.

In order to tackle problems of linear dependency (multicollinearity) amongst the predictor variables, all independent variables were centered on zero²³, which involved subtracting the mean value of the variable from each value (Kohler & Kreuter 2001:223-224, Hamilton 2003:167).²⁴ Thereafter, the squared variables were estimated with the centered independent variables. Problems of multicollinearity are a threat to regression analysis, as in the worst case, the regression equation cannot be solved. In minor cases, standard errors are higher or coefficients are non-significant despite a high explained variance (Hamilton 1992:133-136, Kühnel & Krebs 2001:545, Hamilton 2003:166-170). Using centered variables avoids these problems. It alters the magnitude of the coefficients but it does not alter the fit of the model.

To tackle problems of 'underpowerment', only the diversity variables were included in the model, disregarding control variables. This was done as it provides a stringent test of the hypothesis. Other variables, e.g. economic performance of the previous year or growth in stock market developments would surely provide an alternative good explanation for the recent growth in EBIT or performance in general. However, we want to explain performance not by the same variable, because usually the previous performance is highly predictive as it needs only an addition or multiplication with a factor. The procedure of including so-called lag variables is widely known especially in longitudinal research (Hamilton 2003:285) but its use here is not desirable. Other variables, like the size of the TMT showed in Section 4.3.1.2 not to be of great influence on the independent variables. For the reason of obtaining a manageable model, control variables should be strongly related to the dependent and independent variables or they should in such a small sample not be included. The empirical picture showed that in graphical tests, these variables were not of great importance and therefore the sparsest model was estimated in all cases.

²³ Centered variables are marked in tables with (C).

²⁴ Tests of multicollinearity ("variance of inflation factor") between centered and not centered models were conducted. They revealed that indeed multicollinearity is present when variables are not centered. Therefore, the general advice of centering for metric independent variables was pursued.

The aim of multiple regression is to predict a dependent variable by using independent variables: $\hat{y}_i = b_0 + b_1x_{1i} + b_2x_{2i} + \dots + b_{K-1}x_{K-1,i}$ with $b_0, b_1 > 0$.

Not all variables which influence the dependent variable can be specified. Moreover, there are measurement errors. As a result, we cannot predict the dependent variable accurately. Therefore, the estimation of multiple regression is adjusted to the formula:

$$y_i = b_0 + b_1x_{1i} + b_2x_{2i} + \dots + b_{K-1}x_{K-1,i} + e_i$$

with y being the measured dependent variable, x the measured independent variables, b_0 the regression constant (average value when all independent variables are zero) and e_i the disturbances (residuals). The residuals are the distances between the predicted values (\hat{y}) and the measured dependent values (y), which are not explained by the model.

When talking about regression, one usually refers to Ordinary-Least-Square (OLS) regression. This is a method to minimize the squared residuals in order to predict \hat{y} . As with every parametric estimation method, there are also assumptions which need to be made for regression analysis in order to obtain unbiased and efficient estimates. OLS is an unbiased and efficient method when the so called "Gauss-Markov-Theorem" is fulfilled. It demands that (Hamilton 1992:110-113):

1. Errors have zero mean
2. Errors have constant variance (homoscedasticity)
3. Errors are uncorrelated with each other (no autocorrelation)
4. Errors are normally distributed.

For 1) Errors refer to the true unobserved distortions from the model, whilst the residuals are the empirical distortions. Residuals are the best approximation we can obtain from our data for the true errors (Schnell 1994:219). By definition of the regression formula, residuals have a mean of zero. But to satisfy the assumption, residuals should also locally have a mean of zero.

For 2) Homoskedasticity refers to the assumption of a constant error variance. Heteroskedasticity refers to the violation of this assumption. A violation of this assumption can be caused by systematic measurement errors or a wrong model specification (Schnell 1994:220).

For 3) Errors display the effect of unobserved or not included variables. If correlations exist amongst errors this displays systematic tendencies and can hint towards an incorrect model specification (Schnell 1994:220).

For 4) Normal distribution of errors is not a necessity to obtain unbiased and efficient estimates but a necessity to use t and F distributions for hypothesis testing. Moreover, given that errors are normally distributed, OLS is the most efficient estimator (Hamilton 1992:112).

Any violation of these assumptions may result in biased or inefficient estimates²⁵. Therefore, it is important to test for these assumptions when doing linear regression, especially when comparing the model fit between two competing models. Tests on the plausibility of these assumptions are usually done by using instruments of regression diagnostics.

4.3.2.1. Part 1: Regression for the Full Sample

For the purposes of analysis, linear regression makes a good starting point (Hamilton 1992:148). In the first model, age diversity, firm tenure diversity and TMT tenure diversity is regressed on EBIT growth (Table 9). As such the model has a fit of $R^2=0.23$, which points towards an acceptable overall fit. However, as the sample size is very small, Adjusted R^2 (R_a^2)²⁶ might provide a more precise measure of the model fit. R_a^2 corrects the number of independent variables in relation to the number of observations included in the model (Kohler & Kreuter 2001:192-103). Here R_a^2 is 0.18, which does not divert drastically from the “normal” R^2 . Overall, the model is statistically significant. In other words, the null hypothesis that a R^2 of this magnitude is possible in the sample, although all coefficients in the population are zero, is rejected.

With all independent variables being zero, EBIT growth increases on average by 50.91%. As the independent variables are centered, zero denotes not the absence of diversity with regards to age, firm tenure or TMT tenure, but the average value of these variables. In other words, a team with average values on age, firm tenure and TMT tenure diversity increases its growth in EBIT by 50.91%. With each increase per unit of age diversity (all others being constant) the growth declines on average by 59%. The coefficient of age diversity is not significant, which means that the null hypothesis, that the true parameter is indeed zero in the population, cannot be rejected. Already the 95% confidence interval points in this direction, as it ranges from minus to plus. In 95

²⁵ A summary of common statistical problems and their consequences for OLS can be found in: Hamilton (1992:110-136).

²⁶ The formula for Adjusted R^2 is: $r_a^2 = 1 - \frac{n-1}{n-k}(1-r^2)$ whereby k is the number of parameters and n is the sample size (Kohler & Kreuter 2001:193).

out of 100 cases lies the true parameter (coefficient) within the range of a confidence interval, which is estimated in this way. So in this case, we cannot determine if the coefficient is positive or negative nor can we rule out that it is possibly zero.

A different picture is presented for firm tenure diversity and TMT tenure diversity. With each unit increase in firm tenure diversity, all other variables being constant, EBIT growth increases on average by 131%, with the coefficient being significant. TMT tenure diversity again decreases EBIT growth on average by 225%. Also this result is statistically significant.

Table 9: Linear Regression Results (Model A)

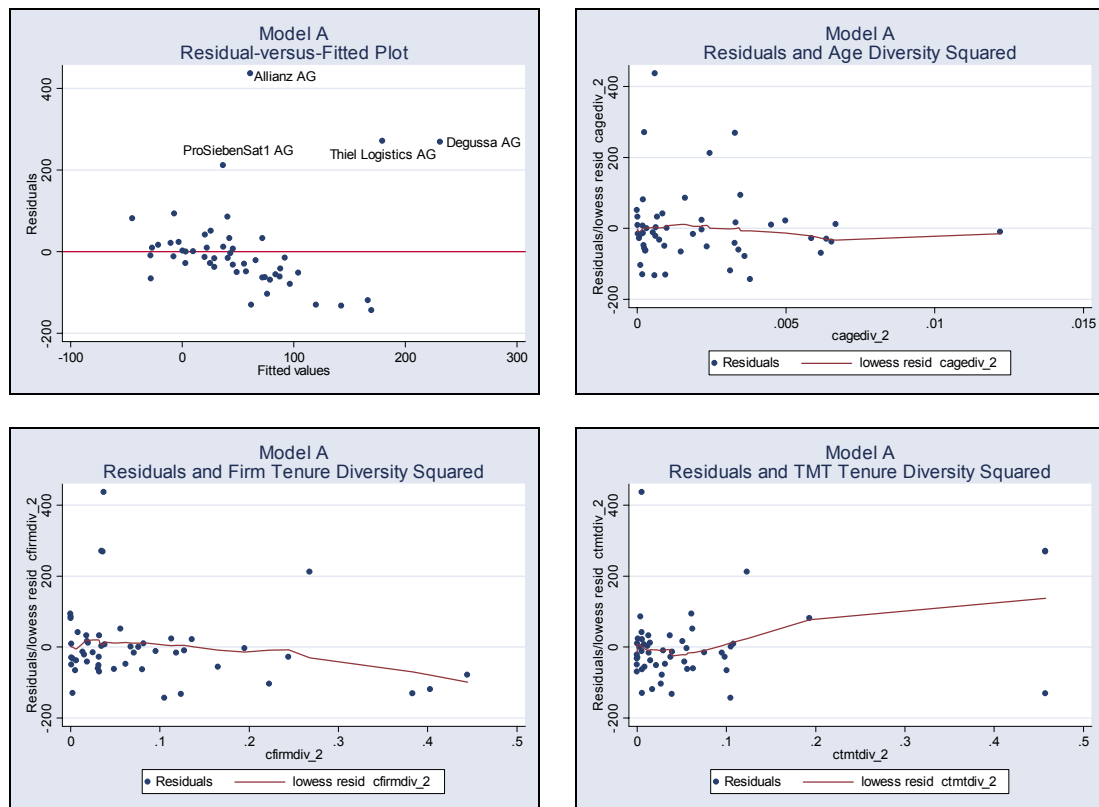
Regression Results		
Dependent Variable: EBIT Growth		
	Model A	
Variable	Coeff.	95% Conf. Int.
Constant (C)	50.91***	20.27/81.55
Age Diversity (C)	-58.77	-741.44/ 623.89
Firm Tenure Diversity (C)	130.91**	16.95/244.87
TMT Tenure Diversity (C)	-224.86***	-356.41/-93.32
R²	.23***	
Adjusted R²	.18	
N	51	
* significant p<0.1; ** significant p<0.05; *** significant p<0.01		

Although the linear model represents a reasonable model fit, regression diagnostics were conducted to check for potential violations of the OLS assumptions and hints towards curvilinearity (Figure 13). The Residual-versus-Fitted plot graphs residuals versus predicted values, with the horizontal line indicating zero. One could argue that the figure does reveal systematic tendencies and unequal variances for the residuals. This can lead to the conclusion that at least assumptions 1 and 2 of the Gauss-Markov-Theorem are violated. As already stated, this might be due to underlying variables, which are not yet included in the model.

In a second step, the plausibility of second-order polynomials was tested by plotting the residuals of Model A against each squared independent variable. A graphical smooth

with a “Locally Weighted Scatterplot-Smoother” (LOWESS²⁷) was fitted to the data. Given that there are systematic tendencies in such plots, the inclusion of these variables is recommended (Schnell 1994:230). The plots here do not reveal systematic tendencies. On the basis of these plots, one would have to conclude that these squared variables do not add to the explanation of the model and therefore do not need to be included. However, these plots cannot be taken for granted. Firstly, the graphs only display residuals instead of true errors. Secondly, there are strong theoretical arguments which suggest that the relationship is a curvilinear one. Although these graphs show that this relationship might not be as straightforward as expected, the strong theoretical arguments for a curvilinear relationship will be pursued and the analysis will be continued by estimating a second-order polynomial regression model.

Figure 13: Regression Diagnostic Plots (Model A)



In a next step, a regression was conducted, which included the centered independent variables and its squares (centered) (Table 10). R^2 (.40) improved and so did R_a^2 (.32), pointing towards a better fit with the data than the linear model. With all independent variables being zero, which determines the average value of the other variables, EBIT

²⁷ LOWESS is a form of non-parametric regression. It is a computationally intensive method which carries out a local regression in order to obtain smoothed values. The smoothed values are obtained by running a regression of $yvar$ on $xvar$ using only the data (x_i, y_i) and a small amount of the data near this point (Schnell 1994:109-113; Kohler & Kreuter 2001:278, Hamilton 2003:174-177, StataCorp. 2003a).

growth increases by an average of 43%. This constant is statistically significant and different to zero in the population. The 95% confidence interval, however, includes zero so that this conclusion should be drawn with caution.

For the interpretation of coefficients of x_i to x_i^2 , one can say that given $b_1 > 0$ and $b_2 < 0$, the curve ascends first and then descends, producing an inverted U-shape (Hamilton 1992:151). In Model B, this is the case for firm tenure diversity. The opposite is true for TMT tenure diversity. The coefficients are $b_1 < 0$ and $b_2 > 0$. This produces, under control of all other variables, a U-shape. The curve first descends and then ascends again (Hamilton 1992:151). Four coefficients are significant. Only for age diversity are the coefficients insignificant. However, both coefficients have positive signs which imply that age diversity is in this case related to the form of a U-shape (Kühnel & Krebs 2001:567). Furthermore, one should mention that a one unit increase of age diversity does not occur within the data as such, as the composition of TMTs is very homogeneous. To translate the coefficient in a more interpretable statistic, one should calculate the increase of one standard deviation. The standard deviation for age diversity is 0.04 which leads to a coefficient for the centered age diversity variable of 0.9 and of the squared age diversity to 2.33.

Relying on these statistics, we could argue that this model fits the data well. Additionally, we can conclude that the hypothesized relationship between demographic diversity and EBIT growth being an inverted U-shape is supported. Moreover, a curvilinear relationship is also reported for TMT diversity, but opposed to hypothesis 1. The squared variables coefficient is positive and indicates a real U-shape. For age diversity, no significant pattern was found. However, to conclude assertively that a curvilinear model regression fits the data well and that OLS procedure produced correct estimates requires regression diagnostics.

Table 10: Polynomial Regression Results (Model B)

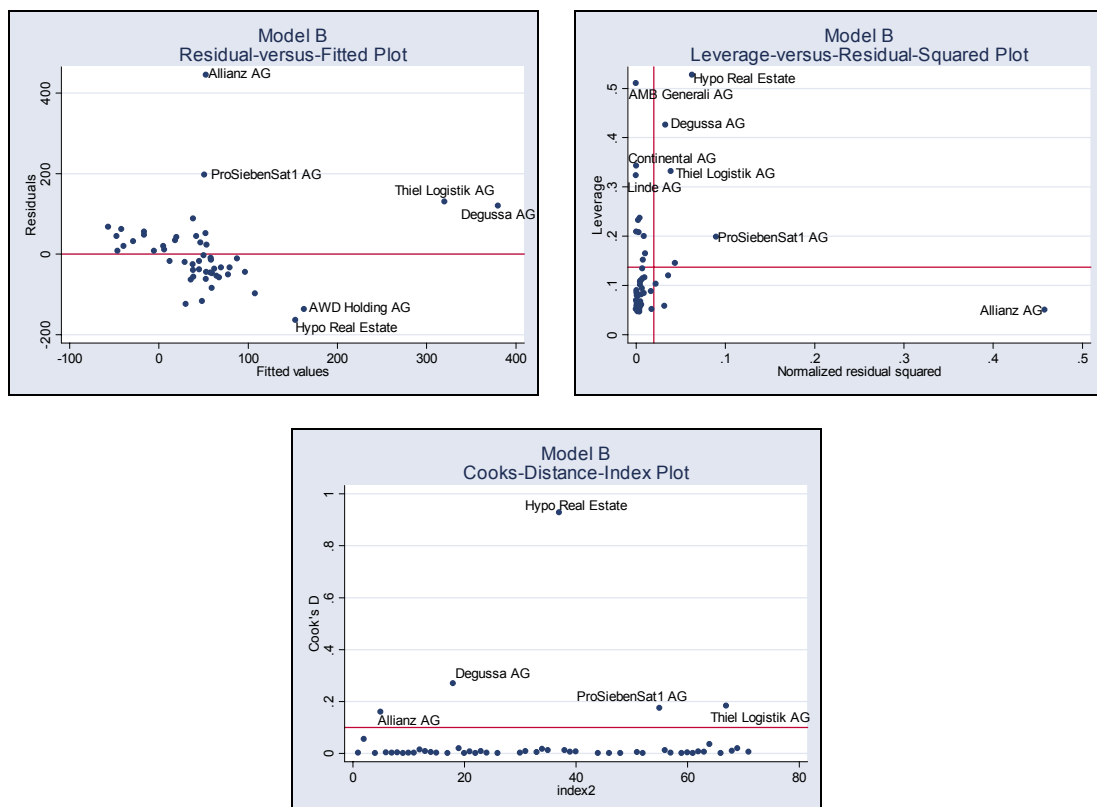
Regression Results		
Dependent Variable: EBIT Growth		
	Model B	
Variable	Coeff.	95% Conf. Int.
Constant (C)	42.85*	-3.18/88.89
Age Diversity (C)	22.72	-609.05/654.48
Firm Tenure Diversity (C)	151.59***	41.57/261.61
TMT Tenure Diversity (C)	-150.53**	-292.38/8.68
Age Diversity ² (C)	1456.86	-10368.06/ 13281.77
Firm Tenure Diversity ² (C)	-296.9**	-586.09/7.70
TMT Tenure Diversity ² (C)	467.87***	158.07/777.66
R ²	.40***	
Adjusted R ²	.32	
N	51	
* significant p<0.1; ** significant p<0.05; *** significant p<0.01		

Figure 14 shows diagnostic plots of Model B. The previously introduced Residual-versus-Fitted Plot shows hardly any systematic tendencies within the residuals. On the other hand, it could be argued that there are, nevertheless, noticeable systematic tendencies present. Based on this graph no definite statement can be made whether assumptions 1 and 2 of the Gauss-Markov Theorem are violated. However, the clear outliers are likely to influence the regression coefficients. This was tested in the following plots.

The Leverage-versus-Residuals-Squared Plot graphs the leverage values of each observation against the squared residuals of each observation, which were obtained from the regression. The leverage of the i th case (h_i) measures the potential for influence of the case based on its unusual combination of X-values (Hamilton 1992:130). Cases which have leverage higher than 0.2 are seen as being “risky” and those above 0.5 should be avoided. High leverage values are risky because too much of the samples information about the independent-dependent variables relationship comes from these cases (Hamilton 1992:130-132). In Model B, ten observations have leverage values above 0.2. Two of these cases even have higher values than 0.5. One

has to notice that it is possible that outliers do not influence the model fit (“nondiscordant outliers”). This is the case when they are consistent with the pattern of the sample (Hamilton 1992:131). But it can happen that cases which have high leverage exert so much influence on the model that they control the regression. As a result, the regression must fit well (Hamilton 2003:160). In particular, polynomial regression curves tend to fit high-leverage cases closely (Hamilton 1992:152). This is likely to lead to sample-specific results which are not generalisable as they might not fit another sample at all. Cooks Distance (Cooks D, D_i) is another influence measure. It measures the influence of the i th case on the model as a whole (Hamilton 1992:132, Kohler & Kreuter 2001:213-214). Cooks D was estimated and plotted against the company’s sequential position in the data set, which was here labelled as “index”. To determine if a case is influential, a size adjusted cut off measure ($D_i > 4/n$) was used (Hamilton 1992:132, Schnell 1994:225). In the case of Model B, five cases influence the model strongly (Hypo Real Estate, Degussa AG, Thiel Logistics AG, Allianz AG, ProSiebenSat1 AG) as shown in the Cooks Distance Index Plot.

Figure 14: Regression Diagnostics Plots (Model B)



There are two major causes for influential cases: firstly, observations are biased by measurement errors and secondly, flawed theory. In most cases, theory is just not powerful enough to explain all the variance we can find in the model. To a great extent, this is due to overlooked factors which influence the outcome variable (Kohler &

Kreuter 2001:215). In order to find an explanation for these influential cases, graphical tests using scatterplot smoothers were conducted showing residuals of Model B and size of the company (measured as number of employees) and the size of the top management team (measured as number of members). The graphics displayed no major systematic tendencies, so that the inclusion of these variables seems unnecessary. Nevertheless, theoretical arguments from previous sections have already hinted towards the potential influence of environmental conditions of stability or turbulence. Therefore, these effects will be investigated in Sections 4.3.2.2 and 4.3.2.3.

Before estimating a model which controls environmental conditions, we should first identify how strongly these influential cases impact the outcome of the polynomial regression results for the full model. In these cases, measurement errors can be ruled out. The next step is to exclude the five cases with a high Cooks D value as well as "AMB Generali AG" from the sample. The latter case does not have a high Cooks D value but has a leverage value above 0.5. The regression results for linear and curvilinear regression of the modified sample are presented in Table 11.

Table 11: Linear and Polynomial Regression Results (Reduced Sample Size; Models C and D)

Regression Results (Reduced Sample Size) Dependent Variable: EBIT Growth				
	Model C		Model D	
Variable	Coeff.	95% Conf. Int.	Coeff.	95% Conf. Int.
Constant (C)	23.54***	11.23/35.86	29.93**	6.01/53.84
Age Diversity (C)	50.10	-235.24/335.44	58.86	-243.8/361.52
Firm Tenure Diversity (C)	16.91	-30.59/64.4	28.97	-25.46/83.41
TMT Tenure Diversity (C)	-58.25*	-126.07/9.57	-66.41*	-143.43/10.62
Age Diversity ² (C)			60.12	-6226.62/6346.86
Firm Tenure Diversity ² (C)			-73.01	-219.73/73.72
TMT Tenure Diversity ² (C)			-27.69	-356.86/301.48
R ²	0.07		0.09	
R _a ²	0.00		-0.05 ²⁸	
N	45		45	
* significant p<0.1; ** significant p<0.05; *** significant p<0.01				

Results show complete insignificant models. It seems that the eliminated six outliers shifted the results towards the hypothesized relationship. In other words, the outliers led to an acceptable model, although the fit for the overall data is bad. This tendency has already been seen in the bivariate scatter plots. The U-shape of TMT tenure diversity on EBIT growth was mainly due to two high value outliers on EBIT which had zero diversity. Whilst not so obvious for variables of age diversity and firm tenure diversity, outliers seemed to influence them as well. This seems to be mirrored here in the modified sample models (Model C and Model D) which have an adjusted model fit

²⁸ The appearance of a negative sign of R_a² can be explained by the formula of R_a² (Section 4.3.2.1).

of zero. Moreover, no distinction in the model quality can be made between a linear and curvilinear model.

One can see from these regression results that small samples estimates are especially vulnerable to influential cases. Deleting such cases can result in a complete collapse of the model. Given no inference should be drawn, one can argue that Model B produces a good model fit. Outliers are thereby seen as being 'part of the data'. However, in order to be more confident with this conclusion, robust regression procedures should in further investigations be used. Given that inference should be drawn on a wider population (see Section 4.2.4), Model D seems to be more appropriate, as it eliminates extremes.

4.3.2.2. Part 2: Regression for Companies in Stable Environments

Environmental conditions have in the theoretical outline (Section 3.2.5) been identified as being a major source of influence on the relationship between demographic diversity and firm performance.

There are two possibilities for investigating the effects of environmental conditions. Firstly, interaction effects can be included in the regression between the independent variables and the moderator. Here it is assumed, that the effect of environmental condition does influence each independent variable. The number of independent variables would consequently increase to 12 independent variables. Having only a maximum of 51 observations, this would probably lead to very susceptible estimates.

Secondly, the option of estimating separate regressions between stable and turbulent environments was chosen. Thereby, sample sizes are by definition smaller but the ratio between independent variables and numbers of observation is at least for stable environments (N=31) better. The regression outcomes of a multiple linear regression (Model E) and a polynomial regression (Model F) are displayed in Table 12.

Table 12: Linear and Polynomial Regression Results for Companies in Stable Environments (Models E and F)

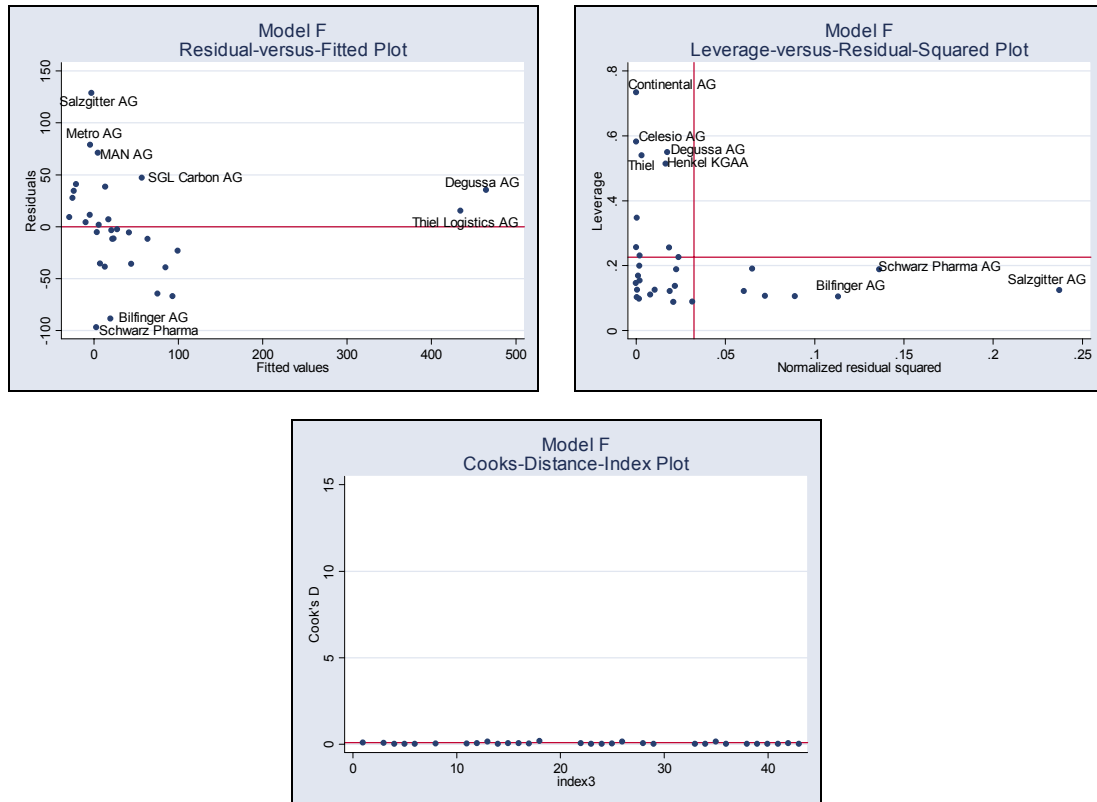
Regression Results for Companies in Stable Environments				
Dependent Variable: EBIT Growth				
	Model E		Model F	
Variable	Coeff.	95% Conf. Int.	Coeff.	95% Conf. Int.
Constant (C)	49.48***	19.32/79.64	3.39	-32.81/39.59
Age Diversity (C)	-365.12	-1195.85/465.60	9.56	-562.14/581.26
Firm Tenure Diversity (C)	148.46**	19.52/277.39	60.31	-43.77/164.4
TMT Tenure Diversity (C)	-366.69***	-491.23/-242.16	-206.92***	-307.04/-106.8
Age Diversity ² (C)			2580.4	-9902.47/15063.26
Firm Tenure Diversity ² (C)			-36.56	-318.56/245.45
TMT Tenure Diversity ² (C)			663.19***	433.78/892.61
R ²	0.60***		0.84***	
R _a ²	0.55		0.81	
N	31		31	
* significant p<0.1; ** significant p<0.05; *** significant p<0.01				

Both models show very strong model fits (Model E: $R_a^2=0.55$; Model F: $R_a^2=0.81$) which have increased enormously as in comparison to Models A-D. Moreover, for Model E only age diversity is again insignificant. Firm tenure diversity leads in this model with every increase (all others being constant) to an EBIT growth of 148%. TMT tenure diversity leads to a decrease of 367% EBIT growth with every step it increases.

Model F is of main interest here. In line with expectations for firm tenure diversity, it shows an inverted U-Shape. TMT tenure diversity and age diversity are again in a U-shape related to EBIT growth. However, the most eye-catching result is that although the overall model fit increased, most of the coefficients are now insignificant. A change of this nature and also change of sign (e.g. age diversity) are typical when multicollinearity amongst the predictor variables is present (Hamilton 2003:166). The variance inflation factor (vif) which gives an indication about what proportion of an x-

variable is independent of all other x-variables (Hamilton 2003:167), was checked. The tests revealed no problem with multicollinearity, so that the unexpected changes need to be examined in the regression diagnostics with more scrutiny (Figure 15).

Figure 15: Regression Diagnostic Plots (Model F)



The Residual-versus-Fitted Plot demonstrates a possible violation of assumptions 1 and 2 of the Gauss-Markov-Theorem. Although Cooks Distance Index Plot does not display influential cases, the Leverage-versus-Residual Plot finds at least unusual cases. There are quite a few which have high leverage values although they seem to fit the model quite well, as they do not have big residuals. Being aware that the bivariate graphs already revealed outliers which seem to be influential there, we have to assume that although the cases do only have high leverage, they control the regression completely. In this respect, we can already find a hint in the plot. In comparison to the Leverage-versus-Residual-Squared Plot of Model B (Figure 14), the average leverage displayed via the red horizontal line, is higher. This should raise attention. Higher leverage average in this case also displays that unusualness is not given only by single outliers, but by a whole group of unusual observations. These fit the model, but as there is more than just one, these observations are not only unusual but also influential. Of course, this can and should also be empirically demonstrated. Therefore, the test was really done by eliminating the cases with high leverage and estimating the regression again (Table 13). Should the regression not change in a drastic way, our

estimations are robust. The test yields an opportunity for the model to substantiate its stands, instead of simply accepting the model fit of Model F.

Table 13: Linear and Polynomial Regression Results for Companies in Stable Environments (Reduced Sample Size; Models G and H)

Regression Results for Companies in Stable Environments (Reduced Sample Size) Dependent Variable: EBIT Growth				
	Model G		Model H	
Variable	Coeff.	95% Conf. Int.	Coeff.	95% Conf. Int.
Constant (C)	25.24	3.89/46.58572	36.12	-11.16/83.41
Age Diversity (C)	-34.04	-695.00/ 626.92	35.29	-690.39/760.96
Firm Tenure Diversity (C)	40.01	-68.88/148.89	57.01	-64.26/178.28
TMT Tenure Diversity (C)	-94	-210.69/22.7	-103.05	-244.04/37.94
Age Diversity ² (C)			-579.97	-20223.46/19063.52
Firm Tenure Diversity ² (C)			-214.05	-691.99/ 263.89
TMT Tenure Diversity ² (C)			28.18	-544.18/ 600.54
R ²	0.12		0.16	
R _a ²	0.00		-0.09	
N	26		26	
* significant p<0.1; ** significant p<0.05; *** significant p<0.01				

Regression results in Table 13 show again a clear drop of explained variance and altogether insignificant coefficients. In both models, one can see that each confidence interval includes zero. Consequently, it cannot be decided whether the coefficient would at least be positive or negative. Investigations of the influence of each deleted observation has on the regression output clearly revealed that “Thiel Logistik AG” and “Degussa AG” were the main influential cases for the sharp drop of the model fit. In other words, if four influential companies were deleted but the above two kept in the regression, the model fit would still be very good. Eliminating these two companies resulted in the sharp drop. Exactly, these two cases have already raised attention in

the graphical bivariate displays (Figure 12). So the presentiments seemed to be correct. These two observations are so influential that they control the regression.

Neglecting the bad model fit we still have to say that the interpretation and shape of the curve remains. TMT tenure diversity still displays a U-shape and firm tenure diversity still displays an inverted U-Shape. Moreover, age diversity also displays the expected inverted U-Shape.

So we have to conclude that given we want to fit a line solely for this sample, the second-order polynomial regression is successful in explaining a large part of variance for companies in stable environments. However, it is also likely to result in biased or inefficient estimates when using OLS regression, as the assumptions of the Gauss-Markov-Theorem are potentially violated. So for fitting a regression model robust regression procedures should be used to gain more confidence in the results from Model F. Given we want to draw inference we have to reject the idea that a polynomial model fits under stable conditions.

4.3.2.3. Part 3: Regression for Companies in Turbulent Environments

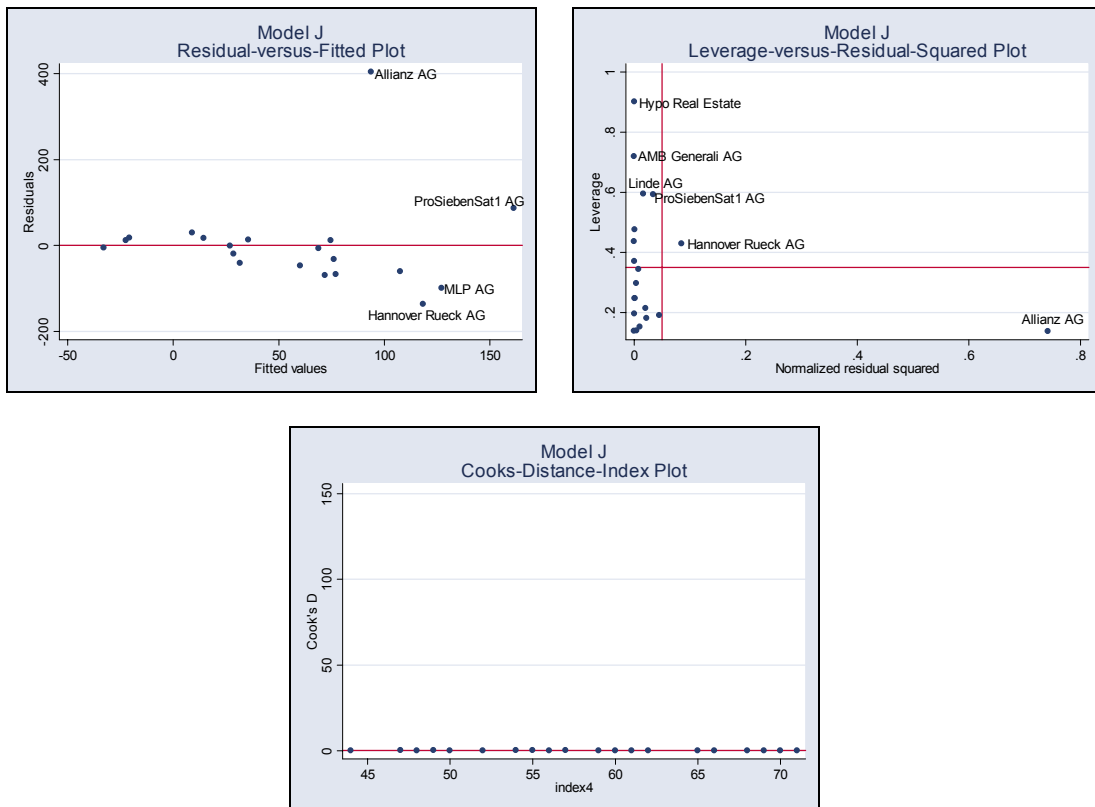
Hypothesis 2 and the resulting empirical expectations stated that diversity on any of the three examined variables should in turbulent environments result in significantly higher coefficients than in stable environments. Table 14 displays the results for the linear regression and the linear regression including second-order polynomials. Both models fit the data badly, as displayed in R^2 and R_a^2 values. Moreover, coefficients are not significant. Confidence intervals range in both models for all coefficients from negative to positive values and the hypothesized inverted U-shape can only be found for age. The other two diversity variables display a U-shape. One has to say, that in the case of turbulent environments, both models do not really seem to be appropriate. This may, to a great extent be due to the fact that only 20 observations are within each model. Imagining a four dimensional space with only 20 observations makes the difficulty clear when fitting a curve. The model might be over specified.

Table 14: Linear and Polynomial Regression Results for Companies in Turbulent Environments (Models I and J)

Regression Results for Companies in Turbulent Environments				
Dependent Variable: EBIT Growth				
	Model I		Model J	
Variable	Coeff.	95% Conf. Int.	Coeff.	95% Conf. Int.
Constant (C)	52.81*	-5.07/110.68	72.52	-44.73/189.77
Age Diversity (C)	172.41	-891.22/1236.05	-7.37	-1246.49/1231.75
Firm Tenure Diversity (C)	105.21	-82.08/292.51	68.53	-168.87/305.93
TMT Tenure Diversity (C)	65.69	-198.34/329.72	136.99	-239.11/513.09
Age Diversity² (C)			-9694.78	-33272.21/13882.66
Firm Tenure Diversity² (C)			96.77	-601.32/794.86
TMT Tenure Diversity² (C)			27.61	-863.73/918.95
R²	0.14		0.19	
Ra²	-0.03		-0.18	
N	20		20	
* significant p<0.1; ** significant p<0.05; *** significant p<0.01				

The regression diagnostics in Figure 16 seem by large to fit assumptions 1 and 2 of the Gauss-Markov Theorem. This might lead us to conclude that the OLS regression was estimated correctly but that between the demographic diversity variables and EBIT growth, there is indeed no relationship, as indicated by R^2 . Again Cook's D shows no influential cases, but the Leverage-versus-Residual plot shows a high average leverage and more than just one or two high leverage cases. Opposed to the case under stable conditions, one can speculate that a group of such cases might lead to a deterioration of the model, although the relationship is potentially present.

Figure 16: Regression Diagnostic Plots (Model J)



Five cases were eliminated of which four (Hypo Real Estate, AMB Generali AG, Linde AG and ProSiebenSat1 AG) had leverage values higher than 0.5. The other elimination (Hannover Rueck AG) was due to its residual being above average. As in the prior sections, elimination was made and regression analysis was repeated (Table 15).

Table 15: Linear and Polynomial Regression for Companies in Turbulent Environments (Reduced Sample Size; Models K and L)

Regression Results for Companies in Turbulent Environments (Reduced Sample Size) Dependent Variable: EBIT Growth				
	Model K		Model L	
Variable	Coeff.	95% Conf. Int.	Coeff.	95% Conf. Int.
Constant (C)	66.29	-13.56/ 146.13	95.56	-97.81/288.93
Age Diversity (C)	-498.75	-2207.15/1209.65	-479.18	-2625.23/1666.86
Firm Tenure Diversity (C)	25.03	-298.2/348.25	1.81	-410.86/414.47
TMT Tenure Diversity (C)	209.98	-328.52/748.47	248.94	-723.93/1221.79
Age Diversity² (C)			-12707.56	-51052.35/25637.24
Firm Tenure Diversity² (C)			11.89	-1666.49/ 1690.27
TMT Tenure Diversity² (C)			305.73	-3622.14/4233.61
R²	0.1		0.16	
R_a²	-0.14		-0.46	
N	15		15	
* significant p<0.1; ** significant p<0.05; *** significant p<0.01				

Overall, there is neither an improvement in the model fit nor in the estimates. Neither coefficients nor confidence intervals show an improvement. Two things need to be mentioned here. Firstly, the small number of cases (N=15) makes it unlikely that the model will improve. Secondly, the number of “risky” leverage cases (between 0.2 and 0.5) outweighs the number of “acceptable” cases by large. Labelling them as single “cases” does not do justice to them.

Therefore, we have to conclude that in a turbulent environment, the curvilinear model does not apply at all, neither in the complete sample nor with the reduced sample. Some difficulties of the model are attributable to the small sample size. However, this problem cannot be dealt with here sufficiently. In comparison to the estimated models for companies operating in stable conditions, the model fits of regression analysis are

worse for companies in turbulent environments. The basic empirical expectation of hypothesis 2 that the curvilinear relationship holds for both sub-samples is therefore not met. Consequently, comparisons regarding the coefficients between the two models cannot be conducted.

4.4. Findings

In the last sections, various models were estimated. The results section (Section 4.3) showed that the relationship between demographic diversity and firm performance was not as strong as had been hypothesized. Therefore, the main findings that can be drawn and potential explanations regarding the assumptions and hypotheses are summarized.

The tests of the assumptions revealed that: (1) TMT are more homogeneous with regards to age diversity than to any other diversity variable, (2) the size of the TMT does not strongly influence its level of diversity and (3) the level of diversity does not systematically differ by environmental conditions.

Reaching the top of the corporate ladder seems to be a long and strenuous process. This accounts for the fact that “age diversity” is very homogeneous in comparison to other demographic diversity variables. Top managers tend to be well skilled and experienced within the company’s record or in other companies and are therefore likely to be older. Young top managers stand out for their abilities but this group is quite rare amongst TMTs. The range of firm tenure diversity of the TMT members is quite widespread. This indicates that some TMTs consist of company’s ‘insiders’ as well as ‘outsiders’. Also the range of TMT tenure diversity is widespread. This is partly attributable to steady replacement within TMTs.

Contrary to statements in literature, the number of people within top teams cannot be seen as a major antecedent of demographic diversity. On this data basis, the assumption that the “higher the number of people, the greater the diversity”, must be rejected. In part it appears that similarity of attraction is a critical factor for promotions. This path may be favoured because having too many diverse people with potentially conflicting ideas might “spoil the cooking”. In other words, such a group can lack the capacity to arrive at consensual decisions.

Also turbulent environmental conditions were expected to suggest that managers with different demographic backgrounds are appointed, which in turn leads to higher levels of diversity. The basic assumption is thereby that the appointment is followed by the

need to generate new ideas. This assumption was not supported on the basis of the data.

In hypothesis 1, it was stated that a negative curvilinear relationship would emerge for the complete sample. The bivariate scatterplots (Section 4.3.1.3) revealed partial support for age diversity and firm tenure diversity on EBIT growth. However, TMT tenure diversity displayed a positive curvilinear relationship and therefore was not in line with empirical expectations. Similar results were obtained in Section 4.3.2.1 when using regression analysis. Coefficients supported the hypothesized inverted U-shape for firm tenure diversity. For TMT tenure diversity and age diversity, a U-shape was found in the data, whereby coefficients were not significant for the latter. The overall model fit was good, thus supporting hypothesis 1. However, the regression estimated was very sensitive to unusual cases or outliers. As a result, eliminating the outliers led to a collapse of the model. This should raise our attention to the difficulties of generalising these findings.

This problem was even more prevalent when regressions were conducted in order to test hypothesis 2. Regressions were conducted for companies which operate in stable and turbulent environments. Under stable conditions, a clear fit improvement was obtained for the polynomial regression. Again, results supported both U-shape and inverted U-shape. The polynomial model found support for all companies operating in stable conditions, supporting the relationship of hypothesis 2. Eliminating the influential cases led, once more, to a collapse of the model. On the basis of the bivariate graphs of Section 4.3.1.3, this was expected. In turbulent conditions, no support was found for an overall curvilinear pattern nor for a linear one. Therefore, hypothesis 2 was not supported as there was clearly no curvilinear pattern. In the absence of data and the curvilinear pattern for companies in turbulent environments, no further comparisons were made between the two sub-groups. Consequently, hypothesis 2 was rejected.

Overall, one can conclude that the findings of the regression analysis section revealed in most cases an improvement in the model fit when estimating a curvilinear relationship instead of a linear model. The curvilinear tendency was more apparent under stable conditions. On the basis of this data, the relationship between demographic diversity and EBIT growth seems for turbulent environments, to be non-existent. The latter finding strongly points towards problems of sample size. All regressions estimated were very sensitive to outliers. Given that a model should be fitted which goes beyond this specific sample, one must say that the present investigation does not stand on solid ground.

The next section will outline potential sources of misjudgements in the design of this study. It will also make suggestions for further research.

4.5. Methodological Shortcomings and Implications for Future Research

In the previous sections, the analysis of data revealed inconsistencies with the hypothesized relationships and empirical expectations in Section 4.1. All design decisions were consciously chosen and have some footings (Section 4.2). However, sometimes it has been necessary to make trade-offs because of time and financial restrictions. Thus, this section tries to uncover potential errors in the methodology and the design of this empirical investigation. It also attempts to explore implications for diversity research and performance. It should make us aware that although results may be flawed, this does not necessarily lead to a rejection of theory. The general problem could be related to methods and data.

The Cross-Sectional Research Design

The empirical investigation has been a cross-sectional analysis with hardly any time lag between the points of data collection of dependent and independent variables. This is a major problem. Given that we would have to expect strategic decisions to take more than just a couple of months to be implemented successfully, the difficulties become clearer. The present diversity would have influence in only a couple of years. Therefore, the call for short and long-term time series designs must be made with a constant monitoring of the changes in the TMT and the performance.

The Sample

The sample here consisted of 80 high performing companies which are included in the DAX or MDAX. The sample size was problematic, especially when estimating models for turbulent or stable conditions. The problem of sample size was likely to have caused the non-findings for the models estimated for companies operating in turbulent environments. The smaller the sub-samples, the less reliable are the estimates of these models. So when comparisons between sub-units (e.g. branches, environmental conditions) are made, there is urgent need for bigger samples. Future research should, therefore, use either specific "Small-N-Methods" for estimations or sample more cases. In addition, although the sample size for this study was quite small, the companies belong to a wide range of branches and sectors. This introduced some difficulties. Performance indicators are usually branch dependent, meaning that the ability of a

company to improve performance in absolute terms depends in parts on the branch it operates in. The same is true for performance indicators of growth. Further studies need to correct for this “branch dependency”. This can be done in three possible ways. Firstly, branch adjusted performance measures can be used, e.g. performance measured as of branch average. Secondly, sample size can be increased. If the overall sample size is bigger, then the number of observations within each sub-unit is also likely to increase. Thirdly, instead of assessing a wide range of branches, one could start by examining only two or three branches. In this case, generalisations to a wider context could not be made. However, more in-depth knowledge could be attained. In any case, the higher the number of observations within each sub-unit, the more reliable the estimates are.

The Teams

Team definitions were based upon titles. Only the highest level of top managers was included. It has been stated elsewhere that it is more likely that the upper two or three levels of managers are influential when shaping an organizations structure and strategy and not only the first level managers. Further research should examine if the highest top managers or if the upper second to third level of managers’ yield more insightful information about the diversity of the top team. Given that all of these managers are influential, the diversity within the upper echelon is likely to be underestimated when only including first level top managers in the definition of the TMT. TMT definitions which include only first level managers tend to sample quite homogeneous groups. This view was upheld in this empirical investigation.

The Variables

The variables investigated here for demographic diversity were only cohort variables (age, firm tenure and TMT tenure). These variables are quite similar in their mechanisms of how they influence cognitions, which is based on the underlying assumptions of life or organizational experiences. Although these variables have a lot of potential to influence cognitions, they are also very “noisy” indicators, vulnerable to errors. Moreover, not only the distribution of these variables seems to be of importance, but also their central tendency. For instance, a homogenous team with quite older people will certainly make different decisions than a homogenous team with “youngsters”. Future research should include this potential moderating effect between the distributional properties and the properties of central tendencies within a group. In addition, other more functional diversity variables need to be included in future research. Whilst the cohort variables are – in combination with central tendencies –

indicators of the general 'atmosphere' within the team, functional variables (e.g. education, university study, previous experiences, etc.) provide a more qualitative assessment of diversity within the team. Differences in such functional variables are more substantial and therefore likely to facilitate task related conflict and communication within the team. This, as it has been previously outlined, should lead to better strategic decisions and in turn better performance. In short, demographic diversity should be assessed by using indicators to represent cohort and functional variables. In addition, other uncontrolled demographic variables like gender, ethnic group or nationality should also be included. Most TMT are very homogenous with regards to these variables. But the homogeneity of these variables can potentially alter the influence of the other demographic diversity variables. Controls are, therefore, necessary to eliminate those influences.

Other problems arose for the dependent variable(s). For financial performance measures based on documentary analysis of financial reports, it is better to use Annual Reports than nine-months reports. A whole year is simply more likely to display a company's performance more accurately. To classify whether companies are operating in turbulent or stable environments, "objective" data should be used. Also if companies from more than one branch are included, specific decisions must be made in this regard. To eliminate branch effects, one could estimate the performance variable of each company as a relative measure to the branch average. The same could be done with company's size, e.g. by dividing the relative measure by sample size. Other variables of economic trends should also be corrected for, but rather than including lag-variables, one should try to eliminate these tendencies in advance. Another problem that arose in this sample was the fact that hardly any variation was found on the dependent variable(s). One could argue that this is a sample specific problem. Still one should consider the general problems of "performance measurement" which might be associated with it. Generally, one would have to reconsider if using financial indicators is sufficient to assess and portray the performance of a company. Maybe measures of performance concerning the strategic choices might be more appropriate. Alternatively, the subjective judging of managers, e.g. whether the team operates successfully or if the right decisions were made, might provide more detailed insight into the company's specific improvement of performance. The use of a combination of such non-financial and financial indicators would give us detailed and richer insights.

Analytical Instruments

The analytical method used was OLS regression. Using OLS, multiple linear and polynomial regressions were estimated. It has been shown that OLS is sensitive to

outliers and unusual observations. To obtain more robust results, observations with high leverage values or Cooks D were eliminated. Thereafter, each model fit was worse. Future research should use non-parametric procedures (LOWESS, LOESS) to get a more unobtrusive idea about the relationship between the diversity variables and performance. Thus, parametric procedures should aid the testing of hypotheses. Advanced data analysis methods, for example multi-level models, could both be useful and beneficial. More use of advanced analytical methods should also be made in the assignment of indicators to theoretical constructs (e.g. factor analysis).

The Model

The theoretical model proposed quite a complex chain of related effects, especially between cognitive variables, team process variables and strategic choice. Unfortunately, these variables were not measured and therefore were not included in the estimated models. Future research should firstly evaluate the appropriateness of a mediated model as proposed here. Secondly, a closer inspection into the “Black Box” should be made. Team process seems to be the most critical and crucial construct within the model. Often team process is left aside as measurement is difficult and hard to access. But only when we can understand how team process in TMTs develops and under which circumstances it is positive or negative, then can we reach firm and reliable conclusions about the overall effect expected between demographic diversity and performance. Obviously, the difficulty lies in the feasibility of such studies. In this regard, exploratory qualitative research methods and case studies could provide greater in-depth knowledge.

5. Concluding Remarks

Firm performance is an important and central issue in economic research. The changing structures in societies and legal foundations as well as the on-going research into identifying crucial factors which shape organizational outcomes have raised the attentions of practitioners and academics to the potential impact that diversity can have. In particular, the effect of the group composition in TMTs is valued highly, as their ability to arrive at high quality decisions is a critical determinant for firm performance. Despite the general consensus that diversity is influential, the empirical results of previous studies are mixed. Although many problems are associated with these studies, the most dramatic shortcomings are that: (1) only linear relationships were tested, (2) studies were predominately conducted in the United States and (3) the companies sampled were not from a cross-section of industries and sectors. This empirical investigation endeavoured to overcome these problems. In using a German sample with companies from a wide range of branches, the relationship between demographic diversity and firm performance was investigated. Distinctively, it was hypothesized that this relationship could be explained with an inverted U-shape. Moreover, it was hypothesized that environmental conditions would impact this relationship by yielding significantly different results between the two sub-groups of companies operating in “stable environmental conditions” and in “turbulent environmental conditions”. For this sample, although directions were not straightforward, the hypothesis of a curvilinear model was generally supported. Curvilinearity was especially prevalent in regression estimates for companies operating under stable conditions. Under turbulent conditions, no reasonable model fit could be obtained. All interpretable results were highly sensitive to outliers and thus generalisations are deemed inappropriate.

Potential shortcomings and their implications for further research that emerged directly from this empirical investigation have already been outlined. Here the generic implications that derived from theoretical and empirical work and which subsequently forms the basis for recommended future research in this field will be highlighted. The followings are needed:

- 1) Studies that investigate various models of TMT demographic diversity and firm performance more thoroughly (e.g. do empirical results justify the support of the dominating mediated model?).
- 2) Novel research into team process (e.g. how does team process manifest itself in TMTs?).

- 3) Research that investigates the differences between diversity studies in small groups and TMTs (e.g. can results from work groups research be transferred or integrated in TMT diversity investigations?).
- 4) A theory that explains which demographic proxy aligns with which aspects of cognitions (e.g. which demographic proxy is best for measuring commitment?).
- 5) Research into the differential effects of various aspects of demographic diversity on firm performance (e.g. do results differ between cohort variables and experience variables?).
- 6) Methodological studies that evaluate alternative research designs, sampling mechanisms, self selection biases and missing data problems and their influence on estimations (e.g. can we quantify the underestimation of coefficients when missing data problems are present?).
- 7) Empirical tests that assign indicators to theoretical constructs in a reliable and valid way (e.g. which financial indicators measure which aspects of firm performance?).
- 8) Research into the dynamics of intradiversity and interdiversity (e.g. does a high level of intradiversity amongst TMT members affect the relationship between heterogeneity and performance?).

The above list is not exhaustive. There are many other questions which could be raised with regards to TMT diversity research. For example, questions of power distribution, nationality, ethnic groups, outside networks or discretion.

In retrospect, this research has given insights into the relationship between TMT diversity and firm performance. On the basis of empirical evidence, one must conclude that the relationship is indeed dynamic and complex. This inherent complexity appears to lie in the underlying, unmeasured processes occurring in the “black box”. In closing, the findings, implications and questions outlined in this research need to be substantiated through future research.

I. Sample

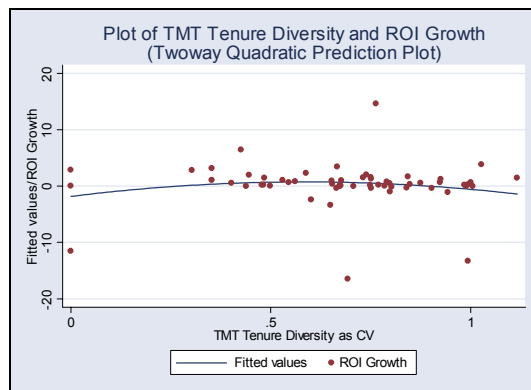
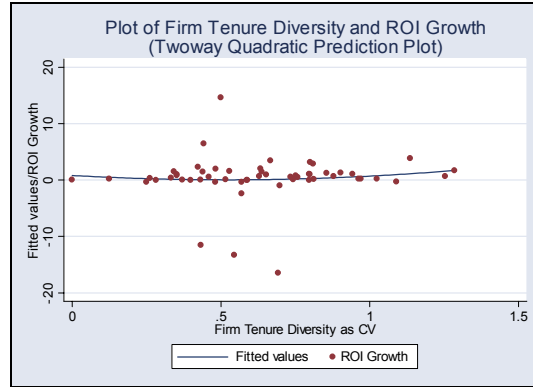
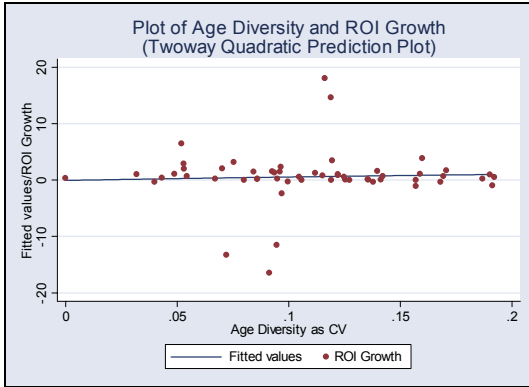
Companies in the DAX	
Adidas-Salomon AG	E.ON AG
Allianz AG	Fresenius Medical Care AG St
Altana AG	Henkel KGaA Vz
BASF AG	Infineon Technologies AG
Bayer AG	Linde AG
Bayerische Hypo- und Vereinsbank	MAN AG St
BMW AG St	Metro AG St
Commerzbank AG	Münchner Rückversicherungs-Gesellschaft AG
Continental AG	RWE AG St
DaimlerChrysler AG	SAP AG
Deutsche Bank AG	Schering AG
Deutsche Börse AG	Siemens AG
Deutsche Lufthansa AG	ThyssenKrupp AG
Deutsche Post AG	TUI AG
Deutsche Telekom AG	Volkswagen AG St

Companies in the MDAX	
Aareal Bank AG	IWKA AG
AMB Generali Holding AG	K+S Aktiengesellschaft
Beiersdorf AG	Karstadt Quelle AG
Beru AG	Krones AG
Bilfinger Berger AG	Leoni AG
Celesio AG	Medion AG
comdirekt Bank AG	Merck KGaA
Degussa AG	MG Technologies AG
DEPFA Bank plc	MLP AG
Deutsche EuroShop AG	MPC AG
Deutsche Postbank AG	Norddeutsche Affinerie AG
Douglas Holding AG	ProSiebenSat.1 Media AG
EADS N.V.	Puma AG
Fielmann AG	Rheinmetall AG Vz
Fraport AG	Rhön-Klinikum AG Vz
Fresenius AG Vz	Salzgitter AG
Hannover Rückversicherung AG	Schwarz Pharma AG
HeidelbergCement AG	SGL Carbon AG
Heidelberg Druckmaschinen AG	STADA Arzneimittel AG
Hochtief AG	Südzucker AG
Hugo Boss AG Vz	Techem AG
Hypo Real Estate Holding AG	Thiel Logistik AG
IKB Dt. Industriebank AG	Vossloh AG
IVG Immobilien AG	WCM AG
	Wincor Nixdorf AG

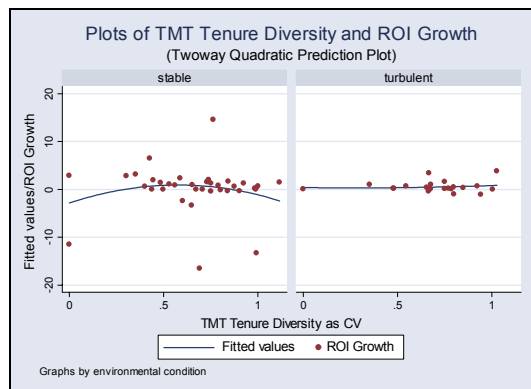
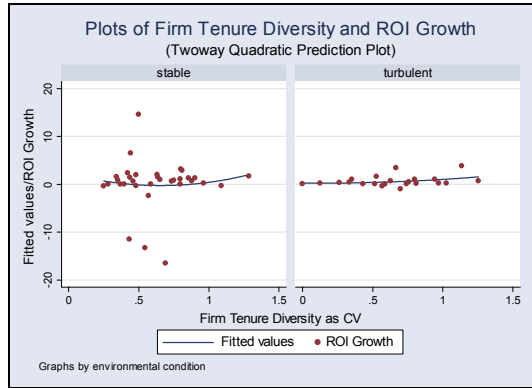
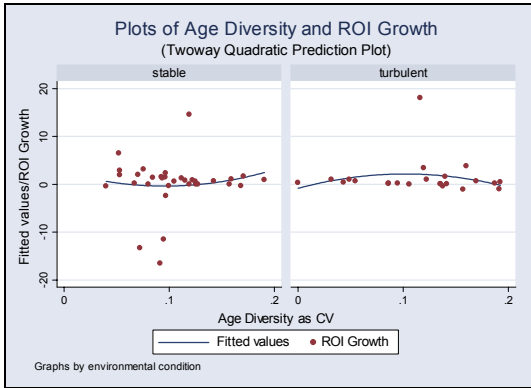
II. Correlation Matrix

	Age Diversity (C)	Firm Diversity (C)	TMT Diversity (C)	Age Diversity ² (C)	Firm Diversity ² (C)	TMT Diversity ² (C)	No TMM	ROI Growth	EBIT Growth
Age Diversity (C)	1.00								
Firm Diversity (C)	0.02	1.00							
TMT Diversity (C)	0.17	0.33	1.00						
Age Diversity ² (C)	-0.08	-0.11	0.02	1.00					
Firm Diversity ² (C)	0.04	0.26	-0.13	0.14	1.00				
TMT Diversity ² (C)	-0.07	-0.12	-0.52	-0.11	0.16	1.00			
No TMM	0.13	0.1	0.2	-0.44	-0.14	-0.13	1.00		
ROI Growth	0.02	0.15	0.05	0.11	0.12	-0.27	0.11	1.00	
EBIT Growth	-0.1	0.15	-0.38	-0.1	-0.07	0.5	0.13	-0.03	1.00

III. Graphs of Demographic Diversity and ROI Growth



IV. Graphs of Demographic Diversity and ROI Growth by environmental condition



Bibliography

Allison, P. D. (1978). "Measures of Inequality." American Sociological Review **43**(6): 865-880.

Amason, A. C. (1996). "Distinguishing the Effects of Functional and Dysfunctional Conflict on Strategic Decision Making: Resolving a Paradox for Top Management Teams." Academy of Management Journal **39**(1): 123-148.

Amason, A. C., Sapienza, H.C. (1997). "The Effects of Top Management Team Size and Interaction Norms on Cognitive and Affective Conflict." Journal of Management **23**(4): 495-516.

Ancona, D. G., Caldwell, D.F. (1992). "Demography and Design: Predictors of new Project Team Performance." Organization Science **3**(3): 321-341.

Aretz, H.-J., Hansen, K. (2003). "Erfolgreiches Management von Diversity. Die multikulturelle Organisation als Strategie zur Verbesserung einer nachhaltigen Wettbewerbsfähigkeit." Zeitschrift für Personalführung **17**(1): 9-36.

Bantel, K. A., Jackson, S.E. (1989). "Top Management and Innovations in Banking: Does the Composition of the Top Team make a Difference?" Strategic Management Journal **10**(Spec. Iss.): 107-124.

Barsade, S. G., Ward, A., Turner, J.D.R., Sonnenfeld, J.A. (2000). "To Your Heart's Content: A Model of Affective Diversity in Top Management Teams." Administrative Science Quarterly **45**(4): 802-836.

Bateman, T. S., Zeithaml, C.P. (1993). Management: Function & Strategy. New York, Irwin.

Blau, P. M. (1977). Inequality and Heterogeneity. New York, The Free Press.

Boone, C., Van Olfen, W., van Witteloostuijn, A., De Brabander, B. (2004). "The Genesis of Top Management Team Diversity: Selective Turnover Among Top Management Teams in Dutch Newspaper Publishing, 1970-94." Academy of Management Journal **47**(5): 633-656.

Bunderson, J. S., Sutcliffe, K.M. (2002). "Comparing Alternative Conceptualizations of Functional Diversity in Management Teams: Process and Performance Effects." Academy of Management Journal **45**(5): 875-893.

Cannella, A. A. J. (2001). "Upper Echelons: Donald Hambrick on Executives and Strategy." Academy of Management Executive **15**(3): 36-50.

Carpenter, M. A., Geletkanycz, M.A., Sanders, Wm. G. (2004). "Upper Echelons Research Revisited: Antecedents, Elements, and Consequences of Top Management Team Composition." Journal of Management **30**(6): 749-778.

Carroll, G. R., Harrison, J.R. (1998). "Organizational Demography and Culture: Insights from a Formal Model and Simulation." Administrative Science Quarterly **43**(3): 637-667.

Cho, T. S., Hambrick, D.C., Chen, M.-J. (1994). "Effects of Top Management Team Characteristics on Competitive Behaviors of Firms." Academy of Management Proceedings: 12-16.

Cox, T. J. (1993). Cultural Diversity in Organizations. San Francisco, Berrett-Koehler.

Cyert, R. M., March, J.G. (1963). A Behavioral Theory of the Firm. Englewood Cliffs, Prentice-Hall.

Edmondson, A. E., Roberto, M.A., Watkins, M.D. (2003). "A Dynamic Model of Top Management Team Effectiveness: Managing Unstructured Task Streams." The Leadership Quarterly **14**(3): 297-325.

Eisenhardt, K. M. (1989). "Making Fast Strategic Decisions in High-Velocity Environments." Academy of Management Journal **32**(3): 543-576.

Eisenhardt, K. M., Schoonhoven, C.B. (1990). "Organizational Growth: Linking Founding Team, Strategy, Environment and Growth among U.S. Semiconductor Ventures, 1978-1988." Administrative Science Quarterly **35**(3): 504-529.

European Union Community (2002). "Treaty on European Union." Official Journal **C 325**.

Ferrier, W. J. (2001). "Navigating the Competitive Landscape: The Drivers and Consequences of Competitive Aggressiveness." Academy of Management Journal **44**(4): 858-877.

Ferrier, W. J., Lyon, D.W. (2004). "Competitive Repertoire Simplicity and Firm Performance: The Moderating Role of Top Management Team Heterogeneity." Managerial Decision Economics **25**(6/7): 317-327.

Finkelstein, S., Hambrick, D.C. (1990). "Top-Management-Team Tenure and Organizational Outcomes: The Moderating Role of Managerial Discretion." Administrative Science Quarterly **35**(3): 484-503.

Finkelstein, S., Hambrick, D.C. (1996). Strategic Leadership. Minneapolis, West.

Flynn, F. J., Chatman, J.A., Spataro, S.E. (2001). "Getting to Know You: The Influence of Personality on Impressions and Performance of Demographically Different People in Organizations." Administrative Science Quarterly **46**(3): 414-442.

Gebert, D., Börner, S., Lanwehr, R. (2001). "Innovationsförderliche Öffnungsprozesse: >>Je mehr, desto besser?<<." Die Betriebswirtschaft **61**(2): 204-222.

Gebert, D. (2004). Innovation durch Teamarbeit. Stuttgart, Kohlhammer.

Geletkanycz, M., Hambrick, D.C. (1997). "The External Ties of Top Executives: Implications for Strategic Choice and Performance." Administrative Science Quarterly **42**(4): 654-681.

Glick, W. H., Miller, C.C., Huber, G.P. (1993). The Impact of Upper-Echelon Diversity on Organizational Performance. Organizational Change and Redesign: Ideas and Insights for Improving Performance. Huber, G. P., Glick, W.H., (Ed.). New York, Oxford University Press: 176-214.

Haleblian, J., Finkelstein, S. (1993). "Top Management Team Size, CEO Dominance, and Firm Performance: The Moderating Roles of Environmental Turbulence and Discretion." Academy of Management Journal **36**(4): 844-863.

Hambrick, D. C., Mason, P.A. (1982). "The Organization as a Reflection of Its Top Managers." Academy of Management Proceedings: 12-16.

Hambrick, D. C., Mason, P.A. (1984). "Upper Echelons: The Organization as a Reflection of Its Top Managers." Academy of Management Review **9**(2): 193-206.

Hambrick, D. C. (1987). "The Top Management Team: Key to Strategic Success." California Management Review **30**(1): 88-108.

Hambrick, D. C. (1989). "Guest Editor's Introduction: Putting Top Managers back in the Strategic Picture." Strategic Management Journal **10**(Spec. Iss.): 5-15.

Hambrick, D. C. (1994). Top Management Groups: A Conceptual Integration and Reconsideration of the "Team" Label. Research in Organizational Behavior. Staw, B. M., Cummings, L.L., (Ed.). Greenwich, JAI Press. **16**: 171-213.

Hambrick, D. C. (1995). "Fragmentation and the other Problems CEOs have with their Top Management Teams." California Management Review **37**(3): 110-127.

Hambrick, D. C., Cho, T.S., Chen, M.-J. (1996). "The Influence of Top Management Team Heterogeneity on Firms' Competitive Moves." Administrative Science Quarterly **41**(4): 659-684.

Hamilton, L. C. (1992). Regression with Graphics. Belmont, Duxbury Press.

Hamilton, L. C. (2003). Statistics with STATA. Belmont, Duxbury Press.

Harrison, D. A., Price, K.H., Bell, M.P. (1998). "Beyond Relational Demography: Time and the Effects of Surface- and Deep-Level Diversity on Work Group Cohesion." Academy of Management Journal **41**(1): 96-107.

Henke, K. (1998). Topmanagement-Team-Analyse. St. Gallen, Difo-Druck.

Henn, G. (2002). Handbuch des Aktienrechts. Heidelberg, Müller Verlag.

Huber, G. P., Glick, W.H. (1993). Sources and Forms of Organizational Change. Organizational Change and Redesign: Ideas and Insights for Improving Performance. Huber, G. P., Glick, W.H., (Ed.). New York, Oxford University Press: 3-15.

Jackson, S. E., Brett, J.F., Sessa, V.I., Cooper, D.M., Julin, J.A., Peyronnin, K. (1991). "Some Differences Make a Difference: Individual Dissimilarity and Group Heterogeneity as Correlates of Recruitment, Promotions and Turnover." Journal of Applied Psychology **76**(5): 675-689.

Jackson, S. E. (1992). Consequences of Group Composition for the Interpersonal Dynamics of Strategic Issue Processing. Advances in Strategic Management. Shrivastava, P., Huff, A., Dutton, J., (Ed.). Greenwich, JAI Press. **8**: 345-382.

Janis, I. L. (1972). Victims of Groupthink. Boston, Houghton Mifflin.

Jans, M. (2004). Empirische Effekte organisationsdemografischer Diversität in Organisationen-Ergebnisse und Erkenntnisse einer Metaanalyse. Essener Beiträge zur Personalforschung. Nienhäuser, W., (Ed.). Essen, (<http://www.uni-essen.de/personal/EBPF3.pdf>). **3**.

Jehn, K. A., Northcraft, G.B., Neale, M.A. (1999). "Why Differences Make a Difference: A Field Study of Diversity, Conflict, and Performance in Workgroups." Administrative Science Quarterly **44**(4): 741-763.

Katz, R. (1982). "The Effects of Group Longevity on Project Communication and Performance." Administrative Science Quarterly **27**(1): 81-104.

Keck, S. L. (1997). "Top Management Team Structure: Differential Effects by Environmental Context." Organization Science **8**(2): 143-156.

Kiecolt, K. J., Nathan, L.E. (1985). Secondary Analysis of Survey Data. London, Sage.

Kilduff, M., Angelmar, R., Mehra, A. (2000). "Top Management Team Diversity and Firm Performance: Examining the Role of Cognitions." Organization Science **11**(1): 21-34.

King, G., Keohane, R.O., Verba, S. (1994). Designing Social Inquiry. Princeton, Princeton University Press.

Klingebiel, N. (1999). Performance Measurement. Wiesbaden, Gabler.

Knight, D., Pearce, C.L., Smith, K.G., Olian, J.D., Sims, H.P., Smith, K.A., Flood, P. (1999). "Top Management Team Diversity, Group Process, and Strategic Consensus." Strategic Management Journal **20**(5): 445-465.

Kohler, U., Kreuter, F. (2001). Datenanalyse mit Stata. München, Oldenbourg.

Kühnel, S., Krebs, D. (2001). Statistik für Sozialwissenschaftler. Hamburg, Rowohlt.

Küting, K., Weber, C.-P. (2004). Die Bilanzanalyse. Stuttgart, Schäffer & Poeschel.

Lawrence, B. (1997). "The Black Box of Organizational Demography." Organization Science **8**(1): 1-22.

Macharzina, K. (2003). Unternehmensführung. Wiesbaden, Gabler.

Mahoney, J. T. (1992). Organizational Economics within the Conversation of Strategic Management. Advances in Strategic Management. Shrivastava, P., Huff, A., Dutton, J., (Ed.). Greenwich, JAI Press. **8**: 103-155.

March, J. G., Simon, H.A. (1958). Organizations. New York, John Wiley & Sons.

Michel, J. G., Hambrick, D.C. (1992). "Diversification Posture and Top Management Team Characteristics." Academy of Management Journal **35**(1): 9-37.

Milliken, F. J., Martins, L.L. (1996). "Searching for Common Threads: Understanding the Multiple Effects of Diversity in Organisational Groups." Academy of Management Review **21**(2): 402-433.

Murray, A. I. (1989). "Top Management Group Heterogeneity and Firm Performance." Strategic Management Journal **10**(Spec. Iss.): 125-141.

Nienhüser, W. (1991). "Organisationale Demographie - Darstellung und Kritik eines Forschungsansatzes." Die Betriebswirtschaft **51**(6): 763-780.

O'Reilly III, C. A., Caldwell, D.F., Barnett, W.P. (1989). "Work Group Demography, Social Integration, and Turnover." Administrative Science Quarterly **34**(1): 21-37.

O'Reilly III, C. A., Snyder, R.C., Boothe, J.N. (1993). Effects of Executive Team Demography on Organizational Change. Organizational Change and Redesign: Ideas and Insights for Improving Performance. Huber, G. P., Glick, W.H., (Ed.). New York, Oxford University Press: 147-175.

O'Reilly III, C. A., Williams, K.Y., Barsade, S. (1998). Group Demography and Innovation: Does Diversity help? Research on Managing Groups and Teams. Gruenfeld, D., (Ed.). London, JAI Press: 183-207.

Oxford Advances Learner's Dictionary (1989). Oxford.

Papadakis, V. M., Barwise, P. (2002). "How much do CEOs and Top Managers Matter in Strategic Decision-Making?" British Journal of Management **13**(1): 83-95.

Pfeffer, J. (1983). Organizational Demography. Research in Organizational Behavior. Cummings, L. L., Staw, B.M., (Ed.). Greenwich, JAI Press. **5**: 299-357.

Pitcher, P., Smith, A.D. (2001). "Top Management Team Heterogeneity: Personality, Power, and Proxies." Organization Science **12**(1): 1-18.

Priem, R. L. (1990). "Top Management Team Group Factors, Consensus, and Firm Performance." Strategic Management Journal **11**(6): 469-478.

Priem, R. L., Lyon, D.W., Dess, G.G. (1999). "Inherent Limitations of Demographic Proxies in Top Management Team Heterogeneity Research." Journal of Management **25**(6): 935-953.

Schneider, B. (1987). "The People Make the Place." Personnel Psychology **40**(3): 437-453.

Schneider, B., Smith, D.B., Taylor, S., Fleenor, J. (1998). "Personality and Organizations: A Test of the Homogeneity of Personality Hypothesis." Journal of Applied Psychology **83**(3): 462-470.

Schnell, R. (1994). Graphisch gestützte Datenanalyse. München, Oldenbourg.

Schnell, R., Hill, P.B., Esser, E. (1999). Methoden der empirischen Sozialforschung. München, Oldenbourg.

Schnell, R., Hill, P.B., Esser, E. (2005). Methoden der empirischen Sozialforschung. München, Oldenbourg.

Sepehri, P. (2002). Diversity and Managing Diversity in internationalen Organisationen. München, Rainer Hampp.

Simons, T., Pelled, L.H., Smith, K.A. (1999). "Making Use of Difference: Diversity, Debate, and Decision Comprehensiveness in Top Management Teams." Academy of Management Journal **42**(6): 662-673.

Smith, K. G., Smith, K.A., Olian, J.D., Sims, H.P., O'Bannon, D.P., Scully, J.A. (1994). "Top Management Team Demography and Process: The Role of Social Integration and Communication." Administrative Science Quarterly **39**(3): 412-438.

Stangor, C. (2004). Social Groups in Action and Interaction. New York, Psychology Press.

StataCorp. (2003a). Stata Statistical Software: Release 8.0. College Station, Stata Corporation.

StataCorp. (2003b). Stata Statistical Software (Graphics): Release 8.0. College Station, Stata Corporation.

Stuber, M. (2004). Diversity: das Potenzial von Vielfalt nutzen - den Erfolg durch Offenheit steigern. München, Luchterhand.

Stumpf, S., Thomas, A. (1999). "Management von Heterogenität und Homogenität in Gruppen." Personalführung **5**: 36-44.

Tasler, J. (2001). The International Composition of Top Management Teams: Implications of Executive Nationality. Göttingen, Cuvillier.

Tihany, L., Ellstrand, A.E., Daily, C., Dalton, D.R. (2000). "Composition of Top Management Team and International Diversification." Journal of Management **26**(6): 1157-1177.

Tsui, A. S., O'Reilly III, C.A. (1989). "Beyond Simple Demographic Effects: The Importance of Relational Demography in Superior-Subordinate Dyads." Academy of Management Journal **32**(2): 402-423.

Turner, J. C. (1987). Rediscovering the Social Group: A Self-Categorization Theory. Oxford, Blackwell.

Wagner, W. G., Pfeffer, J., O'Reilly III, C.A. (1984). "Organizational Demography and Turnover in Top-Management Groups." Administrative Science Quarterly **29**(1): 74-92.

Webster's Dictionary of the English Language (1992). Danbury.

West, M. A., Anderson, N.R. (1996). "Innovation in Top Management Teams." Journal of Applied Psychology **81**(6): 680-693.

West, M. A., Schwenk, C.R. (1996). "Top Management Team Strategic Consensus, Demographic Heterogeneity and Firm Performance: A Report of Resounding Nonfindings." Strategic Management Journal **17**(7): 571-576.

Wiersema, M. F., Bantel, K.A. (1992). "Top Management Team Demography and Corporate Strategic Change." Academy of Management Journal **35**(1): 91-121.

Wiersema, M. F., Bird, A. (1993). "Organizational Demography in Japanese Firms: Group Heterogeneity, Individual Dissimilarity, and Top Management Team Turnover." Academy of Management Journal **36**(5): 996-1025.

Williams, K. Y., O'Reilly III, C.A. (1998). Demography and Diversity in Organizations: A Review of 40 Years of Research. Research in Organizational Behavior. Staw, B. M., Cummings, L.L., (Ed.). Greenwich, JAI Press. **20**: 77-140.

Wirth, G., Arnold, M., Greene, M. (2004). Corporate Law in Germany. München, Beck.

Zenger, T. R., Lawrence, B.S. (1989). "Organizational Demography: The Differential Effects of Age and Tenure Distributions on Technical Communication." Academy of Management Journal **32**(2): 353-376.

URL

<http://www.ny.frb.org/> (25/02/05).

<http://www.deutsche-boerse.com> (30/01/05).

<http://www.wallstreet-online.de> (25/02/05).

<http://www.europa.eu.int> (25/03/05).

<http://www.hoppenstedt.de> (27/02/05).