

# PERFORMANCE EFFECTS OF TOP MANAGEMENT TEAM DEMOGRAPHIC FAULTLINES IN THE PROCESS OF PRODUCT DIVERSIFICATION

THOMAS HUTZSCHENREUTER\* and JULIAN HORSTKOTTE  
WHU - Otto Beisheim School of Management, Vallendar, Germany

*Expanding into new product areas is an important part of the growth strategy of many firms, but there is still more to learn about how it affects firm performance. We believe that as the top management team (TMT) is responsible for coordinating product expansion, looking there can yield valuable clues. We argue that diversification entails significant additional information processing and that this strains top managerial resources. We hypothesize that task-related faultlines within the TMT may help it cope with product expansion while bio-demographic faultlines may hinder it. We find support for these hypotheses on a longitudinal sample of 2,730 expansion steps made by 61 German firms between 1985 and 2007: task related faultline strength increases performance when diversifying, while bio-demographic faultline strength decreases it.*  
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## INTRODUCTION

A large body of research shows that product diversification can yield multiple benefits (e.g., Palich, Cardinal, and Miller, 2000). It can help firms realize economies of scope (e.g., Markides and Williamson, 1994; Rumelt, 1982), increase and exploit market power (e.g., Haveman, 1993; Scherer, 1980), and benefit from larger internal markets (e.g., Hill and Hoskisson, 1987; Stulz, 1990). However, it can also strain managerial resources. Managing a firm is a complex task, managing its expansion adds still more complexity (Mishina, Pollock, and Porac, 2004). An increase in product scope brings with it an increase in the amount of information processing required, especially for upper-level managers who make and

implement scope change decisions. Expanding into a new product area is a path-dependent process that builds on the firm's existing resources (Kim and Kogut, 1996). Experienced managers with intimate knowledge of the firm as an idiosyncratic resource bundle are needed to properly coordinate expansion (Kor, 2003). However, the availability of experienced managers is limited and cannot rapidly be increased (Tan and Mahoney, 2005). Thus, there is a limit to the increase in product scope and the attendant information processing needs per period of time that a firm is able to successfully cope with (Penrose, 1959). When the pace of a firm's expansion into new product areas is too fast, that is, too much product scope is added per period of time, the coordinating abilities of its managers are exceeded and firm profitability will suffer (Vermeulen and Barkema, 2002). Yet few studies have taken such a dynamic perspective and focused on increases in product scope over time instead of the total level of product diversity at a point in time. Moreover, we know little about how managers may affect the limit to the ability of a firm to increase its product scope.

Keywords: expansion process; product diversification; top management team; faultline; performance

\*Correspondence to: Thomas Hutzschenreuter, Chair of Corporate Strategy and Governance, WHU - Otto Beisheim School of Management, Burgplatz 2, 56179 Vallendar, Germany. E-mail: th@whu.edu

Many of the empirical studies carried out to date have failed to sufficiently consider differences in the ability of managers to process information, let alone what influence those differences have on the relationship between scope expansion per time period and firm performance. As responsibility for coordinating increases in product scope lies with the top management team (TMT), we address these issues by empirically investigating how a TMT's composition affects the performance implications of product expansion. In this paper, we adopt Lau and Murnighan's (1998) term *faultline* referring to a conceptual divide that may separate a TMT into subgroups and thus to the structure of diversity within a team. Demographic faultlines have been shown to affect information processing and team outcomes (e.g., Bezrukova *et al.*, 2009; Gibson and Vermeulen, 2003; Lau and Murnighan, 2005; Li and Hambrick, 2005; Molleman, 2005; Thatcher, Jehn, and Zanutto, 2003). We argue that demographic faultlines within a TMT impact its ability to process information and coordinate diversification, and thereby moderate the relationship between added product scope per time period and profitability. Based on the theoretical work of Milliken and Martins (1996), Jackson, May, and Whitney (1995), and Pelled (1996), we distinguish between two types of faultlines depending on the faultlines' underlying characteristics. We argue that task-related faultlines (e.g., differences in educational background and in length of organizational tenure) have a positive effect on information processing, task conflict, and learning, and thus may help the team to successfully handle adding new products in a given time period resulting in improved firm performance. On the other hand, bio-demographic faultlines (e.g., differences in age and nationality) can lead to friction within the team that disrupts information processing and coordination and thus may have a negative moderating effect.

## THEORETICAL BACKGROUND AND HYPOTHESES

### The product expansion process: a dynamic view of diversification

The resource based view (RBV) conceptualizes the firm as a bundle of resources (e.g., Barney, 1991; Wernerfelt, 1984). Those resources are

directed and coordinated by top managers motivated to exploit perceived market opportunities (Castanias and Helfat, 1991, 2001). One of the ways this can be done is by diversifying into new product areas that make use of existing, but unused or underutilized resources and capabilities (Penrose, 1959; Teece, 1980). Thus, diversification can be seen as a path-dependent process by which a firm can increase profitability by building on existing resources and capabilities (Kim and Kogut, 1996). To date, most studies investigating the phenomenon of diversification have taken a static perspective in that they examine the performance implications of the level of diversification at a certain point in time, that is, they consider a snapshot of the diversity within a firm's product portfolio. This approach has yielded conflicting findings (Datta, Rajagopalan, and Rasheed, 1991; Palich *et al.*, 2000). Some researchers have questioned whether further insights can be gained from analyzing diversification from a static perspective. Gary (2005) writes that that line of inquiry is 'exhausted,' and joins Ramanujam and Varadarajan (1989) in calling for dynamic theories and empirical studies that take into account the dynamic nature of diversification. We answer such calls by examining how the amount of added product scope per time period affects performance and how characteristics of the TMT may moderate this relationship.

### Increasing product scope—gain and strain

Adding new products allows a firm to exploit economies of scope (Hill, Hitt, and Hoskisson, 1992; Markides and Williamson, 1994; Teece, 1980), increase and exploit market power and cross subsidize businesses (Caves, 1981; Scherer, 1980), and be more flexible by shifting resources, such as capital and labor, between business areas (Hill and Hoskisson, 1987). At the same time, product expansion increases complexity that can strain managerial resources, especially those of the TMT, as it is responsible for coordinating expansion. When a TMT decides to establish a subsidiary in a product area that is new to the firm, it has to deal with a new external environment. Top managers will need to address new industry-specific environmental elements and issues (Scott, 1992), and to acquire knowledge about specific characteristics and business logics of the product areas added to the firm portfolio

(Pralhad and Bettis, 1986). They may also need to transfer, sometimes adapt, existing resources and routines and to develop new ones to deal with the specific requirements of the new product (Mishina *et al.*, 2004; Szulanski, 1996). In addition, the TMT of the parent firm needs to see to it that the new subsidiary is embedded in the firm's internal environment, that is, incorporate it into the firm's network of already existing subsidiaries. Entering new product areas may require the TMT to adapt or develop internal organizational systems and structures in order to avoid administrative diseconomies and to control losses (Calvo and Wellisz, 1978; Hill and Hoskisson, 1987).

While every diversification step is associated with some degree of additional complexity, the amount of complexity is likely to differ and so the extent to which managerial resources will be taxed will vary. The less related a particular expansion step is to the firm's existing business portfolio, the more complexity it adds, the less relevant preexisting information, and the more difficult it is to absorb new information (Cohen and Levinthal, 1990). Hence, more effort and information processing is required when firms enter new markets compared to entering business areas in which the firm is already active (Kor and Leblebici, 2005; Penrose, 1959). It is not simply the parent firm's primary industry that matters, but how much similarity there is between a new product and the most closely related product already in its portfolio. Thus, an increase in product scope has to do not only with adding new products but also to the extent that those products are related to ones with which the TMT is already familiar. Consequently, an expansion step into an unrelated business area may be just as complex as multiple steps into business areas that are more related to the firm's existing product portfolio.

As firms usually engage in expansion programs that involve a series of steps, the amount of information that must be processed in a given period, and correspondingly the amount of strain on managerial resources, is caused by multiple steps. If steps are undertaken simultaneously, the strain on parent firm managers will be greater. Even if one step is taken at a time, the demand for information processing will build and 'the history of a firm's strategic moves will matter a great deal in the operational effectiveness of their subsequent moves' (Tan and Mahoney, 2005: 114). Thus, in this study we do not

investigate diversification steps in isolation, but in combination. We argue that the information processing requirements with which a TMT must contend are driven by added product scope per period of time and implicit in that are the number of new products, and how closely they are related to the firm's existing product portfolio, of all of the product expansion steps in that period (Hutzschenreuter and Guenther, 2008).

### **Limits on the ability to handle added product scope**

According to Penrose (1959: 46, 52, 76), successful firm expansion requires managers with firm-specific, sometimes tacit, knowledge of resources, capabilities, and routines, and such managers are most effective when they have experience working together. In their paper on Penrose's contribution to the RBV, Kor and Mahoney (2000) underline that the path-dependent nature of the diversification process makes experienced managers vitally important, and Kor (2003), in looking at TMT competence, later writes that managers with experience-based tacit knowledge of firm resources who know one another's skills, limitations, and habits are able to build on the firm's idiosyncratic resources bundle by matching its material, human, or intangible resources with new growth opportunities. This kind of experience and teamwork is needed as well in coordinating diversification (Kor and Leblebici, 2005), as it requires a unique understanding of the specific relationships between headquarters and subsidiaries (Tan and Mahoney, 2005). Thus, the availability of experienced managers facilitates the coordination of interdependencies between subsidiaries and the integration of newly established subsidiaries. Taken together, a significant body of work indicates that the expansion process depends on the availability of unique managerial resources.

The availability of such resources is not unlimited, and they cannot readily be increased. Obviously, firm and team-specific experience is not available on the open market, but must be developed in-house. This not only takes time but also in the interim it occupies the attention of managers already on the team (Kor and Leblebici, 2005). Eisenhardt and Martin (2000) emphasize that diversification requires learning and the creation of new knowledge, which takes time. Vermeulen and Barkema (2002) warn that diversification at

too rapid a pace does not allow sufficient time for learning due to time compression diseconomies (Dierickx and Cool, 1989). At a certain point, expansion into new product areas will exceed the team's combined cognitive abilities (Teece, 1980). The result will be overextended managers, coordination bottlenecks, less control, poorly adapted structures and systems, and ultimately a decrease in firm profitability (Kor and Leblebici, 2005; Levitt *et al.*, 1999). Overburdened management teams may not be able to become sufficiently familiar with new product areas (Gary, 2005) and so will make ill-informed expansion decisions that may prove hard to reverse (Tan, 2003), and may even cause the team to neglect existing business operations. This means that if a firm diversifies too rapidly—that is, it adds more product scope per period of time than it can properly absorb or for which it can develop the required new managerial resources to handle the increased information processing requirements—'the efficiency of the firm will suffer' (Penrose, 1959: 47). Thus, we would expect an inverted U-shaped relationship between added product scope per time period and firm profitability. Yet, regardless of the nature of the direct effect of added product scope on firm performance, that relationship is likely to be moderated by task-related and bio-demographic faultlines within the TMT.

### **The influence of faultlines on the ability to handle added product scope**

We have seen why firms are motivated to increase product scope, and that top managers need knowledge about their firm's resources and one another in order to identify appropriate targets and successfully coordinate the expansion process. We have also seen that the attendant increase in information processing stresses managerial resources, and what the negative consequences of that will be. Limits on the ability of firms to profitably diversify are universal. The impact of those limits hinges on the ability of a firm's TMT to properly handle the information processing demands associated with added scope. That is, how well do members of the TMT gather, share, and attend to relevant information, then jointly analyze and integrate it into the diversification process (Gibson, 2001; Hinsz, Tindale, and Vollrath, 1997; van Knippenberg, De Dreu, and Homan, 2004). Information processing is negatively influenced

by stereotypic and affective perceptions of fellow team members in that they may cause a biased opinion of the value of the information they share (Brewer, 1979; Tajfel, 1982). This may well result in emotional conflict, diminished group cohesion, and diversion of managerial attention away from the task at hand (Jehn, 1995).

A substantial body of research shows that diversity among the members of work groups and management teams is a central factor affecting information processing and, eventually, performance (e.g., Barsade *et al.*, 2000; Carpenter, 2002; Carpenter, Geletkanycz, and Sanders, 2004; Hambrick and Mason, 1984; Jehn, 1995; Pelled, Eisenhardt, and Xin, 1999). Broadly defined, diversity is the degree to which members in a team differ from one another (Jackson, Joshi, and Erhardt, 2003). Research that considers diversity within TMTs has traditionally focused on diversity indexes based on single characteristics, that is, they have examined the dispersion of individual members along one characteristic independently from others (e.g., see Joshi and Roh, 2009 for an overview). However, individuals have multiple attributes on which they may differ and the diversity along multiple characteristics may interact and jointly influence team outcomes (see Harrison and Klein, 2007). Yet how can we consider diversity on multiple characteristics and their interactions within a team? Lau and Murnighan (1998) introduced a group faultline perspective. Faultlines indicate the separation of a team into subgroups based on one or more characteristics. For instance, a gender faultline yields a male subgroup and a female subgroup. If one were to consider multiple characteristics of group members based on their profiles, the faultlines would be stronger and more salient the higher the alignment of differences between members (Thatcher *et al.*, 2003). For example, if all of the male members of a team were over 60 years of age and German and the female members were all young and from outside Germany, the resultant two subgroups would be made up of persons whose characteristics align perfectly, that is, the faultline dividing the two groups would be strong. In contrast, if the team had over and under 60 year-olds, males and females, Germans and non-Germans in many different combinations, the distinctions would be less clear-cut, thus the faultline strength would be weaker. While faultline strength indicates the degree to which multiple characteristics divide a team into subgroups in the same way, strong



faultlines are also related to variety within the team as they imply heterogeneity across subgroups (Harrison and Klein, 2007).

The faultline perspective is conceptually very different from taking into account multiple dimensions 'by adding or averaging diversity indexes' of single characteristics to 'assess overall within-unit diversity,' in part because measuring diversity in that way does not take into account the interactive effect of different characteristics (Harrison and Klein, 2007: 1215). Thus, overall within-unit diversity, per definition, does not reflect the alignment of differences within a team. As the examples above demonstrate, a measure of overall within-unit diversity may be equally high, independent of whether a team is clearly separated into distinct subgroups or not. As a result, Harrison and Klein (2007: 1216, n.2) conclude that 'the construct of faultline strength is far more precise and focused.' Bezrukova, Thatcher and Jehn (2007: 58) analyze several theories of group composition and reason that the group faultlines concept, which they label the 'alignment approach,' provides 'a more comprehensive explanation of group processes and performance' than diversity indexes based on single characteristics. This can be seen clearly in Lau and Murnighan's (2005) findings that show that considerably more of the variance in team members' evaluation of team processes and of their feelings toward each other can be explained by the division of teams into subgroups based on ethnicity and gender-based faultlines than by ethnic and gender-related differences considered independently as single attributes. Several researchers have also explicitly linked faultline strength to team information processing capabilities (e.g., Bezrukova *et al.*, 2009; Dahlin, Weingart, and Hinds, 2005; Gibson and Vermeulen, 2003).

From a dynamic perspective, a TMT's composition, formation of subgroups, and its behavior and performance are path dependent (Beckman and Burton, 2008; Lau and Murnighan, 1998). As time goes by, team members develop norms and a shared understanding of tasks, learn about each other, and form subgroups (Bettenhausen and Murnighan, 1985). TMT history and subgroup dynamics, for example, arising from past conflicts, may rigidify the team's division into subgroups and affect further information processing as a team. In a strong faultline setting, members may identify with their subgroup in a way that withstands subsequent changes in team composition

(Lau and Murnighan, 1998). Moreover, the better a TMT has been able to cope with the complexity of added product scope over the entire expansion period, the lower the strain on top managers later. New managers that enter an existing TMT may create new faultlines and affect subgroup dynamics, but seldom right away as newcomers usually are not in a strong enough position to change already existing team norms and underlying dynamics (Lau and Murnighan, 1998). Until team outsiders accumulate knowledge about other members, gauge the power dynamics, and gain acceptance, they are likely to restrain themselves and yield to pressure to conform (Jackson, Stone, and Alvarez, 1992). Hence, a firm's ability to handle added product scope may not immediately be affected by a sudden change in the composition of its TMT, but will nonetheless be greatly influenced by the history of the team and its subgroup formations. For all of these reasons, the concept of group faultlines is particularly well suited to a dynamic study of the limits of the ability of firms to handle the increased demand for information processing associated with increasing product scope per time period. Due to the inertial effects in team behavior and subgroup formation, faultline strength of TMTs in all years of an expansion period may be crucial and not only of a particular TMT in a specific year of the period.

While the faultline concept holds some promise in our context, its application to research on team effectiveness has been relatively limited (Mathieu *et al.*, 2008), especially in large scale quantitative research (Li and Hambrick, 2005), and the results have been mixed (Joshi and Roh, 2009; van Knippenberg and Schippers, 2007). Indeed, while several studies have found that faultlines exert negative effects on team functionality (e.g., Barkema and Shvyrkov, 2007; Li and Hambrick, 2005; Molleman, 2005), others have found their influence to be positive, with some even suggesting that faultlines may serve as 'healthy divides' (Bezrukova *et al.*, 2009; Cramton and Hinds, 2005; Gibson and Vermeulen, 2003; Thatcher *et al.*, 2003). One possible explanation for such seemingly contradictory results may lie in their operationalization. Many researchers have measured a single faultline based on many different kinds of characteristics (e.g., Thatcher *et al.*, 2003). However, the more kinds of characteristics used, the more difficult it is to determine whether an observed effect is due to one, some, or all of them

in combination (van Knippenberg *et al.*, 2011). In addition to kinds of characteristics, different types of characteristics, that is, task-related and bio-demographic characteristics, have been associated with different effects (e.g., Jackson *et al.*, 1995; Milliken and Martins, 1996; Pelled, 1996). These distinctions have been supported by recent meta-analyses that show diverging effects of task-related and bio-demographic diversity on team performance (Bell *et al.*, 2011; Horwitz and Horwitz, 2007; Joshi and Roh, 2009). Some studies do not combine different types of characteristics in a single faultline measure as we described above, but do explicitly distinguish between different types of faultlines (e.g., Bezrukova *et al.*, 2009; Molleman, 2005). Such an approach is in line with Lau and Murnighan's (1998) contention that multiple faultlines may exist within a single team, and also in keeping with social identity theories according to which managers may see themselves as members of multiple groups at the same time (Amiot *et al.*, 2007; Tajfel and Turner, 1979). In this study we look at two types of faultlines that may divide TMTs during periods of expansion, task-related, and bio-demographic faultlines.

### The influence of task-related faultlines

Task-related faultlines are based on acquired characteristics that serve as indicators of knowledge and perspectives relevant to particular tasks (e.g., Hambrick and Mason, 1984; Jackson *et al.*, 1995). The task-relatedness of a characteristic depends on the task at hand. In this study we do not focus on all of the responsibilities of TMTs (e.g., Mintzberg, 1973), but specifically on the task of expanding into new product areas. Two characteristics that we believe are germane to the task of increasing product scope are organizational tenure and educational background. As we have seen, entering new product areas is a path-dependent process that builds on existing resources (Penrose, 1959). Top managers who have been with the firm for a long time will have garnered through in-house experience explicit and tacit knowledge of the firm's unique combination of resources (Kor, 2003). On the other hand, a negative aspect of long tenure is that with time individuals can become so committed to a certain course of action that their minds are closed to new possibilities and external information (Finkelstein and Hambrick, 1990; Hambrick, 1991; Miller, 1991). In fact, one argument in favor

of naming top managers from outside the firm or who are relatively new to it is that they can bring extraorganizational knowledge and perspectives that may help broaden the TMT's identification of profitable new product areas (e.g., Carpenter and Fredrickson, 2001; Kor, Mahoney, and Michael, 2007; Milliken and Martins, 1996).

The second task-related characteristic we mentioned above is educational background (e.g., Barkema and Shvyrkov, 2007; van Knippenberg *et al.*, 2004; Williams and O'Reilly, 1998). The formal education of top managers, including fields of study and kinds of degrees earned, plays an important part in shaping not only their professional knowledge, skills, and abilities but also their evaluation of new product opportunities (Amason, Shrader, and Tompson, 2006; Carpenter, 2002; Hitt and Tyler, 1991; Wiersema and Bantel, 1992). For example, managers who have studied engineering or science may emphasize the technological or manufacturing aspects of product expansion, while managers who studied law may look at the legal implications of taking on a particular product, and managers who studied business administration may focus on organizational implications.

When task-related characteristics of some members of a TMT align in the same or similar way, a task-related subgroup is likely to emerge within the team. By definition, team members within a subgroup share similar task-related backgrounds and thus are likely to have similar knowledge, perspectives, and mental models (Finkelstein, Hambrick, and Cannella, 2009). At the same time, there is variation in backgrounds across subgroups, and this means that a broader range of information will be available to the team than were it to be made up of members with entirely homogeneous backgrounds. Yet, it is not the availability of knowledge and perspectives per se that is beneficial in performing a task. For the benefits of diversity to materialize, diverse information actually needs to be processed and considered in decision making (Klein and Harrison, 2007; van Knippenberg *et al.*, 2004). Strong task-related faultlines may contribute to information processing simply because they signal like mindedness. Stasser, Taylor, and Hanna (1989) found that, especially in small groups, information is shared more freely when members of the group have reason to believe that at least one other member holds the same point of view. Thus, team members tend to express their opinions more freely in discussions if they believe

that they have natural allies in the members of their subgroup who will be supportive, perhaps who can even be counted on to help win over others on the team (Gibson and Vermeulen, 2003). It is not possible for a TMT to attend to and give equal consideration to every idea and piece of information brought up (Klein and Harrison, 2007), as attending to too many different viewpoints leads to information overload (Barkema and Shvyrkov, 2007; Dahlin *et al.*, 2005). The attention of the team is focused on selected issues and the more members who are likely to share and support an idea, the more its value is validated (Hinsz *et al.*, 1997). Thus, task-related information is less likely to be overlooked if held by members of a subgroup within a TMT.

Moreover, it has been suggested that the increased salience of task-related differences in strong faultline settings may also highlight the potential associated with knowledge diversity (Phillips and Loyd, 2006; Phillips *et al.*, 2004). When TMT members recognize and respect the expertise and contributions of fellow team members who are not in their own subgroup, there will be a more positive attitude toward task-related diversity overall. As a result, the team is more likely to value and use the diverse knowledge and competencies of all its members in the product expansion process (Bezrukova *et al.*, 2009; Cramton and Hinds, 2005; Homan *et al.*, 2007; Molleman, 2005).

Strong task-related faultlines are reflective of marked differences in task-related knowledge and perspectives and may encourage discussion within the team. While there may be no natural meeting of the minds between subgroups, this does not mean that strong faultlines are necessarily negative. Indeed, task conflict, which specifically reflects disagreements between members of different subgroups on task issues, can positively influence information processing (Amason, 1996; Pelled, 1996; Pelled *et al.*, 1999). When members of a team come at a task from different directions, more information gathering is done, more possibilities end up being explored, and more strategies are considered. To integrate different perspectives, team members need to reevaluate their own positions, comprehend opposing arguments, and develop a deeper understanding of the expansion decision, possible issues, and alternative solutions. Debate, constructive criticism, and challenging other members' opinions can play a

valuable part in hammering out joint decisions. In line, task-related conflict has been shown to be positively associated with a TMT's decision making quality and cognitive task performance (e.g., Certo *et al.*, 2006; Olson, Bao, and Parayitam, 2007; Schweiger, Sandberg, and Rechner, 1989).

Task-related faultlines are especially beneficial in coping with the information processing requirements associated with highly complex tasks, such as managing product diversification (Jehn, Northcraft, and Neale, 1999). While it may not be necessary when performing relatively simple or routine tasks to have an exchange of opinions or engage in debate (Jehn, 1995), performing complex tasks, especially those with high uncertainty, may call for extensive information processing and constructive debate centered on diverse perspectives, multiple issues, and alternative solutions. Taken together, we argue that when the different TMTs that have served over the course of a firm's expansion period have had, on average, strong task-related faultlines, they will enjoy information processing benefits and thus will be better able to cope with the increased demand for information processing associated with the complex task of expanding into new product areas. Following this logic, we hypothesize:

*Hypothesis 1: Everything else constant, task-related faultline strength within TMTs during a period of expansion will positively moderate the relationship between added product scope per time period and firm profitability.*

### **The influence of bio-demographic faultlines**

As we have said, faultline strength has an influence on information processing and ultimately on the performance of TMTs and firms. While strong task-related faultlines are beneficial in some circumstances, research suggests that the separation of a team into subgroups based on bio-demographic characteristics can have negative effects (e.g., Earley and Mosakowski, 2000; Homan *et al.*, 2008; Jehn and Bezrukova, 2010; Lau and Murnighan, 2005; Molleman, 2005). Bio-demographic characteristics are innate attributes that are immediately cognitively accessible, pervasive, and hardly alterable (Milliken and Martins, 1996). For the most part, researchers have considered age, gender, and nationality/ethnicity (Joshi and Roh, 2009; Williams and O'Reilly, 1998). Due

to their high visibility, these characteristics are frequently noticed and considered in many different situations over a manager's lifetime (Bell *et al.*, 2011; van Knippenberg and Dijksterhuis, 2000). Social psychology research has shown that managers' perceptions of other team members and the cognitive and affective responses toward them are shaped by the latter's bio-demographic characteristics (Fiske and Neuberg, 1990). Most importantly, they are often associated with well learned and widely held stereotypic beliefs. When these general social stereotypes are activated, team members would perceive other members and use and weigh the information they contribute with a bias (Tajfel, 1982). Activation is more likely in strong bio-demographic faultline settings. The alignment of multiple bio-demographic characteristics in the same way increases the salience of differences between members (Lau and Murnighan, 1998) and triggers multiple stereotypes at the same time. As a result, strong bio-demographic faultlines intensify biased perceptions of other TMT members and their contributions, which negatively influences information exchange and processing (Falkenberg, 1990; van Knippenberg *et al.*, 2004).

Moreover, bio-demographic differences may trigger affective responses. As individuals strive for a positive self-image, they render stereotypes associated with their own bio-demographic characteristics overly positive, which may lead to a halo effect. In contrast, stereotypes concerning dissimilarities are often negatively afflicted (Judd and Park, 1993; Posthuma and Campion, 2009; Tajfel and Turner, 1986; Williams, 2001). The intensity of positive or negative affect about others can be diluted if multiple characteristics are cross-cutting, that is, if some of the characteristics of the members of different subgroups are similar and others dissimilar (e.g., Hogg and Terry, 2000). In a strong faultline setting, however, characteristics are in alignment, affection reinforced, and subgroup separations distinct and salient. In that case, feelings of mistrust and hostility toward members of other subgroups can develop and escalate (Li and Hambrick, 2005; Pearsall, Ellis, and Evans, 2008), to the point of emotional conflict, that is, disagreements over personal issues that are unrelated to the task (e.g., Amason, 1996; Jehn, 1997; Pinkley, 1990). When the situation gets to this point, it diverts attention away from task-related issues (Jehn, 1995), making it particularly difficult to process complex information

(Simons and Peterson, 2000). Members of the team become less willing to share information at large, and intergroup information exchange diminishes (Sawyer, Houlette, and Yeagley, 2006). In such circumstances, processing of new or particularly complex information may be hindered by increased stress and anxiety associated with emotional conflict (Simons and Peterson, 2000).

In summary, strong bio-demographic faultlines in the TMTs that serve during a firm's expansion period can trigger stereotyping that increases bias and that can lead to emotional conflict that taxes the limited attention of the TMT and undermines the sharing of information within it. Consequently, when bio-demographic faultlines are strong, on average, they have a negative influence on the ability of the TMTs to successfully cope with the increased demand for information processing arising from an increase in product scope in a given time period. Thus, we hypothesize:

*Hypothesis 2: Everything else constant, bio-demographic faultline strength within TMTs during an expansion period will negatively moderate the relationship between added product scope per time period and firm profitability.*

## METHODS

### Sample and data

We derived the sample for our analysis from the HDAX index of the German stock exchange. This index comprises the companies with the highest market capitalization in Germany. Following Vermeulen and Barkema (2002), we excluded financial institutions, real estate firms, retailers, purely financial holdings, and cross-listed non-German firms. This resulted in a list of 135 companies that had been listed on the HDAX since its inception. We then collected data on the TMTs and the expansion steps made by these firms from 1985 to 2007. Since we analyze the process of firm expansion, we require complete data for a minimum number of consecutive years per firm. Through the elaborate process outlined below, we were able to gather sufficient data for the entire set of variables for at least six consecutive years for 61 firms. Fourteen of these had their primary industry code in basic materials and utilities, eight in consumer goods and services,



four in pharmaceuticals and healthcare, nine in information technology and telecommunications, 11 in manufacturing of machinery and equipment, five in automotive, and 10 in other industrial industries. Their average revenues were € 10.05 bn. (median: € 3.58 bn.) and their average number of employees was 47,336 (median: 17,448).

From the firms' annual reports, we obtained the list of all subsidiaries at the start of our period of analysis, and identified all new subsidiaries established as well as those divested during the subsequent 23 years. As a result, we can determine the complete portfolio of subsidiaries for the firms for each year they are included in our panel. To exclude purely financial investments, we included newly established subsidiaries only if the parent firm's stake was at least 50 percent after the investment and if the firm had had no stake, or a minority one, before. We chose this time-consuming approach since data on expansion steps are not available from commercial databases.

We also collected demographic data on the firms' TMTs. Demographic data may serve as reasonable indicators for psychological constructs and information processing of top managers and teams (Hambrick and Mason, 1984). The use of such data is clear-cut and objective (Michel and Hambrick, 1992) and very common in management research (e.g., Barkema and Shvyrkov, 2007; Kor, 2006). The German governance system is two-tiered, with a management board (Vorstand) and a separate supervisory board. Members of the Vorstand represent the firm and are legally and collectively responsible for managing the firm with the chief executive officer (CEO) acting as *primus inter pares*. Hence, we equate Vorstand with TMT. From the firms' annual reports, we obtained the list of all executive directors that were on the Vorstand for the respective years of our investigation and gathered demographic data as well as data on the career paths of these managers. Sources for these data were *Hübner's Who is Who*, Lexis Nexis online databases, *Sutter's International Red Series Who's Who in Germany*, *Wer ist Wer? Das Deutsche Who's Who*, *IBP Who's Who in Germany*, *Who's Who in European Business and Industry*, and the Munzinger online archive. We also searched the archives and databases of well-respected newspapers and magazines, including the *Frankfurter Allgemeine Zeitung*, *Der Spiegel*, *BusinessWeek's Executive Profile* section, and *ManagerMagazin*.

We contacted firms and executives directly to close any remaining data gaps and to check the reliability of our data. Firm-year observations were excluded from the analysis if TMT-related data were unavailable for more than one quarter of the top executives of a respective team (c.f. Jensen and Zajac, 2004; Westphal and Zajac, 1997).

This may have led to a survivorship bias if the firms that were excluded were on average less successful. To avoid such a bias, we included non-surviving firms in our sample. Following Carpenter and Fredrickson (2001), we also compared the firms we included to those we excluded using a means test based on data collected from Thomson Reuters Datastream. This test revealed that the firms included did not perform significantly better than those excluded, and hence that survivorship does not bias our results and that our sample does not suffer from sample selection bias (Allison, 2002; Jensen and Zajac, 2004; Little and Rubin, 2002). We used an additional statistical method to determine whether sample selection is an issue in our analysis. Wooldridge (2002) argues that in a fixed effects context, sample selection poses a problem only when selection is related to the idiosyncratic error term in the model. We tested this assumption by performing a test suggested by Nijman and Verbeek (1992) and applied by Berrone and Gomez-Mejia (2009), for example. This test lets us conclude that sample selection does not lead to bias (Wooldridge, 2002).

## Variables

We empirically study how product expansion processes affect firm performance and how this relationship is moderated by faultlines in TMTs. Accordingly, we measure managerial and growth-related characteristics in a given time period and analyze their effect on firm performance at the end of that period. Independent and control variables are calculated as average values over the respective period unless specified otherwise. In line with Weinzimmer, Nystrom, and Freeman (1998), we chose a time frame for an expansion period of five years, since strategic planning time horizons are typically that long (Grant, 2003).

## Dependent variable

Our dependent variable is *firm performance*. We measured it using the firms' return on assets

(ROA) at the end of the expansion period (Hitt, Hoskisson, and Kim, 1997). ROA is commonly used in diversification research (Gomez-Mejia and Palich, 1997; Kim, Hwang, and Burgers, 1989) and is particularly appropriate in our context as it reflects the relative efficiency of the use of a firm's assets and the synergies gained through expansion (Kim *et al.*, 1989). We chose an accounting over a market-based measure of performance because our model predicts realized performance, while market-based measures reflect shareholder expectations about the future.

### *Independent variables*

Our TMT faultline strength variable does not focus on a *single* demographic attribute but takes into consideration how multiple demographic characteristics and their alignment may divide a team into subgroups. We calculated *task-related faultline strength* along the following characteristics: organizational tenure, measured in years; educational specialization, coded using Hambrick, Cho, and Chen's (1996) categories; and level of formal education, measured using the state-approved degrees in the German educational system (Kultusministerkonferenz, 2005). We measured *bio-demographic faultline strength* by age and nationality. We coded nationality as a dichotomous variable, German or non-German, employing an approach widely used in upper echelons research (e.g., Hambrick *et al.*, 1996). We considered the possibility of using gender as a bio-demographic attribute, but decided against doing so as the number of women on the TMTs of our sample firms is negligible.

We measured task-related and bio-demographic faultline strength using the algorithm developed by Thatcher *et al.* (2003), derived from multivariate statistical clustering analysis (e.g., Jobson, 1992; Sharma, 1996), and applied by other researchers studying faultlines (e.g., Bezrukova *et al.*, 2009; Molleman, 2005). As we have discussed, task-related and bio-demographic faultlines may divide a TMT into two subgroups and there are several possible ways in which that might be done. For each possible pair of subgroupings, we calculated the strength of the respective faultlines that divide them by measuring the ratio of the variance of the relevant characteristics between the subgroups

over the total variance in the entire team.<sup>1</sup> The ratio can take on values between 0 and 1 with a higher value indicating a stronger faultline. The maximum value over all possible splits is our variable faultline strength. We followed prior empirical research and considered TMTs with more than three members in our analysis in line with the theoretical logic of faultlines that divide groups into two subgroups comprising at least two members (e.g., Bezrukova *et al.*, 2009; Goodman, 1986; Lau and Murnighan, 2005).

### *Control variables*

We argue that expansion into new industries or product segments is a significant source of complexity. Our measure of *added product scope per time period* captures the number and relatedness of the firm's expansion steps by the number and the products of newly created subsidiaries. We compare the industries the firm enters with those in which it is active at the beginning of the year. Expansion into less related industries is associated with higher levels of complexity. In line with Hutzschenreuter and Guenther (2008), we measure product relatedness based on four-digit industry codes and compare the industry code of an expansion step to that industry code of the firm's business portfolio that it is closest to before expansion. We built on the WZ code system, a hierarchical industrial classification system of the Federal Statistical Office of Germany, which is similar to the Standard Industrial Classification (SIC) system in the United States. Following the approach of Haleblian and Finkelstein (1999), we applied a weighting scheme to assess the degree of relatedness between the two industry codes based on discrete values. We assumed product scope to be the same when two industries share the same four-digit industry code. No scope is *added* if the firm adds a product within an industry code in which it is already active. Consequently, we assigned a 0 in such cases. A three-digit level match results in a diversification score of 1, a two-digit level match is coded 2, and a one-digit level match is coded 3. We assigned a 4 if there was no match at all. In this way, the score is reflective of the product scope that is actually *added* by a particular

<sup>1</sup> For an excellent and detailed explanation and discussion of the measurement of faultlines see Thatcher *et al.* (2003).

expansion step and the associated complexity. We assigned scores for all expansion steps in the five-year period. Because firms had more time to cope with the complexity of an expansion step that took place at the beginning of our five-year expansion period, we discounted the product diversification scores of expansion steps taken in earlier years of the expansion period. The discount is 70 percent for the first year and increases linearly to 100 percent in the last year. Finally, we totalled the scores for all of the steps undertaken in a five-year expansion period to yield a measure that reflects the level of added product scope to which the firm was exposed during the respective period. Since we assume a curvilinear relationship, we included this total score and its squared term.

Faultline strength reflects the extent to which a team is split into distinct subgroups that are homogeneous within those subgroups and heterogeneous across them. The variable TMT faultline distance in turn captures how far apart these subgroups are based on the characteristics used (e.g., Molleman, 2005; Thatcher, Bezrukova, and Jehn, 2004). We include the variables *task-related faultline distance* and *bio-demographic faultline distance* as control variables, each of which is measured along the strongest faultline split by calculating the Euclidean distance between the average values of the considered attributes of the potential subgroups (see Bezrukova *et al.*, 2009). We also control for *TMT size* as a way to capture the quantity of managerial resources. Following Halebian and Finkelstein (1993), we measure TMT size using the number of executives on the firm's Vorstand, which we obtained from the annual reports of the firms in our sample.

In addition to the complexity arising from expansion into new product areas, complexity also arises from expansion into new geographic areas. We controlled for this effect by including the variable *internationalization steps*, that is, the number of expansion steps in the period of analysis that were undertaken outside the existing geographic scope of the firm. We include as well the variable *cultural diversity*. It reflects the complexity of handling a multinational portfolio of business activities at a certain point in time. We computed cultural diversity by calculating the sum of the cultural distances across all dyads of a firm's network of subsidiaries divided by the total number of pairs (Hutzschenreuter and Voll, 2008). In addition, we added the squared term of cultural

diversity to control for curvilinear effects (e.g., Hitt *et al.*, 1997). By analogy, we controlled for a possible effect of *product diversity* on performance (Chatterjee and Wernerfelt, 1991; Palich *et al.*, 2000) as the breadth of the business areas in which a firm is active at a given point in time increases the complexity with which managers must cope. The Berry-Herfindahl index (Berry, 1971), and the entropy measure described by Palepu (1985) are often used by researchers (Hitt *et al.*, 1997; Mahoney, 1992; Tallman and Li, 1996). Both measures led to virtually identical results, so we used the Berry-index (Berry, 1971).

The resources that must be dedicated to expanding need not be borne alone, but may be shared through equity alliances with partner firms. In this way, expanding firms may tap location-specific knowledge and also benefit from relationships developed by partners (Hennart, 1988). At the same time, such partnerships need to be coordinated and controlled, which increases the strain on managerial resources (Chang and Rosenzweig, 2001). We controlled for this effect by including the variable *level of ownership*, which we calculated as the ratio of fully owned new subsidiaries over all expansion steps in the expansion period. Those expansion steps might be undertaken through acquisitions or greenfield investments. Acquiring an existing resource bundle may pose different challenges for the firm than building a subsidiary from scratch (Hennart, 2009). Thus, the mode of entry into product areas may influence expansion performance. To control for this, we calculated the variable *acquisition* as a percentage of the expansion steps made by acquisitions during the period of analysis. A firm that held a minority stake in a subsidiary prior to making an investment that resulted in a majority stake may have acquired valuable knowledge about the subsidiary. As having this kind of knowledge could potentially affect the performance of a subsequent expansion step, we calculated the variable *minority* as a percentage of the steps undertaken where the firm already held a minority stake.

Further, we entered the variable *slack* measured as the firm's current ratio (e.g., Cho and Hambrick, 2006), controlled for *capital structure*, which we calculated as total liabilities over total assets (e.g., Vermeulen and Barkema, 2002), and included *firm size* as a control variable, which we measured as natural logarithm of firm sales (e.g., Carpenter and Sanders, 2004). We tested for an industry effect,

that is, the effect of a firm's portfolio of businesses, by controlling for the degree to which a firm is active in the primary, secondary, or tertiary sector of an economy. None of the firms in our sample had a subsidiary that was active in the primary sector in the period of investigation. Thus, we controlled for this effect by including the variable *industry mix*, which we calculated at the beginning of each expansion period as a firm's percentage of business areas in the secondary sector over all business areas.

## ANALYSIS

The descriptive statistics in Table 1 show mean values, standard deviations, and correlations among variables. We tested for multicollinearity by analyzing variance inflation factors and condition indices. With a value of 2.73 and 4.38, respectively, the largest variance inflation factor and condition number are well below critical values given in the literature (e.g., Souitaris and Maestro, 2010; Tan and Tan, 2005). Thus, we conclude that multicollinearity is not a serious problem in our study.

A Hausman test suggested using a fixed firm effects model (Wooldridge, 2002). Such models have the advantage of controlling for constant unobserved heterogeneity across firms that may explain differences in the dependent variable (e.g., Greene, 2008). For example, they control for the primary industry of the firms in our sample as the primary industry of none of those firms changed during the period of our investigation. Consequently, fixed effects models are preferred when analyzing panel data (Cannella, Park, and Lee, 2008). They are considered to be conservative since only changes in independent variables within a particular firm may result in significant effects.

Following Greene (2008), we tested for heteroskedasticity by calculating a modified Wald statistic for groupwise heteroskedasticity in fixed effects regression models, which indicated that the error variance is specific to the cross-sectional units. Furthermore, a test for autocorrelation in panel data (Drukker, 2003) suggests that autocorrelation may affect our results. There are two approaches for dealing with these issues, depending on the specific panel structure (e.g., Beck and Katz, 1995; Hansen, 2007). Certo and Semadeni (2006) suggest using ordinary least squares fixed

effects method with Huber–White corrected standard errors (White, 1980), an approach used by Anderson and Reeb (2004) for example. Kristensen and Wawro (2007) and Kezdi (2003) suggest using the Arellano estimator in fixed effect models (Arellano, 1987), which is robust to arbitrary heteroskedasticity and autocorrelation and has been applied by McCann and Vroom (2010). We used both approaches, and obtained virtually identical results. Table 2 displays the results with Arellano robust standard errors. We controlled for contemporaneous correlation (Certo and Semadeni, 2006) and for potential time effects (Greene, 2008) by using time dummy variables.

## RESULTS

Table 2 shows the results from the regression analysis used to test our hypotheses. Our dependent variable is firm performance measured as ROA at the end of the period of expansion. Results are robust to operationalizations of firm performance as return on sales and ROA. Model 1 shows the results of regressing firm performance on control variables only. Model 2, the full model, is used to test our hypotheses. It includes all of our control and independent variables and so is less likely than the other models to suffer from any omitted variables bias (Echambadi, Campbell, and Agarwal, 2006). A Wald test showed that the change in R-squared between the models is significant at  $p < 0.05$ .

The underlying relationship of our study is the link between added product scope per time period and firm performance at the end of that particular period. In line with Penrose's theory of the growth of the firm (Penrose, 1959), we found an inverted U-shaped relationship. The results show that the coefficient of the linear term is positive and partially significant and that the squared term is significantly negative in Model 2. Our results are also robust to other operationalizations of added product scope, specifically, those based on the relatedness measures of Fan and Lang (2000) and Robins and Wiersema (1995). In Hypothesis 1 we argued that task-related faultline strength positively moderates the relationship between added product scope and firm performance. This hypothesis is partially supported since Model 2 shows that the coefficient of the interaction of added product scope per time period and task-related faultline



Table 1. Descriptive statistics

	Mean	s.d.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1. Firm performance	0.081	0.076	1.00																
2. Added product scope per time period	4.794	5.759	-0.02	1.00															
3. Task-related faultline strength	0.540	0.114	0.07	-0.08	1.00														
4. Bio-demographic faultline strength	0.679	0.108	0.01	0.00	0.07	1.00													
5. Task-related faultline distance	2.530	5.753	-0.02	-0.06	-0.09	0.03	1.00												
6. Bio-demographic faultline distance	1.006	0.285	-0.04	0.00	0.12	0.10	-0.07	1.00											
7. TMT size	6.567	1.973	-0.02	0.02	-0.29	-0.05	-0.03	0.00	1.00										
8. Cultural diversity	0.759	0.296	0.28	-0.11	0.12	-0.14	0.05	0.08	0.06	1.00									
9. Internationalization steps	4.676	4.335	0.26	0.05	0.08	0.03	-0.04	0.03	-0.03	0.25	1.00								
10. Product diversity	0.689	0.211	-0.12	0.09	-0.27	-0.10	0.09	-0.28	0.39	-0.29	-0.24	1.00							
11. Level of ownership	0.727	0.196	0.18	-0.17	0.16	0.02	-0.04	0.10	0.08	0.12	0.05	-0.12	1.00						
12. Acquisition	0.449	0.263	0.11	0.14	-0.09	0.01	0.09	0.00	0.05	0.06	-0.08	0.17	-0.16	1.00					
13. Minority	0.043	0.073	0.00	-0.09	-0.10	0.09	-0.04	-0.20	-0.05	-0.14	-0.17	0.14	-0.34	0.13	1.00				
14. Slack	1.932	0.881	0.34	-0.03	0.06	0.00	0.03	-0.11	-0.01	0.13	0.08	-0.02	0.08	-0.02	-0.07	1.00			
15. Capital structure	0.636	0.156	-0.28	0.02	0.00	0.01	0.01	-0.06	0.18	-0.15	-0.17	0.27	-0.13	0.01	0.14	-0.58	1.00		
16. Firm size <sup>a</sup>	15.552	1.507	-0.03	-0.02	-0.16	-0.04	-0.05	-0.09	0.70	-0.01	-0.13	0.39	0.06	0.11	0.01	-0.32	0.52	1.00	
17. Industry mix	0.760	0.310	-0.21	0.11	-0.08	-0.16	0.10	-0.01	0.03	0.29	-0.21	0.02	-0.07	0.20	-0.02	-0.13	0.22	0.09	1.00

Notes:  $p < 0.001$  for values larger than 0.169;  $p < 0.01$  for values larger than 0.133;  $p < 0.05$  for values larger than 0.101.

Mean values and standard deviations are for non-centered variables; centering has no impact on standard errors and correlation coefficients.

Mean values and standard deviations of variable 2, 9, 11, 12, and 13 refer to the entire period. Values of other variables are averages.

<sup>a</sup> logarithm of sales in tsd. €

Table 2. Results of fixed effects regression of firm performance with Arellano robust standard errors<sup>a</sup>

	Model 1 Coeff. SE	Model 2 Coeff. SE
Added product scope per time period × Task-related faultline strength		0.010 (0.006) <sup>+</sup>
Added product scope per time period × Bio-demographic faultline strength		−0.012 (0.006) <sup>*</sup>
Added product scope per time period	0.002 (0.001)	0.002 (0.001) <sup>+</sup>
Added product scope per time period squared <sup>b</sup>	−0.076 (0.038) <sup>*</sup>	−0.081 (0.041) <sup>*</sup>
Task-related faultline strength	−0.086 (0.062)	−0.077 (0.063)
Bio-demographic faultline strength	−0.026 (0.052)	−0.040 (0.050)
Task-related faultline distance <sup>b</sup>	0.000 (0.001)	0.000 (0.001)
Bio-demographic faultline distance	−0.019 (0.018)	−0.014 (0.017)
TMT size	−0.009 (0.004) <sup>*</sup>	−0.009 (0.004) <sup>*</sup>
Cultural diversity	0.067 (0.059)	0.087 (0.060)
Cultural diversity squared	0.072 (0.070)	0.121 (0.069) <sup>+</sup>
Internationalization steps	−0.002 (0.001)	−0.002 (0.001) <sup>+</sup>
Product diversity	−0.070 (0.152)	−0.062 (0.133)
Product diversity squared	0.171 (0.312)	0.224 (0.281)
Level of ownership	−0.029 (0.040)	−0.030 (0.040)
Acquisition	−0.017 (0.020)	−0.022 (0.020)
Minority	0.036 (0.053)	0.040 (0.052)
Slack	−0.005 (0.014)	−0.004 (0.014)
Capital structure	−0.143 (0.085) <sup>+</sup>	−0.132 (0.083)
Firm size	0.018 (0.018)	0.013 (0.018)
Industry mix	0.006 (0.127)	0.031 (0.123)
R <sup>2</sup>	0.106	0.123
F	44.510 <sup>***</sup>	51.900 <sup>***</sup>
N = 376		

Notes: \*\*\* p < 0.001; \* p < 0.05; +p < 0.1

<sup>a</sup> Dummies are omitted.

<sup>b</sup> Parameter estimates and standard errors are multiplied by 10<sup>3</sup>.

strength is positive and significant at p < 0.1. To allow for a better interpretation of the interaction effect, we plotted the interaction (Figure 1) and computed *post hoc* statistical tests based on the analysis with Arellano robust standard errors (Aiken and West, 1991).

First, we calculated the base case using the mean value of all relevant variables. In this case, with a mean value of additional product scope of 4.79, the simple slope is 0.0020 (p < 0.1). As the simple slope of the regression line is conditional on the interaction term, we analyzed how changes in task-related faultline strength affect the slope. With this in mind, we calculated as well the simple slopes for a high level of task-related faultline strength (mean value plus one standard deviation) and a low level (mean value minus one standard deviation) (for a similar approach see Zhou and Wu, 2010). Our results reveal that the simple slope is 0.0032 (p < 0.05) for a high and

0.0009 (p > 0.1) for a low level of task-related faultline strength. This result illustrates the positive interactive effect of task-related faultline strength on the relationship between additional product scope and firm profitability. At a low level of task-related faultline strength, the simple slope is zero at an additional product scope of 5.31 above the mean with the curvilinear relationship between additional product scope and performance reaching its maximum.

Supporting Hypothesis 2, the coefficient of the interaction between bio-demographic faultline strength and added product scope is negative (−0.012) and significant (p < 0.05) in Model 2. Using the mean value of all other variables, we estimated the effect of added product scope per time period on firm performance for two levels of bio-demographic faultline strength—a high level (one standard deviation above the mean) and a low level (one standard deviation below

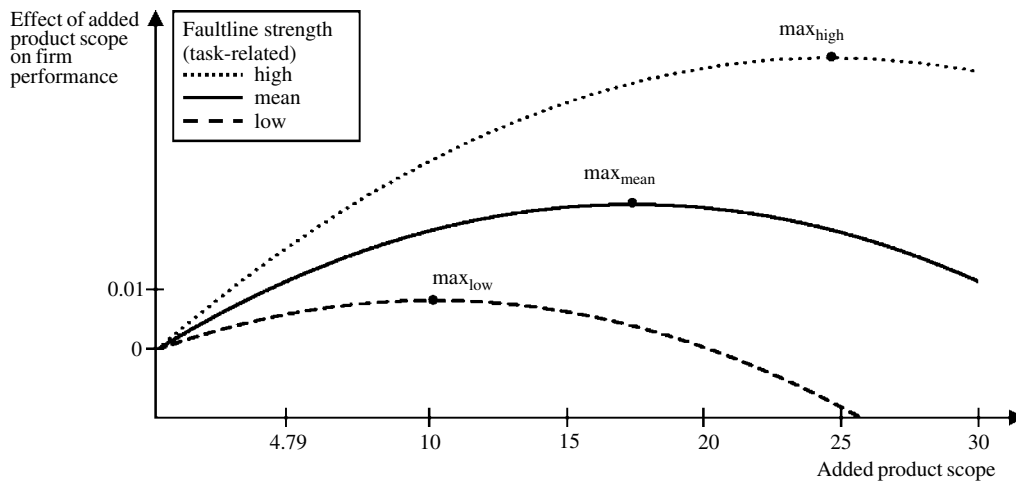


Figure 1. Plot of interaction effect of task-related faultline strength.

the mean). Figure 2 displays the plot of the interaction. When there are weak bio-demographic faultlines in the TMT, the simple slope of added product scope is larger ( $b = 0.0033$ ,  $p < 0.01$ ) than at the average level of bio-demographic faultlines ( $b = 0.0020$ ,  $p < 0.1$ ). However, when bio-demographic faultlines are strong, the simple slope is not significant for firms that add the mean amount of product scope ( $b = 0.0007$ ,  $p > 0.1$ ). At a high level of bio-demographic faultline strength, the maximum of the curvilinear relationship is reached at an added product scope of 9.25. We also perform a robustness test in which we combine task-related and bio-demographic characteristics into a single faultline and find it insignificant. This further corroborates that task-related and bio-demographic faultlines have opposing effects that may offset each other when combined into a single measure.

## DISCUSSION

In this paper, we investigate the impact of product scope expansion on firm profitability. We contribute to the extant literature by examining increases in product scope in a given time period rather than the level of product diversity at a point in time. While other researchers have written about the importance of adopting a dynamic approach given the nature of diversification, few have carried through (Gary, 2005; Ramanujam and Varadarajan, 1989). Our empirical results show that if the rate at which a firm adds product scope

in a period of time, taking into consideration both the number and degree of relatedness of new products in a given time period, is too high, firm profitability suffers. This finding is in line with the Penrose effect, which states that firms that expand too quickly will be unable to properly handle the increased demand for managerial resources related to the complexity of the expansion process and so will experience a slowdown in growth in the subsequent period (Tan, 2003; Tan and Mahoney, 2005).

We identify specific factors that influence the limits of the ability of firms to increase product scope in a given time period, namely task-related and bio-demographic faultlines. We make a distinctive contribution in that we investigate how faultlines within the TMTs that serve during periods of expansion affect their ability to coordinate product expansion successfully and to handle the associated information processing requirements. We show that different types of TMT faultlines moderate the relationship between additional product scope and firm profitability in different ways. Most researchers who have studied faultlines do not explicitly distinguish between different types. However, we contend that our results corroborate our belief that the effect of demographic faultlines depends on its attributes. It is important then for researchers to examine which attributes are used to operationalize faultlines when interpreting findings across studies. Bezrukova and colleagues (2009) propose that faultline strength based on level of education and tenure increases group performance. We too look at the educational background and at the length of organizational tenure

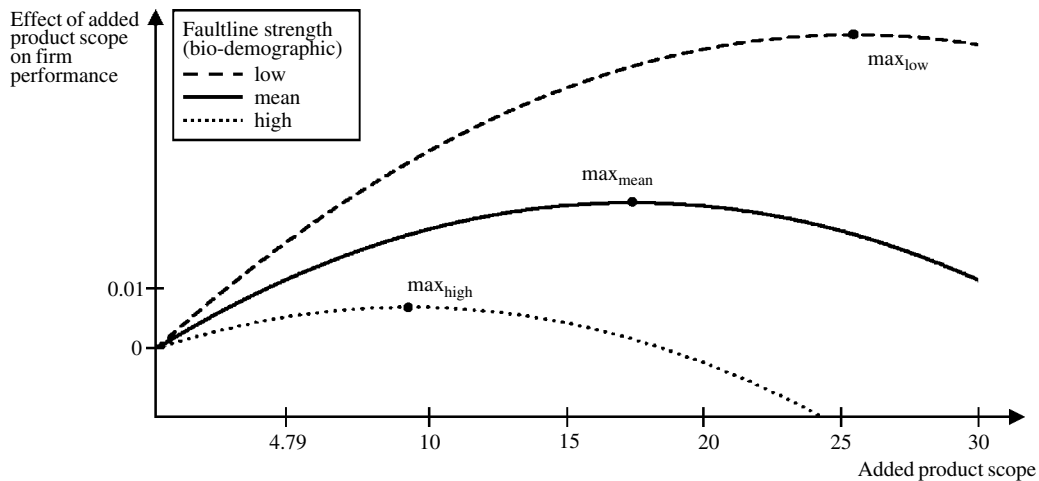


Figure 2. Plot of interaction effect of bio-demographic faultline strength.

of TMT members as these characteristics indicate members' knowledge and perspectives and so how they are likely to approach the task of managing product expansion. We find a significant positive moderating effect of task-related faultline strength on the relationship between the amount of product scope added per time period and firm performance, suggesting that task-related faultline strength helps TMTs during an expansion period to cope with the complexity inherent in expanding into new product areas. Hence, our study makes an important contribution to the TMT literature by empirically showing that, in certain contexts, task-related faultlines may indeed serve as 'healthy divides' (Gibson and Vermeulen, 2003). When such faultlines prompt task-related debate, they affect team information processing and this may positively influence task performance.

When Li and Hambrick (2005) looked at the TMTs of joint ventures, they found that TMTs with faultlines based on the bio-demographic characteristics of age, gender, and ethnicity, and also on length of team tenure, experienced emotional conflicts that negatively affected joint venture performance. Our results, too, indicate that strong bio-demographic faultlines, which we measure looking at age and nationality, can disrupt information processing within TMTs and decrease their ability to cope with complexities. We believe that this is because their strong association with widely shared general stereotypes introduces bias and triggers interpersonal conflict that diverts limited managerial attention away from the task at hand. In line with this, our hypothesis that bio-demographic

faultline strength negatively moderates the link between additional product scope and performance is confirmed.

Our finding of different effects of faultline strength based on different characteristics has important implications for faultline research as it highlights the importance of careful and context-specific selection of characteristics when operationalizing faultlines. We stress that measuring a single faultline based on characteristics that reflect very different aspects of individuals may hinder interpretation of its effect. Moreover, the more characteristics are combined in a single faultline measure the more difficult it is to determine whether an observed effect is driven by a combination of all characteristics or just a subset.

In addition to their implications for research on expansion processes, our results also have relevance for researchers investigating product diversity-performance links from a static perspective, a connection about which, despite a broad range of empirical studies, there is still no consistent picture (e.g., Gary, 2005; Palich *et al.*, 2000). Our results indicate that it is not only the level of product diversity at a certain point in time that has an impact on firm performance but also the process by which it is achieved. Moreover, our findings suggest that the conflicting findings of previous studies might be explained by differences in the ability of TMTs to cope with the complexities of the product diversification process. The managerial relevance of this is clear: When deciding when to initiate and implement expansions, TMTs should carefully weigh their information



processing requirements against their current abilities. In order to do so, it is crucial for the members of TMTs to fully appreciate their capabilities and also the sources of complexity and the information processing requirements of an expansion program. Diversity in the TMT, as measured by faultlines, exerts both positive and negative effects on information processing depending on its type. Our results thus suggest that hiring and promoting top managers whose characteristics increase task-related faultline strength can improve the ability of the team to handle expansions and in so doing improve firm performance. At the same time, an effort should be made to keep bio-demographic faultline strength weak. This does not mean that the TMT should necessarily be made up of persons who are entirely homogeneous in terms of age, nationality, or gender. Teams made up of persons with both similar and dissimilar characteristics may be equally effective. However, clear alignment of bio-demographic differences between groups of top managers should be avoided as this may harm team processes. Or, teams could ask themselves the other way around: in regard to bio-demographics, are we too much divided into homogenous, but different groups in order to perform well in product expansion processes? If so, they should step back and solve the bio-demographics puzzle first. Either way, the results of our study call for a fit between expansion programs and managerial faultlines.

This may be particularly relevant for the firms in our sample. In Germany, as in many other countries, the top management positions of major firms have long been overwhelmingly held by males. Now regulations aimed at increasing the number of females on the TMTs of German firms are under consideration. Gender is but one bio-demographic characteristic. This implies that as CEOs or supervisory boards appoint female top managers, one of the many things of which they should remain mindful is the bio-demographic characteristics of existing team members in an effort to avoid counterproductive faultlines.

## LIMITATIONS AND FURTHER RESEARCH

Throughout this paper, we have written about the members of TMTs. Who are they? Bantel and Jackson (1989) asked CEOs to identify the kinds

of managers who make up the TMTs at their firms, and Michel and Hambrick (1992) considered all managers above the vice-president level to be TMT members. We include all of the members of the German firm equivalent of a management board, the Vorstand. This limits our research as we cannot entirely exclude the possibility of other members of the organization exerting a significant influence on TMT decision making. On the other hand, under German commercial law, all of the members of the Vorstand must be listed in annual reports and so, unlike some other researchers, we have the advantage of being sure that our top managers are identified in a consistent manner. Perhaps even more importantly, Vorstand members are legally and collectively responsible for the management of the corporation. According to Mintzberg (1979: 24), the persons who make up the TMT are those who bear the 'overall responsibility for the organization.' We are confident then that the Vorstand can be taken as the TMT. Our definition led to the inclusion of 6.57 members on average in a team with a standard deviation of 1.97. This is comparable to Bantel and Jackson's (1989) 6.30 members with a standard deviation of 1.64. We also used observable characteristics from archival sources to measure psychological constructs and information processing ability (Hambrick and Mason, 1984), first because they are reliable and objective, and second because this allowed us to gather historical data; crucial given the longitudinal nature of our study. Nevertheless, future studies might complement this kind of approach with data gleaned from surveys or case studies that might more directly measure team dimensions such as processes, communication, and conflict.

We posit that additional product scope is an important source of complexity, and so looked at each step in terms of the firm's product portfolio before it was undertaken. Adding product scope is not the only source of complexity for TMTs. Future research could consider other sources like changes in the business or technological environment (Luo and Peng, 1999), undertaking a program of internationalization (Vermeulen and Barkema, 2002), rapid increases in firm size in general (Mishina *et al.*, 2004) or alternative dimensions of product relatedness, for example those based on similarity of knowledge base (Tanriverdi and Venkatraman, 2005). In the same vein, we only tested how managerial faultlines moderate

the product scope expansion-performance relationship. Future research should examine how these faultlines moderate other expansion strategies-performance relationships, that is, geographic scope expansion. This would lead us to learn more about whether or not faultlines come with different moderating effects for different strategy-performance relationships.

We especially call for further research that examines how the composition of teams may affect their ability to handle different sources of complexity. Another limitation of our study has to do with the timing of expansion steps. Because we relied on annual reports, we know the year of each expansion step but not its exact date and so cannot establish the exact sequence of expansion steps within a particular year. Moreover, we measured expansion steps by the number of subsidiaries established, but do not know their size. We would expect larger expansion steps to be associated with greater complexity. Yet, every expansion step, irrespective of its size, requires the processing of a minimum amount of information and, thus, managerial attention.

That our sample includes only firms headquartered in Germany can also be seen as a limitation. There are several studies that show that a firm's institutional environment may affect the performance of its diversification efforts (Chakrabarti, Singh, and Mahmood, 2007), and others that show that a country's norms and its legal system influence what top managers are able to do (e.g., Hambrick, 2007). For example, CEOs of American firms have more latitude than those of German and Japanese firms and so American CEOs might be expected to have more of an impact on firm performance (Crossland and Hambrick, 2007). Sociocultural norms may influence whether attention is paid to particular differences and the importance attached to specific characteristics (Wiersema and Bird, 1993). For instance, the importance of age, and thus the effect of faultlines based on age, is arguably stronger in Japan than in the United States or Germany. The national context may further influence the effects of team characteristics since variation within the population being studied and sociocultural values may differ across countries (Wiersema and Bird, 1993). For example, it might not have been possible to include a faultline variable based on nationality had we conducted our study based on a U.S. sample. For instance, in a study by Carpenter (2002) that looked at TMTs of

247 large and medium-sized U.S. firms, not one had more than a single foreign national.

Our study indicates the importance of bringing together research done on corporate expansion and that done on TMTs. As TMTs make and implement corporate expansion decisions, they are a crucial contingency factor influencing the outcome of expansion. We believe that the impact of management on expansion processes is a promising area for future research. For example, we focus on added product scope, that is, the number of new product areas entered and their relatedness to existing products, to proxy for the attendant information processing requirements faced by TMTs. Firms may also expand into new geographic markets. Does the geographic, cultural, or institutional distance between the locales in which the firm already does business and newly entered countries give TMTs a like amount of complexity with which to deal (Ghemawat, 2001; Meyer *et al.*, 2009)? Future research might explore the effect of the characteristics of TMT members on international expansion processes and firm profitability. Further research might consider as well alternative outcome variables other than firm performance. For instance, a firm's future growth prospects are likely to be influenced by the ability of its TMT to handle current expansion projects.

In conclusion, our research suggests that a better understanding of the implications for firm profitability of expansion into new product areas requires a dynamic perspective on the role of TMTs. As such, this study takes a step toward a more comprehensive investigation of the performance effect of corporate development processes by showing that task related faultline strength increases performance when diversifying, while bio-demographic faultline strength decreases it.

## ACKNOWLEDGEMENTS

The authors are grateful to the anonymous *SMJ* reviewers for their valuable comments and suggestions, which have significantly improved this article. In particular, we thank Editor Richard A. Bettis for his extremely constructive and developmental guidance throughout the review process. We also thank *SMJ* Managing Editor Lois Gast for the smooth handling of the editorial process.

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