STRATEGIC ORGANIZATION Vol 6(1): 47–81
DOI: 10.1177/1476127007087153

http://so.sagepub.com

Performance effects of firms' expansion paths within and across industries and nations

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Abstract

This article contributes to the emerging discussion on the diversification–performance relationship from a dynamic perspective. The research focuses on the ability of firms to handle complexity associated with added product scope during a period of time and the effect this may have on performance. The authors hypothesize that firms undertaking expansion steps during a given period of time, involving a higher level of added product scope, and those that expand into unrelated industries in an irregular fashion, i.e. with a higher variability, will gain less from expansion. Likewise, the authors hypothesize that if the degree of expansion steps involving internationalization is higher or shows more variance, firms will gain less from expansion. These hypothesized relationships are tested using detailed longitudinal data on 3503 expansion steps undertaken by a panel of 91 German firms, whose expansion programs have been tracked for periods ranging between five and 20 years.

Key words • diversification • expansion path • longitudinal analysis

Introduction

The impact diversification has on performance is one of the most prominent subjects in the field of corporate strategy (Palich et al., 2000). However, empirical studies have to date produced inconclusive results (e.g. Datta et al., 1991; Palich et al., 2000; Martin and Sayrak, 2003). Studies covering this topic have mostly analyzed the issue from a cross-sectional perspective – i.e. analyzing the relationship between a firm's status at a certain point in time (level of diversity) and firm performance. The performance impact of the way in which firms diversify and reach their level of diversity has received little attention. Since the diversification phenomenon is of a dynamic and path-dependent nature itself (e.g. Kim and Kogut, 1996) and diversification profiles change extensively over short periods of time (Gary, 2005), scholars started to question the possibility of gaining new insights from this static perspective and asked for dynamic theorizing and empirical investigation (e.g. Ramanujam and

Varadarajan, 1989; Gary, 2005). After decades of research, Gary was still claiming that 'there is clearly a need to build a richer theory about diversification . . . capturing the dynamic nature of diversification profiles' (Gary, 2005: 644).

A first approach to analyze the dynamic nature of the diversification phenomenon has been the investigation of the relationship between *single* diversification steps and firm performance. Scholars, for example, analyzed the performance impact of corporate refocusing steps (e.g. Hoskisson and Johnson, 1992; Markides, 1992; Johnson, 1996) or expansion through acquisition steps (e.g. Singh and Montgomery, 1987; Barkema and Vermeulen, 1998; Chatterjee and Singh, 1999). However, this kind of research has treated single expansion steps as isolated events. In reality, however, the expansion path may consist of multiple expansion steps. Firms face challenges along their expansion path (e.g. Penrose, 1959; Cyert and March, 1963; Mahoney and Pandian, 1992) that result from the fact that multiple steps are taken in parallel, and which affect the performance impact of expansion (Markides, 1992; Palich et al., 2000). In addition, the irregularity of expansion steps may impact firm performance since irregularity challenges firm resources that are necessary to cope with expansion.

Therefore, this article deals with the diversification phenomenon from a dynamic perspective. We analyze how added product scope and degree of internationalization of *multiple expansion steps* affect the performance impact from those multiple expansion steps. Traditional research argues that a firm has more difficulties coping with an unrelated expansion step than with a related one. Therefore, many studies report better performance implications for a related expansion step (e.g. Healy et al., 1992; Flanagan, 1996; Anand and Singh, 1997). Considering not only *one* expansion step but rather a firm's expansion *program* over a certain period, however, it is of interest what the cumulated impact of multiple steps with potentially varying relatedness is. A single expansion step is part of an expansion program. Therefore, we look at the impact that the additional scope of the expansion program has rather than the impact of the additional scope of single, isolated steps. Second, we look at how the irregularity of the expansion program impacts firm performance.

With this article, we intend to test the aforementioned setting and want to point out that a firm's performance at a certain point in time is dependent on both the rate of expansion and the way it has expanded before. We use longitudinal data on 3503 expansion steps undertaken by 91 German companies within and across industries. We tracked expansion steps for periods ranging between five and 20 years.

Background

Complexity from expansion within and across industries

When analyzing the expansion of firms, research mostly focuses on the benefits a firm can realize with each expansion step by combining and leveraging

resources and capacities (e.g. Hill et al., 1992; Markides and Williamson, 1994; Palich et al., 2000). However, firms also face challenges along the expansion path (e.g. Penrose, 1959; Markides, 1992; Palich et al., 2000). In the following, we argue that the complexity from expansion a firm faces along its expansion path, as well as its distribution, restrict a firm's ability to benefit from expansion.

The expansion process is a complex task since it is associated with the replication, addition and recombination of existing routines (Nelson and Winter, 1982). This results from the disruption of tacit coordination mechanisms for routines (Mishina et al., 2004). Even expansions within industries are challenging. Managers have to identify and evaluate different expansion opportunities as well as to manage their implementation. They have to invest time and attention in recruiting, training, and assimilating new managers (Penrose, 1959). On the other hand, if the firm expands across industries, existing routines may have to be recombined or new ones may have to be built, making it more complex and difficult. Managers expanding into new fields will be confronted with environmental settings that may differ from those of the established business(es). They must learn to deal with different customers, compete against new rivals and execute different processes. Hence, they must gain new operational and market knowledge, and must become able to interpret strategic signals from the new environment. New knowledge can be acquired through experimental learning by doing. The learning process can be supported by existing knowledge, however the less similar the new situation is to the settings a firm has already experienced, the less feasible it is that there will be positive knowledge transfer and application of appropriate behavior (Cohen and Levinthal, 1990; Haleblian and Finkelstein, 1999; Finkelstein and Haleblian, 2002). Stern and Henderson (2004) argue that effectively transferring knowledge between two businesses is unlikely unless their external environments are similar. If the newly established entity is in an industry in which the firm is not yet active, it will be difficult for managers to understand and interpret unfamiliar knowledge and routines and so absorb and apply previous experience (Huber, 1991; Barkema et al., 1997; Vermeulen and Barkema, 2001). Consequently, when expanding into new industries dissimilar from those in which the firm is already active, managers have to acquire additional and specific knowledge about the new industry. Acquisition of such knowledge is complex and requires time. Even acquiring an entity in a new industry or new country and keeping it independent includes difficulties. It is not that challenges from changing routines in the target firm but rather from understanding and controlling it.

Another challenge when expanding a firm stems from the potential need to change structures, systems and processes to new settings (Chandler, 1962; Smith et al., 1985; Bettis and Hall, 1986; Hill and Hoskisson, 1987; Hoskisson, 1987; Kazanjian and Drazin, 1987). For example, it may be necessary to adapt reward systems, methods of decision-making and mechanisms to monitor, control and coordinate the workforce (Markman and Gartner, 2002). When expanding into new environments, administrative diseconomies of coordination and control

might arise (Coase, 1952; Pondy, 1969; Williamson, 1985). Calvo and Wellisz (1978) report about control and effort losses as firms diversify. Similarly, Hoskisson et al. (1991) argue that excessive diversification can lead to a loss of control and misallocation of corporate resources. Leontiades and Tezel (1981) show that at a higher level of diversity firms spend more time on corporate-level planning. Organizational systems tend to be more similar within a given industry than across industries (Balkin and Gomez-Mejia, 1999; Finkelstein and Haleblian, 2002). Thus, existing knowledge about an environment may support effective integration of processes and, as a consequence, reduce the potential for conflict within organizational systems (Finkelstein and Haleblian, 2002). When firms consist of both related and unrelated entities, inconsistent control systems may emerge, leading to increased complexity within a firm (Hill and Hoskisson, 1987; Hill et al., 1992; Hoskisson and Johnson, 1992). But even expansion within environments that the firm is already active in creates costs. While expanding its hierarchical structure, a firm faces higher information processing and transferring difficulties, coordination costs, as well as intrinsic diseconomies of scale (Williamson, 1967; Keren and Levhari, 1983; Markides, 1992).

Constraints to handling complexity from expansion within and across industries and performance impact

So far we have discussed that a firm has to handle challenges associated with the expansion process. More expansion steps as well as lower relatedness of new expansions compared to established businesses are more difficult to handle. Furthermore, a firm is limited in its ability to do this. On the one hand, managers suffer bounded rationality and information-processing limits (March and Simon, 1958; Simon, 1959). On the other hand, only a fraction of available managerial resources can be used for the execution of expansion (Penrose, 1959). It has been shown that the complexity of expansion taxes available resources beyond their capacity (Mishina et al., 2004; Gary, 2005) and that this leads to diminishing performance and failure in subsequent periods (Gary, 2005; Tan and Mahoney, 2005). Managers confronted with more complexity will pay less attention to each individual task, leading to reduced thoroughness (Gary, 2005) and, as a consequence, coordination bottlenecks and quality problems result (Levitt et al., 1999; Oliva and Sterman, 2001). Managers will make premature decisions that will be hard to reverse (Stinchcombe, 1965). Moreover, the amount of complexity a firm can successfully absorb (Cohen and Levinthal, 1990) within a given period of time is limited (Vermeulen and Barkema, 2002) as the diversifying firm suffers 'time compression diseconomies' (Dierickx and Cool, 1989). If the experience comes faster, which happens, for example, if there are more expansion steps into new industries in a given period of time, and hence intervals between expansion steps are short, a firm is not able to absorb lessons learned and consolidate them for utilization in the future (Eisenhardt and Martin, 2000; Hayward, 2002). A similar line of argumentation

is drawn in the ecology literature. Scholars in this stream of research argue that change – which is created to a certain extent while expanding – can be hazardous. According to Amburgey et al. (1993), change makes firms struggle to adapt strategies, internal operational and administrative processes and/or external ties and relationships. Thus, due to disruptions of both internal routines and external linkages (Hannan and Freeman, 1984), change decreases efficiency, increases failure and adversely affects performance (Haveman, 1992; Miller and Chen, 1994; Greve, 1999; Audia et al., 2000). The criticality and impact of change is driven by two factors. On the one hand, changes affecting the non-core or periphery structure do not produce the same magnitude as core changes do. On the other hand, the impact depends on how many changes occur per unit of time. Change can be seen as resetting the liability-of-newness clock. Problems associated with disruption can be repaired after enough time passes. However, if change takes place too often, this recovery may never occur (Amburgey et al., 1993). In summary, we argue that more product scope along the expansion path is more difficult to manage and negatively impacts the relationship between a firm's rate of expansion and its performance.

Distribution of complexity from expansion within and across industries and performance impact

We further argue that besides the magnitude of complexity from expansion within and across industries during a given period of time, its distribution also has an impact on firm performance. If two companies face the same complexity from expansion over a given period of time, there is a difference in whether the expanding firm is exposed to a regular level of complexity or whether there are peaks and periods of idleness, which confront the firm with higher or less exposure to its resources (Vermeulen and Barkema, 2002). This can be reasoned using the concept of absorptive capacity. Over time, a firm's absorptive capacity is not necessarily constant (Cohen and Levinthal, 1994), but is rather influenced by the extent of its usage (Vermeulen and Barkema, 2002). Vermeulen and Barkema (2002) argue that peaks of utilization can reduce a firm's absorptive capacity. The amount of expansion a firm can successfully transform into useful learning within a given period of time is limited (Vermeulen and Barkema, 2002) and the diversifying firm suffers 'time compression diseconomies' (Dierickx and Cool, 1989). The firm can only handle certain amounts of complexity within a given time period and expanding too rapidly, which is expressed by peaks, may lead to overload and a reduction of the firm's absorptive capacity (Simon, 1959; Huber, 1991). In addition to peaks of complexity, idleness reduces absorptive capacity as well (Cohen and Levinthal, 1990; Eisenhardt and Martin, 2000). Firms facing lower absorptive capacity are less able to further absorb complexity because they are less able to interpret and assess it. This impacts the effectiveness of the diversification process and firm performance.

Hypotheses

Expansion rate

It has been pointed out that expanding firms can realize a number of benefits with each expansion step (e.g. Seth, 1990; Palich et al., 2000). Among the most important are the potential to combine and leverage resources and capabilities by sharing knowledge and assets between new and already existing businesses, yielding economies of scale and scope (e.g. Teece, 1980; Hill et al., 1992; Nayyar, 1992; Markides and Williamson, 1994). However, there are not only benefits that can be realized with each expansion step but there are also costs. Each expansion step is associated with a certain amount of complexity. The more expansion steps a firm takes on per period, the higher the complexity it faces. The ability of a firm to handle complexity arising from expansion steps differs depending on its size. Thus, the effect of complexity due to number of expansion steps per period depends on the number of entities a firm already owns and is therefore indicated by the expansion rate. However, a firm needs a certain amount of time to successfully cope with the complexity from expansion. Managers need time to evaluate the new experience, assimilate it and apply it to commercial ends (Cohen and Levinthal, 1990; Vermeulen and Barkema, 2002). Thus, an expansion process that is too fast, i.e. where the expansion rate is too high, leads to the emergence of diseconomies of time compression (Dierickx and Cool, 1989). This makes it even more difficult to develop and consolidate new specific knowledge and capabilities (Hayward, 2002) and thus leads to impaired firm performance (e.g. Penrose, 1959; Mishina et al., 2004; Gary, 2005). Therefore, if a firm expands too fast, the cost of complexity associated with these steps can outweigh their benefits. Thus, we hypothesize:

> **HYPOTHESIS 1** Everything else constant, the function between expansion rate and firm performance is inverted U-shaped.

Interactive effects of added product scope of expansion and degree of internationalization

In our first hypothesis, we argue that there is a certain amount of complexity associated with an expansion step and a firm faces higher complexity when executing more expansion steps. However, different expansion steps are not necessarily associated with the same amount of complexity. For firms expanding into new product markets, the difference in complexity is mainly driven by the degree of familiarity or lack of familiarity (unrelatedness) to already existing businesses. Thus, the amount of complexity an expanding firm has to handle in a given time period depends not only upon the number of expansion steps it is executing within this time period but also upon their associated levels of unrelatedness to already existing businesses. We label this complexity added product scope of expansion.

If a firm expands across industries and enters distant fields, it faces new, unfamiliar settings. Managers need new knowledge and capabilities specific to

the new industry. They have to understand critical success factors of the new business and might have to learn new business logics (Prahalad and Bettis, 1986) in order to avoid value destruction. Accordingly, a firm has to cope with higher complexity when expanding into new businesses. Acquisition of the requisite new knowledge and capabilities can be supported by existing knowledge and experience that has been garnered during previous expansion steps (e.g. Fiol and Lyles, 1985; Huber, 1991). Clearly, managers have more knowledge about related industries than about unrelated ones (Park, 2003) and this being the case, existing knowledge will be of less use the more dissimilar the setting is from settings the firm has experienced before (Cohen and Levinthal, 1990; Haleblian and Finkelstein, 1999). Hence, the greater the degree of unfamiliarity of the new business and so its unrelatedness to the existing business portfolio of the firm, the more new knowledge must be gained and so more time is needed. Consequently, all other things being equal, the lower the relatedness between the new and the already existing businesses and hence the higher the added product scope per period, the greater the complexity to be handled and the more business-specific knowledge must be developed.

Moreover, the new business has to be integrated into the firm. Therefore, a firm's systems, processes and structures have to be adapted to the new settings (Calvo and Wellisz, 1978; Smith et al., 1985). Since organizational systems tend to be more similar within a given industry (Balkin and Gomez-Mejia, 1999; Finkelstein and Haleblian, 2002), lower product scope of expansion reduces the conflict potential in organization systems and diseconomies of coordination and control (Coase, 1952; Pondy, 1969; Williamson, 1985; Finkelstein and Haleblian, 2002).

Like the complexity stemming from expansion into unrelated product markets, firms must also cope with additional complexity when the expansion step involves internationalization. A firm that expands into other countries is an outsider (Hennart, 2005) that has to set up operations in an unfamiliar environment that differs from its home turf in terms of social, legal and economic structures (Wagner, 2004). Managers must interact with people who have different values and attitudes and the firm needs to adapt management practices to the specific national culture (Newman and Nollen, 1996). Managers of the expanding firm need to learn to do business in that new setting. They must especially learn about local habits and preferences and other external conditions influenced by national culture (Barkema et al., 1996). Expatriate managers have to adjust to their new environment and their new task (e.g. Sunkyu et al., 2001; Bhaskar-Shrinivas et al., 2005). Moreover, internationalization adds still further complexity as new subsidiaries have to be integrated into the overall network of the company. Therefore, structures, systems and processes have to be adapted to specific national settings (e.g. Newman and Nollen, 1996). In summary, overseas expansion projects are associated with additional complexity. Consequently, a firm that is expanding with a higher degree of internationalization, i.e. conducting more of its expansion steps abroad, faces more complexity leading to a higher strain on managerial resources. This higher strain on managerial

resources in turn has a negative impact on the relationship between expansion rate and firm performance. Therefore, our hypotheses are:

HYPOTHESIS 2A Everything else constant, the higher the added product scope of expansion a firm faces during a given period of time, the greater its negative impact on the relationship between expansion rate and firm performance.

HYPOTHESIS 2B Everything else constant, the higher the degree of internationalization of expansion steps a firm conducts during a given period of time, the greater its negative impact on the relationship between expansion rate and firm performance.

Volatility of added product scope of expansion and degree of internationalization

In addition to the amount of complexity per unit of time, the distribution of this complexity itself can be a reason for reduced firm performance. It is a difference in whether product scope of expansion is equally distributed over a period or whether there are peaks and periods of less exposure. Both peaks of exposure due to a relatively high level of product scope of expansion, as well as relatively low levels of product scope of expansion, lead to reduced absorptive capacity (e.g. Cohen and Levinthal, 1990; Huber, 1991; Eisenhardt and Martin, 2000; Vermeulen and Barkema, 2002). On the one hand, high levels of product scope at a certain point in time signify high complexity due to the rapidity and extent of expansion. The diversifying firm expands with many steps at the same time and/or into very unrelated fields of businesses. The firm is not able to absorb new settings and successfully transform it into useful learning (Vermeulen and Barkema, 2002). Moreover, it suffers time-compression diseconomies sooner (Dierickx and Cool, 1989). On the other hand, low levels of product scope at a certain point in time signify low expansion activity in terms of number and unfamiliarity of businesses. Infrequent experience can lead to forgetting previously learned lessons (Eisenhardt and Martin, 2000). If long time intervals lie between subsequent expansion steps, experience gained in earlier steps might not be available for the new step (Nelson and Winter, 1982; Eisenhardt and Martin, 2000; Hayward 2002). The same holds true if a firm is rarely expanding into unrelated fields of business, since routines for exploration (e.g. March, 1991) have either not been developed or have already been forgotten.

In summary, the higher the volatility of complexity from added product scope of expansion, the more absorptive capacity is reduced and the sooner time-compression diseconomies appear, compared to firms regularly facing complexity from product scope of expansion (Dierickx and Cool, 1989; Vermeulen and Barkema, 2002). Therefore, an expansion path in which the firm is confronted with a stable level of complexity from added product scope of expansion should be more beneficial than an unbalanced expansion process.

Accordingly, we argue that firms facing higher volatility of complexity from the degree of internationalization face time-compression diseconomies sooner and are more likely to be confronted with reduced absorptive capacity. Therefore, an expansion path in which the firm is able to deal regularly with complexity from internationalization should be more beneficial than an irregular expansion process. Moreover, firms characterized by high volatility of the degree of internationalization are irregularly engaged in internationalizing. To put it another way, firms expanding with a higher volatility in degree of internationalization show a lower consistency in their mix of setting up national and international new entities. In an extreme case, in one year such firms set up all of their new entities abroad whereas in the subsequent year they only conduct national expansions. The drawback of such irregular patterns can be explained based on the literature of organizational learning (e.g. Levitt and March, 1988; Huber, 1991). Such behavior complicates specialized learning. Experience gained from past actions will not be available for further application since infrequent experience and long time spans between actions promote forgetting previously learned lessons (e.g. Nelson and Winter, 1982; Eisenhardt and Martin, 2000; Hayward, 2002). Thus, a firm can benefit less from past actions and from potential efficiency gains (e.g. Argote et al., 1990). We hypothesize:

HYPOTHESIS 3A Everything else constant, higher irregularity in added product scope of expansion during a given period of time will negatively affect firm performance.

HYPOTHESIS 3B Everything else constant, higher irregularity in degree of internationalization during a given period of time will negatively affect firm performance.

Methodology

Data and sample

Sample

To test our hypotheses, we collected longitudinal data on the expansion path of 91 German companies listed on the German Stock Exchange from 1985 to 2004. We started our sample selection with all companies that had been included in the exchange's HDAX index[1] during at least one point in time between the initial composition of this index in 1994[2] and the end of 2004. We chose this approach to capture companies that were excluded from the index as well as companies that were established or grew and so were included. From the resulting list of 195 companies, we eliminated all financial institutions, real estate companies and purely financial holdings, a total of 34 companies. We also excluded retailers, another 15 companies, and 11 cross-listed non-German firms (e.g. Vermeulen and Barkema, 2002).[3] Among the remaining 135

companies, there were 30 that had gone bankrupt, merged with other firms or been taken over and so they could not be contacted directly. We contacted all of the 105 companies remaining and requested historical annual reports dating back to 1985. Moreover, we tried to compile historical annual reports for both active and non-active companies from different public sources. However, many companies were not able to provide their reports for time periods prior to the mid-1990s and public sources were sometimes fragmentary. Moreover, we could hardly obtain annual reports for companies that had gone out of business. We ended up with 91 companies, some of which were still active and others that had gone out of business during our period of analysis, but for which we were nonetheless able to compile annual reports for a satisfactorily long enough period of time (at least five years).

Possible sample bias

In our approach to sample selection, we attempted to avoid a possible survivor bias. In contrast to other studies with a similar approach to data collection, we attempted to include surviving as well as non-surviving firms. While we were able to include a considerable number of non-surviving firms, nonetheless we were constrained by data availability and so were able to gather data on only 11 of the 30 non-surviving companies. Hence, although we tried to avoid a potential survivor bias by our approach to data collection, we still have a difference in percentages of non-surviving firms between our final sample of 91 companies and the sample of 135 companies for which we tried to obtain annual reports (12 percent of non-surviving firms in the first, 22 percent in the latter). Therefore, we gathered financial data for both included as well as excluded firms from different financial databases (Compustat, Thomson Financial) and conducted a means test (see Carpenter and Fredrickson [2001] for a similar procedure). This test indicated that the excluded firms did not significantly differ from the sample firms in any of the variables we were able to compile (number of employees, total liabilities, total assets and earnings before interest and taxes [EBIT]).

Data collection

In this study, we analyzed individual expansion steps taken by the sample companies during the period of analysis. We define an expansion step as a majority or full investment made by the firm into an organizational entity in which it had no, or a minority, equity.[4] Thus, we included only investments into majority-owned entities. We extracted data on new subsidiaries from the annual reports of the firms (Barkema et al., 1996, 1997; Vermeulen and Barkema, 2002). We included all new affiliates, regardless of whether they were greenfield investments/acquisitions, as well as domestic/foreign subsidiaries. Moreover, we collected a complete list of subsidiaries during the first year a firm was included in our panel. We also tracked all disinvestments of subsidiaries, so that we were able to determine the complete portfolio of subsidiaries for each year a firm is included in our panel, as well as all changes to this portfolio within the time the

firm is included. We sourced this information originally from announcements of expansion steps and dissolutions in the management report of the annual report, as well as from changes in the list of affiliates reported in its appendix. Since the HGB, the German accounting standard, requires companies to report all affiliates in which they own at least 20 percent,[5] we were able to create a comprehensive database of expansion steps. This complex and time-consuming approach of extracting expansion steps from annual reports was necessary, as similarly comprehensive data are not available for German companies from any commercial database. After having collected these data, we checked them using two sources. First, we compared the information on acquisitions that we had gathered with information on acquisitions from the Thomson One Banker Deals database. This showed that we had missed no acquisition that was included in that database and that indeed our data were more comprehensive than the data found there. As acquisitions are only a subset of the expansion steps undertaken by the firms in our panel, we contacted the companies again and asked them to verify our data. Eight companies were willing to check our data for completeness and accuracy. This check revealed that we had only missed some minority holdings, but had included all investments into majority-owned entities. In the end, we were able to track a total of 3503 expansion steps, of which 1996 were acquisitions and 1507 greenfield investments. We found that 2124 new affiliates, 61 percent of the total, were located abroad. On average, companies conducted 3.6 expansion steps per year.

Variables

Dependent variable

Our dependent variable is *firm performance*. We used return on assets (RoA) as our primary performance measure.[6] The measure was constructed by taking a three-year moving average to exclude effects from creative accounting to a certain extent. In order to test the robustness of our results, we also estimated models using Tobin's Q as a market-based performance measure, which is a common operationalization of performance in diversification research (Palich et al., 2000). Tobin's Q was computed as the following ratio: (market value of common stock + book value of preferred stock + book value of debt)/book value of total assets (e.g. Miller, 2004). Assuming that capital markets are sufficiently efficient (Fama, 1970), changes in market value of common stock, and thus Tobin's Q, further represent the expected long-term success of expansion decisions (Malkiel, et al., 1979; Khanna and Palepu, 2000; Miller, 2006).

Independent variables

The variable *expansion rate* was measured as the number of expansion steps in a certain period of time divided by the number of entities the firm owns at the beginning of that period. We used this relative variable to account for different abilities of firms to absorb new entities depending on their size.

The product scope of a given expansion step measures the degree of product market expansion and thus the relatedness of that expansion step to the business portfolio of the expanding firm. We measured relatedness using four-digit SIC-codes. In order to capture the scope of product expansion, we applied a measure already used by Haleblian and Finkelstein (1999) and adapted it to our requirements. Whereas Haleblian and Finkelstein (1999) used the measure to capture the relatedness between two acquisitions, we use it to capture the complexity from unrelatedness involved in one expansion step. Since less relatedness is associated with higher complexity, the measure fulfils our requirements. We compared the four-digit SIC-code(s) of the expansion step with those of the existing businesses and constructed a weighting scheme.[7] Matches on more levels of the SIC-code indicate higher relatedness and hence lower complexity. Thus, in order to measure complexity, greater weight was assigned to any case of no match, followed by one-digit SIC-code matches, two-digit and then three-digit matches, indicating that a no-match case has the lowest relatedness and hence the highest complexity. For the calculation of the product scope of expansion, we applied the following weighting scheme: we assumed a linear increase in complexity over different SIC-code matches. If the SIC-code(s) of the new expansion step and those of the firm's already existing businesses matched, the expansion step was assigned a 1 at the three-digit level, a 2 at the two-digit level and a 3 at the one-digit level.[8] A no match was assigned a score of 4. Thus, the higher level of complexity associated with unrelated businesses was assigned a higher score. A match at the four-digit level was assigned a score of 0, since the basic level of complexity from a step has already been captured with the variable expansion rate.

To measure the amount of *added product scope of expansion* within a given time period, we summed up the complexity scores of all expansion steps within the period of analysis. This procedure is visualized in Figure 1. The sample firm represents the average firm of this study that expands with 18 steps and an added product scope of expansion of 6 per five-year period. In year 1, the sample firm expands with four expansion steps, each in an industry where it has already been active (added product scope = 0). In the second year, it expands with two steps – one matching at the two-digit level and the second matching at the one-digit level (added product scope = 5). In year 3, it does not take expansion steps, whereas it expands with eight and four steps in years 4 and 5, respectively. One of these steps matches at the three-digit level, whereas all other steps are into industries where the firm is already being active (added product scope = 1). Over five years, the complexity scores of the 18 expansion steps sum up to the added product scope of expansion of 6. We decided to measure added product scope over a period of five years, since it can be assumed that single expansion steps are completed in less than five years (Pennings et al., 1994). Thus, we argue that the main part of costs due to complexity and benefits associated with expansion steps of the period accrue in this period. Moreover, the time horizon of strategic plans of managers is typically up to five years long (Grant, 2003).

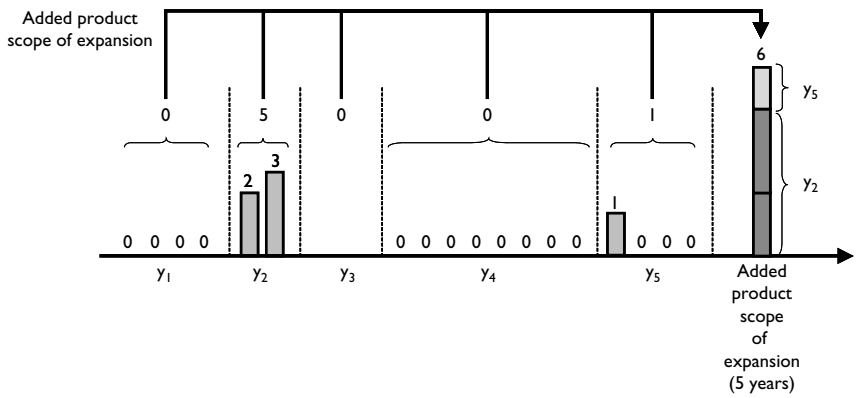


Figure 1 Example of construction for variable added product scope of expansion

Although the measurement of relatedness using measures based on SIC classification is common practice in strategic management research (e.g. Palepu, 1985; Morck et al., 1990), the use of these measures has been widely criticized (Nayyar, 1992; Farjoun, 1994; Robins and Wiersema, 1995; Silverman, 1999). To overcome this criticism, several scholars have constructed alternative measures that are closer to the concept of relatedness and thus have better content validities (e.g. Farjoun, 1994; Robins and Wiersema, 1995; Fan and Lang, 2000). In response to these criticisms, we followed two alternative approaches to measure relatedness presented by Fan and Lang (2000) and Robins and Wiersema (1995). Based on their approaches, we constructed alternative measures for added product scope of expansion, a vertical relatedness and a measure of complementarity based on Fan and Lang, as well as a measure of technology based on Robins and Wiersema.[9]

We calculated *degree of internationalization* as the percentage of expansion steps into foreign geographic markets over all expansion steps within the period of analysis.

The distribution of the product scope along the expansion path was captured as a volatility measure. *Volatility of added product scope of expansion* during a given period of time was defined as the standard deviation of the yearly values of the variable over the time of analysis.

Volatility of degree of internationalization during a given period of time was measured as the standard deviation of the number of international expansion steps per year within the period of analysis. To account for different numbers of total expansion steps per year, we applied the formula:

$$\sqrt{\frac{\sum_{i=1}^{n} \#\ total\ steps\ year_i * \left[\frac{\#\ \text{int.}\ steps\ year_i}{\#\ total\ steps\ year_i} - \frac{\sum_{i=1}^{n} \#\ \text{int.}\ steps\ year_i}{\sum_{i=1}^{n} \#\ total\ steps\ year_i}\right]^2}{\sum_{i=1}^{n} \#\ total\ steps\ year_i}},$$

with n = number of years in period of analysis

Control variables

We employed several sets of control variables. First, we controlled for size effects. Size was measured as the average of the sales (in million euros) at the beginning of each year during the period of analysis. Second, we used the level of product diversity operationalized as the average of the entropy measures during the respective period of analysis to control for possible effects of the status of diversity the company had already reached. We calculated the level of product diversity by applying the entropy measure by Palepu (1985). We also entered the square of this measure to capture non-linearities (e.g. Palich et al., 2000). Third, we introduced the control variable capital structure operationalized as the debt ratio of the firm, which is defined as total liabilities to total assets in the specific year. We also measured it as an average during the period of analysis. Financial leverage may influence a firm's ability to invest in new entities and may relate to a firm's performance (Jensen, 1986). Fourth, we controlled for the degree of acquisition. A firm can either acquire an existing entity or build a new one from scratch (Barkema and Vermeulen, 1998). This control is relevant since learning effects might occur if a firm repeats a specific entry mode and thus the choice of one expansion mode may be related to firm performance (e.g. Barkema et al., 1997; Barkema and Vermeulen, 1998; Haleblian and Finkelstein, 1999; Hayward, 2002). We calculated this measure as the percentage of expansion steps exercised by acquisitions on all expansion steps in the period. We also entered the square of this measure. Fifth, we controlled for the level of ownership. Several studies have found both positive and negative influences associated with this factor. If firms execute their international expansion projects supported by a partner, they might be able to reduce the managerial resources needed, if they can tap the location-specific knowledge of the partner. On the other hand, increased coordination and control efforts might be needed in an equity alliance which might require more managerial resources than an expansion without a partner (e.g. Kogut, 1988; Pennings et al., 1994; Lyles and Salk, 1996). Level of ownership was calculated as the average percentage of ownership in all expansion steps the firm conducted during the period of analysis. Sixth, we introduced the variable *slack* to account for different availabilities of excess resources to handle expansion. Lead by the research of Bourgeois (1981), we measured available slack with data retrieved from the balance sheet of the firms. We used the current ratio that measures the extent to which current assets cover current liabilities as a proxy for financial slack (e.g. Cho and Hambrick, 2006; Herold et al., 2006). Seventh, since the estimated effects may change over time, we also included year dummy variables.

Analysis

We computed our variables for moving five-year periods for the companies in our sample. Thus, we had 434 observations, the number of companies times the number of consecutive time periods in our panel, for which the whole set of variables were available.

Since the use of ordinary least squares (OLS) without any specification to estimate panel data, i.e. sampling observations from a single company over more time periods, may result in biased estimates (e.g. Bergh, 1993a, 1993b; Greve and Goldeng, 2004), we used several specifications. First, we used a fixed-effects model to control for unobserved heterogeneity (e.g. Greene, 2003; Greve and Goldeng, 2004). The application of Hausman's specification test led us to the use of a fixed-effects model as the assumption of random-effects models, namely that the firm-level random effects are not correlated with the other regressors, was violated ($p < .001$) (Hausman, 1978). Fixed-effects models control for all constant unmeasured differences across firms that may explain differences in the dependent variable.[10] We applied the xt-functionality of Stata to model fixed effects.[11] Second, a modified Wald statistic for group-wise heteroscedasticity in the residuals (Greene, 2003) suggested that heteroscedasticity affects our fixed-effects models ($p < .01$). Therefore, when estimating our models we applied Huber/White/Sandwich estimators of variance in order to improve the efficiency of estimators and to reduce heteroscedasticity problems (White, 1980). Third, to test for serial correlation, we used a test for panel data models discussed by Wooldridge (see Wooldridge, 2002). This test gave no evidence of serial correlation.

Moreover, our hypotheses include simple and interaction terms. Based on suggestions by Aiken et al. (1991), we mean-centred all continuous independent variables in models that have been used to test interactions. This facilitated interpretation of our model coefficients and mitigated possible collinearity problems typically associated with interaction terms.

Results

Table 1 shows the descriptive statistics for all variables as well as the correlations between them. The firms in our sample are relatively large with average sales of €7.8 billion. The pooling of data primarily explains the high standard deviation, though some firms showed high growth rates during the sample period resulting in a high variance. Firm-specific differences result in high standard deviations for the other variables. Thus, the companies in our sample show relatively heterogeneous expansion patterns. On average, they expanded with 18.1 new establishments per five-year period, though some did not expand at all during this time interval and others started or acquired many new entities – up to 177. Some companies in the sample more than doubled their initial number of subsidiaries – in one case a 10-fold increase – and on average, they increased their initial base of entities by 37 percent per five-year period. Expanding firms owned 87.8 percent of their new entities and 60.2 percent of expansion steps were international. The average performance of our sample firms was a 5.95 percent RoA.

Table 1 Descriptive statistics and correlations[a]

Variables	Mean	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Return on assets	0.06	0.08	1.00											
2. Expansion rate	0.37	0.40	−0.03*	1.00										
3. Added product scope of expansion	5.93	13.07	−0.10*	0.23	1.00									
4. Degree of internationalization	0.60	0.31	−0.14***	−0.10	−0.13**	1.00								
5. Volatility added product scope of expansion	2.01	2.41	−0.64	0.26***	0.31***	0.05	1.00							
6. Volatility degree of internationalization	0.18	0.13	−0.23**	0.00	−0.02	−0.09*	−0.04	1.00						
7. Size[b]	7817.83	13,638.39	−0.06***	−0.19***	0.09†	0.08*	0.07*	−0.01	1.00					
8. Capital structure	0.63	0.16	−0.07***	−0.40***	0.09†	−0.07*	0.06	−0.04	0.28***	1.00				
9. Slack	2.07	1.07	0.33***	0.15***	−0.07†	0.33**	−0.11**	−0.03	−0.25***	−0.33***	1.00			
10. Level of product diversity	0.81	0.58	−0.11†	−0.17***	0.20***	0.11***	0.12***	0.02	0.38***	0.19***	−0.13**	1.00		
11. Degree of acquisition	0.59	0.29	−0.10*	−0.07†	0.09*	0.04	0.07†	−0.02	−0.02	0.07	0.04	0.23***	1.00	
12. Level of ownership	0.88	0.16	0.18***	0.11**	0.09*	0.36***	0.14***	0.15	0.06†	0.00	0.05	0.00	0.13***	1.00

[a]The mean values are for non-centred variables.
Centring has no impact on standard errors and correlation coefficients.
[b]in millon euros
†$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$.

Tests of hypotheses

Table 2 shows the regression models used for testing our hypotheses. In this table, the measure for firm performance (dependent variable) is RoA. It is measured as a three-year moving average at the end of the last year of our respective period of analysis. The entire set of control variables was included in all models. The results are presented in a hierarchical fashion in order to better illustrate the variance that is caused by the inclusion of different independent variables in the respective regression models (Hitt et al., 2001). Model 1 shows the control variables only. In model 2, we include the variable expansion rate only in order to test for the inverted U-shaped relationship. Model 3 displays the influence of the interaction term between expansion rate and added product scope of expansion, as well as between expansion rate and degree of internationalization. Finally, with the inclusion of volatility of added product scope and volatility of degree of internationalization as main effects, model 4 displays the full model.

In our first hypothesis, we proposed that the function between expansion rate and firm performance is inverted U-shaped. Models 2, 3 and 4 include the variables that are relevant for testing this hypothesis. This hypothesis is further supported since the coefficient of the linear term is positive and significant, and the squared term is negative and significant in each model where they are included. Interpreting the coefficients implies the following: on average, each firm increased its initial base of entities by 37 percent (expansion rate = 0.37). This would lead to an RoA increase at the end of the period of 0.0259 for the average expanding firm compared to a non-growing firm. Furthermore, even if the otherwise average firm expands at a rate of 1.07 (i.e. the mean plus two times the standard deviation), an additional expansion step would still lead to a performance increase. Only at an expansion rate higher than 1.2747 would performance diminish.

Hypothesis 2a predicts that a higher added product scope of expansion would lower the relationship between expansion rate and firm performance. Models 3 and 4 include the variable that is relevant for testing this hypothesis. The estimate is negative and significant. This corroborates hypothesis 2a. Thus, a higher added product scope of expansion negatively moderates the impact of expansion rate on firm performance. The estimates on the main term of added product scope change sign and are only significant in models 1 and 4. For the interpretation of the interaction effect, we calculated the slope of the curve of the regression equation and its maximum, and analyzed their change depending on three values of the added product scope variable (e.g. Baer and Oldham, 2006; Deutsch et al., 2007). For the calculation, we used the mean values of the variables expansion rate and degree of internationalization. Our data reveal that the slope of the inverted U-shaped curve, which is depicted in Figure 2, is 0.0350 ($p < .001$) at point A for a low level of added product scope of expansion, i.e. minus one standard deviation from its mean value, 0.0271 ($p < .001$) at point B for the mean value and 0.0193 ($p < .001$) at point C for a high level

Table 2 Results of regression[a]

Independent variables	Model 1		Model 2		Model 3		Model 4	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
Test of hypotheses								
Expansion rate			0.084	(0.034)**	0.151	(0.030)***	0.152	(0.029)***
Expansion rate squared			−0.016	(0.009)†	−0.015	(0.010)*	−0.015	(0.010)*
Expansion rate × added product scope of expansion					−0.0006	(0.0002)*	−0.0010	(0.0003)***
Expansion rate × degree of internationalization					−0.182	(0.048)***	−0.167	(0.045)***
Volatility added product scope of expansion							−0.003	(0.001)**
Volatility degree of internationalization							−0.071	(0.023)**
Control variables								
Sales[b]	0.756	(0.897)	0.537	(0.888)	−0.196	(0.849)	−0.135	(0.807)
Capital structure	0.124	(0.076)	0.171	(0.073)*	0.091	(0.061)	0.097	(0.060)
Slack	0.004	(0.006)	0.004	(0.006)	0.009	(0.006)	0.009	(0.006)
Level of product diversity	0.039	(0.036)	0.032	(0.037)	0.027	(0.037)	0.030	(0.036)
Square level of product diversity	−0.018	(0.015)	−0.029	(0.014)*	−0.016	(0.014)	−0.024	(0.014)†
Added product scope of expansion	0.0004	(0.0002)†	−0.0003	(0.0002)	0.0003	(0.0004)	0.0020	(0.0008)*
Degree of internationalization	−0.039	(0.018)*	−0.045	(0.018)**	0.020	(0.027)	0.023	(0.023)*
Level of ownership	0.069	(0.029)*	0.034	(0.029)	0.010	(0.029)	0.007	(0.027)
Degree of acquisition	−0.202	(0.094)*	−0.239	(0.092)**	−0.211	(0.082)**	−0.195	(0.076)**
Square degree of acquisition	0.158	(0.074)*	0.193	(0.073)**	0.160	(0.064)**	0.153	(0.061)**
Intercept	−0.041	(0.051)	−0.021	(0.051)	−0.033	(0.040)	−0.021	(0.037)
R^2	0.161	*	0.215	***	0.292	***	0.332	***

[a] Models with robust standard errors. Year dummies are omitted.
[b] Parameter estimates and standard errors are multiplied by 10^6.
† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

of added product scope, i.e. plus one standard deviation from the mean. Our findings therefore suggest that the higher the added product scope of expansion, the lower the performance increase due to expansion. The maximum of the curve, i.e. the expansion rate a firm can pursue until additional steps begin to decrease performance, moves from $max_{low} = 1.5361$ for the low value of added product scope to $max_{high} = 1.0133$ for the high value. Thus, the higher the added product scope of expansion, the lower the expansion rate with which a firm can grow before performance begins to diminish. Our results therefore support hypothesis 2a.

Hypothesis 2b proposes that a higher degree of internationalization has a negative moderating effect on the relationship between expansion rate and firm performance. Models 3 and 4 include the interaction term that is relevant for testing this hypothesis. The estimate is negative and significant. Hypothesis 2b can further be supported. Thus, a higher degree of internationalization of implemented expansion steps negatively moderates the impact of a firm's expansion rate on firm performance. The estimates on the main term of degree of internationalization are significant throughout all models, except model 3, yet also change their sign. Hence, a higher proportion of internationalization of all expansion steps during a given period of time directly influences firm performance. We applied the same process for the interpretation of the interaction of degree of internationalization as we used for the interpretation of the interaction of added product scope. For that reason, we used the mean values of the variables number of expansion steps and added product scope for our calculations. As shown in Figure 3, we found full support for hypothesis 2b. The slope of the inverted U-shaped curve decreases, ceteris paribus, from 0.0836 ($p < .001$) at point A for the low value of degree of internationalization to -0.0293 ($p < .001$) at point C for the high value. This implies that the performance gains that can be realized through a certain expansion rate are negatively moderated by

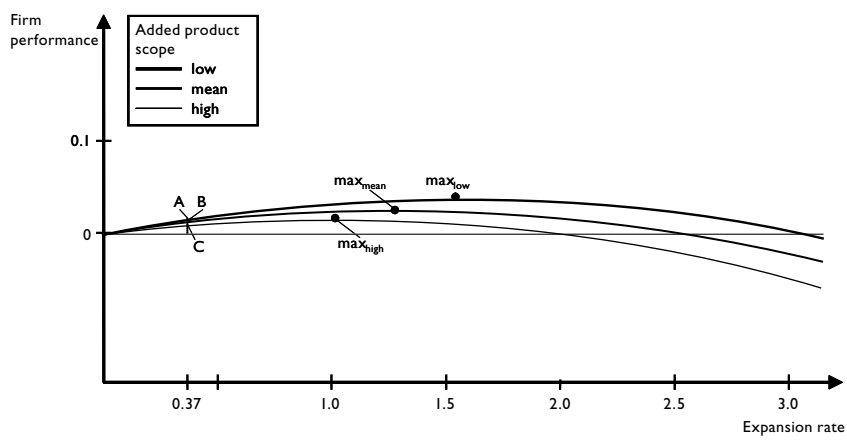


Figure 2 Interaction of added product scope

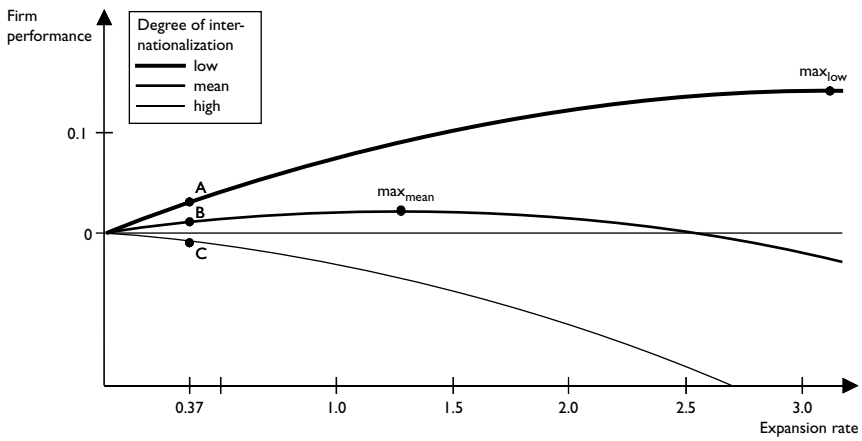
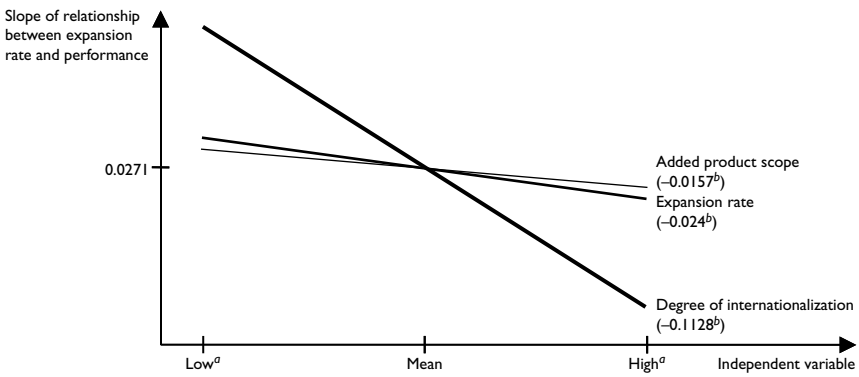


Figure 3 Interaction of degree of internationalization

the degree of internationalization. Furthermore, the maximum changes from $\max_{low} = 3.1554$ for the low value, over $\max_{mean} = 1.2747$ for the mean value to $\max_{high} = -0.6059$ for the high value of degree of internationalization. This result suggests that a firm whose expansion path is ceteris paribus characterized by a high degree of internationalization is already exposed to too much complexity and thus would lower its performance from the first expansion step onwards.

To further depict these results, we developed plots for the slope of the relationship between expansion rate and firm performance. Figure 4 graphically shows the effect of the change of one independent variable under observation at a time on the slope of the curve. At the mean value of these variables, the slope is 0.0271. The graphs indicate the change of the slope of the regression curve, subject to a change of one independent variable from its mean to its low or high value respectively. An otherwise average firm with a low expansion rate increases its performance by 0.0391 with an infinitesimally small increase of its expansion rate. However, if the firm increases its expansion rate to the high value, the performance increase through an infinitesimally small increase in the expansion rate would be reduced by -0.024 to 0.0151. Analogously, a ceteris paribus increase of the added product scope from its low to its high value would result in a change of the slope of the relationship between expansion rate and firm performance by -0.0157. An increase of the degree of internationalization from its low to its high value would result in a decrease of the slope by -0.1128.

In hypotheses 3a and 3b, we argued that volatility of added product scope of expansion and volatility of degree of internationalization negatively influence firm performance. We found support for both hypotheses. Coefficients for the volatility of added product scope of expansion, as well as for the volatility of degree of internationalization, which are displayed in model 4, are both consistently negative and significant corroborating hypotheses 3a and 3b. A higher volatility of



[a] High levels are plus one standard deviation from the mean; low levels are minus one standard deviation from the mean.

[b] Δslope of regression curve between low value of independent variable to high value.

Figure 4 Impact of independent variables on slope of regression curve

added product scope of expansion and of degree of internationalization both negatively impact firm performance. Consequently, the more regular the patterns of added product scope of expansion and degree of internationalization (i.e. the lower the volatility of these variables), the lower the performance impact.

Size, capital structure and slack have no significant influence. Furthermore, neither level of product diversity nor the square of this variable have a continuous significant impact. The coefficient for the degree of acquisition is negative and significant. Furthermore, the coefficient for the square of degree of acquisition is positive and significant. This suggests a U-shaped relationship between degree of acquisition and firm performance. Hence, expansion programs consisting only of acquisitions or only of greenfield investments show the highest return on assets. A possible explanation for this finding can be found in the literature of organizational learning (e.g. Levitt and March, 1988; Huber, 1991) and acquisition experience (e.g. Haleblian and Finkelstein, 1999; Hayward, 2002), which suggests consistently using the same mode of expansion results in specialized learning and that firms benefit from the experience acquired from similar expansions. If a firm is able to learn from what it has done previously, it becomes more efficient and needs fewer resources in the present to accomplish a similar task (e.g. Argote et al., 1990). Firms that mix their modes of expansion cannot learn from past experience. Consequently, firms undertaking their expansion steps consistently with the same expansion mode are better able to learn and need fewer resources for current expansions. The level of ownership of subsidiaries has no significant influence.

Robustness of results

We conducted several alternative analyses[12] to test the robustness of our results. First, we repeated our analysis with alternative measures for added product

scope of expansion based on input–output data (Fan and Lang, 2000). The results of our base analyses could be replicated. Neither the sign of regression coefficients nor their levels of significance changed substantially. The only exception is hypothesis 3a, which could not be replicated with the vertical relatedness measure. We also repeated our analyses with an added product scope measure based on data by Robins and Wiersema (1995). Our basic findings could also be replicated. Second, we tested an alternative weighting scheme for our SIC-based measure. Whereas we applied a linear scheme for the base case, the alternative measure was constructed with over-proportional higher scores for code matches on lower levels of the SIC hierarchy representing more unrelated expansion steps. Thus, the difference between scores assigned to a step–portfolio combination matching on the first level and that matching on the second level is greater than the difference between scores assigned to step–portfolio combinations matching on the second and third level of the SIC hierarchy, respectively. These findings were in line with our base case and thus replicated our basic findings. Third, we applied an alternative performance measure to check for validity of the results. Since the use of accounting-based measures entails several problems (e.g. Fisher and MacGowan, 1983), we applied Tobin's Q as market-based measure, to account for the given concerns. Applying Tobin's Q as performance measure, we could not further support hypotheses 1, 2a and 2b. The direct effect of degree of internationalization is also not significant anymore. However, hypotheses 3a and 3b still receive support. Regarding the control variables, we could find the following change: the coefficients of capital structure exhibit a negative significant influence of this variable on firm performance. This result, that firms with a higher debt ratio perform worse, is in line with other studies (Jensen, 1986; Mansi and Reeb, 2002). One explanation for differences between results using accounting- and market-based performance measures is that the two measures are based on different concepts regarding measurement and time. Whereas accounting-based measures capture realized performance, market-based measures are directed towards future performance expectations and as such long-term future success. Moreover, volatility along a firm's historic expansion path indicates risk. Risk, in turn, is an influencing factor of market-based performance measures, since it affects the rate at which future cash flows will be discounted. Fourth, we tested the robustness of our results for different period lengths, namely four years ($N = 518$) and six years ($N = 358$). We could further support hypotheses 1, 3a and 3b for all alternative lengths of periods of analyses. Hypotheses 2a and 2b were only supported for the four- and five-year cases. Moreover, estimating the models with periods of analysis of six years, we could find higher coefficients for volatility of degree of internationalization, as well as for the interaction of degree of internationalization with expansion rate.

Furthermore, in order to analyze the long-term performance effect, we estimated models with the dependent variable lagged for three and five years, respectively. We could see a fading out of the proposed effects. Hypotheses 1 and 2b are

supported for both alternative lag variables. However, the significance of the coefficients has decreased. Hypotheses 2a, 3a and 3b are no longer significant.

Discussion and conclusions

The article contributes to the emerging discussion on the diversification–performance relationship from a dynamic perspective by analyzing the performance impact of a firm's expansion program consisting of several expansion steps within and across industries. Especially, we investigated how the level of added product scope taken on by expansion moves per time period impacts firm performance. Thus, our research design differs in two ways from traditional studies in the field of diversification research. First, we did not analyze the relationship between diversity – as the level of diversification at a certain point in time – and firm performance. We rather analyzed the way in which firms expand and reach their level of diversity. The necessity to distinguish between these two designs has already been pointed out by scholars but rarely been implemented (e.g. Ramanujam and Varadarajan, 1989; Gary, 2005). Second, we analyzed the performance impact of a program of diversification moves rather than that of single expansion steps. This differentiation has already been applied by Schipper and Thompson (1983) who distinguished between individual acquisitions and programs of acquisition activity.

Moreover, whereas the majority of previous studies examined only expansion steps across industries and firms whose business activities span more than one industry, some researchers pointed to the relevance of intra-industry diversification when analyzing the diversification phenomenon (e.g. Li and Greenwood, 2004; Stern and Henderson, 2004). Following these suggestions, we incorporated expansion steps both within and across industries. In contrast to literature that deals with potential benefits that may be realized when expanding, we not only focused on benefits but also on possible constraints along the expansion path. The literature has stressed that expansion is a complex task and firms are constrained in their ability to handle this complexity. We assumed that a firm facing more complexity per unit of time would be less able to handle this, which leads to inappropriate adaptation of structures, systems and processes, and ultimately to lower performance. Consequently, a firm needs a certain amount of time to cope with the complexity associated with a certain expansion rate and ultimately to carry out the respective expansion steps successfully. More complexity within a given period of time resulting from various expansion steps, each of which is associated with a different amount of complexity, will negatively impact firm performance. To test this, we modeled several types of complexity as well as their distribution along the expansion path into our study. Specifically, we tested for added product scope of expansion and degree of internationalization, as variables for the amount of complexity expansion steps are associated with, as well as for volatility of added product scope of

expansion and volatility of degree of internationalization, describing the distribution of complexity along the expansion path. With the results of our study, we are able to support our view regarding the impact of several types of complexity and their distribution. We were able to show that complexity resulting from added product scope of expansion and degree of internationalization, as well as the distribution of these complexities (i.e. volatility of added product scope of expansion and volatility of degree of internationalization), have a significant negative impact on firm performance.

Our results can give a better understanding of the impact of expansion paths on performance. Expanding firms may gain from the positive effects associated with expansion. However, constraints along the expansion path stemming from complexities as well as their distribution should not be forgotten when analyzing the performance impact of expansion strategies. This view of negative effects along the expansion path is consistent with findings by other scholars. There exists, for example, research dealing with implementation difficulties diminishing potential benefits from diversification (e.g. Reed and Luffman, 1986; Nayyar, 1992). Moreover, our findings are related to Vermeulen and Barkema's (2002) study, which analyzed the internationalization path of companies and found that characteristics of the internationalization path, like speed, scope and irregularity, have a negative impact on a firm's ability to benefit from internationalization. In the short term, we found support for a negative impact of both added product scope and degree of internationalization on the relationship between expansion rate and firm performance. Using a lag variable for measuring long-term performance, we could further corroborate a long-term effect of the degree of internationalization. On the other hand, a long-term effect of added product scope could not be supported. Interpreting these results leads to the conclusion that setting up international entities and integrating them into an international network is such a complex and difficult task and that associated costs still apply after several years. In contrast, it seems that complexity associated with unrelated expansion steps can be coped with in a rather short period of time. Thus, we assume that the absorption of expansion with a high degree of internationalization is more difficult and takes more time. This might further serve as an explanation for the finding that only a small percentage of firms is truly global (Rugman and Verbeke, 2004).

The results of our study further imply that additional product scope and additional internationalization per unit of time influence the demand for managerial services. More additional product scope and more international expansion steps set higher demands on and create more difficulties for resources and capabilities available. Therefore, our study can contribute to the discussion on managerial resources and slack. However, we could not corroborate a significant impact of slack. A reason for that might be that we measured financial slack as current ratio only. Consequently, we included slack on the firm level only (Bourgeois, 1981) and did not further distinguish between absorbed or unabsorbed slack (Tan and Peng, 2003). Still other research indicates that maintaining and monitoring slack in the form of managerial resources is relevant for firm

growth (Mishina et al., 2004). A study by Gary (2005) indicates that potential benefits are wiped out when not enough shared resources are available. Thus, insufficient investment in shared resources could explain why some diversifiers fail to realize potential synergy. He shows that even one related diversification step could destroy value if sufficient resources are not available to realize the benefits. Based on this view regarding the demand for managerial services due to complexity, several implications can be derived. On the one hand, performing an unrelated diversification step is not necessarily associated with a performance decline, as long as the firm has sufficient managerial resources to manage the implementation of the step. On the other hand, several related expansion steps during a period of time can result in diminished performance since there are not sufficient resources to implement them. Moreover, the dynamic view of the expansion path considering negative effects of expansion also helps to explain why some expansion processes allow the realization of larger benefits than others, even though the resulting level of diversity may be identical. To understand performance differences of diversified firms, both level of diversity and the path along which a firm has reached that level have to be considered.

Moreover, our findings regarding hypotheses 3a and 3b, dealing with the distribution of complexity, can contribute to organizational learning literature (e.g. Levitt and March, 1988; Huber, 1991). We have found a negative impact of volatility for both the variables' added product scope of expansion and degree of internationalization. Therefore, we reasoned a negative influence of an irregular expansion path. This result supports the view of a beneficial influence of learning and experience along the expansion path. Firms consistently undertaking specific actions are better able to learn from past experience and apply the learned lessons again. This increases efficiency (e.g. Argote et al., 1990). Our findings are consistent with those in other fields, such as research on acquisition experience (e.g. Haleblian and Finkelstein, 1999; Hayward, 2002).

Even though we could not find a significant influence of level of ownership, there are other studies emphasizing positive issues of partial ownership. Specifically, joint expansion projects can help to spare resources and gain knowledge of the partner (e.g. Kogut, 1988; Lyles and Salk, 1996; Lane et al., 2001). Yet, there also exists research arguing that lower ownership is associated with more unfamiliarity (e.g. Pennings et al., 1994) and also with each partner pursuing different objectives (e.g. Kogut, 1988), leading to negative effects due to conflict and uncertainty, which requires more control and coordination. Moreover, whereas this study could not support an impact of diversity, there is literature suggesting positive effects of diversity and complexity. In innovation research, findings indicate that greater structural complexity is positively associated with innovation (e.g. Damanpour, 1996). Greater complexity increases the depth of the knowledge base, which can lead to an increase in the development of new ideas (e.g. Kimberly and Evanisko, 1981). Groups made up of individuals with diverse prior experiences develop a greater capacity to identify, assimilate and apply new opportunities (Cohen and Levinthal, 1990). It has also been

argued that greater multinational diversity has a positive effect on resources as managers have more opportunities to learn and develop competences in different environments (Tan, 2003).

Like any study, our research has limitations that leave unanswered questions, providing the opportunity to initiate new studies. Resources play an important role in our argumentation as they constrain a firm's ability to expand and diversify. Our independent variables captured the factors determining the level of complexity that has to be handled by the firm. Another aspect we only treated by introducing a financial slack variable is the availability of resources, capacities and capabilities with which the firm might cope with this complexity. That availability can vary between firms and over time. Whereas such a variation between firms is captured using fixed-effects models, we could not incorporate the variation over time. However, there are resources, capacities and capabilities that can only be increased incrementally (e.g. Penrose, 1959; Tan, 2003; Tan and Mahoney, 2005). For example, managers need to acquire specific knowledge and capabilities internal to the firm and doing so takes time. Thus, we would not expect to see major increases in availability of resources in the short term. In addition to this, not only is the volume of resources available important, but their quality is as well. Qualitative attributes like management team characteristics are worthy of examination in this regard (Eisenhardt and Schoonhoven, 1990). The level of experience of managers also plays a crucial role. Literature on acquisitions, for example, showed the positive results of experience (Lubatkin, 1983; Hitt et al., 1998). Haleblian and Finkelstein (1999) reported better performance with higher similarity between current and past action. Unfortunately, these data were not available for our longitudinal research setting. Annual reports only provide limited information on the amount of resources, e.g. the number of board members. They do not give information on the quality of resources. This information might be captured through a detailed survey but, given that there may be non-respondents, this might well lead to a reduction in the size of the sample. Moreover, such an approach would be unlikely to provide historic data for 20 years. This could possibly be done with a detailed case study based on comprehensive interviews, though doing that in turn is not feasible for the entire sample of 91 firms. Moreover, other factors besides managerial services exist that may influence a firm's ability to expand. The expansion process requires a firm to detect opportunities for growth, process information and initiate projects. Therefore, firms and their managers must be able to identify and acquire knowledge, to assimilate this knowledge, to transform it and to exploit it to commercial ends, a capability that has been called 'absorptive capacity' (Cohen and Levinthal, 1990; Zahra and George, 2002). However, absorptive capacity is a multi-level construct (Zahra and George, 2002) and the aspects of managerial services, which we have discussed so far, are only one component of this construct. Other factors like different organizational forms (van den Bosch et al., 1999) or learning structures (Lane et al., 2001) can facilitate the assimilation and

transformation of new knowledge and thus influence a firm's absorptive capacity. In summary, factors influencing absorptive capacity as well as amount and quality of managerial resources are worthy of consideration in future studies. The gathering of such data, however, entails severe problems since the constructs are difficult to measure and comprehensive historical data hard to survey. Other scholars faced the same problems and followed a similar line of argumentation that led them to not include the availability perspective in their studies (Vermeulen and Barkema, 2002; Tan and Mahoney, 2005).

We included the variables' added product scope of expansion and degree of internationalization in our analysis to address complexity resulting from expansion. However, there are other characteristics of expansion steps that can influence the level of complexity as well. Future studies might incorporate size of steps relative to company size (Haleblian and Finkelstein, 1999), for instance. A relatively small and unimportant step may add less complexity than an expansion step that accounts for a large fraction of the overall firm. Nevertheless, each expansion step is associated with a basic level of complexity that strains resources to some extent. Some tasks, implementation, for example, are size-related while others, such as the search for investment opportunities, the evaluation of what is entailed in each step, and the many decisions that must be made during the expansion process itself, are independent of step size. Furthermore, we only analysed expansion steps – defined as acquisitions of existing entities or installations of new entities. Due to data constraints, it was not possible to include expansion by investments in existing entities.

Firm characteristics can also facilitate the handling of complexity. The organizational form can have an influence. For example, multidivisional structures may lower the need for coordination between subsidiaries as each may have its own business-unit-specific resources and capabilities (e.g. Hoskisson and Johnson, 1992). We have addressed this in part by comparing each newly established entity with the one that is the most similar to it in the firm's portfolio. Moreover, different coordination mechanisms will require different levels of attention by management (Tan and Mahoney, 2005). While output control will not require substantial time and effort by headquarters, behavior or social control will (March and Simon, 1958; Mintzberg, 1979). These factors are worthy of consideration in future research, though we ourselves were bound to secondary data that did not permit their inclusion in our study.

Our variable added product scope of expansion measures complexity associated with expansion steps of different relatedness. Thus, our measure differs from an alternative measure constructed as the difference of the entropy measures between two points in time. In distinction to added product scope of expansion, the difference of two entropy measures does not necessarily include the same amount of complexity, as it is also sensitive to simple sales growth and divestitures. Furthermore, we incorporated alternative relatedness measures and in so doing, made two assumptions. First, we used data originally calculated for US industries, as we did not have access to adequate German data. We assumed

that the relatedness between two industries using US data could be applied to German companies. However, it can be argued that our sample firms do not solely compete within Germany but rather internationally. Second, we used input–output data for the year 1992, assuming the relatedness measure remained constant over the time of our study. Future studies could calculate the measures based on German data and for other years.

Another limitation of this study is the treatment of different modes of expansion. We controlled for the degree of acquisition to detect learning effects. Since the setting of our study deals with the analysis of the influence of all expansion steps along a firm's expansion path, we treated greenfield investments and acquisitions as equivalent steps. Thus, we did not address different learning and performance implications between greenfield investments and acquisitions.

We can draw a number of practical implications from our study. Given the limited nature of managerial services and the implication of this for future expansion, managers must judiciously decide on the expansion rate and the type of expansion steps the firm should undertake. Adding complexity in one dimension should be balanced by less complexity in other dimensions. Firms expanding with many new entities in one period should reduce their added product scope of expansion. Likewise, firms expanding into less related product fields should minimize simultaneous internationalization. This is in line with the findings by Gary, who concluded that 'management's role is to choose the appropriate time path of investment' (Gary, 2005: 652) and with Vermeulen and Barkema's (2002: 649) claim for a 'path of balanced growth'. As managerial services can only be increased incrementally, their expansion should be planned in advance with strategic foresight. Furthermore, managers must consider the path dependency of expansion decisions. Today's decisions regarding expansion projects will influence a firm's future size and the demand for managerial services.

In summary, our results and the discussion indicate that a dynamic perspective of the diversification phenomenon helps to better understand performance differences between diversified firms. This study is a step towards Gary's (2005) claim to build a richer theory about diversification capturing dynamic diversification profiles. However, further dynamic examination of the expansion path and its impact on firm performance seems promising in order to improve our understanding of the performance implications from diversification.

Notes

1 The HDAX is a combined index consisting of the segments DAX30, MDAX, and TecDAX and thus contains the most important firms of the Prime Standard of the German Stock Exchange.

2 For those companies belonging to the HDAX in 1994, we collected data back to 1985 where possible.

3 We excluded financial institutions, financial holdings, real estate companies and retailers since they differ significantly in their business model. Thus, their financial structure and

performance measures are highly different from the firms remaining in the sample. For example, the cost income ratio is a much better indicator for the performance of banks than the RoA. Furthermore, the size of banks is rather measured in assets under management and not in sales. Therefore, the operationalization of some of our variables is not directly applicable to the excluded firms which thus cannot directly be compared to the other firms in the sample. Moreover, we excluded cross-listed firms with headquarters outside Germany in order to homogenize the sample and to avoid mediating effects of external factors such as different taxes and labor costs (McDougall and Oviatt, 2000).

4 We have chosen 50 percent for our study since this determines the border of the company. Managers are usually not able to exercise control over minority-owned subsidiaries. This in turn influences the kind of decisions and tasks managers are able to undertake. Ultimately, complexity associated with these tasks and decisions is also reduced. Moreover, minority-owned subsidiaries are in the majority of cases financial and not strategic investments, which by definition influence complexity and demand for managerial services.

5 With the introduction of the KonTraG (regulatory standard) in 1998, listed companies in Germany must include in their list affiliates in which they own 5 percent or more.

6 The use of RoA as our primary performance measure can be explained as follows. First, the use of accounting-based measures has several advantages (Robins and Wiersema, 1995). They have a close connection to the decision variables used by firm managers. Decisions regarding expansion projects are made by managers using data derived from financial statements (Holzmann et al., 1975; Ramanujam and Varadarajan, 1989). Moreover, and perhaps more importantly, accounting-based measures are mainly used in other studies in the field of strategic management allowing comparability and preserving consistency. Second, as accounting-based performance measure, we preferred RoA since return on equity is sensitive to differences in capital structure (Hitt et al., 1997).

7 We compared the SIC code of the new subsidiary with that of the most similar subsidiary in the portfolio. This approach is similar to the WARN measurement described by Teece et al. (1994). We have chosen this approach rather than a comparison to all existing businesses since a firm can use knowledge spillover from existing businesses to run a new business. The amount of newness and the amount of new knowledge that has to be acquired depends upon the knowledge embedded in the most similar business and its distance. Consequently, we computed for every new subsidiary the distance to all already existing businesses and took only the smallest one into account. Thus, we were able to incorporate learning effects from prior expansion steps and the knowledge inherent in existing businesses.

8 The concentric index (Caves et al., 1980), which is a common measure for company diversity, uses a weighting scheme that distinguishes between different levels of the SIC hierarchy in a similar way.

9 In order to capture complexity per step and to make the measure comparable with the SIC-based measure, we inverted the scores and transformed them into a 0- to 4-point range. To calculate added product scope of expansion, we applied the same aggregation logic as in the SIC-based approach.

10 With the use of fixed-effect models, industry dummies are not necessary as industry membership did not vary among our sample firms during the time period studied and fixed-effect models control for variance due to time-invariant characteristics (Carpenter and Fredrickson, 2001). Consequently, industry dummies were not included in our models. The same holds true for a possible variable controlling for attrition. We could not survey data for 20 years for all of our sample companies. Thus, our data sample has an unbalanced panel structure that could cause ous biases. One possibility to check for sample selectivity bias in panel data is to perform an added-variable procedure (or Quasi-Hausman test) as suggested by Verbeek and Nijman (1992). However, since the attrition variable is constant for each firm and does not change over time, the inclusion of fixed-effects firm dummies already controls for this and the adding of another such variable would not change the estimation results.

11 This procedure is equivalent to including firm dummies.
12 Tables with results of regression for these alternative analyses can be provided upon request.

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