Value-Enhancing Learning from Industry-wide Diversification Experience

Thang Nguyen
University of Portsmouth
Charlie X. Cai
University of Leeds

Dr. Thang Nguyen

Thang Nguyen is a research fellow in crowdfunding at Portsmouth Business School, University of Portsmouth, UK. Thang was awarded a PhD in finance in 2014 from Leeds University Business School. His main academic interests include crowdfunding, corporate diversification, corporate finance and organisational learning. His current focus is on research in crowdfunding which is an unexplored and very potential area. Thang has presented his research in different conferences.

Prof. Charlie X Cai.

Charlie X Cai is Professor of Finance at Leeds University Business School, UK. Charlie's research agenda covers financial markets, asset pricing, corporate governance, behavioural finance, banking and emerging markets. Many of his work has been published in ABS listed 3 and 4 start journals including Journal of Accounting and Economics and Journal of Money, Credit and Banking. He is currently serving on the editorial board of the International Small Business Journal and Accounting and Finance.

1. Introduction

Organizational learning is defined as a change in an organization's knowledge that occurs as a function of experience (Argote and Miron-Spektor, 2011; Huber, 1991). Fundamentally, knowledge can be acquired in two ways: internally, from a firm's own experience; and/or externally, from the experience of other firms (Bapuji and Crossan, 2004). It is widely shown that learning from experience has significant impact on strategic activity performance (e.g. acquisition, strategic alliance, diversification). Empirical evidence on this impact, however, relates mainly to internal learning in the context of acquisition (see e.g. Haleblian and Finkelstein, 1999; Finkelstein and Haleblian, 2002; Hayward, 2002).[1]

The value of diversification has for a long time been the subject of intense discussion among researchers (see surveys by Palich, Cardinal and Miller, 2000 and Martin and Sayrak, 2003). While most of the debate in the literature hinges on the mean value of diversification, Stein (2003) suggests that research should pay more attention to cross-sectional variation; that is, identifying specific circumstances in which diversification may be a value-creating or value-destroying strategy. Our study aims to provide an interdisciplinary investigation of whether and how organizational learning from industry diversification experience affects diversification value.

The importance of learning for diversification decisions can be better understood in the wider context of capability development. Learning is an integral part of dynamic capability development. Zollo and Winter (2002) link the learning mechanism to the evolution of dynamic capability. Salge and Vera (2013) conceptualize incremental learning as a dynamic capability and vital driver of organizational adaptation. Firms may also build their capacity at a strategic level by learning from the experience of others. Almazan *et al.* (2010) and Guillén (2002) suggest that under uncertainty, economic agents learn most effectively from the experience of their peers and neighbours in guiding

[1] See Barkema and Schijven (2008) and Argote and Miron-Spektor (2011) for comprehensive reviews of the literature.

their decision making. Such vicarious learning enables a firm to engage in exploratory learning (Miner and Haunschild, 1995); this is especially relevant to the diversification context. Diversification is a complex and rare event; external experience can thus be a more important source of learning than internal experience because the heterogeneous nature of diversification experience is not easily obtainable given the limited internal experience of any individual firm (Ingram and Baum, 1997a).

Our paper aims to enable a deeper understanding of the link between external experience and diversification performance, and contributes to the literatures of both diversification and organizational learning in several ways. First, we contribute to the organizational learning literature by providing a theoretical framework for external experiential learning with a specific focus on industry experience. Early work on learning curves, 'through its emphasis on "learning by doing", … focuses exclusively on the firm's own experience, thus largely disregarding the opportunities of firms to learn from the experience of other firms.' Barkema and Schijven (2008, p. 596). But while the concepts of vicarious or observational learning have been applied in previous studies, there is no theoretical framework for such learning.[2] Building on existing literature, we propose a framework which outlines the key theoretical foundations, and which describes the experiential learning process as the interaction of experience with internal context to create knowledge transfer. It also identifies two important characteristics of experience that are key determinants of learning effectiveness: specificity and heterogeneity. Experience requires some level of specificity to be relevant for learning (Barkema and Schijven, 2008). This is especially important in vicarious learning, given that the industry experience pool is large. So firms need to select their lessons from other firms that have

[2] A number of studies on external learning mainly focus on providing evidence of imitation as a widespread practice in strategic contexts (Haunschild, 1993; Haunschild and Miner, 1997). Barkema and Schijven (2008) contend that 'they do not offer any definitive insights into actual learning, because they do not examine the performance effects of such imitative behaviour'. The study of external learning impacts on performance is limited in terms not only of quantity but also of research context. In particular, they have been undertaken in one industry, e.g. the effects of external learning on the failure of hotels in Manhattan (Baum and Ingram, 1998) or in the semiconductor industry (Irwin and Klenow, 1994), and mostly in an acquisition context (Beckman and Haunschild, 2002; Haunschild and Miner, 1997).

similar characteristics (such as industry mix, size and region), since learning from examples with low specificity will result in drawing irrelevant and incorrect causal inferences. The other important and related concept is the heterogeneity of the external experience, which has two contrasting effects on learning. Barkema and Schijven (2008) in their review conclude that heterogeneity in the experience of others appears to be beneficial, because research shows consistent positive effects for vicarious learning. However, the very nature of heterogeneity poses a challenge to effective learning: the probability of misinterpreting the experience of others is greater, given that other firms' experiences are inevitably more heterogeneous than those internally accumulated (Baum and Ingram, 1998). Thus heterogeneity can both increase the chances of finding good specificity among the lessons in the pool of experience, *and* increase the risk of choosing lessons with poor specificity.

Second, applying the above theoretical framework to the context of diversification decisions, using a sample of US firms in the period 1990–2009, we produce a model linking industry experience and diversification value, and report the unique finding of a cubic relationship with three distinct phases. This adds new insight to our understanding of external learning and diversification value. In organizational learning literature, only a few studies (Baum and Ingram, 1998; Sarkar, Echambadi and Ford, 2003; Beckman and Haunschild, 2002) have investigated the effects of external learning, and all of these report a linear relationship between industry experience and diversification value. However, our study suggests that care needs to be taken when learning from external experience with too little or too much heterogeneity.

Finally, this study contributes to the literature on diversification value. To the best of our knowledge, it is the first study to adopt an organizational learning perspective to investigate the cross-sectional variation of diversification value. Previous studies show that the value of diversified firms is negatively related to the diversity of their segments' resources and investment opportunities

(Rajan, Servaes and Zingales, 2000), or to agency problems (Hoechle *et al.*, 2012).[3] Using theoretical arguments and empirical methods from the organizational learning literature, our study shows that learning from industry experience as well as from the firm's own experience plays a significant role in determining diversification value.

The rest of the paper is organized as follows. The next section reviews the relevant literature and develops our theoretical framework. The third section describes our research methods and data sample. The fourth section reports and discusses our main results and robustness tests. The final section concludes the discussion and presents thoughts for future research.

2. Theoretical development

2.1. Literature

Given the scarcity of literature on external learning, it was paramount to develop a theoretical framework to facilitate our reasoning and research design. In this section, we discuss the literature that informed this theoretical development. We draw on early learning curve theory (Yelle, 1979), and transfer theory from cognitive psychology (Cormier and Hagman, 1987), for internal learning, and the sociological theory of imitation (DiMaggio and Powell, 1983) and psychological theory of vicarious learning (Bandura, 1977) for external learning.

Early literature on organizational learning mainly focuses on learning from an organization's own experience. The learning curve literature has been mostly conducted in the operating context and suggests that experience matters and always brings positive incremental value to organization value (see e.g. Dutton and Thomas, 1984; Argote, Beckman and Epple, 1990). The literature is then taken one step further by examining the conditions on transferability of experience. Negative

[3] As a counter argument, Ataullah *et al.* (2014) provide evidence from insider trading to capture the true belief of managers, which casts doubt on the agency theory-based explanation for corporate diversification.

transfer is found to be possible when the relevance of experience is in question. For example, Haleblian and Finkelstein (1999) are the first to challenge the traditional learning curve perspective by arguing that transferring acquisition routines from one industry to another may mean transferring old lessons to new settings where they do not apply. Subsequent to their studies, the non-linear relationship between experience and performance is further extended in the context of low-tech industries (Porrini, 2004) or international alliance (Nadolska and Barkema, 2007).

Theories that help us to understand external learning are the sociological theory of imitation (DiMaggio and Powell, 1983) and the psychological theory of vicarious learning (Bandura, 1977). There is evidence in the literature that firms imitate one another, especially their competitors, in strategic contexts. In early evidence of imitation, Haveman (1993) shows that firms are more likely to enter a given industry when it contains profitable firms. Yang and Hyland (2006) find that financial service companies in the US are more likely to engage in unrelated rather than related acquisitions if their competitors undertake more unrelated acquisitions as well.

There are pros and cons to external learning. In its favour, vicarious learning is a cost-effective way for a firm to explore a variety of solutions to a strategic or operational problem without bearing the risk of running the experiment itself (Miner and Haunschild, 1995); that is, it enables a firm to engage in exploratory learning (March, 1991). This is directly relevant to diversification strategy as diversification is a costly and complex decision. In other contexts, too, there is evidence that vicarious learning is value enhancing. For example, Ingram and Baum (1997b) find that the operating experience of other Manhattan hotel chains increases the survival probability of the focal chain, thus implying vicarious learning. Beckman and Haunschild (2002) argue that firms can learn to acquire more successfully by tapping into the experience of their network partners (e.g. via board interlocks).

On the downside of external learning, the probability of misinterpreting the experience of others is greater given that other firms' experiences are more heterogeneous than those accumulated internally. This poses greater challenges to effective external learning, and imitation does not necessarily enhance value. A firm may copy the practices of another based on considerations of legitimacy rather than efficiency (DiMaggio and Powell, 1983). Moreover, Barkema and Schijven (2008) point out that research on imitation and vicarious learning effects is still at an early stage. Importantly, previous studies do not examine the performance effects of such imitative behaviour. We contribute to this question by examining the impact of the quantity of industry experience on the focal diversification performance.

2.2. A theoretical framework of external experiential learning

Given the above theoretical and empirical studies, we present our theoretical framework pictorially in Figure 1, which depicts the idea of external learning as the transfer of external experience into internal knowledge that enhances decision making. Three key elements of this framework are the pool of experience, the organizational context and the learning outcomes. In brief, it shows that context interacts with experience to create knowledge; this is in line with a more general organizational learning framework proposed by Argote and Miron-Spektor (2011). The organizational context includes characteristics of the organization such as its structure, culture, technology, identity, memory, goals, incentives and strategy. The context may also include relationships with other organizations through alliances, joint ventures and membership of associations (Argote and Miron-Spektor, 2011).

The features of most interest to this study are the quality and relevance of the lessons to be learned. Two key characteristics of experience are discussed in the literature: specificity and heterogeneity. Their main impact on learning is due to their effects on causal ambiguity. Experience

needs to be specific to enable the identification of relevant causal patterns. Specificity can be defined as how close the relevant aspects of experience are to the focal organization's characteristics; for example, industry, geographic and cultural dimensions. While discussing the literature on acquisition learning, Barkema and Schijven (2008) suggest that experience needs a certain level of specificity to foster learning. When the specificity is insufficient, negative experience transfer may occur. For example, Barkema, Bell and Pennings (1996) show that experience with expansions in nearby cultural regions tended to decrease the survival chances of the focal acquisition since the prior acquisition events were still too different from the focal one. In the context of industry learning, the complexity of cross-organizational difference may make industry experience insufficiently specific to be useful for learning, especially in the early days when there are only a few experiences to draw on. It is therefore less likely that a firm will find lessons in the pool of industry experience that are relevant to learn from for its focal expansion.

Another concept is the heterogeneity of external experience. Focusing on internal learning, Schijven and Barkema (2007) use transfer theory to propose a dynamic approach to learning. They argue that the firm initially requires relatively homogeneous experience (within the same industry) to foster learning by avoiding too much causal ambiguity. Heterogeneity engenders causal ambiguity (Zollo and Winter, 2002) and difficulty in learning from experience (March, Sproull and Tamuz, 1991). External experience is inherently more heterogeneous than it is possible for any given firm to accumulate internally. In the context of firm diversification, heterogeneity in industry experience (in terms of variations in firm size, combination of industry expansion types and diversification timing) would provide a richer pool of experience for a given firm to find specific lessons to learn from.

Heterogeneity and specificity are closely linked. In general, heterogeneity of external experience will increase the chance of finding specific lessons and have a positive effect on learning (Barkema and Schijven, 2008). However, excessive heterogeneity in external experience will be

damaging to learning as it may bring more noise into the pool of experience and make it more difficult to identify the lessons that are specific to the focal event.

The above discussion suggests that experience heterogeneity affects the identification of specific lessons, and therefore plays two distinct roles in learning. This is well summarized by Barkema and Schijven (2008, p. 608):

> The research on experience heterogeneity suggests an interesting paradox. On one hand, heterogeneity enables firms to explore a wider variety of experiences, which, in theory, engenders more scope for identifying the causal patterns required for capability development. On the other hand, this very heterogeneity may be overwhelming for boundedly rational actors because of the causal ambiguity it presents.

2.3. A model of industry experience and diversification value

Diversification decisions can be seen from a resource-based perspective (Martin and Sayrak, 2003). This suggests that firms pursuing diversification are those that possess excess capacity in resources and capabilities that are transferable across industries. For example, efficient supporting functions such as marketing, logistics, finance and legal departments may provide firms with a comparative advantage over their more specialised or focused peers when these functions can be shared among firm segments in different industries. Maksimovic and Phillips (2001) formalized this idea in a dynamic model of firm diversification whereby the firm repeatedly enters new businesses and exits old ones in the search for good matches with its organizational capabilities.

Furthermore, firms benefit from diversification in many different ways. For example, diversification may enhance firm value through providing market power (Palich *et al.*, 2000), exploiting resources that would otherwise prove non-performing (Markides, 1992), reducing overall firm risk (e.g. Barney, 1997) or providing tax and financial benefits (e.g. Berger and Ofek, 1995).

These benefits vary with firm context, so picking the right lesson to learn from is essential for the focal firm to make informed and correct inferences from the industry experience. Good lessons would be those prior diversifications from firms with similar resource bases before the diversification (specificity) and where the causal relationship between diversification and performance is clearly identifiable (low causal ambiguity).

Figure 2 summarizes our hypothesis development given the above theoretical framework. We hypothesize that the level of industry experience affects diversification value in three distinct phases of external learning.[4] First, in a baseline case, managers will not attempt to learn, given no, or very low, precedents within the industry; in these early cases, there is no learning effect in the diversification value. When experience accumulates, firms may start attempting to learn but, with low experience heterogeneity, lessons may not be specific enough and meaningful causal relationships may be difficult to infer. Firms are more likely to pick the wrong lessons and/or draw incorrect inferences, making the outcome of learning worse than that of no learning – the baseline (Haleblian and Finkelstein, 1999).

Second, as industry experience grows, it provides a wider variety of lessons with a higher level of experience heterogeneity (than the first phase). This modest level of industry experience heterogeneity will enable the focal firm to better exploit prior diversifications and identify more relevant and specific lessons for its focal diversification decisions (Baum and Ingram, 1998; Hayward, 2002). The increase in heterogeneity also helps in identifying a causal pattern that can be used to evaluate the focal diversification opportunities (Barkema and Schijven, 2008).

[4] In this paper, we focus our attention on the learning effect on diversification value. An equally important and interesting research question can be asked about the learning effect on the probability of diversification. Through learning from external experience, firms may decide *not* to engage in a new expansion. In this regard, our empirical results did not capture those opportunity gains or losses as an outcome of external learning on the diversification decision.

Finally, abundant industry experience leads to excessive heterogeneity which, because of bounded rationality, decreases the chances of identifying lesson specificity and increases causal ambiguity, which inhibits effective learning (Barkema and Schijven, 2008). Also, as argued by Cohen and Levinthal (1990), a firm's absorptive capacity (i.e. the ability to evaluate and utilize outside knowledge) is constrained by its level of prior knowledge. Too heterogeneous a pool of external experience may go beyond a firm's absorptive capacity and hence negatively affect learning and value. Zollo and Winter (2002, pp. 10–11) articulate this relationship between heterogeneity and learning: 'As task heterogeneity increases, inferences become more difficult to make and, when made, they are more likely to generate inappropriate generalizations and poorer performance.'

Overall, our model predicts that negative experience transfer can happen when there is too little or too much external experience, since causal ambiguity is highest in these situations.

3. Data sample and methodology

3.1. Data sample

The data sample includes all non-financial and non-utility US firms with total market capitalization of more than $10m available in the Worldscope database for the period 1990–2009. All the sample data is CPI-adjusted to 2000 USD. The segment data (including a segment's assets, capital expenditure, depreciation, operating income and SIC code) and the firm's financial data are extracted from the Worldscope database, while the Thomson Financial database is used to retrieve data on cash-flow statements. All the financial data is winsorized at 1% from both extremes. As Hodgkinson and Sparrow (2002) suggest, assessing knowledge (the outcome of learning) by measuring changes in performance or value has the advantage of capturing tacit as well as explicit knowledge. In contrast, measuring knowledge by assessing changes in cognition through questionnaires and verbal protocols are not able to capture tacit or difficult-to-articulate knowledge. In this regard, the use of secondary

data to capture changes in performance or value suits the aim of this study to examine the overall learning effect on the firm.

To isolate the effect of industry experience on diversification value, only firms that increased their reported number of segments by exactly one segment in any year between 2000 and 2009 are selected.[5] This restriction provides a more focused sample that has good matching of industry experience and the subsequent focal diversification, whereas firms undertaking more than one diversification in a year will have confounding effects on valuation. For the same reason, we exclude firms that divest in the same year that they diversify. The final sample includes 498 diversifications from 435 different firms. The unit of analysis is each diversification.

3.2. Measurements

3.2.1. Diversification value

The independent variable is the measure of firm diversification value as in Lang and Stulz (1994). Diversification is perceived as a strategic move which occurs when a firm's reported number of segments increases. A firm that increases its reported number of segments is a firm that has either acquired or internally developed new lines of business, or has expanded its existing lines of business to the point where it is required to report new business segments. Diversification value is captured by the difference between the value of the diversified firm and its imputed value; that is, the value of the firm if all its segments operated as specialized firms. Empirically, diversification value is estimated as the firm's industry-adjusted Tobin's *q* (hereafter *q*), which is the difference between a firm's *q* and the asset-weighted sum of imputed *q*s of all the firm's segments, where *q* is calculated as the ratio of asset market value to book value. The imputed segment *q* is approximated by averaging

[5] Following Haleblian and Finkelstein (1999), we set aside ten years of the total sample period to capture diversification experience. The sample of focal diversifications, therefore, includes diversifications in the period 2000–2009.

the *q*s of all single-segment firms in the same two-digit SIC-code industry. The industry-adjusted *q* (IA*q*) is calculated as follows:

$$\text{IA}q = \text{Firm}q - \sum_{i=1}^{n} q_i * \left(\text{BV}_i / \text{FirmBV} \right), \quad (1)$$

where Firm*q* is the firm's actual *q*; q_i (i = 1…n) is the estimation of segment i's *q*, imputed as the average *q* of all specialized firms in the same industry; n is the number of segments; BV_i is the book value of segment i's assets; and FirmBV is the book value of the firm's total assets.

Following previous diversification studies (e.g. Hoechle *et al*., 2012), we control for a number of firm characteristic variables known to have significant effects on diversification value. Particularly, *Firm size* is included as larger firms are shown to be less efficient (Berger and Ofek, 1995). A dummy variable, *Dividend*, for dividend status, is included to control for the firm's ability to access financial markets. *Asset tangibility* is included as firms with lower asset tangibility may generate greater cash flows from intangibles and thus have higher *q* (Lang and Stulz, 1994). *Capex/assets* is to control for growth opportunities (Berger and Ofek, 1995). *Leverage* is controlled for its capacity to affect firm value through its role in discouraging managers' overinvestment of free cash flow (Hoechle *et al*., 2012). We calculate firm Herfindahl index (*Firm-Herfindahl)* as the sum of squared values of sales per segment as a fraction of total firm sales and use it as a measure of firm diversification. Nevertheless we only include this measure as a robustness test because of its high correlation with the level of diversification experience[6]. We further calculate the industry Herfindahl index as a measure of competition level. The industry Herfindahl index is the sum of squared values of sales per firm as a fraction of industry sales. Higher Herfindahl values indicate lower levels of competition. We add both the index of the firm's primary industry (*PI-Herfindahl*) and the index of the industry that it diversifies to (*DI-Herfindahl*). The reason we control for this is that diversification value may be

[6] Results are similar to our main analyses and available on request from the authors.

higher (lower) if firms expand into a more (less) competitive industry,[7] and is also likely to be affected by the competition level of the firm's primary industry.

3.2.2. Industry experience

As there is no study which investigates the effect of industry experience on diversification, we need to construct a measure of external experience specific to this context. In our study, we define external learning as congenital learning (Huber, 1991; Bapuji and Crossan, 2004); that is, firms learn from the industry (or population) experience accumulated before the focal diversification.

Industry experience is, accordingly, reflected in the number of industry diversifications that are similar to the focal diversification during the previous three years.[8] It is widely shown in the literature that specificity or similarity is an important factor facilitating learning and imitation between organizations (Finkelstein and Haleblian, 2002). Similarity is defined with respect to the direction of diversification, which broadly captures the link between a firm's present industry (or industries) and the industry into which the firm expands. The diversification direction is represented by a combined four-digit number formed from the two-digit SIC code of the present segment(s) and the two-digit SIC code of the new segment. For example, a firm with a segment in SIC code 12 that diversifies into an industry with SIC code 23 in the year 2003 will be given diversification direction 1223, and industry experience equal to the number of diversifications of other firms in the sample in the direction 1223 during the period 1999 to 2002. Similarly, a firm with two segments in SIC codes 20 and 21 that diversifies into an industry with SIC code 35 will have industry experience equal to the sum of the number of diversifications in each of the directions 2035 and 2135 during the

[7] We thank an anonymous referee for providing this suggestion.

[8] The three-year window used to calculate the number of industry diversifications is rather arbitrary. The time period is selected with the main aim of being not 'too long', as Baum and Ingram (1998, p. 997) note that 'other organizations' experience may differ in its value to the focal organization depending on when it is generated'; an experience that takes place too long in the past may not be applicable as the business environment changes. However, our results hardly alter when a window of either two or four years is adopted.

previous three years. Firms are then sorted in ascending order of industry experience, based on the number of similar diversifications, into ten roughly equal groups numbered from 1 to 10. This group number is our industry experience score and we use it as the measure of external diversification experience; the higher the score, the greater the level of industry experience accrued before the focal diversification.

This categorical variable (i.e. the group's number) is used to measure industry experience (*I-experience*), instead of the actual number of similar diversifications, for two reasons. First, the number of diversifications is a rather widely varying figure to use as a measurement of industry experience. Second, using the actual number of similar diversifications as the measure of industry experience may not be capable of capturing the effect of industry experience on diversification value as the marginal effects may be trivial. For instance, the value of diversified firms with ten similar diversifications may not be significantly different to the value of firms with fifteen similar diversifications.

3.2.3. Firm diversification experience

It is widely documented in the literature that internal learning from experience affects the performance of different strategy activities (Barkema and Schijven, 2008; Hayward, 2002). Following Hayward (2002) we add control variables for different aspects of the firm's own diversification experience, including level, similarity and timing.

To measure the firm's own experience, following Haleblian and Finkelstein (1999), we set aside ten years of the total sample period to capture diversification experience. The focal diversification is one made by the firm in the period 2000–2009. The level of diversification experience (*D-experience level*) is then measured as the number of diversifications made by the firm between 1990 and the focal diversification.

Similarity of diversification experience is represented by a dummy variable (*D-experience similarity*), which takes a value of 1 if the new segment in the focal diversification has the same two-digit SIC code as the new segment in the most recent prior diversification, and zero otherwise. This variable is missing for firm–year observations with no prior diversification.

Timing of diversification experience (*D-experience timing*) is defined as the number of years between the focal diversification and the one preceding it. Where the focal diversification is the first one in the sample period, our approach follows Hayward (2002) in imputing the maximum experience timing interval; that is, the year of the focal diversification less the first year of the sample, 1990. For example, if a firm diversifies for the first time within the sample period in 2001, its diversification experience timing score will be 11.

We also control for the moderation effect of internal experience on external learning.[9] Theoretically, there may be either a complementary or a substitutive relationship between external and internal learning. The complementary possibility is built on the absorptive capacity argument, suggesting that industry experience may need some absorptive capacity (previous internal diversification experience) to have a positive effect (Cohen and Levinthal, 1990). There are as many scholars (Sarkar *et al.*, 2003; Barkema and Schijven, 2008), however, who argue for a substitutive relationship: that external learning effects tend to become weaker in more experienced firms as they tend to focus more on their own experiences. So we add an interaction variable as the multiplication of the levels of industry experience (*I-experience*) and firm diversification experience (*D-experience level*) to control for this possible relationship.

3.2.4. Summary statistics

[9] We thank a referee for pointing out this possibility.

Table 1 presents summary statistics for the sample. It is noticeable that the average industry-adjusted *q* is negative, suggesting that, consistent with previous literature (e.g. Lang and Stulz, 1994), the value of diversified firms in the sample is discounted against the value of a comparable portfolio of specialized firms. The average industry experience score is 5.5 implying that on average there are about 85 similar diversifications within the three years prior to the focal diversification.[10] On average, these firms undertook 1.3 diversifications before the focal diversification. The mean of diversification experience similarity (0.35) indicates that firms overwhelmingly (65%) diversified into a different industry from that of the previous diversification. The time between diversifications ranges from one to nineteen years, with an average of seven years.

****

Table 1

****

4. Empirical results

4.1. External learning and diversification value

Table 2 reports the analyses of the relationship between diversification value and industry experience. A Jonckheere–Terpstra (J–T) test is used to test for ordered differences in diversification value for each level of industry experience, with the null hypothesis that there is no trend in the statistics.[11] Our analysis shows that the J–T test for the whole sample is negative and significant at the 10% level. This suggests that learning from others' experience may not enhance value.

[10] The number of similar diversifications for an industry experience score of 5 is 85, as shown in Table 2.
[11] The Jonckheere–Terpstra (J–T) test is used to test the ordered alternative. A positive (negative) standardized J–T statistic indicates an increasing (decreasing) order. The significance level indicates whether the alternative hypothesis of increasing (decreasing) ordering difference may be accepted with some level of confidence.

Table 3 reports the multivariate analysis of the effect of industry experience on diversification value. All the models use ordinary least squares (OLS) regressions with year fixed effects and are heteroskedasticity-consistent. [12] Potential multicollinearity among the independent variables is examined by means of the variance inflation factor (VIF), eigenvalue and condition number. This is not reported in the table, but no significant problem in these regressions is indicated.[13]

****
Tables 2 & 3
****

Table 3's Model 1, which includes only the industry experience variable and the control variables from the main analysis, produces results consistent with the preliminary evidence in Table 2. The coefficient of the industry experience variable is negative and statistically significant at 1%. An increase of 1 in the industry experience score reduces a firm's industry-adjusted *q* by 0.052, which is equivalent to 17% of the average industry-adjusted *q* of firms in this subsample.[14]

To study the non-linear relationship between diversification value and industry experience, Model 2 includes the industry experience variable, its square and cubic terms, and the control variables. Model 3 further adds the firm's own experience level, while Model 4 incorporates all measures of the firm's own experience (i.e. the level, similarity and timing of diversification experience).

Models 2, 3 and 4 consistently show a cubic relationship between industry experience and diversification value. In all the models, the turning points can be estimated at around 4 and 7, suggesting that external learning reduces value when the industry experience score is less than 4 or greater than 7, but is beneficial to firm value when the industry experience score is between 4 and 7.

[12] Firms making more than one diversification between 2000 and 2009 will appear more than once in the sample. However, Durbin–Watson statistics significantly reject the hypothesis of an autocorrelation problem in the analysis.
[13] Estimations from Model 4 in Table 3 show that for all variables the VIF is less than 10, eigenvalue is less than 0.01 and condition number is less than 30; necessarily suggesting, according to Belsley, Kuh and Welsch (1980), that collinearity does not exist in the model.
[14] 17% = (0.052/0.3)*100%

These results are consistent with our model predictions. Though the finding of a cubic relationship is, to the best of our knowledge, unique in the literature, we can still link each phase of the curve with evidence from existing studies. The most prevalent finding reported in literature is perhaps that firms always benefit from external learning (e.g. Baum and Ingram, 1998; Beckman and Haunschild, 2002). For instance, Baum and Ingram (1998) report that the start-up failure rate of a Manhattan hotel can decline as much as 90% when the hotel is able to learn from experience accumulated in the industry before its founding. Much less evidence is reported on negative impacts of external learning on performance (i.e. the first and third phases of the cubic curve). Hayward (2002) reports that too homogeneous a pool of experience has negative impacts on learning and value. Weigelt and Sarkar (2009) find that the experiential diversity of technology solution providers positively influences client innovation adoption; nevertheless the benefit disappears at high levels of diversity. Evidence from our research similarly suggests that too homogeneous or too heterogeneous a pool of industry experience will negatively affect learning and hence reduce diversification value.

As our model in the 'Theoretical development' section suggests, when there is very low industry experience (an industry experience score of 1, as shown in Table 2, with a mean of 5 similar diversifications) there are not enough suitable lessons, so firms might not attempt to learn from industry experience and thus no misinterpretation of such experience occurs.[15] As more industry experience accumulates, firms begin to learn from others, but where the lessons remain limited in number and heterogeneity, firms may still be unable to find a specific example that is directly relevant to learn from or imitate. The low heterogeneity in the sample also engenders a higher level of causal ambiguity, leading to incorrect inferences in learning. Therefore, attempts to learn from these early lessons of others may turn out to be detrimental to value. In the middle phase, when further similar diversifications are undertaken and industry experience accumulates (an industry

[15] In this phase, there may be the potential confounding effect of first-mover advantage at play. Empirically we control for this possibility by adding the measure (*DI-Herfindahl)* of competition in the expanded industry.

experience score of 4 or more, with an average of 56 or more similar diversifications), firms have a better choice of lessons relevant to the focal diversification decision. As more experience accumulates, the causal relationship between diversification and firm value can also be identified with greater confidence, and external learning therefore improves value. In the final phase (an industry experience score of more than 7, with an average of more than 178 similar diversifications), where there is a large number of diversification events in the pool of experience, it is a challenge to select the right lessons to learn from. Specificity is reduced and excessive heterogeneity blurs the causal patterns. The chance of misinterpretation is greater and external learning again reduces value.

Our results on the effects of internal learning on diversification value are also largely consistent with findings from previous studies. First, Haleblian and Finkelstein (1999) report a U-shaped relationship between the level of a firm's diversification experience and the diversification value. Arguably, inappropriate generalization is more common when firms do not have sufficient knowledge to usefully learn from experience (i.e. premature learning; Bapuji and Crossan, 2004). As a firm becomes more experienced, the likelihood of appropriate generalization will increase, leading to improved performance (Zollo and Winter, 2002; Haunschild and Sullivan, 2002). Second, Haleblian and Finkelstein (1999) and Finkelstein and Haleblian (2002) document that learning is facilitated and hence performance improves if later acquisitions are in the same industry as prior acquisitions. Finally, Hayward (2002) and Gersick (1994) clearly show that too long or too short a time between acquisitions may hamper performance. Model 4 of Table 3 reports the patterns consistent with these studies.

Table 3 also shows that most of the control variables have expected effects on diversification value. Coefficients on industry Herfindahl indexes are negative though not statistically significant. Among other variables, coefficients on firm size, asset tangibility and capital expenditure are

statistically significant in most models. We also run the models with firm Herfindahl index (*Firm-Herfindahl)* as a control variable for the degree of firm diversification; the results remain unchanged.

To summarize, this subsection shows that external learning from industry experience affects diversification value in a cubic relationship. External learning reduces value when the level of industry experience is too low or too high. This suggests that too simple or too complex a pattern of industry experience is detrimental to organizational learning and diversification value.

4.2. External *vs* internal learning

So far we have demonstrated that both external and internal learning play important roles in affecting diversification value (though their interactive effect is not significant). It is not clear, however, which form of learning is the more significant. We extend the analysis of the effects of industry and firm diversification experience on diversification value by using a newly developed method from Huettner and Sunder (2012) to distribute the R-squared value in Model 4 of Table 3 among the group of dependent variables. This novel method is particularly appropriate to our research for its decomposition of the overall R-squared value, which can thus be used to indicate which types of diversification experience are more important in explaining variation in diversification value.

We report the decomposition of R-squared for the full model (Model 4) in the last column of Table 3. It shows that, among the diversification experience variables, industry experience and the timing of internal experience are the most important in explaining variation in diversification value; around 13% of the explained variation can be attributed to each of these variable groups. The firm diversification experience variables for level and similarity of experience are much less important in terms of their contribution to R-squared; only 3.6% (0.6%) of the explained variation is attributable to the grouped variables for experience level (similarity). Our finding that the timing of firm

diversification experience is more important than its level or similarity can be further shown by comparing Model 3 and Model 4 of the table. When experience timing is added, the level of firm diversification experience becomes statistically insignificant in Model 4.

Among the control variables, the decomposition of R-squared shows that asset tangibility is the most important variable in determining the cross-sectional variation of diversification value. This is consistent with the view that firms with lower asset tangibility may generate greater cash flows from intangibles and thus will have higher *q*. Interestingly, the above decomposition procedure assigns the greatest explanatory importance to the group of year dummy variables.[16]

5. Conclusions

5.1. Main findings

This paper analysed the effects of external learning on cross-sectional variation of diversification value. Building on previous literature we develop a theoretical framework of experiential learning. Appling the framework in the context of diversification, we derive a model that demonstrates a three-phase relationship between industry experience and firm diversification value: (1) when industry experience is rare, it may negatively affect value; (2) when experience is more abundant, it may be beneficial to value; and (3) when it is too heterogeneous and complex, it may again become detrimental to learning and value.

Using data for US firms in the period 1990–2009, our study found evidence supporting this model's predictions. Our research shows that external learning from industry experience significantly affects value, in a cubic relationship that remains significant even when internal learning is controlled for. Using a method of R-squared decomposition, we show that the variables for external learning

[16] It further shows that years 2003 and 2006 show the largest diversification discount and contribute a large proportion of the explanatory power.

from industry experience and for the timing of any internal diversification experience provide the largest explanatory power regarding the cross-sectional variation of diversification value. These findings support the view that industry experience can be a more important source of learning than internal experience (Ingram and Baum, 1997a).

5.2. Implications for managerial practice

Findings from our study suggest that, in general, managers may learn from the experience of other firms. However, it should be noted that learning from industry experience does not guarantee improved performance, and that managers may choose the wrong lesson to follow when an industry has too few or too many examples of diversification. Our theoretical framework and empirical evidence suggest that when learning from peers, managers should pay attention to both the specificity and heterogeneity of external experience.

5.3. Broader theoretical implications

Our study has significant implications for the organizational learning literature. In particular, the proposed theoretical framework of experiential learning could be applied to a much wider context of corporate strategy study. It provides a good starting point for studying external learning in the strategic context to complement the organizational learning literature focusing largely on internal learning (Barkema and Schijven, 2008). Our study also has implications for the literature on diversification value. We demonstrate that learning, especially learning from peers, has an important role in diversification performance. Although the application of organizational learning is shown to be pervasive in organizational life, previous empirical analysis has been conducted mainly in manufacturing settings or an acquisition context (Barkema and Schijven, 2008). We find evidence of organizational learning in corporate diversification. This is important, as Haleblian and Finkelstein (1999) suggest that the understanding of organizational learning may be advanced by investigating

the impact of learning in different organizational contexts. Our empirical findings also offer an additional valuation factor (industry experience) for theoretical and empirical studies on the diversification discount (Martin and Sayrak, 2003).

5.4. Limitations and future research

Several areas of our work could be developed in future research. It would be beneficial to investigate further the interaction of internal and external organizational learning in the context of absorptive capacity. It is possible that more experienced firms may be better at learning from external experience. Although our study shows no interactive effect between the two types of learning, future research might further investigate the effects of internal and external experience by examining a firm's absorptive capacity.

Our research did not examine the mechanisms involved in generalizing knowledge from the experience of other firms. Conduits are not necessary for learning to occur; firms can learn from other firms through mere observation (e.g. Ingram and Baum, 1997a). However, Haunschild (1994) argues that imitation and vicarious learning are driven by conduits; research on these has so far mainly focused on board interlock. Future research could explore other channels of knowledge transfer and their impact on diversification performance.

This research could also be developed by examining whether learning from experience occurs similarly in refocusing activities such as spin-off or divestment. Learning processes may also vary depending whether diversification is conducted through internal development or acquisition, and this too merits further research.

References

Almazan, A., A. D. Motta, S. Titman and V. B. Uysal (2010). 'Financial structure, acquisition opportunities, and firm locations', *Journal of Finance*, **65**, pp. 529–563.

Argote, L., S. L. Beckman and D. Epple (1990). 'The persistence and transfer of learning in industrial settings', *Management Science*, **36**, pp. 140–154.

Argote, L. and E. Miron-Spektor (2011). 'Organizational learning: From experience to knowledge', *Organization Science*, **22(5)**, pp. 1123–1137.

Ataullah, A., I. Davidson, H. Le and G. Wood (2014). 'Corporate diversification, information asymmetry and insider trading', *British Journal of Management*, **25**, pp. 228–251.

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bapuji, H. and M. Crossan (2004). 'From questions to answers: reviewing organizational learning research', *Management Learning*, **35(4)**, pp. 397–417.

Barkema, H. G., J. H. J. Bell and J. M. Pennings (1996). 'Foreign entry, cultural barriers, and learning', *Strategic Management Journal*, **17**, pp. 151–166.

Barkema, H. G. and M. Schijven (2008). 'How do firms learn to make acquisitions? A review of past research and an agenda for the future', *Journal of Management*, **34(3)**, pp. 594–634.

Barney, J. B. (1997). *Gaining and sustaining competition advantage*. Reading, MA: Addison-Wesley.

Baum, J. A. C. and P. Ingram (1998). 'Survival-enhancing learning in the Manhattan hotel industry, 1898–1980', *Management Science*, **44**, pp. 996–1016.

Beckman, C. M. and P. R. Haunschild (2002). 'Network learning: The effects of partners' heterogeneity of experience on corporate acquisitions', *Administrative Science Quarterly*, **47**, pp. 92–124.

Belsley, D. A., E. Kuh and R. E. Welsch (1980). *Regression Diagnostics: Identifying Influential Data and Sources of Collinearity*. New York: John Wiley and Sons.

Berger, P. and E. Ofek (1995). 'Diversification's effect on firm value', *Journal of Financial Economics*, **37**, pp. 39–65.

Cohen, W. M. and D. A. Levinthal (1990). 'Absorptive capacity: A new perspective on learning and innovation', *Administrative Science Quarterly*, **35**, pp. 128–152.

Cormier, S. and J. Hagman (1987). *Transfer of Learning: Contemporary Research and Applications*. San Diego, CA: Academic Press.

DiMaggio, P. J. and W. W. Powell (1983). 'The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields', *American Sociological Review*, **48**, pp. 147–160.

Dutton, J. M. and A. Thomas (1984). 'Treating progress functions as a managerial opportunity', *Academy of Management Review*, **9**, pp. 235–247.

Finkelstein, S. and J. Haleblian (2002). 'Understanding acquisition performance: The role of transfer effects', *Organization Science*, **13**, pp. 36–47.

Gersick, C. (1994). 'Pacing strategic change: The case of a new venture', *Academy of Management Journal*, **37**, pp. 9–45.

Guillén, M. F. (2002). 'Structural inertia, imitation, and foreign expansion: South Korean firms and business groups in China, 1987–1995', *Academy of Management Journal*, **45**, pp. 509–525.

Haleblian, J. and S. Finkelstein (1999). 'The influence of organizational acquisition experience on acquisition performance: A behavioral learning perspective', *Administrative Science Quarterly*, **44**, pp. 29–56.

Haunschild, P. R. (1994). 'How much is that company worth? Inter-organizational relationship, uncertainty and acquisition premiums', *Administrative Science Quarterly*, **39**, pp. 391–411.

Haunschild, P. R. and A. S. Miner (1997). 'Modes of interorganizational imitation: The effects of outcome salience and uncertainty', *Administrative Science Quarterly*, **42**, pp. 472–500.

Haunschild, P. R. and B. N. Sullivan (2002). 'Learning from complexity effects of prior accidents and incidents on airlines' learning', *Administrative Science Quarterly*, **47**, pp. 609–643.

Haveman, H. A. (1993). 'Follow the leader: Mimetic isomorphism and entry into new markets', *Administrative Science Quarterly*, **47**, pp. 593–627.

Hayward, M. L. A. (2002). 'When do firms learn from their acquisition experience? Evidence from 1990–1995', *Strategic Management Journal*, **23**, pp. 21–39.

Hodgkinson, G. P. and P. R. Sparrow (2002). *The Competent Organization: A Psychological Analysis of the Strategic Management Process*. Buckingham, UK: Open University Press.

Hoechle, D., M. Schmid, I. Walter and D. Yermack (2012). 'How much of the diversification discount can be explained by poor corporate governance?', *Journal of Financial Economics*, **103**, pp. 41–60.

Huber, G. P. (1991). 'Organizational learning: The contributing processes and the literatures', *Organization Science*, **2**, pp. 88–115.

Huettner, F. and M. Sunder (2012). 'Axiomatic arguments for decomposing goodness of fit according to Shapley and Owen values', *Electronic Journal of Statistics*, **6**, pp. 1239–1250.

Ingram, P. and J. A. C. Baum (1997a). 'Opportunity and constraint: Organizations' learning from the operating and competitive experience of industries', *Strategic Management Journal*, **18**, pp. 75–98.

Ingram, P. and J. A. C. Baum (1997b). 'Chain affiliation and the failure of Manhattan hotels, 1898–1980', *Administrative Science Quarterly*, **42**, pp. 68–102.

Irwin, D. A. and P. J. Klenow (1994). 'Learning-by-doing spillovers in the semiconductor industry', *Journal of Political Economy*, **102**, pp. 1200–1227.

Lang, L. H. P. and R. Stulz (1994). 'Tobin's Q, corporate diversification, and firm performance', *Journal of Political Economy*, **102**, pp. 1248–1280.

Maksimovic, V. and G. Phillips (2002). 'Do conglomerate firms allocate resources efficiently across industries? Theory and Evidence', *Journal of Finance*, **57**, pp. 721–768.

March, J. G. (1991). 'Exploration and exploitation in organizational learning', *Organization Science*, **2**, pp. 71–87.

March, J. G., L. S. Sproull and M. Tamuz (1991). 'Learning from samples of one or fewer', *Organization Science*, **2**, pp. 1–13.

Markides, C. C. (1992). 'Consequence of corporate refocusing: Ex ante evidence', *Academy of Management Journal*, **35**, pp. 398–412.

Martin, J. D. and A. Sayrak (2003). 'Corporate diversification and shareholder value: a survey of recent literature', *Journal of Corporate Finance*, **9**, pp. 37–57.

Miner, A. S. and P. R. Haunschild (1995). 'Population level learning'. In B. Staw and L. Cummings (eds), *Research in Organizational Behavior*, Vol. 17, pp. 115–166. Greenwich, CT: JAI Press.

Nadolska, A. and H. G. Barkema (2007). 'Learning to internationalise: The pace and success of foreign acquisitions', *Journal of International Business Studies*, **38**, pp. 1170–1186.

Palich, L. E., L. B. Cardinal and C. C. Miller (2000). 'Curvilinearity in the diversification–performance linkage: An examination of over three decades of research', *Strategic Management Journal*, **21(2)**, pp. 155–174.

Porrini, P. (2004). 'Alliance experience and value creation in high-tech and low-tech acquisitions', *Journal of High Technology Management Research*, **15**, pp. 267–292.

Rajan, R., H. Servaes and L. Zingales (2000). 'The cost of diversity: The diversification discount and inefficient investment', *Journal of Finance*, **55**, pp. 35–80.

Salge, T. O. and A. Vera (2013). 'Small steps that matter: Incremental learning, slack resources and organizational performance', *British Journal of Management*, **24**, pp. 156–173.

Sarkar, M. B., R. Echambadi and C. Ford (2003). 'Learning to collaborate: The effects of experiential and vicarious learning on alliance performance', Working paper, Seattle Academy of Management.

Schijven, M. and H. G. Barkema (2007). 'A stepwise approach to acquisition capability development: The joint importance of experience homogeneity and heterogeneity', Working paper, Tilburg University.

Stein, J. C. (2003). 'Agency, information and corporate investment'. In G. M. Constantinides, M. Harris and R. Stulz (eds), *Handbook of the Economics of Finance*, Vol 1A, pp. 111–165. Amsterdam, Netherlands: Elsevier Science.

Weigelt, C. and M. B. Sarkar (2009). 'Learning from supply-side agents: The impact of technology solution provider' experiential diversity on clients' innovation adoption', *Academy of Management Journal*, **52(1)**, pp. 37–60.

Yang, M. and M. A. Hyland (2006). 'Who do firms imitate? A multilevel approach to examining sources of imitation in the choice of mergers and acquisitions', *Journal of Management*, **32**, pp. 381–399.

Yelle, L. E. (1979). 'The learning curve: Historical review and comprehensive survey', *Decision Sciences*, **10**, pp. 302–328.

Zollo, M. and S. G. Winter (2002). 'Deliberate learning and the evolution of dynamic capabilities', *Organization Science*, **13**, pp. 339–351.

Figure 1. Framework of external experiential learning

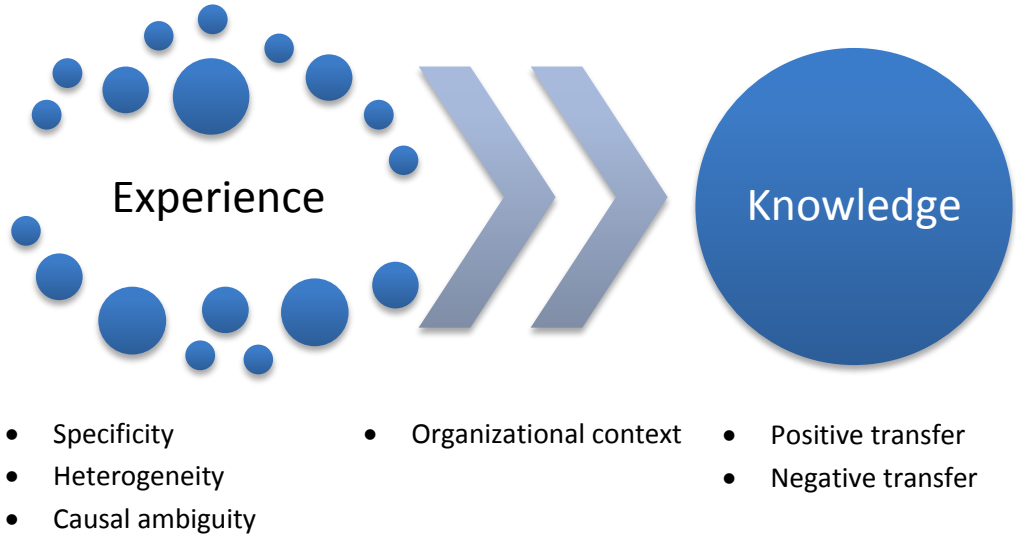

Figure 2. Industry diversification experience and focal diversification value

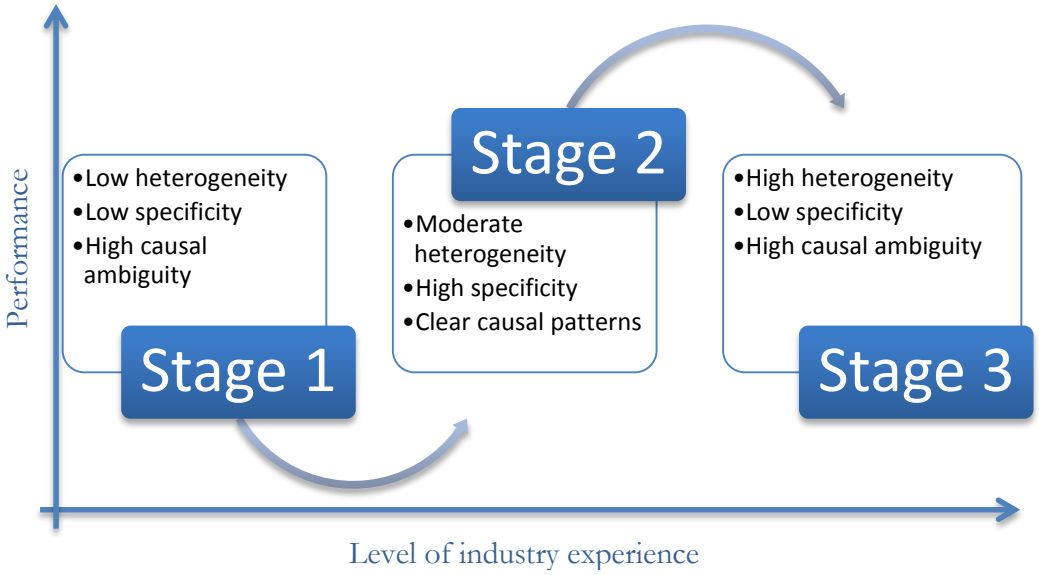

Table 1 Summary statistics

The sample includes all non-financial and non-utility firms with complete segment data available in the Worldscope database and total market capitalization of more than $10m who increase their reported number of segments by exactly one segment in any year between 2000 and 2009. *Industry-adjusted q* is the difference between a firm's *q* and the sum of its asset-weighted segment *q*s, where a segment's *q* is approximated by averaging the *q*s of all single-segment firms in the same two-digit SIC code industry. The level of industry experience is based on the number of diversifications during the previous three years that are similar to the focal diversification. This similarity is defined with respect to the direction of diversification, which captures the link between the firm's present industry (or industries) and the industry into which it expands. Firms are sorted into ten groups (see Table 2) according to their number of similar diversifications. Each group is then assigned an industry experience score (*I-experience*) which is used as the measure of industry experience level for firms in this group. *D-experience level* is the number of increases in the firm's reported number of segments between 1990 and the focal diversification. A firm that makes no prior diversification during the period is assigned a zero experience score, while a firm with more than five diversifications is given a score of 5. *D-experience similarity* takes a value of 1 if the focal diversification shares the same two-digit SIC code as the most recent prior diversification, and zero otherwise. *D-experience timing* is the number of years between the focal diversification and the one before it. When the firm has no diversification experience before the focal diversification, the timing is imputed as the number of years from the first year of the sample (1990) to the year of the focal diversification. *PI-Herfindahl* is the Herfindahl index of the firm's primary industry, and *DI-Herfindahl* the index of the diversification industry; each calculated as the sum of squared values of sales per firm as a fraction of industry sales. *Firm-Herfindahl* is the firm index, which is the sum of squared values of sales per segment as a fraction of total firm sales. *Number of segments* is a count of the segments that represent 10% or more of the firm's consolidated sales. *Firm size* is the natural logarithm of total assets. *Dividend* takes a value of 1 if the firm pays a dividend, and zero otherwise. *Asset tangibility* is the ratio of net value of property, plant and equipment to total assets. *Capex/assets* is capital expenditure divided by total assets. *Book leverage* is the ratio of total debt to total assets.

Variable	**Mean**	**Median**	**SD**	**Min**	**Max**	**N**
Industry-adjusted *q*	−0.300	−0.430	1.270	−5.620	6.430	498
Industry experience (I-experience)	5.480	5.000	2.870	1.000	10.000	498
Firm diversification experience (D-experience)						
D-experience level	1.340	1.000	1.430	0.000	5.000	498
D-experience similarity	0.350	0.000	0.480	0.000	1.000	309
D-experience timing	7.040	5.000	5.390	1.000	19.000	498
DI-Herfindahl	0.140	0.080	0.150	0.030	1.000	468
PI-Herfindahl	0.130	0.080	0.130	0.030	1.000	498
Firm-Herfindahl	0.600	0.570	0.230	0.140	1.000	498
Number of segments	3.360	3.000	1.360	2.000	7.000	498
Firm size	5.740	5.730	2.140	−0.900	10.200	498
Dividend	0.560	1.000	0.500	0.000	1.000	498
Asset tangibility	0.260	0.190	0.220	0.000	0.930	497
Capex/assets	0.050	0.040	0.060	0.000	0.400	498
Leverage	0.220	0.190	0.210	0.000	1.940	498

Table 2 Industry experience and diversification value

The sample includes all non-financial and non-utility firms with complete segment data available in the Worldscope database and total market capitalization of more than $10m who increase their reported number of segments by exactly one segment in any year between 2000 and 2009. The level of industry experience is based on the number of diversifications during the previous three years that are similar to the focal diversification. This similarity is defined with respect to the direction of diversification, which captures the link between the firm's present industry (or industries) and the industry into which it expands. Firms are sorted into ten groups according to their number of similar diversifications. Each group is then assigned an industry experience score (*I-experience*) which is used as the measure of industry experience for firms in this group. *J–T tests* reports the standardized Jonckheere–Terpstra statistics.

Industry experience score (I-experience)	**Avg no. of similar diversifications**	**Industry-adjusted *q***			**N**
		Mean	**Median**	**SD**	
1	4.900	0.034	−0.103	1.817	50
2	17.460	−0.466	−0.276	1.186	50
3	33.180	−0.419	−0.541	1.544	50
4	56.060	−0.460	−0.428	0.894	50
5	85.400	−0.105	−0.461	1.371	50
6	126.040	−0.351	−0.578	1.046	50
7	177.780	0.042	−0.210	1.277	50
8	258.120	−0.432	−0.555	1.111	50
9	377.140	−0.299	−0.461	1.114	50
10	808.667	−0.593	−0.647	0.987	48
J–T tests	−1.556 *				

* indicates statistical significance at the 10% level.

Table 3 Industry experience, firm diversification experience and diversification value

The sample includes all non-financial and non-utility firms with complete segment data available in the Worldscope database and total market capitalization of more than $10m who increase their reported number of segments by exactly one segment in any year between 2000 and 2009. The dependent variable is *Industry-adjusted q*. *Interaction* is the multiplication of the levels of industry experience (*I-experience*) and firm diversification experience (*D-experience level*). Other variables are defined as in Table 1. *Group % of* R^2 is the percentage contribution of the (grouped) variables to the overall R-squared value.

	Model 1		Model 2		Model 3		Model 4		
Variable	**Est.**	***t*-value**	**Est.**	***t*-value**	**Est.**	***t*-value**	**Est.**	***t*-value**	**Group % of R^2**
Intercept	1.194	3.540***	2.021	3.640***	2.309	3.970***	1.117	1.370	
Industry diversification experience									
I-experience	−0.052	−2.610***	−0.701	−2.450**	−0.755	−2.650**	−0.668	−1.970**	13.170
I-experience squared			0.144	2.560**	0.153	2.750***	0.151	2.360**	
I-experience cubed			−0.009	−2.780***	−0.010	−2.970***	−0.010	−2.670***	
Firm diversification experience									
D-experience level					−0.397	−2.930***	−0.248	−0.830	3.672
D-experience level squared					0.062	2.460**	0.053	1.160	
D-experience similarity							0.118	0.850	0.612
D-experience timing							0.243	2.750***	12.907
D-experience timing squared							−0.021	−2.550**	
Interaction					0.015	1.130	−0.006	−0.310	27.962
DI-Herfindahl	−0.093	−0.170	−0.284	−0.480	−0.031	−0.050	−0.370	−0.570	
PI-Herfindahl	−0.903	−1.310	−0.736	−1.050	−0.776	−1.120	−1.002	−1.420	
Firm size	−0.154	−4.090***	−0.150	−3.940***	−0.141	−3.770***	−0.032	−0.860	
Dividend	−0.043	−0.400	−0.068	−0.630	−0.046	−0.430	−0.152	−1.150	
Asset tangibility	−0.910	−2.580**	−1.027	−2.890***	−1.045	−2.920***	−0.710	−1.620	
Capex/assets	4.127	2.580**	4.482	2.880***	4.329	2.800***	1.793	1.030	
Leverage	0.073	0.170	0.050	0.120	0.020	0.050	−0.416	−1.130	
Year FE	Y		Y		Y		Y		41.677
R^2	0.118		0.128		0.141		0.120		
N	497		497		497		308		

***, ** and * indicate statistical significance at 1%, 5% and 10% levels respectively.