STRATEGIC ORGANIZATION Vol 4(3): 215–247
DOI: 10.1177/1476127006066596

http://so.sagepub.com

ARTICLES

Does experience matter? The effect of founding team experience on the survival and sales of newly founded ventures

Frédéric Delmar Strategy and Organization, EM Lyon, France

Scott Shane Weatherhead School of Management, USA

Abstract

While earlier researchers have argued that the founding team's industry and start-up experience should positively affect new venture performance, robust empirical support for these arguments has been lacking. Moreover, theory suggests that the relationship between founding team experience and new venture performance may be more complex than previous empirical research suggests. We test specific hypotheses about the effect of founding team industry and start-up experience on the survival and sales of 223 new ventures initiated by a representative sample of Swedish new ventures, using a methodology that overcomes the limitations to previous research. Our results show that founding team experience enhances both new venture survival and sales, but that the effects are non-linear, and vary with venture age.

Key words • industry experience • new venture creation • sales growth • start-up experience • survival

Does founding team experience enhance the performance of new ventures? Practitioners seem to think so. Investors in new ventures often say that they 'bet on the jockey, not on the horse' when choosing which ventures to back. Arguing that experienced entrepreneurs will do a better job with a mediocre business opportunity than inexperienced entrepreneurs will do with an excellent opportunity, investors hold that entrepreneurs' greater industry and start-up experience will create better-performing ventures than entrepreneurs with less experience. But is it true?

Perhaps surprisingly, the extant literature does not help very much in answering this question. Although several studies have examined the effects of founding team experience on the performance of new ventures, they offer little clear evidence to guide researchers or practitioners. Despite theory to suggest that founding team experience might show increasing or decreasing returns, and might vary with organizational age (Brüderl and Schussler, 1990; Fichman and Levinthal, 1991), prior studies exploring the effect of founding team experience on new venture performance posit a linear relationship that does not vary with venture age or with the amount of founding team experience.

Moreover, as Table 1 summarizes, prior research faces four methodological limitations. First, studies that test the effect of venture team experience on new firm survival (Wicker and King, 1989; Brüderl et al., 1992; Taylor, 1999; Bates and Servon, 2000; Van Praag, 2003) rarely test for convergent validity with other dimensions of new venture performance. The few studies that do examine the effect of founding team experience on firm survival and other measures of new venture performance (Gimeno et al., 1997; Shane and Stuart, 2002; Bosma et al., 2004) do not find consistent effects on multiple measures of performance.

This pattern of empirical results makes it difficult to accept the hypothesis that founding team experience enhances new venture performance. Because venture team start-up and industry experience do not have the same effects on multiple measures of new venture performance, researchers should only accept the more nuanced hypothesis that venture team experience reduces the likelihood of new venture failure. This result raises an important theoretical question: Perhaps founding team endowments offer a buffer that allows new firms to survive, but have no effect on sales or profits (Brüderl and Schussler, 1990; Fichman and Levinthal, 1991) because the benefits of experience that permit survival may not be sufficient to generate positive outcomes (Otani, 1996).

Second, virtually all previous studies that examine the effect of founding team experience on aspects of new venture performance other than survival fail to correct for venture failure, limiting the validity of their findings. [Gimeno et al., 1997 is the only exception we could identify.] Studies that fail to correct for new venture survival face a selection problem because they only examine the performance of new ventures that have managed to survive. The failure to correct for new venture survival in regressions that examine the effect of founding team experience on new venture performance results in systematic downward bias in the estimates for the effect of founding team experience. If founding team experience reduces the failure rate of new ventures, then a selected sample of surviving ventures will have a higher level of founding team experience than a non-selected sample of all new ventures. The reduced variance among the surviving ventures makes it less likely that the effect of founding team experience on measures of new venture performance will be observed. Thus, the examination of the uncorrected effects of founding team experience on measures of new venture performance suggests less convergence between the effects of venture

Table 1 Prior studies looking at venture team industry and start-up experience

Study	Sample	Significant effect of team start-up exp. on survival	Significant effect of team industry exp. on on survival	Sample representative of population new firms	Corrects for selection	Measures effect of team exp. on another performance	Retrospective surveys of interviews
Bates and Servon (2000)	275 businesses in 1992 Characteristics of Business Owners Database formed 1986–92 who were self-employed because they could not find suitable work elsewhere	Not tested	Positive	No	No	Not tested	No
Bosma et al. (2004)	896 new businesses started in Netherlands in 1994 and registered in database of Dutch chamber of commerce	No	Positive	No	No	Positive effect of start-up and industry experience on three-year profit and positive effect of industry experience on three-year employment	No
Brüderl et al. (1992)	1849 business founders in Munich area who founded firms during 1985 and 1986	None	Positive	Yes	No	No	Yes
Brüderl and Preisendorfer (1998)	1849 business founders in the Munich area who founded firms during 1985 and 1986	None	Positive	Yes	No	Yes, positive effect of industry experience on sales growth	Yes
Gimenao et al. (1997)	1547 firms from NFIB membership founded in 1983–5 with exit recorded in 1986 and 1987	None	Positive	Yes	No	Yes, positive effect of startup and industry experience on economic performance	Yes

Table 1 Continued

Study	Sample	Significant effect of team start-up exp. on survival	Significant effect of team industry exp. on on survival	Sample representative of population new firms	Corrects for selection	Measures effect of team exp. on another performance	Retrospective surveys of interviews
Klepper (2001)	Population of entrants in the US automobile industry 1895–1966	Positive	No	No	No	Not tested	No
Pennings et al. (1998)	Dutch accounting firms established 1880–1990	Not tested	Curvilinear	No	No	Not tested	No
Shane and Stuart (2002)	134 firms founded to exploit inventions assigned to MIT 1980–94	None	None	No	No	Yes, positive effect of industry experience on likelihood of IPO	Yes
Taylor (1999)	British household panel survey 1991–5	Positive	Not tested	Yes	No	Not tested	Yes
Van Praag (2003)	271 white males 20–32 years old who become self-employed in unincorporated companies 1985–9	No	Positive	No	No	Not tested	No
Wicker and King (1989)	413 retail and service establishments in five Southern Californian counties in 1985 taken from California State Board of Equalization	Not tested	Positive	No	No	Not tested	No

team experience on firm survival and other performance measures than is actually the case (Greene, 2000).

Third, many of the studies of the effect of venture team experience on new venture survival use retrospective designs (Brüderl et al., 1990; Gimeno et al.,

1997; Brüderl and Preisendorfer, 1998; Taylor, 1999; Shane and Stuart, 2002) to gather data, raising the potential for another type of selection bias. Because the failure rate of new ventures is very high in their early years, studies using retrospective methods typically examine a selected group of surviving firms. Unless researchers have some archival method for gathering information about the variables of interest, retrospective research designs fail to capture information on failed ventures (because key informants are not available to answer questions about those ventures). As a result, the observed positive association between founding team experience and the survival of new ventures indicates that these studies systematically over-sample new ventures with experienced founders, biasing the estimates of the effect of founder industry and start-up experience.

Fourth, even the empirical evidence that shows the positive effect of founding team experience on new venture survival has limited generalizability because most previous studies (Wicker and King, 1989; Gimeno et al., 1997; Bates and Servon, 2000; Van Praag, 2003; Bosma et al., 2004) have explored convenience samples that do not represent known populations, or are limited to a single industry or sector (Pennings et al., 1998; Klepper, 2001; Shane and Stuart, 2002). Because previous samples are not representative of the population of newly founded firms, researchers cannot conclude that founding team industry and start-up experience enhance the survival of the typical new venture.

The purpose of this study is twofold: First, it examines the effect of founding team experience on the survival and sales development of new ventures using a research design that overcomes the four methodological limitations described above. Second, it examines hypotheses which argue that the effect of founding team experience is neither constant over venture age, nor linear across the entire range of experience.

Empirically, we examine the effect of founder industry and start-up experience on new venture survival and sales over their first 30 months of life for a sample of 223 new ventures representative of the population of new firms founded in Sweden in 1998. Our results indicate that founding team industry and start-up experience enhance both new venture survival and new venture sales, but the effects are nonlinear, and vary with venture age.

Theoretical background and hypotheses

A wide variety of studies have shown that new firms suffer from a liability of newness (Carroll and Hannan, 2000). As Stinchcombe (1965: 263) explained: 'new organizations, especially new types of organizations, generally involve new roles, which have to be learned.' In addition, new ventures lack routines for coordinating the activity of organization members, as well as for producing and delivering products or services. Furthermore, new ventures lack the social ties to key stakeholders that facilitate economic activity (Arrow, 1974).

Researchers have studied a variety of factors that overcome these liabilities of newness, and positively affect the performance of start-up firms. These factors include aspects of the external environments, including founding conditions (see Carroll and Hannan, 2000 for a review), and industry characteristics (Eisenhardt and Schoonhoven, 1990; Caves, 1998). They also include aspects of firm strategy (Boeker, 1989), including the choice of alliance partners (Stuart et al., 1999), entry timing (Mitchell, 1991), and barriers to entry (Sandberg and Hofer, 1987). Researchers have even examined the effect of the status of the financial backers of new firms (Freeman, 1999), and the prominence of the prior employers of venture founders (Burton et al., 2002).

Many of these factors, such as environmental conditions or firm strategy, operate at a higher level of analysis than the individual level at which we focus. Hence, they are beyond the scope of our study. However, researchers have also examined the effect of a variety of individual factors, including the social capital of founders (Shane and Stuart, 2002), founding team demography (Eisenhardt and Schoonhoven, 1990), the amount of time that the founding team members have worked together (Roure and Maidique, 1986), venture team size (Eisenhardt and Schoonhoven, 1990) and the functional backgrounds of the founders of new ventures (Jones-Evans, 1996).

While these individual factors affect the performance of new ventures and are important for researchers to study, we argue that two other individual attributes, the prior start-up and industry experience of the founding team, are also important and have received less rigorous scholarly attention. Prior founding team industry and start-up experience are important for two reasons. First, theory suggests that founding team experience is likely to be critical to the performance of new ventures. Earlier researchers (Jovanovic, 1982; Otani, 1996) have suggested that both founding team prior industry and start-up experience help a new venture to overcome liabilities of newness (Bates, 1990; Gimeno et al., 1997). Start-up experience, which we define as the previous creation of new organizations, provides information about such activities as opportunity identification and evaluation, resource acquisition and firm organizing. Industry experience, which we define as previous work in the industry in which the new firm will operate, provides information about industry rules and norms, customer and supplier networks, and employment practices.

Both of these forms of experience help entrepreneurs to overcome liabilities of newness and enhance the performance of their new ventures because the activities in which entrepreneurs engage are subject to learning curves. The more that entrepreneurs start firms or work in an industry, the better they become at organizing firms, acquiring resources, attracting customers and suppliers, and hiring employees. Because this learning can be transferred by entrepreneurs from one setting to another, the position of a new venture on the learning curve is determined, at least in part, by the prior industry and start-up experience of the founding team.

Second, practitioners focus their attention on founding team start-up and industry experience, which suggests their importance. Surveys of investors consistently reveal that they consider the industry and start-up experience of new firm founders to be among the most important determinants of new venture success (MacMillan et al., 1985; Hall and Hofer, 1993). We view practitioner attention to these dimensions as suggestive of a lay theory of new venture success that has not received adequate empirical testing.

Theory suggests that founding team experience enhances the performance of new ventures in three different ways. First, it provides information that facilitates the development of the organizing routines and skills in which new ventures are initially disadvantaged. Second, founding team experience provides role familiarity, which is important when founding team members adopt the roles that they play in new ventures. Third, founding team experience links the entrepreneur to a network of employees, suppliers, investors and customers (Campbell, 1992).

Defining venture performance

Researchers have discussed a variety of outcomes that founding team characteristics, such as prior industry and start-up experience, might affect. For example, Schoonhoven et al (1990) examined the effect of founding team characteristics on the time it takes semiconductor firms to get new products to market, while Burton et al (2002) and Shane and Stuart (2002) have looked at the effect that founding team characteristics have on the ability of new ventures to raise external capital.

Although previous studies show the effect of founding team experience on a wide variety of outcomes, we believe survival and sales are particularly important measures to study. Many studied outcomes, such as getting new products to market or raising money, are aspects of the organizing process itself (Delmar and Shane, 2003). Because founding team experience might have different effects on aspects of the venture organizing process than on the survival and sales of new ventures, examination of the effect of founding team experience on the latter outcomes is necessary to conclude that founding team experience has implications for new venture outcomes beyond aspects of the organizing process itself.

Hypotheses

Start-up experience

The venture team's start-up experience should enhance the survival and the sales of a new venture for at least three reasons. First, much of the relevant knowledge about creating a new company is learned by doing (Jovanovic, 1982). Start-up experience provides tacit knowledge of organizing routines and skills that have already been learned from their prior activities, and which can be transferred to the new venture (Ripsas, 1998; Shepherd et al., 2000). Experienced firm

founders have often learned what needs to be done to successfully organize a new firm because they have previously encountered the problems associated with hiring new employees, finding financial capital, developing a new product, and establishing contacts with potential customers. Thus, start-up experience provides a particular type of human capital that cannot be acquired easily through other means (Carroll and Mosakowski, 1987).

Second, start-up experience provides knowledge of what roles are necessary in organizations, and who should fill those roles. Knowledge of the appropriate roles and responsibilities for organization members is often difficult to develop without establishing new companies and defining the required new organizational roles and responsibilities (Brüderl et al., 1992). For example, fulfilling the role of gathering information and making decisions as an entrepreneur is likely to require experience in these fields (Duchesneau and Gartner, 1990). Start-up experience also may lead founders to better identify information channels needed to identify and exploit productive opportunities. Alternatively, experienced founders may know what firm organizing activities to focus attention on, and so be better able to set up a new firm than inexperienced founders (Ericsson and Smith, 1991).

Third, start-up experience links the entrepreneur to a network of employees, suppliers, investors and customers (Campbell, 1992). Because social ties are an important lubricant of economic activity (Arrow, 1974), the initial lack of ties to stakeholders hinders new firms relative to established organizations (Stinchcombe, 1965). Start-up experience transfers these social ties from prior settings, facilitating resource acquisition, the implementation of techniques to evaluate customer needs and other organizing activities that enhance new venture sales (Venkataraman, 1997). In addition, start-up experience provides legitimacy in the eyes of important stakeholders of the new venture, which, in turn, facilitates the process of obtaining resources and organizing new firm operations (Aldrich, 1990). Consequently, founders' experience represents a resource that reduces the liability of newness that new ventures face (Shane and Khurana, 2003).

Fourth, start-up experience provides tacit knowledge about how to run a new firm that has been learned from prior mistakes (Ripsas, 1998; Shepherd et al., 2000). For instance, experienced firm founders have often learned what needs to be done to successfully organize a new firm because they have previously encountered the problems associated with hiring new employees, finding financial capital, developing a new product, establishing contacts with potential customers, and attracting and hiring employees (Brüderl et al., 1992; Aldrich, 1999). This also allows them to focus on the task of building a venture, despite competing demands on their time, because they know what activities are important to develop a new business. These arguments lead to the first hypotheses, as follows.

HYPOTHESIS 1A The founding team's start-up experience will increase a new venture's survival.

HYPOTHESIS 1B The founding team's start-up experience will increase a new venture's sales.

Industry experience

The venture team's start-up experience should enhance the survival and the sales of a new venture for at least three reasons. First, a founding team with more industry experience has a better understanding of how to satisfy customer demand in that industry because such information is often only available through industry participation (Knight, 1921; Von Mises, 1949; Johnson, 1986). By working with customers and understanding the advantages and disadvantages of various product and service offerings, as well as gaps in existing efforts to satisfy customer needs, a founding team develops a rich understanding of what to offer as a product or a service. This gives them an advantage in being able to more rapidly identify and develop a market entry strategy, and to focus on relevant steps to achieve a positive outcome.

Second, many of the skills and much of the information necessary to effectively exploit an opportunity can only be learned through employment in an industry, because such information is uncodified. This knowledge might be related to production processes, market niches, technological developments, or products or services (Cooper et al., 1994; Klepper, 2001). Because a founding team with industry experience has acquired this knowledge, ventures founded by experienced teams are more likely to survive and achieve greater sales than ventures founded by teams that are novices in an industry.

Third, social ties to suppliers and distributors are created over time through activity in an industry. When people found ventures in the same industry in which they have been working before, they can transfer social ties from their prior settings to their new venture. These social ties are valuable in obtaining commitment and support from suppliers, distributors and customers. Moreover, these ties, and the status of the people with whom the ties are created, provide legitimacy in their eyes of important stakeholders in the new venture, which, in turn, facilitates the process of obtaining resources and organizing new firm operations (Aldrich, 1990). As a result, founding teams with more industry experience are likely to have advantages over other founding teams in developing their new businesses. These arguments lead to the following hypotheses.

HYPOTHESIS 2A The founding team's industry experience will increase a new venture's survival.

HYPOTHESIS 2B The founding team's industry experience will increase a new venture's sales.

Decreasing marginal returns to experience

Founding team experience is unlikely to have a linear effect on new venture performance as the amount of experience increases. Rather, the effect of start-up and industry experience on new venture performance is likely to decline

with the amount of experience because experience effects face diminishing marginal returns.

Experience curves affect the development and performance of new businesses. When people embark on the process of creating new firms, they develop a conception of what the newly formed organization will look like and seek to establish the organization in a way consistent with that vision (Witt, 2000). The specific steps that firm founders take towards the establishment of new organizations are affected by the knowledge that they have about the industry in which the firm will operate and the new firm organizing process. Founders without any experience in the venture's industry or in the start-up process have little knowledge to guide this process. As a result, those firm founders are likely to make more mistakes than the firm founders with industry and start-up experience, hindering the performance of their new ventures.

Each additional amount of experience that firm founders have is likely to have a positive performance effect because this experience provides knowledge that guides the entrepreneurial process and reduces founder error (Witt, 2000). However, the level of performance benefits that founder industry start-up and industry provides is likely to decline with each additional amount of experience. While each additional amount of experience provides additional knowledge to guide future entrepreneurial processes and to reduce error in the process, the additional knowledge that experience provides increases at a decreasing rate (Cyert and March, 1963). As a result, the knowledge gained from industry and start-up experience that allows firm founders to undertake many aspects of new firm activity more effectively – establishing a new company, dealing with suppliers, finding customers, organizing production and so on – is unlikely to be as great for the founding team's second, third or fourth prior start-up as is for their first prior venture (Witt, 2000). As a result, the performance benefits of the fourth prior start-up will have a lesser effect than the performance benefits of the third prior start-up, which, in turn, will be smaller than for the second prior start-up and so on. These arguments lead to the third set of hypotheses, as follows.

HYPOTHESIS 3A The effect of the founding team's start-up experience on new venture survival will be a positive, but declining, function of founding team start-up experience.

HYPOTHESIS 3B The effect of the founding team's industry experience on new venture survival will be a positive, but declining, function of founding team industry experience.

HYPOTHESIS 3C The effect of the founding team's start-up experience on new venture sales will be a positive, but declining, function of the amount of founding team start-up experience.

HYPOTHESIS 3D The effect of the founding team's industry experience on new venture sales will be a positive, but declining, function of the amount of founding team industry experience.

Decrease with venture age

The effects of founding team industry and start-up experience will vary over the life of a venture. The beneficial effect of founding team experience will decline as the venture ages. New ventures begin as ideas and are transformed by entrepreneurs into new organizations (Aldrich and Martinez, 2001). The transformation of ventures from ideas into organizations suggests that the relative contribution of founder knowledge to the performance of new ventures will decrease as ventures age. In the initial phases of venture development, when the venture is mostly an idea, founder knowledge accounts for almost all of the factors that affect venture performance. Whether a venture survives or develops depends largely on what founders know about how to get control over resources or how to establish organizational boundaries (Aldrich and Martinez, 2001). In the later stages of venture development, when employees have been hired and assets purchased, characteristics of these factors begin to affect venture performance. As a result, the relative effect of founder industry and start-up experience on venture performance declines with venture age.

Second, the founders of new ventures face steep learning curves in developing new businesses (Gibb, 1994). These steep learning curves mean that, as new ventures develop, the effect of each unit increase in experience on outcomes declines with the amount of experience. As a result, the magnitude of the performance gap between experienced and inexperienced ventures declines as ventures age.

The experience of founders influences where a new venture starts on this learning curve. When a new firm is first founded, it possesses little more than the assets that the founders bring with them to the venture. For the typical new venture, those assets take the form largely of the founders' human capital (Bhide, 2000). In contrast, ventures founded by more experienced entrepreneurs begin their lives further up the learning curve because the human capital that their founders provide is more valuable to the performance of the new ventures than the human capital of inexperienced founders. However, the value of founder human capital decreases as ventures age because the effect of each unit increase in experience on outcomes declines with venture experience. As a result, the performance benefits that experienced new venture founders provide to new ventures will decline as ventures age.

Third, new ventures change as they get older (Churchill and Lewis, 1983). In particular, their activities become more and more complex, making the performance of new ventures less directly linked to the characteristics of the founding team and more the result of other factors.

In addition, as ventures age, labor begins to be divided among organization members and the proportion of labor accounted for by the founder decreases (Witt, 2000). Consequently, founder-specific characteristics influence a smaller portion of venture activities as ventures age.

Furthermore, learning involves the creation of routines that can be used to respond to future circumstances when similar circumstances appear in the future

(Cyert and March, 1963). Examples of these routines in new ventures include routines for invoicing, checking inventory, purchasing, budgeting, evaluating investments, selecting employees and so on (Mathews, 2003). As organizations develop, founder decision making begins to be replaced by organizational routines. The organization ecology literature suggests that these routines become embedded in organizations over time (Carroll and Hannan, 2000). As a result, the role of individuals in ensuring that activities occur in organizations declines as ventures age. These arguments lead to the fourth set of hypotheses, as follows.

HYPOTHESIS 4A The effect of the founding team's start-up experience will be a positive, but declining, function of venture age.

HYPOTHESIS 4B The effect of the founding team's industry experience will be a positive, but declining, function of venture age.

HYPOTHESIS 4C The effect of the founding team's start-up experience on new venture sales will be a positive, but declining, function of venture age.

HYPOTHESIS 4D The effect of the founding team's industry experience on new venture sales will be a positive, but declining, function of venture age.

Method

Design and sample

In order to test the effect of venture teams on the sales of newly founded firms, we had to overcome two difficult data collection problems. First, to avoid selection bias (which would bias our estimates of the effects of experience on new venture sales), we needed to collect data on firms from the point at which they were started forward in time (Heckman, 1979; Yamaguchi, 1991; Blossfeld and Rohwer, 1995). Second, to generalize our results to a known population, we needed to obtain a sample representative of that population.

Therefore, we first identified members of the Swedish labor force who were starting new ventures at a particular point of time, creating a sample of new ventures that represented the population of all new ventures at risk of formation in Sweden at that point in time. In the first nine months of 1998, we randomly sampled, by telephone, 35,971 Swedes between the ages of 16 and 70 (the definition of the working-age population in Sweden) and asked them to participate in our study. 30,427 individuals (84.6%) agreed to participate.

We then asked the respondents if they were in the process of starting a new business either alone or as a part of a team. We provided the respondents with a definition of a new business in order to minimize problems with perceptual differences in the definition of a new business. The definition we provided was

broad, and included a variety of different types of new businesses including farms, consultancies and home-based businesses.

If there was an affirmative answer to the screening question, we subsequently asked the respondent if the new firm was an independent effort or an effort on behalf of an existing organization. We did this to ensure that our sample consisted only of independent new businesses, not divisions of existing corporations.

If there was an affirmative answer to the independent venture question, we then asked if the respondent was a member of the start-up team, rather than an adviser or investor. Because we were interested only in founding team members, we excluded those people who indicated that they were not members of the start-up team.

We were also concerned that many of the respondents might have started their new firms before we began our observation period. Therefore, we asked the respondents to indicate the month and year when work on the new venture first began. We defined work on the new venture as any action taken to exploit the identified opportunity (for example, product development or seeking funds). By focusing on organizing action as our definition of initiating a new venture, we were able to differentiate between ventures whose founders had merely thought about starting a new firm and ventures whose founders had acted to establish new firms.

We discovered that some respondents indicated that they were in the process of starting a new business, but had begun that effort as early as 1947. Therefore, we excluded all respondents who had started businesses before 1998, the start year of our observation period. The problem with including respondents who had started businesses before our observation period is that we had no way to observe the other members of their start-up cohort. We suspected that many people who had started businesses in earlier cohorts (for example, 1947) had long since terminated their efforts. The inclusion of respondents from earlier cohorts who were still in the process of starting their businesses would have resulted in selection bias, because other individuals who had started new ventures in their cohort, but who had already terminated their efforts, would have indicated that they were not in the process of establishing a new firm when surveyed by us in 1998. As a result, our screening questions capture all of the new ventures started in 1998, but only long-in-process entrants from earlier years. Because long-in-process new firms do not represent the population of new firms started in earlier years, their inclusion would bias our sample.

The main objective of our survey was to gather panel data about the new ventures over time. Therefore, we resurveyed the respondents every six months for two years.[1] We obtained high response rates for the successive waves: 90.5 percent at six months, 91.9 percent at 12 months, 98.5 percent at 18 months and 96.1 percent at 24 months. Only 12 of the firms that ceased to participate at one of the waves of data collection never returned to participate. We explored whether the 12 firms that dropped out of participation and 211 firms that

continued to participate differed significantly on any of the variables in our study. Because we did not find any statistically significant differences between the two groups, we have included all 223 ventures in this study. That is, the 12 firms that did not return to our data collection were treated as right censored at the point that they ceased participation. We also analyzed the data excluding these 12 cases and found qualitatively the same results.

Our sample provided an interesting snapshot of the development of new ventures in Sweden. Of the 223 new ventures, 17.8 percent were in the manufacturing sector, 21.6 percent were in professional services and the rest were in the non-professional service sector. The most prominent industries in the sample were professional services, retail establishments, and hotels and restaurants. Approximately two-thirds of the ventures, or 63.4 percent, served firms as their main customers. The employment of the average firm in our sample was consistent with the employment of the average new firm in Sweden in the year of observation, which had 1.4 employees.

Analysis

Survival

We examined the influence of founding team start-up and industry experience on the survival of the new ventures across the 30-month observation period of our panel. Over our observation period, 82 of the 223 ventures (36.8 percent) were disbanded. Half of the ventures in our sample that disbanded did so before the tenth month.

We predicted the hazard of the venture being disbanded using event history analysis with standard errors clustered by venture (Blossfeld and Rohwer, 1995; Wooldridge, 2002). We employed a piece-wise constant exponential model, which splits the time axis into time periods, and assumes that the transition rate is constant within these intervals, but can change between them (Blossfeld and Rohwer, 1995).[2] The piece-wise model is useful when researchers cannot make assumptions about the time dependence of the process, which is the case here given the controversies about the time dependence of new venture termination (Brüderl and Schussler, 1990; Fichman and Levinthal, 1991).

Sales

We analyzed how founding team start-up and industry experience influenced the sales of the new ventures across the 30-month observation period of our panel. The ventures in our sample experienced significant changes in their level of sales over their first 30 months of life. We found that only 3.1 percent of the ventures in our sample had achieved any sales at all in their first month, and that the average amount of monthly sales for a one-month-old venture was Skr2580 (Skr is the abbreviation for the Swedish krona or crown) ($290; US$1 equaled approximately Skr9 at the time of observation). However, 52.5 percent of our sample that survived to 30 months had achieved sales by month 30, and the

average monthly sales of the ventures that had survived to 30 months was Skr223,030 ($25,000).

Because our sales measure is limited (i.e. it takes the value of zero for a non-trivial fraction of the population, but is roughly continuously distributed over positive values), we used a random effects Tobit model in which we cluster our standard errors by venture.[3]

Dependent variables

Venture failure

We measured venture failure as the termination of the venture by all members of the team pursuing it. We identified termination by asking the respondents at each wave of the survey whether all members of the founding team had ceased their effort to establish the venture, and if so, in what month that effort ended. As we were able to identify the specific month of termination, we were able to create survival models that measured the monthly spells for the new ventures. In the month that all members of the founding team terminated their effort to establish the new venture, we coded the venture with a '1'. Otherwise, we coded this variable as '0'. Those ventures not terminated by the end of our 30-month observation period were treated as censored.[4]

Sales

We measured sales as the log of level of sales achieved by the venture in the month of observation, plus 1 to correct for zero values. We measured sales by asking the respondents every six months the value of sales that had been made since the last interview. We then predicted the average monthly level of sales for that period of the panel. Sales were measured in Skr '000.

Predictor variables

In our models, we invoke the concept of Granger causality and measure changes in the independent variables in the time period prior to changes in the dependent variable (survival or sales). Granger causality holds that an effect in a prior period can lead to an effect in a subsequent period; however, an effect in a subsequent period cannot lead to an effect in a prior period. For example, our results suggested that the venture's employment, which is measured at time (t–1) leads to a change in the level of venture sales which is measured at time (t), not that a change in the level of venture sales, which was measured at time (t) leads to a change in employment, which was measured at time (t–1).

We measured industry experience as the log of the total number of years of experience in the industry across all founding team members. On average, the founding teams had 15.6 years of industry experience, but 24 percent of the ventures had no founding team experience in their industry. We used the log transformation of this variable because the distribution of this variable was

heavily skewed, containing several outliers. We corrected for zero years of experience by adding 1 to all values.

We measured start-up experience as the log of the total number of firms previously started by the members of the founding team. On average, the founding teams had started three previous firms, but 52 percent of the teams had no previous start-up experience. We again relied on the log transformation to correct for skewed data and added 1 to all values to allow the log transformation of cases with zero years of experience.

Control variables

Team age

We controlled for the total number of years of age of the team members because age influences industry and start-up experience. We again used log transformation to correct for skewness.

Team size

We controlled for team size because a larger venture team has the opportunity to obtain more human capital and more resources (information, time and money) than a smaller team (Roberts, 1991; Klepper, 2001). Moreover, larger teams can accomplish tasks more quickly because founding team members can specialize their activities. Furthermore, larger teams benefit from variation in experience, which may yield more innovative solutions to problems (Leonard and Sensiper, 1990). We measured team size as the log of number of members of the venture team.

Employment

We measured the venture's employment because a smaller team can compensate for less human capital by hiring employees who contribute their human capital to the new venture. Moreover, hiring employees increases the production capacity of a new venture, increasing the sales that the firm can achieve. We measured the number of employees by asking the respondents every six months how many part-time and full-time employees were working in the new firm. We counted part-time employees as one-half of full-time employees. Once more we corrected for skewness by using the log transformation. We updated this variable at the time of each survey.

Industry

We controlled for several differences in the industries in which the new ventures operate. All firms in Sweden are required by law to register with the government and are captured in the business register, which is updated every two weeks. In addition, questionnaires are sent out to companies to verify that the information in the registry is correct. We used data from this business register to create four industry measures. These variables are coded at the five-digit

standard industrial code level, and are updated on a yearly basis, using data from 1998, 1999 and 2000. For example, one industry was 72201, IT consultants; another industry was 55300, restaurants; a third industry was 63330, travel agencies.

To ensure that the industry classification of the new firms in the sample was reliable, we had two industry experts from Statistics Sweden (the managers of the business registry) code the firms to industries based on information received from the respondents at the time of the initial interview. Both experts coded 89.4 percent of the cases as belonging in the same industry. In the remaining 10.4 percent, we used the classification done by the most senior expert. The five measures created using data from Statistics Sweden were as follows.

First, we measured industry entry as the number of new firms that entered the industry in the year of investigation. We measured the number of entries because new firm failure is more likely to occur in industries with a higher rate of entry than in industries with a lower rate of entry (Caves, 1998; Carroll and Hannan, 2000).

Second, we measured industry size as the total value of sales in the industry in the year of investigation. We control for industry size because the total amount of sales possible for a new firm is greater in larger markets than in smaller ones (Eisenhardt and Schoonhoven, 1990).

Third, we measured industry growth as the annual percentage rate of change of sales in the industry in the year of investigation. Industry growth facilitates the sales of new firms because it is easier for new firms to generate sales in environments of increasing demand than in environments of constant or shrinking demand (Audretsch and Mahmood, 1995).

Fourth, we measured the average firm age in the industry in the year of investigation because new firms often grow faster in younger industries than in older ones (Acs and Audretsch, 1989).

Fifth, we measured the average firm size in the industry in the year of investigation because firms have a more difficult time entering and growing in industries dominated by large dominant incumbent firms (Caves, 1998).

Time

Because we expected that new ventures would either drift towards higher sales or be terminated over time, we expected that some of the variance in sales and survival across the new ventures in the sample would be explained by venture age. To mitigate this effect, we included a series of dummy variables for each of the waves of data collection: up to six months, 7–12 months, 13–18 months and 19–24 months. (The final wave was the omitted period.) By including the dummy variables for each of the waves, we parcelled out the portion of the variance that is explained solely by the passage of time.

Correcting for selection

One problem with studying determinants of the sales of new firms is that only those firms that survive are measured, and many new firms do not survive. The coefficients on variables that have a significant effect on both survival and sales will be biased downward in regressions predicting sales if only surviving firms are included in the sample and researchers do not correct for the selection that results from survival because the firms that fail are more likely to have lower values in the predictor variables (Heckman, 1979; Greene, 2000). To correct for this problem, we used Lee's (1983) generalization of the Heckman selection model (1979) to create a selection correction variable. By introducing this variable into our models predicting firm sales, we could obtain more precise estimates for our independent variables (Greene, 2000; Hamilton and Nickerson, 2003).

We used the hazard of termination during the 30 months of observation calculated from a piecewise exponential model to predict firm exit for our 223 ventures to generate the selection correction variable (lambda):

$$\lambda_{it} = \frac{\phi[\Phi^{-1}(F_i(t))]}{1 - F_i(t)}$$

where $F_i(t)$ is the cumulative hazard function for project i at time t, ϕ is the standard normal density function, and Φ^{-1} the inverse of the standard normal distribution function (Lee, 1983).

The model used to predict the hazard of venture failure and to compute lambda must include at least one covariate that influences the probability of venture failure but not the level of sales the venture achieves (Greene, 2000). Therefore, we include four additional covariates in the failure models: *purchased*, a dummy variable that takes the value of 1 if the new venture was started through the purchase of a business from another party; *need permit*, a dummy variable that takes the value of 1 if the venture needs permits or licenses to operate; *obtained government loan*, a dummy variable that takes the value of 1 if the venture obtained debt from a government agency; and *received equity from the government,* a dummy variable that takes the value of 1 if the venture obtained an equity investment from a government agency.

Controlling for past performance

New venture performance and founding team human capital are both associated with unobserved characteristics of new ventures, such as product quality. For example, founding teams with more industry experience may have higher-performing firms because they develop higher-quality products. As a result, estimates of the effects of human capital may simply proxy for unobserved product quality and not have any real effect on firm performance. To increase the likelihood that our measures of human capital actually measure the effect of

human capital and not other things that happen to be correlated with human capital, we included lagged venture performance in our regressions to predict new venture survival and sales. By including lagged performance, we control for unobserved factors that co-determine firm sales and human capital (Wooldridge, 2002; Hamilton and Nickerson, 2003). As a result, our measures of human capital represented only founding team human capital, and allowed us to accurately estimate the effects of the venture team's human capital on firm performance (Heckman and Borjas, 1980). We measures sales in Skr '000.

Results

Predicting survival

Table 2 provides the results of our regressions to predict new venture survival. Model 1 is our base model. It reports results from the piece-wise constant model of the hazard of venture termination that includes the control variables: the lagged past performance measure, employment, venture team size and age, the industry variables and the time pieces. Model 2 adds the effect of founding team start-up and industry experience.

Consistent with hypothesis 1a, we found that new ventures whose founding teams have greater start-up experience are more likely to survive (–1.21, $p<.05$). The probability of venture termination is 42.2 percent lower for ventures founded by teams with the mean level of start-up experience (three prior start-ups) than for ventures founded by teams with no previous start-up experience. However, in contrast to hypothesis 2a, we found no significant effect for venture team industry experience on the hazard of venture team survival.

We also hypothesized that the marginal effect of industry and start-up experience on new venture survival would decline with experience (hypotheses 3a and 3b). Our results in support of hypothesis 1a suggest the decreasing marginal effect of start-up experience. Because we examine the effect of the log of start-up experience, our finding of a statistically significant and economically meaningful effect of start-up experience on venture termination implies that start-up experience has a decreasing marginal effect on new venture termination.

In model 3, we examined the effect of having start-up experience of one, two, three or four or more start-ups among members of the venture team (as compared with the null of no start-up experience). We also examined the effect of having 1–5, 6–10, 11–15 or more than 15 years of industry experience (as compared with the null of no industry experience). Consistent with hypothesis 3a, the results in model 3 show that the amount of start-up experience does not have a linear effect on new venture survival. The difference in the effect of having no start-up experience and having one prior start-up was statistically significant, but the difference between having one prior start-up and more than one prior start-up was not statistically significant. However, the results in model 3

Table 2 Piece-wise exponential models to predict the hazard of venture termination

	Model 1			Model 2			Model 3			Model 4		
	β	(s.e.)	*p*	β	(s.e.)	*p*	β	(s.e.)	*p*	β	(s.e.)	*p*
Start-up experience				–1.208	(0.520)	*				–2.269	(1.514	
Industry experience				–0.051	(0.266)					2.185	(1.364)	
Team age	–1.560	(0.845)	t	–0.957	(0.954)		–1.534	(0.931)		–1.116	(0.957)	
Team size	1.103	(0.847)		1.942	(0.969)	*	1.736	(1.043)		1.972	(0.956)	*
1 start-up							–1.247	(0.596)	*			
2 start-ups							–0.504	(0.344)				
3 start-ups							–0.381	(0.395)				
4 or more start-ups							–0.210	(0.433)				
1–5 yr. exp.							–0.193	(0.324)				
6–10 yrs exp.							–0.298	(0.372)				
11–15 yrs. exp.							0.272	(0.533)				
>15 yrs. exp.							–0.099	(0.397)				
Start-up × 0–6										1.663	(1.613)	
Start-up × 7–12										0.487	(1.573)	
Start-up × 13–18										2.005	(1.751)	
Start-up × 19–24										2.090	(2.287)	
Industry × 0–6										–2.452	(1.435)	t
Industry × 7–12										–1.903	(1.401)	
Industry × 13–18										–2.706	(1.468)	t
Industry × 19–24										–4.326	(1.611)	**

No. employees	–1.636	(1.003)		–1.537	(0.964)		–1.580	(0.952)	t	–1.506	(0.932)	
Lagged sales	–79.377	(49.146)		–78.061	(51.135)		–80.764	(54.399)		–78.067	(50.078)	
Industry entry	0.007	(0.021)		0.010	(0.021)		0.012	(0.022)		0.010	(0.021)	
Industry size	0.006	(0.005)		0.006	(0.005)		0.006	(0.005)		0.006	(0.005)	
Industry growth	–0.111	(0.290)		–0.115	(0.296)		–0.125	(0.304)		–0.113	(0.303)	
Average firm age	0.026	(0.050)		0.041	(0.049)		0.036	(0.052)		0.041	(0.049)	
Average firm size	–0.015	(0.026)		–0.014	(0.026)		–0.016	(0.030)		–0.013	(0.025)	
Months 0–6	0.723	(0.479)		0.687	(0.479)		0.672	(0.479)		0.670	(0.670)	
Months 7–13	1.492	(0.464)	**	1.459	(0.464)	**	1.466	(0.465)	**	1.744	(0.817)	*
Months 14–18	0.698	(0.527)		0.661	(0.526)		0.677	(0.530)		0.581	(0.904)	
Months 19–24	0.015	(0.623)		–0.009	(0.623)		–0.006	(0.624)		0.243	(0.968)	
Obtained government loan	–0.367	(0.048)	***	–0.374	(0.050)	***	–0.360	(0.052)	***	–0.401	(0.052)	***
Received government inv.	–0.272	(0.031)	***	–0.324	(0.030)	***	–0.285	(0.032)	***	–0.304	(0.032)	***
Need permit	–0.406	(0.260)		–0.435	(0.264)	t	–0.389	(0.267)		–0.444	(0.263)	t
Purchased business	–1.259	(0.705)	t	–1.294	(0.742)	t	–1.219	(0.743)		–1.391	(0.769)	t
Constant	–2.097	(1.458)		–2.830	(1.615)	t	–1.815	(1.616)		–4.480	(2.115)	*
log likelihood	205.88			203.17			201.91			202.32		
Chi square	434.99			581.02			479.97			593.40		

Key: t = $p < 0.10$; * = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$ in two-tailed tests. The sample consists of 5093 firm-month observations, 223 cases and 82 failures. All models are significant at the $p < .00001$ level.

do not support hypothesis 3b. There is no significant diminishing return for the effect of industry experience on new venture survival.

We hypothesized that the effects of founding team industry and start-up experience would decline as the ventures aged. In model 4, we examined the effects of interactions between venture age and start-up experience (hypothesis 4a) and industry experience (hypothesis 4b). As model 4 shows, we do not find support for hypothesis 4a. The magnitude of the effect of start-up experience on reducing the hazard of venture termination does not decline as the ventures age.

We also fail to find support for hypothesis 4b. The magnitude of the effect of industry experience on reducing the hazard of venture termination is not significantly different for most time pieces. Moreover, the magnitude of the effect of industry experience on reducing the hazard of venture termination is significantly higher for ventures between 19 and 24 months old than for the other time pieces.

We tested for the robustness of the effects for founding team industry and start-up experience on new venture survival. In unreported regressions, we explored whether the effects of founding team industry and start-up experience on new venture survival were curvilinear. When we introduced them into the regressions, the quadratic forms for the experience variables were insignificant, suggesting that the founding team experience effects we observed are better expressed as linear functions than as curvilinear ones.

In unreported regressions, we also examined whether founding team industry and start-up experience interacted with each other to affect the survival of new ventures and whether founding team industry and start-up experience interacted with industry characteristics. We did not find significant effects for either of these types of interaction.

Predicting sales

Table 3 presents the results of our regressions explaining new venture sales. Model 1 is the base model that takes into account the effects of the selection correction lambda, the lagged past performance measure, employment, venture team size and age, industry differences and the time period effects. Model 2 adds the effect of founding team start-up and industry experience.

Consistent with hypothesis 1b, we found that new ventures whose founding teams had greater start-up experience have higher levels of logged sales (.21, $p<.10$). Ventures with founding teams that had the mean level of start-up experience (three prior start-ups) had sales that were 11.3 percent higher than ventures with founding teams that had no prior start-up experience. Consistent with hypothesis 2b, we found that new ventures whose founding teams had more industry experience had higher levels of logged sales (.14, $p<.05$). Ventures with founding teams that had the mean level of industry experience (16 years) had sales that were 17 percent higher than ventures with founding teams that had no prior industry experience.

We also hypothesized that the marginal effect of industry and start-up experience on new venture survival would decline with experience (hypotheses 3c and 3d). In model 3, we examined the effect of having start-up experience of one, two, three and four or more start-ups among members of the venture team (as compared with the null of no start-up experience). We also examined the effect of having industry experience of 1–5, 6–10, 11–15 and 16 or more years of industry experience (as compared with the null of no industry experience). In contrast to hypothesis 3c, the results in model 3 show that the amount of founding team start-up experience does not show decreasing marginal effects on ventures sales. Only ventures with founding teams that had four or more prior start-ups had sales significantly higher than ventures with teams that had no prior start-up experience. Similarly, in contrast to hypothesis 3d, the results in model 3 show that the amount of founding team industry experience does not show decreasing marginal effects on venture sales. Only venture teams with 11–15 years of industry experience had sales significantly higher than ventures with teams that had no prior industry experience.

We hypothesized that the effects of founding team industry and start-up experience would decline as ventures age. In model 4, we examined the effects of interactions between venture age and start-up experience (hypothesis 4c) and industry experience (hypothesis 4d), respectively. Model 4 supports hypothesis 4c. While the main effect of start-up experience is positive, the coefficient on the interaction of start-up experience with the time pieces are negative, statistically significant and show a declining magnitude as ventures age, suggesting that the size of the effect of start-up experience on sales gets smaller as the ventures age.

However, model 4 does not provide support for hypothesis 4d. No significant effects of the interactions between the effect of industry experience and venture age on venture sales were observed.

We tested for the robustness of the effects for founding team industry and start-up experience on new venture sales. In unreported regressions, we explored whether the effects of founding team industry and start-up experience on new venture sales were curvilinear. The quadratic forms for the experience variables were insignificant when they were introduced into the regressions, suggesting that the founding team experience effects we observed are better expressed as linear functions than as curvilinear ones.

In unreported regressions, we also examined whether founding team industry and start-up experience interacted with each other to affect the sales of new ventures, and whether founding team industry and start-up experience interacted with industry characteristics. We did not find significant effects for either of these types of interaction.

To ensure that our results were not artifacts of specification errors, we reran our analyses without our controls for past performance and number of employees, which were highly correlated with our selection correction lambda. The

Table 3 Tobit models to predict new venture sales

	Model 1			Model 2			Model 3			Model 4		
	β	(s.e.)	*p*	β	(s.e.)	*p*	β	(s.e.)	*p*	β	(s.e.)	*p*
Start-up experience				0.213	(0.114)	t				0.525	(0.151)	***
Industry experience				0.135	(0.065)	*				0.168	(0.093)	*
Team age	–0.176	(0.227)		–0.501	(0.252)	*	–0.374	(0.239)		–0.483	(0.249)	
Team size	0.115	(0.243)		0.057	(0.259)		–0.092	(0.283)		0.060	(0.259)	
1 start-up							–0.008	(0.117)				
2 start-ups							–0.017	(0.100)				
3 start-ups							0.030	(0.111)				
4 start-ups							0.266	(0.105)	*			
1–5 yr ind. exp.							0.083	(0.096)				
6–10 yrs ind. exp.							0.018	(0.106)				
11–15 yrs ind. exp.							0.265	(0.136)	*			
>15 yrs ind. exp.							0.103	(0.104)				
Start-up × 0–6										–0.510	(0.141)	***
Start-up × 7–12										–0.323	(0.142)	*
Start-up × 13–18										–0.362	(0.146)	*
Start-up × 19–24										–0.248	(0.147)	t
Industry × 0–6										–0.093	(0.091)	
Industry × 7–12										–0.013	(0.093)	
Industry × 13–18										0.048	(0.095)	
Industry × 19–24										–0.058	(0.096)	

Lambda	0.334	(0.022)	***	0.328	(0.022)	***	0.324	(0.022	***	0.322	(0.021)	***
No. employees	0.304	(0.042)	***	0.298	(0.042)	***	0.297	(0.042)	***	0.277	(0.042)	***
Lagged sales	0.057	(0.030)	t	0.058	(0.029)	*	0.056	(0.029)	t	0.057	(0.029)	t
Industry entry	–0.002	(0.005)		–0.002	(0.005)		–0.003	(0.005)		–0.001	(0.005)	
Industry size	0.003	(0.001)	t	0.002	(0.001)		0.002	(0.001)		0.002	(0.001)	
Industry growth	0.102	(0.047)	*	0.103	(0.048)	*	0.084	(0.050)	t	0.105	(0.050)	
Average firm age	–0.002	(0.014)		–0.005	(0.013)		–0.003	(0.013)		–0.005	(0.013)	
Average firm size	0.004	(0.003)		0.004	(0.003)		0.004	(0.003)	t	0.005	(0.003)	t
Months 0-6	–0.458	(0.052)	***	–0.461	(0.052)	***	–0.465	(0.052)	***	–0.132	(0.097)	
Months 7–13	–0.221	(0.053)	***	–0.226	(0.053)	***	–0.231	(0.053)	***	–0.053	(0.100)	
Months 14–18	–0.112	(0.052)	*	–0.113	(0.052)	*	–0.116	(0.052)	*	0.027	(0.102)	
Months 19–24	–0.090	(0.053)	t	–0.090	(0.053)	t	–0.090	(0.052)	t	0.091	(0.103)	
Constant	0.410	(0.370)		0.810	(0.391)	*	0.699	(0.386)	t	0.590	(0.395)	
log likelihood	692.94			688.52			685.86			677.01		
Wald Chi square	737.31			773.28			787.43			817.34		

Key: t = $p < 0.10$; * = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$ in two-tailed tests. The sample consists of 223 cases and 881 observations All models are significant at the $p < .00001$ level.

results of this test were qualitatively the same as those for our reported results, suggesting that our results are not artifacts of specification errors.

Finally, we test the robustness of our sales models to the sensitivity of the Tobit estimator to the distribution of the error terms. We re-estimated our models using a random effect GLS model and a Poisson regression and found qualitatively the same results, suggesting that our results are not artifacts of the use of a Tobit estimator.

Discussion

The purpose of this study was to test the effect of founding team start-up and industry experience on new venture survival and sales in a way that overcomes the methodological limitations of prior research, as well as to explore whether these effects were non-linear and vary with venture age. To do this, we examined the effect of prior start-up and industry experience of the venture team on the survival and sales of a representative sample of 223 new firms founded in Sweden in 1998, using data collected prospectively, and correcting for venture failure when estimating the effects on venture sales. We found that founding team experience enhances both new venture survival and new venture sales, but that the effects are non-linear and vary with venture age.

Implications

Our findings suggest that researchers take a more nuanced view of the effects of founding team industry and start-up experience on the performance of new ventures than is currently expressed in the literature. Unlike much of the prior research, which focuses largely on new venture survival, the results of this study show that venture team start-up and industry experience enhance new venture survival and new venture sales in different ways. Specifically, we observed that founding teams with prior start-up experience are less likely to fail than ventures with no prior start-up experience, but that the effects are driven almost exclusively by the difference between any and no prior start-up experience. In contrast, we found that only ventures whose founding teams had started four or more prior start-ups had significantly higher sales than ventures founded by teams with less experience.

These findings suggest that the effect of founding team start-up experience on new venture survival and new venture sales are not the same. Consequently, the discussion of the effect of founding team experience on new venture performance presented in the research literature should reflect these differences. Perhaps small amounts of start-up experience might offer a buffer that allows new firms to survive, but have no effect on sales (Brüderl and Schussler, 1990; Fichman and Levinthal, 1991), because the benefits of small

amounts of experience are enough to enhance survival, but not enough to generate positive sales outcomes (Otani, 1996).

The findings also suggest that researchers should develop more nuanced explanations for the effect of experience than the simple linear effects posited in the literature. Our results indicate that non-linearities exist in the effects of founding team experience on venture survival and sales, as indicated by the significantly higher sales of ventures founded by teams with 11–15 years of industry experience. Researchers need to consider these non-linearities in their explanations for the effect of founding team experience on new venture performance.

Researchers should also refine the argument that founding team experience enhances new venture performance in order to incorporate variation in the effects of industry and start-up experience on new venture survival and sales as ventures age. For example, our results indicate that the effect of start-up experience on venture sales is not constant, but instead decreases as ventures age.

While our findings illustrate the value of time variant explanations for the effect of founding team experience on venture performance, they also indicate the need for the development of additional theoretical explanations. The explanation that we proposed – that the contributions of founding team members are more important early in the life of ventures – can account for the effect of start-up experience on venture sales. However, it cannot explain the effect of industry experience on venture failure, which appears to grow as ventures age. Perhaps industry and start-up experience affect the performance of ventures differently as they age. Or perhaps the effects of experience on venture failure and venture sales are different as ventures age. Either way, lower-level (variable-specific) theoretical explanations for the effect of the interaction between founding team experience and venture age on new venture performance need to be developed.

In sum, our findings are important from a theoretical perspective because they do not support the parsimonious explanation presented in the literature, which holds that founding team experience enhances new venture performance. Rather, they suggest that researchers need to explain the effects of founding team experience on new venture performance in ways that account for the differences in the effects on venture survival and sales, the non-linear form of these effects and their interaction with venture age.

This study also provides a useful methodological contribution by showing how the use of panel data and certain statistical techniques can control for methodological limitations to the results of many studies of entrepreneurial activity (Hamilton and Nickerson, 2003). One limitation that the techniques used in this study overcome is bias from unobserved heterogeneity in opportunities. Although human capital influences the performance of new firms, so do the characteristics of entrepreneurial opportunities. Because the distribution of human capital across entrepreneurs is correlated with the attributes of entrepreneurial opportunities (for example, pharmaceutical company researchers tend to found biotechnology firms, not gas stations), cross-sectional studies of the effect of human capital on new firm performance suffer from bias (Shane, 2000). By

using lagged performance variables in our regression analysis, we were able to parcel out the effect of opportunity from the effect of human capital and more accurately measure the effect of human capital on the performance of new firms.

The techniques used in this study also mitigate the problem of selection bias that hinders efforts to estimate the effects of many aspects of entrepreneurial activity. Many new firms fail early in their lives (Aldrich, 1999), making it difficult to draw accurate inferences from samples of surviving firms. This study shows how researchers can design data collection efforts on new firms to avoid the selection bias that comes from using retrospective research designs.

Moreover, failure to correct for the failure of new firms in estimates of the factors that affect the level of sales that they generate leads to biased estimates in regression analysis. This study shows how researchers can more accurately estimate the effect of founding team human capital on new venture sales by correcting for the failure of new ventures.

Limitations

Our study was limited by our inability to measure changes in the human capital of venture teams over time, as members of the founding team enter or exit. Therefore, we cannot determine whether the start-up and industry experience of the founding team has long-lasting effects on new venture sales or can be reversed by changing the composition of the venture team over time.

Our study was also limited by our inability to measure the nature of start-up and industry experience. We know only the amount of prior experience, not its quality. We also lack the data to address whether more recent experience is better than less recent experience, or whether successful experience is better than unsuccessful experience. We have no way of knowing whether founding team members with previous experience in growing firms or industries would have higher sales than founding team members with the same amount of experience in shrinking firms or industries. We lack information about the level of management experience of the members of the team. As a result, we cannot ascertain whether founding teams that have more management experience create ventures with greater sales than founding teams made up primarily of non-managerial employees with the same level of industry experience. Furthermore, we cannot determine whether the value of start-up and industry experience lies in information, the social ties created by experience or another mechanism.

Our effort to overcome methodological limitations in previous research limited the scope of our study. The desire for rigor demanded the collection of data at six occasions over a 30-month period on a representative sample of the Swedish work force. As a consequence, our measures were relatively coarse-grained. However, we believe that the methodological limitations overcome in this study suggest the importance of future studies of the human capital of new venture founding teams that employ more fine-grained measures, using similar

longitudinal designs on representative samples of new firms measured from their initiation.

In summary, we have shown that founding team experience enhances both the survival and sales of new ventures, even after the effects of industry, past performance, team size, employment and selection effects are controlled. However, we have found that these effects are non-linear and interact with venture age, suggesting that experience influences new venture performance in ways more complex and nuanced than previous research would suggest.

Acknowledgements

Both authors contributed equally to the writing of this paper and are listed alphabetically. The research design owes an intellectual debt to the Panel Study of Business Start-ups undertaken by the Entrepreneurial Research Consortium, a temporary voluntary association of 30+ US and non-US universities. The Knut and Alice Wallenberg Foundation, the Swedish Foundation for Small Business Research, and the Swedish National Board for Industrial and Technical Development funded the study. Arnie Cooper, Per Davidsson, Tim Pollock, three anonymous reviewers and SO! editor Joel Baum provided helpful comments.

Notes

1 Because individual entrepreneurs founded many of the ventures in our sample, it was not possible to obtain information from multiple respondents for all of our ventures. However, for a subset of the ventures founded by two or more people, we interviewed more than one team member. Our interviews revealed a high level of convergence in the responses provided by the venture team members. This convergence adds confidence to our approach of treating respondents as key informants about their ventures.

2 Our results are robust to the specification of the model. We find the same qualitative results for our independent variables after having estimated the models using log-normal; log-logistic, Weibull and Cox models.

3 Our results are robust to the specification of the model. We found qualitatively the same results by estimating the models using random-effect GLS and Poisson regressions. In addition, a probit model to test whether or not sales were achieved produced comparable results.

4 Because termination can be made for either voluntary or involuntary reason, we also tested for these competing events. We find qualitatively the same results in both cases, leading us to conclude that the reason to terminate is not important in this case.

References

Acs, Z. J. and Audretsch, D. B. (1989) 'Births and Firm Size', *Southern Economic Journal* 56(2): 467–76.

Aldrich, H. (1990) 'Using an Ecological Perspective to Study Organizational Founding Rates', *Entrepreneurship Theory and Practice* 14(3): 7–24.

Aldrich, H. (1999) *Organizations Evolving*. London: Sage Publications.

Aldrich, H. and Martinez, M. (2001) 'Many are Called, but Few are Chosen: An Evolutionary Perspective for the Study of Entrepreneurship', *Entrepreneurship Theory and Practice* 25(4): 41–56.

Arrow, K. (1974) *The Limits of Organization*. New York: Norton.

Audretsch, D. B. and Mahmood, T. (1995) 'New Firm Survival: New Results Using a Hazard Function', *The Review of Economics and Statistics* 77(1): 97–103.

Bates, T. (1990) 'Entrepreneur Human Capital and Small Business Longevity', *The Review of Economics and Statistics* 72(4): 551–9.

Bates, T. and Servon, L. (2000) 'Viewing Self-employment as a Response to Lack of Suitable Opportunities for Wage Work', *National Journal of Sociology* 12(2): 23–53.

Bhide, A. (2000) *The Origins and Evolution of New Businesses*. New York: Oxford University Press.

Blossfeld, H. P. and Rohwer, G. (1995) *Techniques of Event History Analysis: New Approaches to Causal Analysis*. Mahwah, NJ: Lawrence Erlbaum Associates.

Boeker, W. (1989) 'Strategic Change: The Effects of Founding and History', *Academy of Management Journal* 32: 489–515.

Bosma, N., Van Praag, M., Thurik, R. and de Wit, G. (2004) 'The Value of Human and Social Capital Investments for the Business Performance of Startups', *Small Business Economics* 23(3): 227–40.

Brüderl, J and Preisendörfer, P. (1998) 'Network Support and the Success of Newly Founded Businesses', *Small Business Economics* 10: 213–25.

Brüderl, J., Preisendörfer, P. and Ziegler, R. (1992) 'Survival Chances of Newly Founded Business Organizations', *American Sociological Review* 57(April): 227–42.

Brüderl, J. and Schussler, R. (1990) 'Organizational Mortality: The Liabilities of Newness and Adolescence', *Administrative Science Quarterly* 35(3): 530–48.

Burton, D., Sorensen, J. and Beckman, C. (2002) 'Coming from Good Stocks', *Research in Sociology of Organizations* 19: 239–62.

Campbell, C. (1992) 'A Decision Theory Model for Entrepreneurial Acts', *Entrepreneurship Theory and Practice* 17(1): 21–7.

Carroll, G. and Hannan, M. (2000) *The Demography of Corporations and Industries*. Princeton, NJ: Princeton University Press.

Carroll, G. and Mosakowski, E. (1987) 'The Career Dynamics of Self-employment', *Administrative Science Quarterly* 32: 570–89.

Caves, R. (1998) 'Industrial Organization and New Findings on the Turnover and Mobility of Firms', *Journal of Economic Literature* 36: 1947–82.

Churchill, N. and Lewis, V. (1983) 'The Five Stages of Small Firm Growth', *Harvard Business Review* 53: 43–54.

Cooper, A. C., Gimeno-Gascon, F. and Woo, C. (1994) 'Initial Human and Financial Capital as Predictors of New Venture Performance', *Journal of Business Venturing* 9: 371–95.

Cyert, R. and March, J. (1963) *A Behavioral Theory of the Firm.* Englewood Cliffs, NJ: Prentice Hall.

Delmar, F. and Shane, S. (2003) 'Does Business Planning Facilitate the Development of New Ventures?', *Strategic Management Journal* 24(12): 1165–85.

Duchesneau, D. and Gartner, W. (1990) 'A Profile of New Venture Success and Failure in an Emerging Industry', *Journal of Business Venturing* 5(5): 297–312.

Eisenhardt, K. M. and Schoonhoven, C. (1990) 'Organizational Growth: Linking Founding Team, Strategy, Environment, and Growth among U.S. semiconductor ventures, 1978–1988', *Administrative Science Quarterly* 36(3): 504–29.

Ericsson, K. and Smith, J. (1991) 'Prospects and Limits of the Empirical Study of Expertise: An Introduction', in K. Ericsson and J. Smith (eds) *Toward a General Theory of Expertise: Prospects and Limits*, pp.1–38. Cambridge: Cambridge University Press.

Fichman, M. and Levinthal, D. (1991) 'Honeymoons and the Liability of Adolescence: A New Perspective on Duration Dependence in Social and Organizational Relationships', *Academy of Management Review* 18(2): 442–68.

Freeman, J. (1999) 'Venture Capital as an Economy of Time', in R. Leenders and S. Gabbay (eds) *Corporate Social Control*, pp. 460–82. Boston, MA: Kluwer.

Gibb, A. (1994) 'Do We Really Teach (Approach) Small Business the Way We Should?', *Journal of Small Business and Entrepreneurship* 11(2): 4–27.

Gimeno, J., Folta, T., Cooper, A. and Woo, C. (1997) 'Survival of the Fittest? Entrepreneurial Human Capital and the Persistence of Underperforming Firms', *Administrative Science Quarterly* 42: 750–83.

Greene, W. (2000) *Econometric Analysis*. Upper Saddle River, NJ: Prentice Hall.

Hall, J. and Hofer, C. (1993) 'Venture Capitalists' Decision Criteria in New Venture Evaluation', *Journal of Business Venturing* 8: 25–42.

Hamilton, B. and Nickerson, J. (2003) 'Correcting for Endogeneity in Strategic Management Research', *Strategic Organization* 1(1): 51–78.

Heckman, J. (1979) 'Sample Selection Bias as a Specification Error', *Econometrica* 47(1): 153–62.

Heckman, J. and Borjas, G. (1980) 'Does Unemployment Cause Future Unemployment? Definitions, Questions and Answers from a Continuous Time Model of Heterogeneity and State Dependence', *Economica* 47(187): 247–84.

Johnson, P. (1986) *New Firms: An Economic Perspective*. London: Allen and Unwin.

Jones-Evans, D. (1996) 'Experience and Entrepreneurship: Technology-based Owner-Managers in the UK', *New Technology, Work, and Employment* 11: 39–54.

Jovanovic, B. (1982) 'Selection and the Evolution of Industry', *Econometrica* 50(3): 649–70.

Klepper, S. (2001) 'Employee Startups in High-tech Industries', *Industrial and Corporate Change* 10(3): 639–74.

Knight, F. (1921) *Risk, Uncertainty, and Profit*. New York: Augustus Kelly.

Lee, L. (1983) 'Generalized Econometric Models with Selectivity', *Econometrica* 51(2): 507–12.

Leonard, D. and Sensiper, S. (1990) 'The Role of Tacit Knowledge in Group Innovation', *California Management Review* 40(3): 112–32.

MacMillan, I., Siegel, R. and Subbanarasimha, P. (1985) 'Criteria Used by Venture Capitalists to Evaluate New Venture Proposals', *Journal of Business Venturing* 1: 119–28.

Mathews, J. (2003) 'Competitive Dynamics and Economic Learning: An Extended Resource-Based View', *Industrial and Corporate Change* 12(1): 115–45.

Mitchell, W. (1991) 'Dual Clocks: Entry Order Influences on Incumbent and Newcomer Market Share and Survival When Specialized Assets Retain Their Value', *Strategic Management Journal* 12: 85–100.

Otani, K. (1996) 'A Human Capital Approach to Entrepreneurial Capacity', *Economica* 63(250): 273–89.

Pennings, J., Lee, K. and Witteloostuijn, A. (1998) 'Human Capital, Social Capital, and Firm Dissolution', *Academy of Management Journal* 41(4): 425–40.

Ripsas, S. (1998) 'Towards an Interdisciplinary Theory of Entrepreneurship', *Small Business Economics* 10: 103–15.

Roberts, E. (1991) *Entrepreneurs in High Technology: Lessons from M.I.T. and Beyond*. New York: Oxford University Press.

Roure, J., and Maidique, M. (1986) 'Linking Refunding Factors and High Technology Venture Success: An Exploratory Study', *Journal of Business Venturing* 1: 295–306.

Sandberg, C. and Hofer, C. (1987) 'Improving New Venture Performance: The Role of Strategy, Industry Structure, and the Entrepreneur', *Journal of Business Venturing* 2: 5–28.

Schoonhoven, C., Eisenhardt, K. and Lyman, K. (1990) 'Speeding Products to Market: Waiting Time to First Product Innovation in New Firms', *Administrative Science Quarterly* 35(1): 177–207.

Shane, S. (2000) 'Prior Knowledge and the Discovery of Entrepreneurial Opportunities', *Organization Science* 11(4): 448–69.

Shane, S. and Khurana, R. (2003) 'Career Experience and Firm Founding', *Industrial and Corporate Change* 12(3): 519–43.

Shane, S. and Stuart, T. (2002) 'Organizational Endowments and the Performance of University Start-Ups', *Management Science* 48(1): 154–70.

Shepherd, D., Douglas, E. and Shanley, M. (2000) 'New Venture Survival: Ignorance, External Shocks and Risk Reduction Strategies', *Journal of Business Venturing* 15: 393–410.

Stinchcombe, A. L. (1965) 'Social Structure and Organizations', in J. G. March (ed.) *Handbook of Organizations*, pp. 142–93. Chicago, IL: Rand MacNally.

Stuart, T. E., Huang, H. and Hybels, R. (1999) 'Interorganizational Endorsements and the Performance of Entrepreneurial Ventures', *Administrative Science Quarterly* 44: 315–49.

Taylor, M. (1999) 'The Survival of the Fittest: An Analysis of Self-Employment Duration in Britain', *The Economic Journal* 109: C140–C155.

Van Praag, M. (2003) 'Business Survival and Success of Young Small Business Owners', *Small Business Economics* 21: 1–21.

Venkataraman, S. (1997) 'The Distinctive Domain of Entrepreneurship Research: An Editor's Perspective', in J. Katz and R. H. S. Brockhaus (eds) *Advances in Entrepreneurship, Firm Emergence, and Growth*, pp. 119–38. Greenwich, CT: JAI Press.

Von Mises, L. (1949) *Human Action: A Treatise on Economics*. New Haven, CT: Yale University Press.

Wicker, A. and King, J. (1989) 'Employment, Ownership, and Survival in Microbusinesses: A Study of New Retail and Service Establishments', *Small Business Economics* 1: 137–52.

Witt, U. (2000) 'Changing Cognitive Frames – Changing Organizational Forms: An Entrepreneurial Theory of Organizational Development', *Industrial and Corporate Change* 9(4): 733–45.

Wooldridge, J. M. (2002) *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.

Yamaguchi, K. (1991) *Event History Analysis*. Newbury Park, CA: Sage Publications.

Frédéric Delmar is a professor in strategy and organization at EM Lyon in France, and an associate professor at the Stockholm School of Economics in Sweden. His research focuses on new venture development, venture growth, the psychology of the entrepreneur, and on entrepreneurship in the knowledge intensive sector. His research has appeared in *Strategic Management Journal, Journal of Business Venturing* and *Entrepreneurship Theory and Practice*, among other journals. *Address*: Strategy and Organisation, EM Lyon, 23 avenue Guy de Collongue, F-69134 Ecully Cedex, France. [e-mail: delmar@em-lyon.com]

Scott Shane is SBC professor of economics at Case Western Reserve University, a visiting professor at Imperial College, and a visiting scholar at the Federal Reserve Bank of Cleveland. His research has appeared in *Management Science, Organization Science, Academy of Management Journal, Academy of Management Review* and *Strategic Management Journal,* among other journals. He has published eight books, among them, *Finding Fertile Ground: Identifying Extraordinary Opportunities for New Ventures; From Ice Cream to the Internet: Using Franchising to Unlock the Potential of Your Business; Academic Entrepreneurship: University Spinoffs and Wealth Creation* and *A General Theory of Entrepreneurship: The Individual-Opportunity Nexus, Foundations*

of Entrepreneurship. His current research examines how entrepreneurs discover and evaluate opportunities, assemble resources and design organizations; university spin-offs and technology transfer; and business format franchising. *Address*: Weatherhead School of Management, Case Western Reserve University, 11119 Bellflower Rd, Rm 282, Cleveland, OH 44106, USA. [e-mail: sas46@weatherhead.cwru.edu]