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Jonathan T. Eckhardt, Scott Shane, Frédéric Delmar,

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Multistage Selection and the Financing of New Ventures

Jonathan T. Eckhardt

The Weinert Center for Entrepreneurship, University of Wisconsin, 5252 Grainger Hall, 975 University Avenue, Madison, Wisconsin 53706, jeckhardt@wisc.edu

Scott Shane

Weatherhead School of Management, Department of Economics, Case Western Reserve University, 11119 Bellflower Road, Room 282, Cleveland, Ohio 44106, scott.shane@case.edu

Frédéric Delmar

Strategy and Organization, EM Lyon, 23 Avenue Guy de Collongue, Ecully Cedex, F-69134, France, delmar@em-lyon.com

Using a random sample of 221 new Swedish ventures initiated in 1998, we examine why some new ventures are more likely than others to successfully be awarded capital from external sources. We examine venture financing as a staged selection process in which two sequential selection events systematically winnow the population of ventures and influence which ventures receive financing. For a venture to receive external financing its founders must first select it as a candidate for external funding, and then a financier must fund it. We find evidence that founders select ventures as candidates for external finance based on their perceptions of market competition, market growth, and employment growth, while financiers base funding decisions on objective verifiable indicators of venture development, such as the completion of organizing activities, marketing activities, and the level of sales of the venture. Our findings have implications for venture financing and evolutionary theories of social processes.

Key words: venture financing; entrepreneurship; evolutionary theory

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Introduction

The process of founding a new venture requires entrepreneurs to engage in activities such as hiring employees, obtaining inputs, and developing products. Because these activities are costly, and often must take place before the new venture generates revenue from the sale of new products or services, founders of many firms seek financing from outside sources for their new ventures (Gompers and Lerner 1999). Consequently, external financing is an important part of the new venture creation process (Venkataraman 1997, Shane and Venkataraman 2000), and is widely examined in the literature (MacMillan and Narasimha 1987, Gompers 1994, Sapienza and Gupta 1994, Gompers 1995, Gompers and Lerner 1999, Sorenson and Stuart 2001, Shane and Cable 2002).

Although much prior research has explored new venture finance (Sahlman 1990, Fried and Hisrich 1994, Gompers and Lerner 1999, Uzzi and Gillespie 1999), none of this literature has examined the fundamentally dynamic nature of the process. New venture finance follows a pattern of multistage selection over time. In the first stage, firm founders select, from

the population of new ventures, those that they perceive as having performance prospects that justify the investment of time in resources necessary to raise funds from external sources (Bhide 1992). In the second stage, financiers choose to provide capital to the subset of the firms for which firm founders seek financing for which there is objective evidence of performance. The sequential nature of this process—financiers do not finance ventures that do not seek external financing—combined with the different selection criteria of financiers and firm founders, creates a two-stage process of cumulative selection (Langolis and Everett 1994). To examine this argument, we analyze a unique data set capturing the life histories of 221 new ventures—which we define as efforts by one or more individuals holding at least fractional ownership to create new independent organizations to pursue for-profit business opportunities—initiated in Sweden during the first nine months of 1998.

This paper makes several contributions. First, this study indicates that the financing of new ventures follows an evolutionary selection process. Consistent with Mohr (1982), we find that the specific process

under which selection occurs, as well as the criteria that appear to drive selection at each stage, are both important in explaining why some ventures in the population are more likely to receive financing from external sources than others. Second, we empirically examine the overlooked yet important role of founders in the process of new venture finance. By taking into consideration the two-stage process of cumulative selection, we reduce the bias that comes from the problematic assumption, inherent in static cross-sectional and single-stage longitudinal studies, that founders' selection criteria do not influence the characteristics of the sample of ventures that investors have the opportunity to finance (Bates 1990). Specifically, we show how failure to appropriately address the potential effects of selection at each stage fails to capture key relationships and leads to biased findings (Klepper et al. 1983, Hogan and Kitagawa 1985, Yamaguchi 1991). Third, our study provides evidence about new venture finance that can be generalized to the typical new venture. Most studies of venture finance have focused on financing of ventures by professional venture capital firms. However, most fledgling ventures are financed from sources other than venture capital (Bates 1990, Hustedde and Pulver 1992). In contrast to studies that have focused exclusively on venture capital financing, ventures in our sample seek funds from friends, family, banks, business angels, and government agencies, as well as from venture capitalists.

Fourth, our study overcomes the problems of selection bias that plague many studies of new venture finance. Standard approaches to venture finance typically examine samples constructed from lists of new firms. These approaches suffer from selection bias because those ventures that were abandoned before the lists were created must be excluded from analysis (Katz and Gartner 1988, Gompers 1995), and financing events may have occurred prior to a firm being included on the published list. We start with a random sample that is representative of the population of new Swedish ventures, and our data includes information collected over time about both the search for, and receipt of, external financing, allowing us to avoid the problem of left-censored observations.

We define a new venture as an effort by a person or persons to create a new organization that engages in commercial activity. We define a new venture this way, rather than as a new legal entity, because firm financing events can occur well before new legal organizations are established (Bantel 1998, Zahra et al. 2000). Our data support this approach, as we find that many of the ventures in our sample seek and receive financing from external sources before they became new legal organizations.

We define the first financing event as the first time the venture is awarded capital from external sources, where external sources include any provider of capital who was not a member of the founding team. Hence, we examine the typical initial financing event for the typical venture. Consistent with evidence on the sources of financing for most ventures, venture capital is a source of financing for relatively few of the ventures in our sample.

We examine two stages of the financing process. Stage 1 is defined as the decision of founders to seek financing for external capital. Stage 2 is defined as the decision of investors to provide capital to those ventures that sought external financing. As our interest is in studying factors that influence the receipt of capital from external sources for the *first* time, we do not examine financing events that follow the receipt of first financing.

Theory Development

New Venture Finance as a Multistage Selection Process

We argue that the most accurate theoretical lens for viewing the new venture financing process is that of a multistage selection process. For a venture to receive financing from external sources, an entrepreneur must decide to seek financing from outside sources and then an investor must fund it. Patterns exist among entrepreneurs in how they select ventures to become candidates for external capital, and patterns exist among investors in how they select ventures to finance. Consequently, the aggregated actions of entrepreneurs and investors at each stage act as population level selection screens (Meyer 1994).

Multistage selection models assume four characteristics that shape the attributes of any population. First, variation exists in any population of entities (Nelson and Winter 1982). Second, those entities do not all have an equal likelihood of selection (Hannan and Freeman 1977). Third, selection is staged; and each selection screen is contingent on the outcome of prior selection screens (Aldrich 1999). Fourth, the selection criteria can vary across stages of selection (Campbell 1969).

The new venture finance process possesses all four of these characteristics (Aldrich 1999). First, the population of new ventures for which founders decide whether to seek external financing exhibits significant variation in the nature of the opportunities pursued, the human capital of the founders, and the approach that the founders plan to take to organizing a firm. Second, this variation means that not all new ventures are equally fit for external financing. Selection criteria exist that make some ventures more

likely to be selected as candidates for external financing, as well as render some selected candidates more likely to receive such external financing. For example, prior research has shown that several attributes influence the likelihood of obtaining venture finance. Venture age is associated with obtaining external capital (MacMillan et al. 1985, Churchill and Lewis 1986, Hall and Hofer 1993), as are the founders' work experience, and industry-specific experience (Hustedde and Pulver 1992, Lerner 1994, Bhide 2000). Third, the selection process is cumulative, resulting in path dependencies. The population on which selection occurs at later stages is contingent on selection outcomes at prior stages. As the process evolves, prior selection events winnow down the population that enters each subsequent stage. In the specific case we examine, this means that only those ventures that firm founders select as candidates for external financing are evaluated by financiers. Finally, the characteristics necessary for selection at one stage may be quite different from the characteristics necessary for survival at subsequent selection events (Campbell 1969). In the case of venture finance, differences in cognitive approach (Busenitz and Barney 1997, Sarasvathy et al. 1998), information, or incentives may render the selection criteria utilized by founders and investors to be different.

In Figure 1 we highlight the selection problem in the multistaged venture finance process. In this rudimentary example, ventures are identified as having two characteristics: (1) the founder's perception of the growth of the market in which the venture operates (denoted A), and (2) the level of sales of the venture (denoted B), where capital letters refer to larger values and lower-case letters refer to smaller values. Column 1 represents the pool of all ventures that exist at a specific point in time. In the first stage, from this initial pool founders select those ventures in markets they perceive as growing (A) as candidates for external financing, creating the pool of investment candidates depicted in Column 2. In the second stage, financiers attempt to provide financing only to those ventures that have higher sales (B). As shown in Figure 1, founder selection may constrain the choices of

financiers, to the extent that ventures exist in Column 1 that exhibit objective performance attributes, such as having higher sales, that never become candidates for external financing.

The nature of selection at the two stages fosters empirical complexities that must be addressed to appropriately measure the factors that drive selection, even if the empirical interest is only on the second stage (Berk 1983). For instance, failure to appropriately model the two stages would provide no explanation as to why a venture with growing sales but that is in a market that the founders do not perceive as growing very rapidly (venture "aB" in our example), fails to receive external financing even though it met financiers' selection criteria.¹

Selection Criteria at the Two Stages

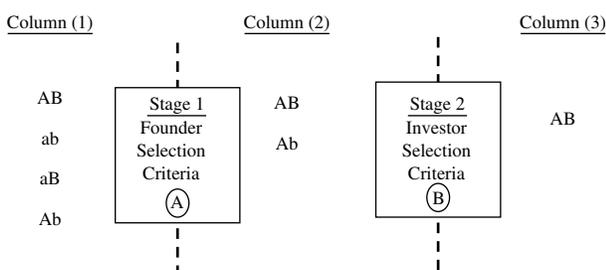
Stage 1 Selection: Founders' Selection Criteria.

New ventures vary significantly on many dimensions, including expected value, risk, and resource requirements (Shane 2000). Because obtaining external financing is costly (Bruno and Tyebjee 1985, Bhide 1992), firm founders will seek such financing if they believe that the value of the venture justifies incurring the costs that external finance entails. Thus, founders assess the potential of their new ventures to determine whether or not to seek external capital.² They select new ventures as candidates for financing from among the pool of all new ventures on the basis of their perceptions of dimensions such as market growth, industry competitiveness, and price competitiveness (Highfield and Smiley 1987, Acs and Audretsch 1989, Romanelli 1989, Shankar et al. 1999). Specifically, founders are more likely to select as candidates for financing those ventures that they perceive to have higher market growth, and less

¹ It is important to note that even in cases where founders and investors select ventures through the financing process in the same manner, founder selection must be appropriately addressed in statistical models that examine the relationship between venture attributes and investor selection because founder selection is variance reducing (Klepper et al. 1983). For example, if only those ventures high in sales became candidates for external investment, it would not be possible to examine the effect of venture sales on the likelihood of receiving capital from financiers because of a lack of variance in sales in the pool of candidates for external capital.

² Entrepreneurs in the process of pursuing opportunities have been found to be overoptimistic, particularly about their own ventures (de Meza and Southey 1996, Busenitz and Barney 1997, Cooper et al. 1988). This overoptimism can lead entrepreneurs to view a particular venture as promising if their optimism leads them to believe that a given industry is more attractive than it really is. We argue that what motivates entrepreneurs is their perception of industry conditions, which may or may not reflect actual industry conditions. As a result, those firm founders who perceive that they have identified high value opportunities will be more likely to seek external financing relative to other entrepreneurs.

Figure 1 Multistaged Venture Finance Process



industry and price competition because they perceive ventures with these characteristics to be more valuable and more likely to justify costly investments in time and resources necessary to secure funding. This argument leads to the first hypothesis:³

HYPOTHESIS 1. The likelihood that a firm founder will seek external funds for a venture increases with the founder's positive assessment of the venture.

Stage 2 Selection: Investors' Selection Criteria.

While firm founders seek financing largely as a result of their own perception of the prospects for their ventures, financiers do not select ventures on the basis of the founders' perceptions, but instead seek observable sources of information about the performance of the new ventures. External sources of information help to overcome problems that may arise due to asymmetry of information and interests between investors and entrepreneurs. For example, firm founders may possess private information regarding the feasibility of the business opportunity that they are pursuing, as well as private information on their own capabilities, knowledge, and the effort they are likely to put forth to exploit a business opportunity, and they may withhold this information from financiers (Levin et al. 1987, Amit et al. 1990, Gompers 1995). Moreover, firm founders exhibit biases in decision making, such as representativeness, the propensity to draw generalized inferences from small unrepresentative samples (Tversky and Kahneman 1974), and overoptimism (de Meza and Southey 1996). These biases may lead entrepreneurs to make decisions that are not appropriate for the success of the new venture and therefore inappropriate as the basis of a financier's decision.

Among the major sources of information that financiers seek is information from the market about the venture's ability to meet a market need. Because no venture can earn revenues unless it has a good or service to offer customers, evidence that ventures have made contact with potential customers via informal or formal marketing activities provides investors with positive information about the potential of the new venture. Another key measure of market acceptance is the extent to which the venture has successfully sold goods or services to customers because sales demonstrate that customers are willing to pay for the product or service (Sahlman 1990). The completion of key organizing activities, such as the forming of a legal entity and applying for necessary permits and intellectual property protection, also provides investors with information about

new venture prospects because organizing activities indicates that the venture is successfully developing into an actual business entity. Specifically, investors are more likely to provide financing to those ventures that have engaged in marketing activities, have undertaken more organizing activities, have engaged in more product development activity, and have generated more sales. This argument leads to the second hypothesis:

HYPOTHESIS 2. The likelihood that a firm founder will receive external funds for a venture, conditional on seeking it, increases with objective measures of the venture's performance.

Methodology

Sample and Procedure

Obtaining a representative sample of new ventures is a difficult process because no effective sampling frame exists. Prior research has commonly defined a business start-up as an entity that has achieved particular milestones, such as forming a legal organization or initiating production (Carroll and Hannan 2000). However, such an approach introduces selection bias in explaining new venture finance, because ventures may receive capital prior to the formation of a legal entity (Sahlman 1990), and because organizing activities undertaken by entrepreneurs prior to the formation of a legal entity may influence the financing process (Aldrich 1999).

Because the population of newly founded ventures is impossible to identify directly, we began with a random sample of the working-age population to identify people in the process of starting a new business. We contacted by telephone during the first nine months of 1998, 35,971 adults between the ages of 18 and 70 years old, who were living in Sweden. Of those contacted, 30,427 (84.6%) agreed to participate in the survey. We did not find any significant difference in age, sex, and geographic location of contacts between those that agreed to participate and those that declined to participate.

We then sought to identify those individuals who had started a new business during that nine-month period. To do this we engaged in a four step process. First, we asked the respondents if and when they had started a new venture, having defined the start of a new venture as the time when the founder(s) initiated efforts to create the new business (rather than when they first thought about it). Second, we asked if the respondents possessed a fractional or full ownership position in a venture on which they had started to work, alone or with others, during the first nine months of 1998. Third, we screened out those who indicated that the venture was undertaken on

³ We hypothesize that founders are more likely to seek external financing when their assessments of the ventures are more positive. Note that this hypothesis does not require any founders to pursue ventures that they assess negatively, as founders can vary in the extent that they assess their ventures positively.

behalf of their current employer or an existing firm. Finally, we asked respondents who indicated that they met the criteria for more than one business to describe the venture that they had founded most recently. Of the individuals contacted, 221 had established a new venture that met our criteria.⁴ Thus, our study of venture finance is based on a random sample of Swedish new ventures that were initiated between January and September 1998. We use the founders of these ventures as informants about the ventures and treat the venture as the entity that we track over time.

We contacted the respondents every six months after our initial contact for 30 months or until the venture was abandoned.⁵ Ventures that dropped out of the sample due to abandonment or nonparticipation were treated as censored from the time of last contact. Response rates for each subsequent wave of data collection ranged from 90.5% to 98.5%. We tested for statistical difference between those ventures that were dropped as a result of nonresponse and those that continued to respond throughout the entire 30 months. The only statistical difference detected between the two groups was that founders of ventures that prematurely ceased to participate expected less competition than ventures that participated for the entire period of study.

Ventures in our sample included new farms, home-based businesses, independent consulting firms, manufacturing firms, restaurants, high-tech firms, and cleaning companies. Founders pursued a variety of opportunities. Just under half (46.6%) pursued low-tech service opportunities, 87 (39%) pursued high-tech service opportunities such as software design,

and 32 (14.3%) pursued manufacturing opportunities. Over one-third (36.7%) of the ventures asked for funds and 63 (28.5%) ventures ultimately received funds from an individual, friend or family member, bank, government agency, or venture capitalist within 30 months of starting to pursue the business opportunity. Less than 10% of the ventures in the sample received funding from venture capitalists.

Method and Measures

We analyze the venture financing process as a two-stage selection process that evolves over time. In the first stage, we hypothesize that specific characteristics of the venture will increase the hazard of seeking financing from outside sources. In the second stage, we hypothesize that specific characteristics of ventures which founders sought to finance will increase the hazard that financiers will fund the ventures. In our sample, no financier provided capital to a venture that a founder had not first decided to finance externally.

Similar to Gompers (1995) and Carroll and Hannan (2000), the hazard rate, or the probability of the event of interest occurring given that the event has not yet occurred, is specified as

$$h(m) = \frac{\text{probability that the event occurs between month } m \text{ and } m + \Delta m}{\text{probability that the event occurs after month } m.}$$

Covariates are hypothesized to influence the instantaneous probability of the event occurring by shifting the baseline hazard rate (h_0). As estimates are generated via maximum likelihood, with robust clustering on each venture, we report chi-square as the model fit statistic in our results. We examine the data in monthly spells. Those ventures for which the event of interest has not occurred by the end of 30 months are treated as right censored.

We use the Weibull hazard model for four reasons. First, our data is right censored, as some of the 33% of the ventures that sought financing but failed to receive financing from external sources by the end of the 30 month panel could have received financing after our sampling frame ended. Second, the Akaike information criterion test indicates that the Weibull model provides a better statistical fit to our data than other hazard models (Akaike 1974, Blossfeld and Rohwer 1995). Third, unlike the Cox proportional hazard model, the Weibull model allows us to control directly for the influence of venture age on the hazard rates. Finally, the Weibull model is commonly used in hazard models in venture finance (Gompers and Lerner 1999).

⁴ We dropped two cases of respondents under the age of 18 from the analysis to ensure that the sample for this study represents only adults. The inclusion or exclusion of respondents under the age of 18 has no qualitative effect on our results.

⁵ Data for each venture is based on the response of one individual. In the study of large organizations, construct validity is commonly achieved by collecting information from several respondents due to concerns that one individual may not be fully aware of the characteristics of the organization. Conversely, in small ventures such as those studied in this sample, in most cases such an approach is impractical and redundant for several reasons. First, in many ventures no individual other than the respondent was intimately involved in the start-up activities of the organization or possessed information necessary to describe the start-up process. Second, in most cases respondents are providing information on a small group of people. For the ventures in the sample, the distribution of start-up team size is 44% (1 founder), 33% (2 founders), 10% (3 founders), 6% (four founders), and 5% (five founders). (Numbers do not sum to 100% due to rounding.) Therefore, in the most extreme case in our sample, respondents were required to report on the activities of five business associates. This compares favorably with studies of large organizations where studies of multiple respondents still require respondents to represent the perceptions of thousands of individuals. See Gerhart et al. (2000) for a more detailed discussion of the trade-offs discussed here.

We measure whether the founder sought funds from an outside source (Stage 1) by asking the respondent, every six months, if the venture has sought external funds. To measure if the venture received funds from an external source (Stage 2), we asked the respondent, every six months, if the venture had received funds from an external source for the first time. If the respondent indicated yes for either question, we asked in which month that event first occurred. We coded these variables 1 for each month the event occurred; 0 otherwise. Hence, we are able to identify by month if and when ventures were selected into each stage.

Predictor Covariates

Founder Perceptions About the Business Opportunity. We predict that entrepreneurs are more likely to seek funding from external sources as their positive assessment of the prospects of the venture increases. We measure the founder's self-assessment of the prospects of the venture with the following questions:

Anticipated Market Growth. We measure the founders' expectations of industry growth at the time of the initial survey by asking the respondents to select, from a four-point scale, whether they perceive market growth to be "diminishing" (1), "unchanged" (2), "expanding" (3), or experiencing "strong expansion" (4). This variable is time invariant.

Anticipated Market Competition. We measure the founders' perceptions of market competition at the initial survey by asking the respondents to indicate on a four-point scale whether, in the industry where they plan to launch their business, they: "expect no competition" (0), "expect low competition" (1), "expect moderate competition" (2), or "expect strong competition" (3). This variable is time variant.

Anticipated Employment Growth. We measure the founders' perceptions of the expected size of the ventures by asking them, at each wave of the survey, to indicate the number of employees that they anticipate will be on the payroll in year five. This variable is time variant.

Anticipated Price Competitiveness. We measure perceptions of price competition by asking the respondents to indicate the importance of offering competitive prices to secure customers on a four-item scale in which "0" equals "no importance," "1" equals "marginal importance," "2" equals "importance," and "3" equals "critical importance." This measure is time invariant.

Objective Information About the Venture. We predict that financiers are more likely to provide funding to specific ventures as positive objective information about the venture increases. We measure the objective information about the venture with the following covariates.

Organizing Activities. We measure organizing activities by asking five questions that prior research has indicated are activities that are undertaken by founders when organizing new ventures (Carter et al. 1996, Reynolds and White 1997). Every six months, we asked respondents the following questions, coded as "1" if the respondent answered "yes" and "0" if the respondent answered "no": (1) Has the venture filed the necessary forms with the tax authorities? (2) Has the venture registered with government authorities? (3) Have any raw materials, inventory, supplies, or components for the start-up been purchased? Have any major items like equipment, facilities, or property been purchased, leased, or rented for the new start-up? ("Major" was defined as an item with a retail value greater than U.S. \$1,000.) (4) Has the venture sought to obtain a patent, copyright, or trademark? (5) Has the venture sought to obtain necessary permits or licenses to operate? Following prior research, we total these dichotomous measures (Reynolds and White 1997) to yield a single measure of venture-organizing activities that can be objectively verified by potential investors. This variable is time variant.

Initiated Marketing. We measure the initiation of marketing by asking the respondents every six months whether they have initiated marketing. If they indicate yes, we ask them at which month they initiated marketing. We code this variable "0" for every month that they have not initiated marketing and "1" thereafter. This variable is time variant.

Stage of Product Development. We measure the level of product development completed by asking the respondents every six months, "at what stage of development is the product or service this start-up will be selling?" The scale of responses was "1" equals "no work has been done to develop a product or service;" "2" equals "work to develop the product or service is still in the idea stage;" "3" equals "a model or procedure is being developed;" "4" equals "a prototype or procedure has been tested with customers;" and "5" equals "the product or service is completed and ready for sales or delivery." This variable is time variant.

Venture Sales. We measure the level of venture sales by asking the respondents every six months to provide the sales they have earned by month. For every month they recorded sales, we code the amount of sales as the natural log of sales. Otherwise, we code this variable "0." This variable is time variant.

Control Covariates

Prior research has indicated that the human capital and reputation of founders is likely to influence the likelihood that a venture will receive financing from external sources. We independently control for two dimensions of human capital and reputation, the prior

startup experience and the industry experience of the members of the founding team.

Start-up Experience. We measure the total number of prior new ventures at the initial survey by asking, “How many companies has each member of the venture team started previously?” This variable is time invariant.

Industry Experience. We measure the total years of industry experience of the start-up team at the initial survey by asking, “How many years of experience in the industry does each member of the venture team have?” We sum industry-years across all members of the team to compute the total industry experience for the team. This variable is time invariant.

Completed Business Plan. We control for whether or not the venture has a completed business plan because having a completed business plan is likely to increase the probability of being awarded external funding. Every six months, beginning with the initial interview, we measure whether respondents have completed a written business plan by asking, “Has a business plan been written?” If they indicate yes, we ask them at which month they completed the business plan. We code this variable “0” for every month that they have not completed a written business plan and “1” thereafter. This variable is time variant.

Venture Age. We control for the age of the venture, in months, because the likelihood that a venture will receive external financing is affected by the age of the venture. This variable is time variant.

Industry Sales Growth. We control for three dimensions of industry using data from Statistics Sweden, the government agency that is the primary provider of economic statistics in Sweden. The variables are computed from a database that includes all firms operating in the country. The database is updated approximately 26 times a year with data provided by tax authorities in Sweden. We control for the two-year percentage growth in sales in the same five-digit industry in the year using data provided by Statistics Sweden because new ventures in growing industries should receive more external financing. This variable is time variant.

Number of Firms in Industry. We control for the size of the industry by including as a covariate the total number of active firms in the industry as provided by Statistics Sweden because new ventures in larger industries may be more likely to be awarded external financing. This variable is time variant.

Average Firm Age in Industry. We measure average firm age in the same five-digit industry for the same year using data provided by Statistics Sweden because new ventures in younger industries should receive more external financing. This variable is time variant.

Selection Correction

We analyze the venture financing process as a two-stage selection process that evolves over time. Therefore, we model the systematic selection on the part of founders of ventures on which to seek funding in the regression to predict receipt of funding by including a correction variable, λ , in the second-stage financier decision-to-fund regression to more accurately examine the relationship between hypothesized covariates and selection for financing by investors in the second stage (Klepper et al. 1983). Our correction is based on Lee’s (1983) generalization of Heckman’s two-stage selection model (Heckman 1979) calculated as follows:

$$\lambda_{im} = \frac{\phi[\Phi^{-1}(F_i(m))]}{1 - F_i(m)},$$

where $F_i(m)$ is the cumulative hazard function for founder selection into the pool of financing candidates for venture i at month m , ϕ is the standard normal density function, and Φ^{-1} is the inverse of the standard normal distribution function (Lee 1983). Because the hazard model used to generate the predicted probabilities of seeking financing used to compute λ must include at least one covariate that influences the hazard rate of asking for financing but not the hazard of seeking funds from external sources that is included as a covariate the Stage 1 regressions but not the Stage 2 regressions (Little and Rubin 2002, Frees 2004), we include as an additional predictor in first-stage hazard models a dummy variable indicating if the venture is in a low-tech service industry.

Results

Panel A of Table 1 provides descriptive statistics for the 221 ventures included in the analysis at birth—the first month each venture existed—while Panel B of Table 1 provides the same summary statistics in venture months for the entire 30-month period. Examination of Table 1 shows the importance of a dynamic approach to venture finance, as attributes of the ventures that are potentially important to the financing process change over time. For example, a comparison between Panels A and B of Table 1 indicate that at the start of the 30-month period most ventures had not yet completed a business plan, and most had yet to be paid for producing a product or service. Yet, over time, a considerable number of ventures completed a formal written business plan (27%) and most (over 58%) of the ventures booked sales.

Table 2 provides summary statistics for the first month of selection into each stage, where Stage 1 is the group of ventures selected by founders as candidates for external financing, and Stage 2 is the pool of ventures from Stage 1 that were guarded funding from external sources. As illustrated in Table 2, a preliminary inspection of the summary statistics indicates that a multistage selection model appears con-

Table 1 Sample Descriptive Statistics

Variable	Mean	Std. dev.	Min	Max
Panel A: Characteristics at venture birth (first month, 221 venture months)				
Anticipated employment growth	2.76	5.88	0.00	40.00
Anticipated market competition	1.99	0.97	0.00	3.00
Anticipated market growth	2.97	0.74	1.00	4.00
Anticipated price competitiveness	2.37	0.77	1.00	4.00
Organizing activities	1.20	1.05	0.00	5.00
Initiated marketing	0.14	0.35	0.00	1.00
Venture sales	0.11	0.67	0.00	5.78
Stage of product development	3.93	1.19	1.00	5.00
Industry experience	15.72	21.21	0.00	122
Start-up experience	2.15	10.41	0.00	150
Completed a business plan	0.02	0.15	0.00	1.00
Venture age	1.00	0.00	1.00	1.00
Number of firms	11,462	26,396	23	129,403
Average firm age	5.60	2.51	2.18	16.09
Industry sales growth	1.30	0.52	0.16	4.48
Service (low-tech)	0.47	0.50	0.00	1.00
Panel B: Entire 30-month period (4,024 venture months)				
Anticipated employment growth	3.47	10.64	0.00	200.00
Anticipated market competition	2.06	0.91	0.00	3.00
Anticipated market growth	2.94	0.73	1.00	4.00
Anticipated price competitiveness	2.36	0.75	1.00	4.00
Organizing activities	2.25	1.37	0.00	5.00
Initiated marketing	0.41	0.49	0.00	1.00
Venture sales	0.91	1.70	-1.77	9.56
Stage of product development	4.38	1.04	0.00	5.00
Industry experience	15.62	22.05	0.00	122
Start-up experience	2.70	13.12	0.00	150
Completed a business plan	0.19	0.39	0.00	1.00
Venture age	12.76	8.61	1.00	30.00
Number of firms	10,387	23,019	23	129,403
Average firm age	5.83	2.52	2.18	16.09
Industry sales growth	1.32	0.55	0.16	4.48
Service (low-tech)	0.45	0.50	0.00	1.00

sistent with the data. First, inspection of the means for key variables for the ventures selected into each stage of the finance process suggests that substantial differences exist between the underlying populations of firms at each stage. For example, the mean of the sales variable increased drastically between the initial sample of all 221 firms and the 81 firms that survived the selection criteria in the first stage of the venture finance process. Second, the first selection event appears to be particularly important. Of the initial 221 ventures, only 81 (36%) are selected into the pool of ventures that are candidates for external capital, but 63 (over 77%) of these candidates ultimately received capital from external sources. Third, Table 2 indicates that the selection criteria may not be the same at each stage. For example, financiers appear to be more interested than entrepreneurs in financing new ventures in smaller industries (the change in the mean of this variable is positive between birth and Stage 1, while negative between Stage 1 and Stage 2). Therefore, it appears that the process which alters the surviving sample in this study is not random and that the way the financing process evolves is important to understanding which firms ultimately receive funds.

Table 3 provides the correlation matrix and Table 4 shows the results of the primary Weibull models. We report exponentiated coefficients in Table 4. Those coefficients greater than one reflect a positive relationship between the coefficient and the propensity of an event occurring, and values less than one reflect the opposite.

Table 2 Selection Stage Means

Variable	Birth mean	Stage 1: Asked for funds		Stage 2: Received funds	
		Mean	% change from previous	Mean	% change from previous
Anticipated employment growth	2.76	5.04	82.49	6.10	21.01
Anticipated market competition	1.99	1.94	-2.65	1.90	-1.73
Anticipated market growth	2.97	3.12	5.07	3.17	1.64
Anticipated price competitiveness	2.37	2.31	-2.63	2.24	-3.06
Organizing activities	1.20	2.16	79.50	3.14	45.47
Initiated marketing	0.14	0.36	155.24	0.65	81.77
Venture sales	0.11	0.76	584.91	1.94	157.29
Stage of product development	3.93	4.30	9.39	4.54	5.67
Industry experience	15.72	22.04	40.19	24.65	11.86
Start-up experience	2.15	2.06	-4.28	2.19	6.24
Completed a business plan	0.02	0.22	882.22	0.43	92.86
Venture age	1.00	5.94	493.83	11.43	92.46
Number of firms	11,462	14,929	30.24	13,575	-9.07
Average firm age	5.60	5.70	1.72	5.87	2.95
Industry sales growth	1.30	1.23	-5.41	1.23	0.63
Service (low-tech)	0.47	0.56	19.20	0.51	-8.57
Number of ventures	221	81	-63.35	63	-22.22

Note. Stage 1 refers to the pool of ventures selected by founders as candidates for external financing, while Stage 2 refers to those ventures awarded external financing from those selected for financing in Stage 1 (see text).

Table 3 Sample Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Anticipated employment growth	1														
(2) Anticipated market competition	0.08	1													
(3) Anticipated market growth	0.15	0.08	1												
(4) Anticipated price competitiveness	-0.03	-0.01	-0.10	1											
(5) Organizing activities	0.12	0.05	0.03	-0.08	1										
(6) Initiated marketing	0.11	0.08	0.14	-0.02	0.33	1									
(7) Venture sales	0.26	0.08	0.10	-0.12	0.47	0.28	1								
(8) Stage of product development	0.00	0.04	0.10	-0.11	0.31	0.23	0.28	1							
(9) Industry experience	0.04	0.11	0.02	-0.07	0.13	0.13	0.21	-0.06	1						
(10) Start-up experience	0.00	0.05	-0.08	-0.05	0.00	0.12	0.10	-0.02	0.10	1					
(11) Completed a business plan	0.11	0.16	0.04	0.03	0.30	0.32	0.24	0.23	0.17	0.07	1				
(12) Venture age	0.09	0.06	0.01	-0.03	0.39	0.26	0.30	0.25	0.04	0.02	0.29	1			
(13) Number of firms	-0.02	0.03	0.08	-0.05	-0.07	-0.05	-0.03	-0.07	0.06	0.00	0.00	-0.01	1		
(14) Average firm age	-0.01	-0.01	-0.12	0.00	0.15	-0.01	0.06	0.01	0.20	-0.02	0.04	0.07	-0.31	1	
(15) Industry sales growth	0.00	0.01	-0.05	-0.13	-0.05	0.06	0.01	0.06	-0.10	-0.05	-0.06	0.00	-0.17	-0.31	1
(16) Service (low-tech)	-0.06	0.03	-0.21	0.11	0.12	-0.10	0.01	0.03	-0.02	-0.07	0.04	0.02	0.01	0.03	0.02

Seeking External Capital

The model in Column 1 of Table 4 provides substantial support for Hypotheses 1. In Column 1 we report the estimated association of model covariates on the hazard of seeking capital from external sources. We find that founders are approximately 3% more likely to seek external financing for ventures that they anticipate will be growing in employment ($p < 0.01$), and that founders are approximately 20% less likely to seek external capital for ventures in markets that they perceive are more competitive ($p < 0.10$). Further, they are almost 50% more likely to seek capital from external sources for ventures that they anticipate will serve more rapidly growing markets ($p < 0.10$). We did not find a statistically significant relationship between anticipated price competitiveness and the probability that a founder will seek financing from external sources. Overall, we find that founder perceptions of the venture appear to have significant impact on the decision to seek external financing. Among the perceptions, we find that anticipated market growth appears to have the largest effect in magnitude.

Receiving Capital Given that Capital Is Sought

The model in Column 2 of Table 4 provides considerable support for Hypotheses 2. In Column 2, we report the estimated association of covariates on the hazard of receiving funds on the sample of only those 81 ventures that were selected by founders as candidates for external financing. For each additional organizing activity completed, we find that ventures are almost 50% more likely to receive capital from external sources given that capital has been sought ($p < 0.01$). Similarly, ventures that have engaged in marketing activities are almost twice as likely to be awarded capital from external sources, given that capital has been sought ($p < 0.05$), and each unit increase in the log of sales is associated with an

approximate 17% greater likelihood that the venture will receive capital from external sources given that capital has been sought ($p < 0.01$). However, we find no statistically significant relationship between the level of product development and the probability that a founder will receive financing from external sources conditional on seeking external financing. Overall, we find that objective dimensions of venture development appear to have significant impact on the probability that a venture will receive external financing conditional on such financing being sought. Among the perceptions, we find that initiating marketing activities and undertaking organizing activities appear to have the largest effect in terms of magnitude.

Examining the Validity and Impact of the Multistage Selection Model

In Column 3, we estimate a version of the Stage 2 model in which we do not include the founder selection λ to show how failure to correct for systematic selection by founders would yield different results. The difference in the magnitude of the coefficients in Columns 2 and 3 indicates that the estimates for the effect of different factors on financiers' funding decisions would be incorrectly estimated without first correcting for founder selection of ventures as candidates for external funding. For example, without correcting for founder selection, we find no evidence that investors differentially select on the presence of business plans. However, when we properly correct for founder selection, we observe a statistically significant relationship between the presence of a business plan and investors' financing decisions. This evidence suggests that failure to properly model both stages of the process may lead researchers to inappropriately fail to find support for key relationships.

In Column 4 of Table 4, we demonstrate empirically the differences between this multistage model of

Table 4 Weibull Regression Models

	Seeking external capital (1)	Receiving funds given funds sought		Receiving funds (Single-stage full sample) (4)
		(λ) (2)	(Standard) (3)	
Founders' perception of opportunity				
Anticipated employment growth	1.03** (0.01)	1.02+ (0.01)	1.00 (0.01)	1.01** (0.01)
Anticipated market competition	0.79+ (0.10)	0.79 (0.11)	0.85 (0.12)	0.72* (0.11)
Anticipated market growth	1.47+ (0.30)	1.05 (0.21)	0.93 (0.19)	1.38 (0.28)
Anticipated price competitiveness	0.8 (0.14)	0.93 (0.20)	1.02 (0.21)	0.83 (0.17)
Objective indicators				
Organizing activities	1.12 (0.12)	1.53** (0.19)	1.37** (0.16)	1.50** (0.17)
Initiated marketing	0.89 (0.24)	1.99* (0.61)	2.19** (0.66)	1.69+ (0.47)
Venture sales	1.09 (0.10)	1.17** (0.07)	1.12* (0.06)	1.14+ (0.07)
Stage of product development	1.11 (0.15)	0.90 (0.17)	0.85 (0.15)	0.88 (0.16)
Human capital				
Industry experience	1.01+ (0.00)	1.00 (0.00)	0.99 (0.00)	1.00 (0.00)
Start-up experience	1.00 (0.01)	0.93 (0.05)	0.93 (0.05)	0.98 (0.02)
Controls				
Completed a business plan	3.10** (1.02)	2.72* (1.12)	1.58 (0.56)	2.87** (0.91)
Venture age	0.73** (0.04)	0.77** (0.07)	0.92** (0.03)	0.79** (0.05)
Number of firms	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)
Average firm age	0.96 (0.05)	0.98 (0.07)	1.02 (0.07)	0.94 (0.06)
Industry sales growth	0.61 (0.19)	1.17 (0.59)	1.84 (0.76)	0.68 (0.25)
Service (low-tech)	1.95** (0.50)			
λ		10.46* (12.25)		
Log-likelihood	-207.22	-97.35	-98.52	-135.97
χ^2 -square	79.17	60.39	45.92	101.85
Number of events	81	63	63	63
Number of ventures	221	81	81	221
Venture months	3,384	720	720	4,024

Note. Robust standard errors are in parentheses, +significant at 10%; *significant at 5%; **significant at 1%.

venture finance and an alternate single-stage model, by re-analyzing our data with a standard, single-stage event history model to predict the hazard of receiving funds from an outside source for the entire sample of 221 ventures. By comparing the results shown in Columns 2 and 4 of Table 4, we can also see the value of the two-stage model for accurately evaluating the venture finance process.

This effort indicates that key influences in the process are lost in the venture finance models that collapse both stages of the process into a single event. In Column 4 of Table 4, we find no relationship between anticipated market growth and the instantaneous

probability that a venture will receive funds from outside sources. However, when we appropriately model the stages of the process, as is done in Columns 1 and 2 of Table 4, we find that this is a key characteristic influencing which ventures ultimately receive funds from outsiders, as founders appear to differentially select ventures through the financing process based on perceptions of anticipated market growth. Finally, a researcher might infer from the single-stage model in Column 4 that financiers differentially select ventures for external financing based on founder perceptions of anticipated market competition. However, by appropriately modeling the two stages of the process, we find that such an inference is incorrect. This selection is driven by founder, not investor selection. Therefore, failure to consider venture finance as a multistage selection process will lead researchers to systematically underestimate the importance of key covariates on the successful receipt of external capital from investors, as well as to give rise to the likelihood that they will misattribute causal order.

Discussion and Implications

We examined why some new ventures and not others receive financing from external investors. We analyzed a unique data set capturing the life histories of 221 new ventures initiated in Sweden during the first nine months of 1998. We modeled venture financing as an evolutionary selection process in which founders select ventures as candidates for external capital based on their own positive assessments of the ventures, while investors use objective characteristics of the ventures to select which ventures to finance from a pool of ventures that founders have put forth as candidates for external financing. We showed how failure to examine new venture finance through the lens of multistage selection would cause researchers to draw incorrect inferences about the venture finance process.

Limitations

This study is not without limitations. First, the study examined new firm formation only in Sweden for 30 months spanning 1998 and 1999. As a result, time or Sweden-specific attributes could limit the generalizability of the results to other periods or locations. However, we can identify no theoretical reason why the results of this study should not generalize to other periods or locations. Nevertheless, as with single country studies of business phenomena in the United States, future research in other countries using similar research designs is necessary to demonstrate the generalizability of the results.

Second, because we use key informants to provide information about the ventures we study, individual-level biases in responding to questions

might influence the responses we analyze. Unfortunately, the nature of the new firm creation process makes it difficult to control for this bias. In the initial period of the life of the venture, which we study, individuals often act alone to organize new firms. Consequently, only the individual respondents possess the information about such aspects of their businesses such as organizing activities undertaken and the search for capital. We sought to minimize biases in interpretation by asking respondents about concrete actions (e.g., did you write a business plan?). Nevertheless, the potential for individual-level bias in the responses to our survey remains.

Third, as is the case with all longitudinal survey research, our survey administration may have influenced the behavior of the founders that we survey (Schwab 2005). However, the timing and nature of the questions that we ask, as well as our distance from sources of capital, mitigate this concern.

Fourth, the amount of funding sought might signal the attractiveness of the venture and thus affect the probability of obtaining external financing, conditional on it being sought. Because we do not have the data, we cannot measure the effects of the amount of funding sought on the probability of obtaining external financing. Our results are therefore limited by the assumption that the amount of financing sought does not influence the effect that objective characteristics of the venture have on the probability that the venture receives external financing, conditional on such financing being sought.

Implications

Our results make a powerful argument for the relevance of multistage selection to the study of social processes in general (Baum and Singh 1994, Baum and McKelvey 1999). True to the original variation-selection-retention framework (Campbell 1969), we find that selection events systematically influence the observed characteristics of organizations that successfully pass through the venture finance process. First, internal and external selection criteria act in tandem to shape the characteristics of new firms. In the specific case of venture finance, our results show that it is necessary to explicitly address both selection events to understand the evolution of the population of new firms.

Second, the accumulation of selection events constrain future possibilities. We provide empirical evidence suggesting that path dependencies may occur due to cumulative selection (Langolis and Everett 1994). Populations of ventures and firms that have survived multiple irreversible stages of selection are likely to have common characteristics that were necessary to survive the previous selection events. These common characteristics may influence or constrain

future behavior. In our study, investors do not return to the initial sample of 221 ventures when seeking investments, and such a return is not likely to be possible because, as a consequence of founders' decisions, the full set of ventures is unlikely to be made available to investors. This is important because ventures with desirable characteristics for selection at later stages may be systematically underrepresented at the later stages, due to their lack of selection at earlier stages.

In the specific case of venture finance, our study shows that the screening actions of founders constrain the subsequent investment options of investors. We find that founders base financing decisions on their perceptions of market competition, price competition, and employment growth, while investors base funding decisions on objective verifiable indicators of venture development, such as the level of sales, the extent that organizing activities have been completed, and the initiation of marketing efforts. Hence, our study suggests that empirical investigations of venture finance can be improved by examining it as a multistage selection process, where the actions of founders as well as investors are taken into account. For example, our study suggests that research investigating factors that drive aspects of founder selection, such as recent work on why entrepreneurs prefer investments from some venture capitalists over others (Hsu 2004), is likely to enhance our understanding of why some ventures are more likely to successfully raise capital from external sources. Similarly, as we treat the receipt of funding as a dichotomous variable, a fruitful direction for further research would be to examine if the model is robust to explaining the level, or amount of funding received from external sources.

Third, our findings indicate that events that occur early in the process of organization development may be just as important as events that occur later in the process, and failure to measure the early events can hinder our understanding of organizational development. For example, much more of the selection of ventures to receive external financing was undertaken by firm founders than by investors. As shown in Table 2, only one-third (37%), or 81 of the initial 221 ventures, were presented to investors as candidates for financing. However, of those presented to investors for funding, over three fourths (78%) ultimately received financing. If more of the selection on dimensions other than venture finance occurs early in the firm creation process, researchers who concentrate on later events might fail to fully understand the process of firm development by systematically under-measuring the early parts of the process. Similarly, failure to appropriately model specific selection events early in the process may lead researchers to misattribute causal order, or fail to find support for important covariates in later stages.

Finally, the selection process has important implications for policy makers and founders. Our study suggests that policies designed to stimulate venture finance by increasing the capital available to entrepreneurs may ultimately prove less successful than expected, as some ventures that exhibit characteristics important to investors are likely to never become candidates due to systematic selection on the part of founders. Similarly, our results indicate that founders may wish to delay seeking capital from external sources until objective information on the prospects of their venture has been generated.

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