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Coming From Good Stock: Career Histories and New Venture Formation

M. Diane Burton
Cornell University, mdb238@cornell.edu

Jesper B. Sørensen
Stanford University

Christine M. Beckman
University of California, Irvine

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Coming From Good Stock: Career Histories and New Venture Formation

Abstract

We examine how the social structure of existing organizations influences entrepreneurship and suggest that resources accrue to entrepreneurs based on the structural position of their prior employers. We argue that information advantages allow individuals from entrepreneurially prominent prior firms to identify new opportunities. Entrepreneurial prominence also reduces the perceived uncertainty of a new venture. Using a sample of Silicon Valley start-ups, we demonstrate that entrepreneurial prominence is associated with initial strategy and the probability of attracting external financing. New ventures with high prominence are more likely to be innovators; furthermore, innovators with high prominence are more likely to obtain financing.

Keywords

organization, human resource management, high technology

Disciplines

Human Resources Management | Labor Relations | Organizational Behavior and Theory | Technology and Innovation

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7. COMING FROM GOOD STOCK: CAREER HISTORIES AND NEW VENTURE FORMATION

M. Diane Burton, Jesper B. Sørensen and
Christine M. Beckman

ABSTRACT

We examine how the social structure of existing organizations influences entrepreneurship and suggest that resources accrue to entrepreneurs based on the structural position of their prior employers. We argue that information advantages allow individuals from entrepreneurially prominent prior firms to identify new opportunities. Entrepreneurial prominence also reduces the perceived uncertainty of a new venture. Using a sample of Silicon Valley start-ups, we demonstrate that entrepreneurial prominence is associated with initial strategy and the probability of attracting external financing. New ventures with high prominence are more likely to be innovators; furthermore, innovators with high prominence are more likely to obtain financing.

INTRODUCTION

It has often been noted that some of the most radically innovative products and technologies are developed and commercialized not by existing companies, but rather by entrepreneurial ventures (Schumpeter, 1934; Tushman & Anderson,

1986; Henderson & Clark, 1990). This is a remarkable fact, given that creating a new organization requires the mobilization of a substantial array of social and material resources (Stinchcombe, 1965). These resource mobilization tasks are simplified when entrepreneurs choose to focus on proven, established products and technologies. By contrast, organizations devoted to new products and technologies face severe hurdles. The entrepreneur must not only come up with a new idea, but also overcome the skepticism of resource providers, since the uncertainty and risk associated with any new venture is particularly heightened when the underlying product or technology is unproven (Aldrich & Fiol, 1994).

Where do innovative new ventures come from? The simple answer is that they emerge – directly and indirectly – from established firms (Freeman, 1986). Contrary to popular myths of lone college drop-out entrepreneurs, most new ventures are founded by people with prior employment experience (Cooper, 1985; Robinson & Sexton, 1994). In this sense, entrepreneurs are organizational products: “Organizations create their own competition by providing the skills and background that provide credibility for the entrepreneur. They provide the knowledge of opportunity by placing that person in a position to know about unserved or badly served markets” (Freeman, 1986, p. 39).

In this paper we argue that entrepreneurial opportunities and resources accrue to incipient entrepreneurs as a function of the structural position of their prior employers. Much as geographical regions differ in their rates of entrepreneurial activity, established firms differ markedly along this dimension. Some firms are entrepreneurial hotbeds, as perhaps most famously exemplified by Fairchild Semiconductor, founded in 1957. Fairchild spawned ten new ventures in its first eight years; moreover, most of the thirty-one semiconductor firms founded in Silicon Valley in the 1960s could trace their lineage to Fairchild (Saxenian, 1994; Rogers & Larsen, 1984). Examples of such “Fairchildren” include Intel, Advanced Micro Devices and LSI Logic. Other firms give rise to relatively few, if any, new ventures.¹

In this paper, we argue that one consequence of these differences in rates of entrepreneurial activity among established firms is to influence the visibility of established firms in the entrepreneurial community. We use the term entrepreneurial prominence to describe these differences in visibility. We consider established firms that spawn a large number of new ventures through employee departures to be more entrepreneurially prominent than those that do not. Our core contention is that innovative new ventures are more likely to emerge from established firms that are entrepreneurially prominent. We expect this for two reasons. First, we believe that there are important informational and resource benefits to being affiliated with a prominent firm. Second, we argue that there are substantial reputational benefits that accrue to employees of prominent firms,

and that these benefits play a crucial role in reducing the perceived uncertainty surrounding a venture. We conceive of the entrepreneurial prominence of established firms as a form of social capital that is transferred to employees as they leave the firm and attempt to launch new ventures. We explore how differences in the entrepreneurial prominence of established firms affects the characteristics of entrepreneurial behavior. Thus, while established firms may have difficulty innovating (Sørensen & Stuart, 2000) and commercializing new innovations (Hiltzik, 1999), they play an important passive role in shaping the emergence of entrepreneurial ventures.

Our paper is related to and draws on a number of streams of theory and research. First, there is a long sociological interest in the emergence of new organizations. In fact, one of the early propositions put forward by Stinchcombe is that "the probability that a man or group of men will be motivated to start an organization is dependent on the social structure and the position of men within it." (1965, p. 147). Furthermore, sociologists have argued for some time that the dynamics of new venture formation depend critically on the distribution of opportunities and resources through social structure (Light, 1972; Hannan & Freeman, 1977; Aldrich & Zimmer, 1986). However, most efforts to examine organizational emergence come from the ecological tradition where there is keen attention to the broad structural characteristics of firms, but little attempt to link individuals to this social structure. At the same time, attempts to link fixed individual attributes, such as psychological characteristics, to entrepreneurial activity have met with limited success (Brockhaus & Horwitz, 1986; Herron & Robinson, 1993). Our paper explicitly reconnects individuals and organizations with a distinctly sociological approach that allows us to explore whether some individuals, by virtue of their location in the social structure of existing organizations, are better able to form highly uncertain, innovative start-ups.

Second, there is a growing interest in the economic and sociological literature on technological innovation in the operation of geographical "spillover" effects (Jaffe, Trajtenberg & Henderson, 1993; Saxenian, 1994; Stuart & Sorenson, in press). These studies examine how horizontal differentiation along a geographic dimension affects the innovative activity of established firms and the emergence of new ventures. For example, Jaffe et al. (1993) find that the patenting rates of established firms are positively influenced by the patenting activity of other firms in the same metropolitan area. Saxenian (1994) argues that the distinctive organizational arrangements and cultures in Silicon Valley are a source of the regions' high levels of entrepreneurial activity. Stuart and Sorenson (in press), studying the biotechnology industry, argue that new firms are more likely to emerge in regions that have a high density of established

biotechnology activity. Similarly, there is a long-standing interest in understanding how horizontal differentiation among industries leads to differential rates of entrepreneurship and innovation (e.g. Cohen & Levin, 1989). Our approach differs from these literatures in that we do not seek to understand regional or industrial differences in entrepreneurial activity; in fact, we focus on a single region, Silicon Valley and a limited number of high-technology industries. Instead, we investigate the consequences of vertical differentiation among firms in terms of status, prominence, or visibility (Benjamin & Podolny, 1999; Podolny, 1993; Stuart, Hoang & Hybels, 1999).

Third, students of organizations have become increasingly interested in how the movement of individuals between organizations shapes organizational behavior and industry dynamics. Most studies of this phenomenon start from the notion that managerial outlooks and predispositions are shaped by career histories (Gunz & Jalland, 1996), and that the movement of managers across firm boundaries is an occasion for the diffusion of ideas and innovations (Baty, Evan & Rothermel, 1971; Pfeffer & Leblebici, 1973; Boeker, 1997; Sørensen, 1999). Because managers in different firms have divergent experiences, the pattern of movement between firms is an important determinant of industry dynamics. Past studies of this process have focused on the movement of managers between existing organizations. By contrast, we focus on those managers who leave their jobs to start new firms and thus shed light on the effects of career trajectories on industry dynamics.

Fourth, since we attach primary significance to the career histories of entrepreneurs, our research is also related to work that examines how career histories shape the entrepreneurial process (Brittain & Freeman, 1986; Boeker, 1988; Higgins & Gulati, 1999; Shane & Khurana, 1999). Work histories are important determinants of the resources available to entrepreneurs. Prior research on the effects of entrepreneur's pre-ownership experiences tends to focus on the types of work that entrepreneurs have performed in the course of their careers (Shane, 2000; Jones-Evans, 1996; Cooper & Dunkelberg, 1986). By contrast, we emphasize *where* entrepreneurs worked prior to founding the new venture; in other words, we focus on the identity of previous employers. By doing so, we capitalize on the notion that careers situate the entrepreneur in a social structure of existing firms that facilitates or constrains the flow of opportunities and resources. We ask how the social structure of existing firms influences the entrepreneurial process.

This paper makes a number of contributions. First, in contrast to the studies of the relationship between managerial mobility and organizational behavior cited above, we draw attention to the informational and reputational benefits that may come from being associated with prominent employers. Second, by

focusing on *where* founders worked, we ask how the social structure of existing organizations influences the entrepreneurial process. Finally, by differentiating new ventures according to their initial strategy, we offer a more nuanced explanation of the entrepreneurial process.

In order to cast light on where innovative new ventures come from, we use a unique sample of Silicon Valley start-ups and investigate the determinants of their initial strategies and financing. We focus on explaining two characteristics of these ventures: (1) their founding strategies, specifically whether or not they pursue an innovation strategy; and (2) the ability of the new ventures to attract external financing at founding. We use the career histories of the founders, including the identities of past employers, to examine how differences in the prominence of the established firms affects the strategy and financing of new ventures.

The remainder of this paper is organized as follows. In the next section, we outline a series of arguments linking the entrepreneurial prominence of established firms to the characteristics of new ventures. We then discuss the characteristics of our data and the methods used to test our hypotheses. The presentation of results is followed by a discussion section.

ENTREPRENEURIAL PROMINENCE AND FIRM ADVANTAGE

Students of the link between career histories and entrepreneurship have examined how the accumulation of human capital through career histories influences the formation of new ventures. In particular, scholars have emphasized how job experiences shape the technical and managerial skills of (potential) entrepreneurs. For example, Jones-Evans (1996) examines how the occupational backgrounds of technological entrepreneurs affect the skills they bring to their ventures. He finds, for example, that entrepreneurs from academic research settings have strong technical skills but low levels of managerial competence. In a similar vein, Chandler (1996) examines how the past experiences of founders affect the success of new ventures. He finds that new venture performance improves to the extent that there is similarity between the task environment of the new venture and the task environment faced by the entrepreneur in his or her previous job. Similarly, performance tends to improve to the extent that the skills required in the new venture are similar to those previously developed (Chandler, 1996; see also Chandler & Jansen, 1992; Cooper, Gimeno-Gascon & Woo, 1994). Finally, Shane (1999) demonstrates how differences in the past experiences of a set of entrepreneurs shapes their conceptions of the opportunities associated with the same technological innovation.

As this brief review suggests, the main focus in past research on careers and entrepreneurship has been on how careers shape the human capital available to entrepreneurs. However, the effects of careers on social capital are neglected in existing research (Aldrich & Zimmer, 1986). Entrepreneurial activity depends on access to ideas and resources, and such access is differentially available to individuals occupying different positions in the social structure (Burt, 1992). One of the key determinants of an individual's position in social structure is her career history, in particular her affiliation with different employers. Employers shape the personal networks of their employees, expose them to new ideas, endow them with valuable resources and confer implicit credentials upon them. At the same time, established firms are differentiated from each other both horizontally – by virtue of being engaged in different activities – and vertically – by virtue of being more or less visible in different arenas. The nature of the resources available to employees therefore typically will differ according to the structural position of the employer. Therefore, to understand how the social structure of established firms affects entrepreneurial behavior, we must consider the consequences of such differentiation among established firms.

We conceive of the social structure of existing firms as a set of positions hierarchically ordered according to the prominence of their occupants. Network theorists suggest that an actor's prominence in a social network is a function of centrality – the extent to which the actor is extensively involved in relations with other actors (Knoke & Burt, 1983). Prominence garners both informational and reputational benefits for the actor. In recent years, organizational sociologists have applied this notion of prominence to understanding organizational behavior and industry dynamics (Podolny, 1993; Podolny, Stuart & Hannan, 1996; Stuart et al., 1999). In this paper we are particularly interested in the landscape of existing firms as it relates to the generation of new firms; thus, we focus on the entrepreneurial prominence of firms in the existing social structure. Established firms acquire entrepreneurial prominence by virtue of their being tied to a relatively large number of new ventures. Unlike strategic alliances (Stuart et al., 1999) and many other types of interorganizational ties, these ties generally are not created intentionally by established firms; rather they are formed by virtue of employees leaving to found new ventures.

Entrepreneurs must be adept at executing two roles: (1) scanning the environment for opportunities and devising strategies to take advantage of them; and (2) ensuring and managing the flow of resources – such as capital, supplier relationships and customers – to the venture such that it may pursue its business strategies successfully. Prior employment experience shapes the capabilities of entrepreneurs with respect to these two roles. Our argument is that entrepreneurs benefit if they launch a venture from a prominent position

in this social structure. Employment by a prominent firm benefits the entrepreneur in two ways: (1) centrality in entrepreneurial networks makes it easier to identify entrepreneurial opportunities and to act to exploit the opportunities; and (2) the prominence of prior employers helps to reduce the perceived uncertainty of a new venture for external constituents.

Entrepreneurial opportunities arise when a prospective entrepreneur receives new information that, when combined with knowledge already possessed, can be translated into something of value (Shane, 2000). As such, the potential that an opportunity will be discovered is related to both the stock of knowledge an actor possesses and the flow of new information. This implies that human capital differences can only partially explain the entrepreneurial process. Structural differences in access to new information must also be considered.

Network theorists have demonstrated that the quantity and quality of the information an actor receives is a direct function of the actors social network (e.g. Granovetter, 1973; Burt, 1992). Entrepreneurially prominent firms, by virtue of their network centrality, will be exposed to stronger flows of new information about technologies, emerging markets, and unmet customer needs. High quality information will pass through prominent firms in high volume and at a fast rate; thus, employees have a higher propensity to make the necessary information combinations and recognize opportunities. But recognizing the opportunity is only the first step in creating a new venture. Prospective entrepreneurs must take action to transform an opportunity into a venture. Here, we believe that nascent entrepreneurs in entrepreneurially prominent firms vicariously benefit from the experiences of those entrepreneurs who preceded them. As employees exit to launch new ventures, they likely deposit knowledge about the appropriate steps and methods for building an enterprise with former colleagues and coworkers. First, coworkers rarely immediately sever ties when colleagues change employment. Second, organizations have memories residing in long-tenured employees about the actions and activities of former employees. Thus, tactical knowledge of entrepreneurship – which law firms to call, which financiers to meet, where to locate offices – becomes part of the stock and flow of information available to employees of entrepreneurially prominent firms.

Although the information benefits of working for a prominent employer can help people to identify entrepreneurial opportunities and allow them to take appropriate steps towards becoming an entrepreneur, prospective founders still face substantial obstacles to launching the new venture. Entrepreneurs must successfully mobilize the resources of wealth, power and legitimacy necessary to realize their vision (Stinchcombe, 1965; Aldrich & Zimmer, 1986). Doing so requires overcoming information asymmetries that make it difficult for

external resource providers to assess the quality of a new venture or its founders *ex ante*. These problems are exacerbated to the extent that a venture wishes to pursue a new, unproven strategy. Under these conditions, external actors are likely to arrive at an estimate of the quality of the venture by considering more easily observable attributes that are thought to be associated with the quality of the venture (Stuart et al., 1999; Podolny, 1993; Spence, 1974).

One source of information on the quality of the venture lies in the prior accomplishments of the founding team members. Here, the career histories of entrepreneurs enter through a consideration of the experiences and skills that have accumulated through the career. Studies suggest, for example, that venture capitalists are particularly interested in the background experiences and managerial capabilities of entrepreneurs (MacMillan, Siegel & SubbaNarishma, 1985; Goslin & Barge, 1986; but see Hall & Hofer, 1993). Indicators of technological competence might include educational credentials and patents held.

A second class of information on the quality of new ventures is reputational, and focuses on the identity of the entrepreneurs themselves. Sociologists have long maintained that individual reputations are in part constructed from the identities of the parties with whom a person associates (Blau, 1964). In particular, individual reputations benefit from association with prominent actors (Goode, 1978). These reputational advantages in turn facilitate the mobilization of resources and social action. Sociologists of science, for example, argue that scientific careers are enhanced to the extent that young scholars are affiliated with prominent individuals in the field (Merton, 1968). Latour (1987) suggests that the reception accorded to new ideas depends on the prominence of the scientist's associates. Podolny and Stuart (1995) show that other actors are drawn to innovations that are advanced by actors whose prior technological contributions are perceived as important.

In a study of entrepreneurial ventures in biotechnology, Stuart et al. (1999) demonstrate that the prominence of a venture's alliance partners is positively associated with its performance. In their model, new ventures with prominent affiliates benefit from an implicit transfer of status from the affiliates. In the eyes of third parties, association with high-status partners functions as a guarantee as to the quality of the venture. Affiliation with prominent partners therefore gives firms an advantage in the competition for customers, suppliers and employees.

We argue that the prominence of prior employers plays a similar role in reducing the perceived uncertainty of a new venture. External actors use information on previous employers to make inferences about the likelihood that the founders will build a successful venture. Third parties suffer from an

information asymmetry that makes it difficult to assess the true abilities of potential entrepreneurs *ex ante*; this asymmetry is analogous to the one faced by employers when making employment decisions. In this setting, founders who come from employers that are established incubators for entrepreneurial talent benefit from this association. In other words, the prominence of previous employers may function as an indicator of the quality of the prospective founder (Spence, 1974). This supposition – that employees of prominent firms are, on average, of higher quality – may indeed be correct. If more prominent firms are also more successful, for example, they can devote greater resources to attracting and retaining skilled personnel, and they may invest more in training. Furthermore, highly skilled individuals can be expected to prefer employment with prominent employers, improving the pool of candidates for employment at such firms. (Note that we are careful here *not* to argue that employers explicitly seek to certify their employees; nor, that they have a reputational incentive to ensure that they hire only highly qualified employees. Unlike alliance partners, who may put their reputations at risk when associating with a new venture (Stuart et al., 1999), we do not see the reputations of prior employers as being at risk in the entrepreneurial ventures of their employees.)

Finally, employees of entrepreneurially prominent firms are advantaged because more is likely to be known about them in the entrepreneurial community. Just as centrality in information networks may help founders gain access to information and resources, it also helps diffuse information *about* founders and their new ventures. The experiences and accomplishments of prospective founders will be more widely recognized if they come from prominent employers. In this respect, affiliation with prominent employers may reduce the information asymmetries faced by a new venture directly.

For each of these reasons, then, third parties may infer that founders from more prominent employers possess, on average, greater skills and have a higher probability of success in their new ventures. Because of this, we suspect that start-up proposals from employees of prominent firms will *a priori* seem more promising and hence receive more attention from external actors. Thus, external actors will have a greater level of confidence in the ability of such founders to have success in the new venture. Employment by prominent firms, in short, should reduce the perceived uncertainty of a new venture. This idea is consistent with early statements by Stinchcombe (1965, pp. 146–147) regarding entrepreneurship, where “. . . the patterns of trust and of mobility of resources which determines whether resources can be moved to innovators are socially patterned.” In this paper we propose a specific source of these social patterns – past employers.

HYPOTHESES

Our arguments suggest that potential entrepreneurs secure informational and reputational benefits by virtue of having once been employed by a prominent firm. Furthermore, these benefits will be amplified in the face of uncertainty. In order to test these assertions, we first examine the level of uncertainty involved in the kinds of ventures entrepreneurs start. We distinguish between ventures that pursue innovation strategies and those that pursue other strategies. Most of the organizational strategy typologies employed by empirical scholars allow for this distinction (e.g. Miles & Snow, 1978; Porter, 1980; Miller, 1986). One theme across all of the typologies is the importance of differentiating firms that are exploiting an existing market from those that are creating a new market. Following Maidique and Patch (1982), we believe that this is an especially salient distinction for technology-based firms. In our definition, firms pursuing an innovation strategy are seeking to win a technology race in a new niche. These firms are attempting to gain competitive advantages by being the first to develop and exploit new, hitherto unproven technologies. By contrast, incrementalist start-ups build upon existing products and technologies, and seek to gain competitive advantage through technical enhancements, superior marketing and customer service, and/or cost advantages. A critical difference between innovative and incrementalist start-ups lies in the degree of uncertainty associated with a new venture of each type. High levels of uncertainty characterize innovative start-ups, as the core products and technologies around which they are built are of unknown value. The level of uncertainty for incremental ventures is correspondingly lower, since external actors can more readily judge a venture's promise by reference to existing firms. The information asymmetries involved in assessing a venture's quality are exacerbated for innovative ventures, and founders of innovative ventures must therefore overcome a greater degree of perceived uncertainty regarding their firm's prospects.

Identifying opportunities for innovative ventures requires a good understanding of the future path of technological progress and a wealth of information about technological alternatives. Entrepreneurs from prominent firms should be at an advantage in both respects. The reputational benefits of being affiliated with a prominent employer should make entrepreneurs more successful at reducing the perceived uncertainty of their ventures. As a result, the informational and reputational benefits of working for a prominent firm should translate into a superior ability to identify opportunities for innovation. Thus we hypothesize that

Hypothesis 1: The prominence of prior employers will be positively related to whether a firm pursues an innovative strategy.

Our second hypothesis concerns the ability of entrepreneurs to secure external financing at the time of firm founding. In particular, we are interested in whether entrepreneurs from prominent firms are better able to acquire resources from third parties. We suspect that the willingness of third parties to invest in a highly uncertain venture during its infancy, before it has any track record by which to be assessed, depends on the perceived quality of the new venture. There are three ways in which a brand new venture can have higher perceived quality: (1) its founders have high levels of human capital; (2) it has a product which can be independently evaluated; and (3) it has ties to prominent firms that serve as endorsements. While in our analyses, we will attend to all three mechanisms, we are primarily interested in the third, thus we hypothesize that

Hypothesis 2: The prominence of founding team's prior employers will have a positive effect on the probability of a new venture obtaining external financing at the time of founding.

DATA AND METHODS

Data on New Ventures

The data for this study are from the Stanford Project on Emerging Companies (SPEC) (Baron, Hannan & Burton, 1999, 2001). SPEC is a stratified random sample of 173 young high-technology firms in Silicon Valley.² The sample is drawn from the population of firms listed in *Rich's Everyday Sales Prospecting Guide* (1994) and *The Technology Resource Guide to Greater Silicon Valley* (1993/1994) and supplemented with firms from the Silicon Valley business press that were too young to appear in published directories. SPEC is a longitudinal study of organizational evolution with emphasis on formal systems and practices. In order to minimize recall bias and to guarantee that the entities under consideration could potentially have the need for formalized structures and systems, age and size criteria were used to define the population. Firms included in the study were no older than 10 years and had at least 10 employees at the time of sampling. At the time of sampling, the average firm was 7.3 years old and had 89 employees. The sample included firms that ranged in age from 2 to 12 years and in size from 9 to 2042 employees. The SPEC research team conducted interviews with founders, CEOs, and senior managers responsible for human resources, gathered survey and archival data, and compiled detailed organizational histories for each of the firms in the study.

Bhide (1999) reports that 60% of start-ups fail within the first six years and that even those that survive remain small. Based on these statistics, the SPEC

sample is likely biased towards successful start-ups. The nature of the sampling frame means that the firms under investigation have achieved some minimum scale and longevity. However, it is important to note that attempts were made to include younger firms, precisely to minimize survivor bias. Furthermore, despite this data limitation – which plagues virtually all survey or interview-based organizational research – the SPEC sample has some noteworthy advantages for our purposes. First and foremost, it includes firms pursuing different strategies, with different sources of capital. Second, it is geographically constrained, which increases the probability that multiple founders will have held positions in a given employer and thus generate variation in our measure of prominence. For these reasons, we believe the sample is appropriate for testing our ideas.

The first dependent variable of interest in this paper is whether or not the firm was founded to pursue a technological innovation strategy. Trained MBA and doctoral students conducted semi-structured interviews with a founder of each of the firms asking him or her to describe the core competence of the firm at founding. The open-ended response (supplemented in some cases by early press reports, product announcements, business plans and prospectuses) comprised the raw data that was used to categorize each of the firms into one of four strategic archetypes: Innovators, Enhancers, Marketers and Low-Cost Producers (see Hannan, Burton & Baron, 1996). Innovators are firms that seek to gain first-mover advantages by winning a technology race. Enhancer firms seek to produce a product similar to other companies, but employ a general modification or enhancement to gain competitive advantage. Marketers seek competitive advantage through superior sales, marketing or customer service. Finally, Low Cost Producers are firms that seek cost advantages through cost efficient production techniques, relationships with low cost suppliers, or economies of scale. The three latter strategies all revolve around extending existing products or services. For the analyses presented here, we collapse the latter three categories into one category, thereby focusing on the distinction between innovators and incrementalists. In light of suggestions that entrepreneurs may selectively recall their company's history (Bhide, 1999), the use of a retrospective measure of strategy may seem problematic. However, we feel confident that our measure captures the difference between innovators and incrementalists with a high degree of accuracy. In particular, respondents were not asked to classify their strategies themselves; rather researchers coded strategies based on business plans, prospectuses, and articles from the business press describing the industry. Furthermore, Hellman and Puri (1999) perform a number of post-hoc analyses of the same data, including linking patenting activity to strategy and finding that innovators accumulate larger patent portfolios, which increase our confidence in the measure.

The second dependent variable is whether the firm received external financing at the time of founding. New ventures have a variety of alternative sources of capital. Some entrepreneurs self-finance the early start-up phase by using their own personal assets. Other entrepreneurs have a source of revenue or cash flow, such as a licensing agreement or a consulting contract, that finances the venture. Still others are able to mobilize the resources of friends and family to support the early stages of a new enterprise. Many must seek capital from external third parties such as venture capitalists, private investors (so-called "angels"), corporate investors, commercial or investment banks, other financial institutions such as pension funds or insurance companies, or the government. These alternative funding sources vary in the extent to which they are willing to associate with risky ventures and in the price at which they provide capital. Venture capitalists and private investors anchor the end of the continuum that finances the most uncertain enterprises at the highest price (see Roberts & Stevenson (1991) for an overview of start-up financing). Not surprisingly, most of the start-up firms that received external funds at inception obtained the funds from these high price sources. Thus, the task of attracting external financing was one of persuading investors who were in the business of evaluating risky ventures.

Information on the financing history of each of the SPEC firms was collected via a combination of public and proprietary databases, SEC filings and annual reports, internal company documents and a survey instrument that was sent to the most senior finance executive at each of the firms.³ In this paper we focus on whether or not an entrepreneurial venture received funds from any outside investor at inception. We do not distinguish types of investors, nor do we differentiate so-called "seed money" from first or second round financing, nor do we account for differences in the amount of financing. Instead our variable is simply a measure of whether the founding team had any amount of money from any third party at the earliest moments of the firm's existence. Of course it is interesting to note that the vast majority of external investors in the SPEC sample were venture capitalists (71%) with some angels (13%) and corporate investors (13%). Only one of the SPEC firms borrowed start-up funds from a commercial bank. The invested amount for all stages of investment (for the subset of firms for which we have the data) ranged from \$10,000 to \$30,000,000 with one firm receiving \$100,000,000 in cash and stock as part of a merger agreement. Excluding this outlier firm, the average investment size is just under \$2.5 million, and the amounts of initial investments are on the small end of the distribution.

We are interested in whether a founding team can persuade third parties that their venture is promising before they have begun significant operations and have a tangible organizational track record that can be evaluated. Having an

external third party provide financial capital is evidence that the team was successful. Ideally, we want to capture those firms that have external funds at inception. In practice, this is difficult to operationalize. There are ambiguities and inaccuracies inherent in both the founding dates and the financing dates. Most scholars define the birth of a firm as the date that it was legally incorporated. However, in constructing organizational life histories for very young firms we discovered that many had substantial lives – ones that involved full-time employees and/or revenues from sales – well before the founders ever approached a lawyer to incorporate them. For this reason we define the founding date as the earliest possible date that there is any indication that a new organization exists, including legal incorporation, having a full-time employee, or selling a product. This sets the start-up clock to begin at the earliest possible moment. Similarly, financing dates recorded in commercial databases and on our surveys were often recorded in terms of annual “quarters.” Even in cases where a precise date was given, we understood this to be the date a financing deal closed, rather than the moment when negotiations commenced or even when a “handshake” or verbal agreement was reached. Thus, in order to accommodate these recording inaccuracies, we coded a firm as having external financing at founding if it was received within three months of the founding date.⁴

Data on Founders' Careers

We have further augmented the SPEC data with information on the career histories of each of the founding team members of the SPEC companies. As part of the data collection process, the SPEC research team interviewed and surveyed a founder of each of the firms. This informant was asked to identify, by name, the other members of the founding team. This list of founding team members was then verified through archival research of public documents as well as internal company records available to the research team. Among the 173 SPEC firms, founding team size ranged from 1 to 12 (with an average team size of 3). For each founding team member, SPEC research assistants searched a number of archival sources, including SEC filings, company documents, newspaper articles and profiles, electronic databases such as Lexis/Nexis, and internet archives in order to reconstruct each founder's job history prior to launching the new venture. For each of the 527 founders, we attempted to collect information on all jobs held prior to the start of the new venture including the position held and the name of the employer. We contacted the human resources department for 20% of the firms and confirmed the founders prior place of employment. The career history data collection process generated a list of 1252

positions in 438 distinct prior employers. In our data, the number of prior jobs held by a given founder ranges from 0 to 9. Of the 527 founders we identified at least one prior employer for 420.⁵ Our key independent variable, employer prominence, requires that we have data on at least one prior employer for at least one member of the founding team. We were unable to collect any career history or educational background information for any of the founders at 9 of the 173 SPEC companies; thus our sample is reduced to 164 firms.

Measuring the Prominence of Past Employers

The central predictor of interest is the prominence of each founder's past employers. Our measure of prominence should capture the extent to which an existing firm is visible to those engaged in entrepreneurial activity (cf. Knoke & Burt, 1983). Given the diversity of industries represented by our firms, it is difficult to think of a single dimension along which all of the firms can be unambiguously ranked. Asset- or revenue-based size measures may have some applicability to for-profit organizations, but are difficult to apply to universities, for example. Measures of technological prominence based on patents (Stuart et al., 1999) may also be a plausible basis for ranking firms. Again, however, difficulties arise with respect to cross-industry comparisons and with respect to the best way to characterize the prominence of firms operating in multiple industries. More importantly, it is unclear what criteria third parties in an entrepreneurial context use to assign prominence to existing firms, and whether these criteria are consistent across industries. Ideally, we would want an independent reputation survey of all existing firms completed for each of the years from 1982 to 1992 when sample ventures were founded. Unfortunately, we know of no such survey.

For these reasons, we choose to arrive at the prominence of past employers inductively, based on the observed pattern of entrepreneurial activity in our sample. We measure a firm's prominence by the extent to which it has been a source of entrepreneurial ventures. Firms that generate a lot of new ventures should be more visible to other actors in the entrepreneurial community. In order to construct this measure, we start with a binary matrix of ties between the 164 new ventures in the SPEC sample that have some prior career data for the founders and the 438 past employers of all of the founders. A "tie" is formed if any member of the founding team had worked for the past employer. Thus entries in the cells i,j of this matrix are 0 if there is no founding member at start-up i who worked for the past employer j , and 1 if there is at least one founder who worked for the past employer j . Summing across the rows generates a count, for each start-up, of the number of prior employers represented on the founding team.

$$a_i = \sum_j x_{ij}$$

Summing down the columns of this matrix generates a count, for each past employer, of the number of start-ups in the SPEC sample that have emanated from that employer.

$$b_j = \sum_i x_{ij} - 1$$

We subtract 1 from b_j to exclude the focal start-up; if a past employer has only generated one start-up (each has generated at least one), it will have a prominence score of zero. For each venture in the SPEC sample, we then generate a measure of the prominence of all of the past employers by summing the b_j across each of the past employers represented on the founding team.⁶

Using the observed entrepreneurial activity in our sample to measure the prominence of past employers may strike some as tautological, given that we are seeking to explain entrepreneurial activity. There are two reasons why we believe this is not so. First, we do not use this measure to predict the *rate* of entrepreneurial activity, but rather as a predictor of the *characteristics* of the entrepreneurial activity. We do not see a necessary connection between our measure of prominence and whether entrepreneurs pursue innovation strategies, much less whether they are able to secure external financing at start-up. Second, we conceive of the SPEC sample of start-ups as generating a sample of past employers of start-up founders, where the past employers are represented proportional to the entrepreneurial activity that they generate. Our strategy thus parallels the National Organizations Survey, which generated a sample of organizations by asking randomly selected individuals to name their employers (Kalleberg, Knoke, Marsden & Spaeth, 1996; see also McPherson, 1982). This sampling procedure – termed probability proportional to size sampling – is statistically optimal for populations where the elements vary widely in size (Sudman, 1976). We believe that replications of this procedure for new high-technology ventures in Silicon Valley would generate similar lists of past employers.

The career history data collection process generated a list of 1252 positions in 438 distinct prior employers. If people were described as being in self-employment (such as doctors or independent consultants), or for some other reason the firm was not identified, the “prior firm” was coded as missing. Missing prior firms account for 87 of the 1252 positions (6.9%). The remaining positions are in firms that range from familiar high-technology employers in Silicon Valley – such as Hewlett-Packard, Intel and Apple – through academic institutions – such as Stanford and Harvard – to the military and less

well-known firms. Despite the diversity of firms, there is a surprising degree of concentration in entrepreneurial activity (see Table 1).

For example, 6 prior employers dominate the list (IBM, Hewlett-Packard, Stanford University, Apple Computer, Intel, and National Semiconductor) and 69 SPEC firms (46% of the sample) have at least one founder who worked at one of these six firms. It is also worth noting that, while this list captures many large Silicon Valley employers, it is not collinear with size. One of the largest employers, Lockheed, with over 21,000 employees in 1990, does not appear on the list of prominent firms. Furthermore, for firms such as Apple Computer (5,700 employees) and Sun Microsystems (7,700 employees) the prominence

Table 1. Top 24 Entrepreneurially Prominent Firms in SPEC Sample.

| Firm | # of SPEC Firms |
|--------------------------------|-----------------|
| IBM | 21 |
| Hewlett-Packard | 16 |
| Stanford University | 15 |
| Apple | 12 |
| Intel | 11 |
| National Semiconductor | 10 |
| ROLM Corporation | 9 |
| AT&T | 8 |
| Sun Microsystems | 6 |
| UC Berkeley | 5 |
| Silicon Graphics | 5 |
| Ungermann Bass | 5 |
| AMD | 4 |
| Digital Equipment Corporation | 4 |
| MIPS Computer Systems | 4 |
| NASA AMES | 4 |
| NIH | 4 |
| Xerox Corporation | 4 |
| Bridge Communications, Inc. | 3 |
| Chips and Technologies | 3 |
| Control Data Corporation | 3 |
| Texas Instruments Incorporated | 3 |
| U.S Navy and Naval Reserve | 3 |
| Harvard University | 3 |

Note: SPEC firms can have multiple parents. For example, a SPEC firm may have one founder who worked at IBM, HP, and GE and a second founder who worked at HP and Honeywell. The career backgrounds are aggregated at the firm level; thus this SPEC firm has prior ties to four firms (IBM, HP, GE, and Honeywell) and would be listed in this table as coming from both IBM and HP.

measure appears unrelated to size. Apple's prominence score is double that of Sun's (12 compared to 6).⁷

Control Variables

In addition to the prominence of past employers, we control for a number of other characteristics of the SPEC companies and their founders (since we are studying the firms at their inception, there are few organizational characteristics to measure). In the external financing models, we control for how far along each company is in the entrepreneurial process by including an indicator as to whether or not they had a completed product ready for shipment within six months of founding. Having a working product, or even a product prototype, is one way that a firm can reduce the perceived uncertainty for external stakeholders. We believe that this approach to reducing uncertainty will be particularly effective for firms pursuing an innovation strategy; thus, we include an interaction term. We also control for industry for several reasons. We want to capture differences in the need for capital (medical devices companies on average should require more initial capital than software companies) and the attractiveness of an industry in the capital market. We also need to account for different baseline levels of innovativeness across industries. Finally, industries are not equally represented in the sample. In the analyses presented in this paper we include dummy variables for three broad industries: medical-related (including medical devices and biotechnology), networking and telecommunications, and semi-conductors. The omitted category consists primarily of computer hardware and software companies, electronic component manufacturing companies, and contract research and development firms.

Past research suggests that career experiences shape the propensity and ability of individuals to launch entrepreneurial ventures. We control for a number of such experience-related characteristics in our models. First, we control for the number of founders with prior entrepreneurial experiences. Second, we include measures of the number of founders with prior senior management experience. Some evidence indicates that venture capitalists take into account the management experience of entrepreneurs (MacMillan et al., 1985). We also control for the number of founders with experience in sales/marketing or finance in order to control for the possibility that the perceived quality of a team may be related to the presence of functional diversity.

Finally, we control for the general human capital of the founders by including education level in our analyses.⁸ Specifically, we measure the proportion of the founding team that has advanced degrees (i.e. more than a B.A.) We also consider the possibility that third parties might look to tangible measures of

Table 2. Descriptive Statistics.

| Variable | Mean | SD | Min | Max | N |
|----------------------------------|-------|--------|-----|------|-----|
| Innovation Strategist | 0.491 | 0.501 | 0 | 1 | 159 |
| External Financing within 3 mos. | 0.370 | 0.484 | 0 | 1 | 138 |
| Product within 6 mos. | 0.185 | 0.389 | 0 | 1 | 168 |
| Medical-related Industry | 0.143 | 0.351 | 0 | 1 | 168 |
| Networking & Telecom. Industry | 0.202 | 0.403 | 0 | 1 | 168 |
| Semiconductor Industry | 0.107 | 0.310 | 0 | 1 | 168 |
| Prior Founding Experience | 0.560 | 0.860 | 0 | 5 | 168 |
| Senior Management Experience | 0.935 | 1.079 | 0 | 5 | 168 |
| Finance or Sales Experience | 1.185 | 1.434 | 0 | 9 | 168 |
| Log Number of Patents | 0.698 | 0.967 | 0 | 3.85 | 166 |
| Advanced Degrees | 0.784 | 0.355 | 0 | 1 | 151 |
| Number of Past Employers | 3.440 | 2.107 | 0 | 11 | 168 |
| Ties to Prominent Firms | 9.595 | 10.860 | 0 | 52 | 168 |

accomplishment as an indicator of the quality of the founding team; thus, we collected information on all of the patents granted to each of the founders in our sample prior to the launch of the new venture.⁹ We interpret this as a measure of the technological or innovative competence of the founding team members.¹⁰

Table 2 presents descriptive statistics for all variables in the models. Bivariate correlations are presented in Appendix A.

As is apparent from Table 2, almost half of the ventures in our sample pursue an innovation strategy. Slightly over a third of the SPEC companies have external financing at the time of founding, while approximately one-sixth have a product within the first six months. On average, 3.4 different employers are represented on each founding team, which is slightly more than the mean founding team size (2.95).¹¹ The vast majority of prior employers (338 of 438) have a prominence score of 0. The maximum prominence score for a prior employer is 21. Aggregating across all prior employers for a team yields a prominence score range from 0 to 52 with the average SPEC firm earning 9.6 points.

RESULTS

We argue that firms pursuing innovative strategies face higher levels of uncertainty. Evidence of the higher level of uncertainty surrounding innovation strategists can be found in Table 3, which cross-classifies the initial strategy of the ventures in our sample by whether or not the firm had external financing at founding.

Table 3. Relationship between Strategy and External Financing.

| <i>Strategy:</i> | <i>External Financing at Founding</i> | | |
|------------------|---------------------------------------|-----------|-----|
| | No | Yes | |
| Incremental | 31 52% | 29 48% | 60 |
| Innovation | 51 72% | 20 28% | 71 |
| <i>Total</i> | 82 | 49 | 131 |

$\chi^2 = 5.65$ (1 *d.f.*), $p < 0.02$.

While almost half of the incrementalist firms had external funding at the outset, only 28% of those firms pursuing an innovation obtained such funds. This difference is statistically significant. By construction, incrementalist firms are operating in known market niches where there are already established entities. There is both an identifiable market opportunity and a means to assess – and benchmark – the quality of the product or service being offered by the new venture. Neither is possible for innovative firms. Thus, we interpret this table to support our claims that third parties, such as venture capitalists, are less willing to provide initial funding to new ventures that pursue high-risk and uncertain innovation strategies.

In Table 4, we present logistic regression estimates of the determinants of a new venture's strategy at the time of founding. We focus our discussion on the fourth column of results. The parameter estimates suggest that the past career experiences of founders have an impact on their choice of strategy. Teams with a lot of experience in sales or finance are, as might be expected, less likely to pursue innovation strategies. Graduate education also has a positive impact on the decision to pursue an innovation strategy.

As predicted by Hypothesis 1, the prominence of past employers has a positive impact on the propensity to pursue risky strategies. A one-standard deviation increase in the average prominence of the founding team's past employers increase the odds of pursuing an innovation strategy by a factor of 1.65. This result is consistent with our claim that entrepreneurs benefit from being associated with prominent employers. Our measure of the prominence of past employers captures the extent to which firms are at the center of entrepreneurial activity. This centrality in entrepreneurial networks can have both informational and reputational benefits which make it more likely that employees of prominent firms will pursue innovation strategies.

Table 4. Logistic Regression Estimates of the Determinants of Founding Innovation Strategy (N = 159).

| Variable | (1) | (2) | (3) | (4) |
|-------------------------------------|--------------------|-------------------|---------------------|---------------------|
| Medical-related Industry | 1.745** (0.591) | 1.255 (0.641) | 1.132 (0.670) | 1.399 (0.709) |
| Networking and Telecom. Industry | -0.420 (0.419) | -0.522 (0.448) | -0.621 (0.480) | -0.881 (0.523) |
| Semiconductor Industry | 0.187 (0.545) | -0.215 (0.632) | -0.343 (0.682) | -0.328 (0.746) |
| Log Number of Patents | | 0.418 (0.217) | 0.453 (0.234) | 0.372 (0.243) |
| Graduate Degrees | | 1.429* (0.553) | 1.525** (0.569) | 1.384* (0.619) |
| Prior Founding Experience | | | 0.185 (0.234) | 0.183 (0.248) |
| Senior Management Experience | | | 0.026 (0.201) | -0.135 (0.226) |
| Sales or Finance Experience | | | -0.444** (0.165) | -0.556** (0.175) |
| Number of Past Employers | | | | 0.164 (0.136) |
| Employer Prominence | | | | 0.046* (0.023) |
| Constant | -0.187 (0.217) | -1.349 (0.500) | -0.972 (0.526) | -1.572 (0.606) |
| N | 159 | 144 | 144 | 144 |
| Log-Likelihood | -103.03 | -86.586 | -81.537 | -75.453 |
| Pseudo R-squared | 0.065 | 0.131 | 0.182 | 0.243 |

* $p < 0.05$, ** $p < 0.01$ (two-sided tests).

It is difficult to differentiate the information and reputation accounts as explanations of the prominence effect. The information story suggests that employees of prominent firms take advantage of ideas and innovations that they are exposed to in the course of their work. Their employer may not be aware of these ideas, or may not be interested in pursuing them. In order to explore the role that

such exposure may play, we turned to the explanations given by founders in response to the question, “What was the catalyst or impetus for founding the company?” Out of these open-ended responses, we coded whether the founder indicated that the idea that formed the basis of the new venture had come from work being done at a prior employer. Of the firms for which we have such interviews (N = 131), 23% mentioned that projects they had undertaken in the context of a prior employment setting as the catalyst for starting the venture. In separate models, we included a dummy variable indicating whether such a project with a prior employer was the impetus for the new venture. This variable had no effect on the probability of pursuing an innovative strategy, and had a negligible effect on the relationship between the prominence of past employers and venture strategy.

We also experimented with a different measure of employer prominence, in part because of our lingering concern over whether our effects are driven by differences in the size of prior employers. Size may be relevant since it has been shown to affect organizational innovation processes (Cohen & Levin, 1989). We do not have direct measures of employer size. Instead, we created a dummy variable indicating whether the prior employer was listed in the Silicon Valley 100, an annual listing of the largest firms in Silicon Valley produced by the San Jose Mercury News. In separate analyses (available from the authors), we experimented with various ways of including information on the number of prior employers listed in the Silicon Valley 100. None of these affected the propensity of firms to pursue an innovation strategy, and the effects of entrepreneurial prominence were robust throughout the different specifications.

In Table 5 we turn our attention to the determinants of external financing at founding. These estimates are from logistic regression models of whether or not a venture had external financing within three months of founding.

As the cross-classification in Table 3 suggested, firms pursuing an innovation strategy are less likely to secure external financing at start-up. In the second model, we introduce an interaction effect between the firm’s strategy and whether or not they had a product at founding. We see that these two variables have a complex effect on the likelihood of external financing at founding. The main effect of the product variable indicates that firms pursuing an incrementalist strategy are less likely to secure external financing at founding. This may seem counterintuitive. However, it is important to note that our dependent variable primarily captures infusions of venture capital, which comes at a higher cost than traditional sources of capital (such as bank loans). Since incrementalists are operating in established markets, those with a product in hand have the least need for this more expensive type of financing. In fact, they may be able to generate sufficient revenue from sales to mitigate the need

Table 5. Logistic Regression Estimates of the Determinants of External Financing at Start-up (N = 128).

| Variable | (1) | (2) | (3) | (4) | (5) | (6) |
|----------------------------------|-------------------|--------------------|--------------------|--------------------|--------------------|---------------------|
| Medical-related Industry | -0.568 (0.586) | -0.572 (0.591) | -0.197 (0.628) | -0.309 (0.654) | -0.236 (0.701) | -0.066 (0.720) |
| Networking and Telecom. Industry | 0.581 (0.461) | 0.404 (0.476) | 0.525 (0.498) | 0.373 (0.515) | 0.587 (0.538) | 0.300 (0.568) |
| Semiconductor Industry | -0.268 (0.663) | -0.235 (0.674) | 0.289 (0.730) | 0.125 (0.755) | -0.062 (0.784) | -0.209 (0.811) |
| Innovation Strategist | -0.469 (0.527) | -1.097 (0.670) | -1.488* (0.746) | -1.568* (0.767) | -1.697* (0.789) | -2.009* (0.816) |
| Product | -0.705 (0.399) | -0.993* (0.436) | -1.018* (0.479) | -1.079* (0.517) | -0.940 (0.533) | -2.286** (0.780) |
| Product * Innovation Strategy | | 1.891 (1.129) | 2.252 (1.182) | 2.695* (1.231) | 3.025* (1.284) | 3.201* (1.306) |
| Graduate Degrees | | | 0.240 (0.629) | 0.262 (0.636) | 0.261 (0.655) | 0.455 (0.695) |
| Log Number of Patents | | | -0.403 (0.242) | -0.363 (0.245) | -0.338 (0.249) | -0.318 (0.256) |
| Prior Founding Experience | | | | -0.058 (0.285) | -0.023 (0.289) | -0.242 (0.314) |
| Senior Management Experience | | | | 0.350 (0.214) | 0.513* (0.235) | 0.545* (0.247) |
| Sales or Finance Experience | | | | -0.072 (0.157) | -0.009 (0.161) | 0.025 (0.176) |
| Number of Past Employers | | | | | -0.235 (0.144) | -0.226 (0.149) |
| Employer Prominence | | | | | 0.006 (0.022) | -0.072 (0.042) |
| Innovation Strategy * Prominence | | | | | | 0.115* (0.048) |
| Constant | -0.145 (0.357) | 0.068 (0.375) | -0.282 (0.454) | -0.116 (0.474) | -0.155 (0.521) | 0.432 (0.596) |
| N | 129 | 129 | 121 | 121 | 121 | 121 |
| Log-Likelihood | -80.408 | -79.022 | -71.417 | -69.964 | -68.350 | -64.817 |
| Pseudo R-squared | 0.056 | 0.072 | 0.1 | 0.118 | 0.138 | 0.183 |

* $p < 0.05$, ** $p < 0.01$ (two-sided tests).

for any external financing. Turning to innovation strategists, the interaction effects suggests that for these firms, having a product makes it more likely that the firm will receive external financing at founding. Unlike incrementalist ventures, however, innovative start-ups are more in need of venture capital due to the uncertainty surrounding the market for their products.

In the next two models, we include measures of the experiences and achievements of the founding team. First, we see that prior founding experience has no effect on the odds that a new venture will receive external financing at founding. This may be due to the fact that our measure captures only whether or not a founder had been involved with a prior start-up, but nothing about the outcome. If the prior founding experiences have had negative outcomes, third parties may be hesitant to invest in another venture. Alternatively, if the prior founding experience had been successful, and the entrepreneur has “cashed out,” his or her own personal wealth may obviate the need for external financing in the early stages of the firm. It is also worth noting that prior founding experience is significantly correlated with senior management experience – which has a positive effect on the odds of attracting external stakeholders. Founding teams whose members include at least one with prior senior management experience are more likely to secure external financing at founding. This is consistent with studies showing that venture capitalists value the management experiences of entrepreneurs when evaluating proposals (MacMillan et al., 1985). Neither the innovative ability of the founders, as measured by the number of patents held, nor graduate credentials have a significant effect.¹²

We see in the fifth model in Table 5 that the prominence of past employers initially has no significant effect on the odds of securing external financing at start-up, suggesting no support for Hypothesis 2. However, this model does not take into account the different levels of uncertainty associated with innovation strategies and incrementalists. We expect entrepreneurial prominence to be especially beneficial when the perceived uncertainty of the venture is high, such as when a firm pursues an innovative strategy. In the final model (model 6) in Table 5, the effect of employer prominence differs for the two types of firms. Among firms pursuing an innovation strategy, employer prominence has the expected positive and statistically significant effect on the odds of securing external financing at start-up. For innovative ventures, where the quality of the venture team is arguably of greatest importance, employer prominence has a significant effect on the ability of the founders to secure resources from external providers.¹³ (Separate analyses (not shown) using the Silicon Valley 100 measures discussed above had no influence on the pattern of results.) This supports our claim that the reputational benefits of employer prominence reduces the perceived uncertainty of new ventures and facilitates entrepreneurial activity.

DISCUSSION AND CONCLUSION

The analyses presented in this paper provide evidence supporting the claim that career histories shape the entrepreneurial process. First, functional and educational backgrounds influence initial strategic choices, and management experience is important to external stakeholders. Entrepreneurs with advanced degrees establish firms with innovation strategies, but entrepreneurs with sales or finance experience are less likely to pursue an innovation strategy. Entrepreneurs with senior management experience have more legitimacy with external constituents and are more likely to obtain external financing. These findings are consistent with work on human capital and the importance of career histories on the formation of new ventures. Our work moves beyond these findings, however, to address the importance of social capital for entrepreneurs. Entrepreneurs setting out from prominent employers have both information and reputation advantages over those who emanate from less prominent firms. It is important to note not only *what* experiences and background entrepreneurs have but also *where* these experiences come from. The information and reputation advantages that accrue from social capital allow entrepreneurs from prominent firms to pursue more risky ventures, such as founding a firm dedicated to establishing a new product or market. The reputational capital derived from being affiliated with a prominent employer also allows entrepreneurs to reduce the perceived uncertainty of their venture, thereby facilitating the acquisition of resources from third parties. Risky ventures (those pursuing an innovation strategy) that emerge from prominent employers are more likely to obtain external financing.

While we believe our analyses are persuasive, they are limited in certain respects. First, our data do not allow us to distinguish between a *desire* to launch a new venture pursuing an innovation strategy, and the ability to do so. This makes it difficult to specify clearly the mechanism by which employer prominence influences the choice of initial strategy. Specifically, we cannot confidently determine whether individuals from prominent employers are more likely to launch innovative ventures because they are privy to superior information, or because they benefit from the prominence of their employers in convincing third parties to support the venture. Distinguishing between these accounts would require a more detailed study of proposed entrepreneurial ventures and the process by which they move from initial concepts to nascent firms. Despite this limitation, what we do know is important: entrepreneurs from prominent employers launch more innovative ventures, and those ventures are more likely to obtain external financing.

Second, while our interpretation of these results emphasizes the benefits of prominent structural locations, we are sensitive to alternative explanations that

point to the possible effects of unobserved heterogeneity among founders. It is possible that the observed effects of entrepreneurial prominence are due to unobserved characteristics of established firms and the employees they attract. For example, entrepreneurially prominent firms may attract employees whose personal characteristics make them particularly likely both to pursue innovative ventures and to win the confidence of external investors. As with any such claim, we cannot rule out with certainty that the findings can be attributed to unobserved heterogeneity. However, we feel confident that we have measured and controlled for several of the most important individual-level characteristics that can most plausibly be thought to affect the outcomes we examine. Our models include measures of the patenting activities of the founders, their educational backgrounds, their prior work experiences and their past entrepreneurial activity. Moreover, we have no *a priori* reasons to expect that the firms identified as entrepreneurially prominent in this sample should differ systematically in their recruitment behavior. At the same time, we believe that an important and promising line of future research would be to explain why firms differ in the rate at which they generate new ventures through employee departures. The limited amount of work that has been done in this area suggests that such variations can be traced to differences in internal promotion chances, reward levels, technological emphases and managerial practices (Freeman, 1986; Brittain & Freeman, 1986). A full understanding of how established firms shape entrepreneurial behavior must attend to both the cause and the consequences of entrepreneurial prominence.

Finally, the diversity of firms in the SPEC data set, although useful for understanding a broad set of organizations, has certain shortcomings. Ideally, in addition to our employer prominence measure, we would have an exogenous measure of the prominence of past employers. The broad set of industries represented in the sample make such a measure difficult to generate. For studies of new ventures within a single industry, measures of technological or innovative prominence may be appropriate. Stuart et al. (1999), for example, measure the prominence of alliance partners using counts of citations to a firm's patent portfolio. The development of exogenous measures of prominence requires confidence about the criteria by which members of the entrepreneurial community rank existing firms. To our knowledge, this topic is unexplored in the existing literature. Furthermore, an exogenous measurement of prominence has its own problems. No clear dimension exists on which we could compare the prominence of a biotechnology firm with the prominence of a hardware firm. As such, single industry studies may be more appropriate places to develop exogenous measures of prominence.

We began this paper by arguing that the landscape of existing firms shapes the entrepreneurial process. We believe our results demonstrate that patterns

of entrepreneurial activity are shaped by the social structure of existing organizations (Stinchcombe, 1965; Aldrich & Zimmer, 1986). Our work is, therefore, an important complement to studies showing how the general scarcity of resources affects the formation of new firms (Hannan & Freeman, 1989). In particular, these findings stress the importance of hierarchical differentiation in the social structure of organizational populations (Podolny, 1993; Podolny et al., 1996; Stuart et al., 1999). We know from this existing work that prominence dictates future patterns of affiliation, firm survival, and performance. We find additional benefits accruing from prominence: firms emanating from prominent firms are more innovative.

For network theorists, our work further confirms the importance of network position. Entrepreneurs with prominent past employers occupy a privileged place in the social structure, and their position garners important advantages with respect to access to resources and information. What we add to the network literature is an examination of how the network of existing organizations impacts the new venture, and by extension the new venture network. The new ventures that spawn from prominent employers may occupy a more prominent position in their own network. The access to external funding immediately connects these innovative new ventures into an exclusive network of organizations. The innovative strategies of these firms may lead them to higher visibility in their own industries. And the fact that they emerge from prominent others may imprint them with positional advantage from the very beginning (Stinchcombe, 1965). Prominence may not only be fairly stable over time, it may transfer from one organization to the other through entrepreneurs. Furthermore, the impact of the new venture's lineage may have implications far beyond founding. These possibilities offer intriguing directions for future research.

We noted earlier that organizational researchers have grown increasingly interested in the role managerial careers play in shaping organizational behavior and industry dynamics. Most research in this tradition focuses on how career histories shape individual experiences and abilities (Boeker, 1997; Sørensen, 1999). Our research emphasizes that careers have important reputational consequences as well. In this respect, the identity of a person's employers (and perhaps other institutional affiliations) assumes primary significance. Organizational reputations transfer to individual reputations. Inferences about the talents and abilities of individuals are constructed from their histories of affiliation with employers. This parallels studies of scientific careers, which have documented that the prestige of the university a person attended has a positive effect on the prestige of the first job (Hurlbert & Rosenfeld, 1992). Our results suggest, however, that the effects of institutional or organizational prestige extend beyond the signals associated with educational credentials and

encompass the firms and other organizations that people move through in the course of their careers. Moreover, the effects of institutional prestige extend beyond their impact on individual life courses. The role that hierarchical differentiation among organizations plays in both individual career dynamics and organizational populations, and the interconnections between the two levels of analysis, is an important arena for future research.

Future research should examine other benefits of entrepreneurial prominence. We find a link between prominence and innovative strategies and external funding, but prominent past employers may continue to impact internal organizational decisions through means like the recruitment of personnel from prominent firms. Ventures spawned from prominent employers may be more likely to go public successfully, or they may be more likely to be acquired by a larger, more established firm attempting to increase their own prominence. These various research possibilities point out how disentangling where imprinting ends and path dependence begins offers a challenge to future research.

Our research contributes to a greater understanding of what differentiates new ventures. In order to understand the emergence of innovative new ventures, we need to know where they come from in the network of existing organizations. Past employer prominence offers firms a significant advantage in the struggle for survival and success. We tie new ventures into the existing social structure and point out that a new venture is more than a compilation of skills and experiences, but it emerges from other organizations with positions in the social structure. Without incorporating the existing social structure into our understanding of new ventures, we cannot hope to understand why one venture survives and another fails, much less why the occasional venture succeeds beyond all expectations. Despite the rapid rate of new venture formation, the ever changing technology, and the considerable hurdles new ventures face, the underlying stability of the social structure offers a means to understand and keep up with the changing organizational landscape.

NOTES

1. Note that we do not seek to explain why some firms generate more entrepreneurial offspring than others; rather, we take this distribution as given. See Freeman (1986) and Brittain and Freeman (1986) for a discussion of these issues.

2. For details on the data collection and coding methods, see Burton (1995); Baron, Burton and Hannan (1996); Hannan, Burton and Baron (1996). These publications describe the original sample of 100 firms for which data was gathered in the summer of 1994. The sampling and data collection strategies were replicated in the summer of 1995 to supplement the sample with an additional 72 firms (See Baron, Hannan & Burton 1999, 2000 for more information).

3. The financing history data collection effort was led by Professors Thomas Hellmann and Manju Puri of the Stanford Graduate School of Business (Hellmann & Puri, 1999). Sixty-six firms (38%) responded to a finance history survey that was addressed to the senior executive responsible for finance. Data for a large number of the sample firms was available from commercially available databases that track the venture capital industry. 107 (62%) of the SPEC sample firms had records in the Venture One database (see Gompers & Lerner (2000) for a discussion of this database); 95 (55%) had records in the Venture Economics database (see Lerner, 1995, for a discussion of this database). Additional information was gleaned from the founder interview transcripts as well as archival research in the business press.

4. We tested alternative intervals. The results when we more strictly define the date of financing are weaker, since there are fewer positive outcomes, but in the same direction. We obtain statistically significant findings that are substantially equivalent to those reported when we expand the financing interval to be within the first six months of founding. We chose to report the analyses from the slightly more conservative three-month interval.

5. We confirmed that there were at least 38 additional founders who began working at the SPEC firm directly from school and thus their number of prior employment ties was truly 0. For the remaining 69 it is difficult to ascertain whether missing data arises because the founder had no prior jobs, or whether the experience was simply not reported in our sources. We suspect that there is some bias toward large, established firms being mentioned in press accounts about the individuals in our sample; employers that are less important in the eyes of the media may not be mentioned in newspaper stories and press releases. We attempt to account for this problem in our analyses by replicating the models using different numbers of prior jobs (see note 11). At a minimum, it is important to note that since we were unable to administer job history interviews to the founders, these data are imperfect records of the career histories of the SPEC entrepreneurs.

6. This measure of prominence will increase on average with the number of prior employers recorded for a founding team. In order to account for this, we control for the number of past employers in the models.

7. Numbers of employees by firm is based on data from September 1990 and was reported in a San Jose Mercury News article, "Largest Employers" printed Monday, January 14, 1991 on page 2C.

8. The models that we report in this paper include only the education control variables. The findings are equivalent when we include age as a proxy for experience; however our sample size is dramatically reduced due to the difficulty in locating reliable birthdates for the founders.

9. Patent data for each individual was collected through the U.S. Patent Office's web site: <http://www.uspto.gov>

10. We also collected information on the number of citations to each founder's portfolio of patents; however, this had no effect in our models.

11. It is possible that our data collection strategy misses firms that are prominent in an entrepreneurial context but that do not garner media attention. For these reasons, we conducted the analyses using only the immediately prior job for each founder, using three prior jobs per founder, and using all available data. The results conform to our hypothesized expectations; however, the prominence distribution is greatly constrained

in the first case and dramatically skewed in the latter. We report the intermediate choice, allowing up to three prior jobs for each founder, in this paper.

12. We tested for an interaction effect with the strategy of the firm; it was not significant.

13. Arguably, the firms with the greatest uncertainty surrounding their quality are innovation strategists without a product at the time of founding. This suggests a three-way interaction between strategy, product at founding and employer prominence. We tested for this interaction in a separate model, not shown here. Employer prominence has no significant effect for innovators with a product, but does have a significant effect for innovators without a product. This is consistent with our argument.

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Appendix A: Bivariate Correlations.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|------------------------------------|--------|-------|--------|--------|--------|-------|-------|------|-------|-------|-------|-------|------|
| 1 Innovation Strategist | 1.00 | | | | | | | | | | | | |
| 2 External Financing within 3 mos. | -0.19* | 1.00 | | | | | | | | | | | |
| 3 Product within 6 mos. | -0.25* | -0.05 | 1.00 | | | | | | | | | | |
| 4 Medical-related Industry | 0.28* | -0.11 | -0.11 | 1.00 | | | | | | | | | |
| 5 Networking & Telecom. Industry | -0.14 | 0.18* | -0.01 | -0.21* | 1.00 | | | | | | | | |
| 6 Semiconductor Industry | 0.01 | -0.03 | -0.07 | -0.14 | -0.17* | 1.00 | | | | | | | |
| 7 Log Number of Patents | 0.24* | -0.14 | -0.19* | 0.32* | -0.11 | 0.19* | 1.00 | | | | | | |
| 8 Graduate Degrees | 0.27* | -0.04 | -0.18* | 0.09 | -0.08 | 0.13 | 0.18* | 1.00 | | | | | |
| 9 Prior Founding Experience | 0.06 | -0.01 | -0.10 | 0.11 | 0.05 | 0.00 | 0.05 | 0.05 | 1.00 | | | | |
| 10 Senior Management Experience | -0.03 | 0.15 | -0.11 | 0.02 | 0.18* | 0.00 | -0.04 | 0.01 | 0.39* | 1.00 | | | |
| 11 Finance or Sales Experience | -0.18* | 0.03 | -0.05 | -0.05 | 0.04 | -0.02 | -0.01 | 0.00 | 0.19* | 0.39* | 1.00 | | |
| 12 Number of Employers | 0.21* | -0.07 | -0.15 | 0.11 | 0.25* | 0.01 | 0.14 | 0.08 | 0.31* | 0.48* | 0.36* | 1.00 | |
| 13 Employer Prominence | 0.24* | -0.05 | -0.01 | -0.14 | 0.11 | 0.10 | 0.07 | 0.15 | 0.04 | 0.14 | 0.17* | 0.52* | 1.00 |