

# Social Influence and Entrepreneurship: The Effect of University Peers on Entrepreneurial Entry

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Theories of entrepreneurship have proposed that entrepreneurs are shaped by contextual influences. This paper examines the social transmission of entrepreneurial behavior across university peers. I propose that peers acquainted at a university increase the probability of an entrepreneurial entry by transmitting information about new opportunities and by reducing the uncertainty associated with entrepreneurship. Based on unique data on hedge fund foundings between 1979 and 2006, this study documents that past entrepreneurial behaviors of university peers are an important driver of individual rates of entrepreneurship. Additional analyses show that social influence has a stronger effect on the transition to entrepreneurship when exerted by spatially proximate university peers and university peers who share gender with the focal individual. These findings provide evidence that the effect of university peers arises as a result of social influence rather than the institutional impact of universities. Together, the results uncover novel pathways of social transmission of entrepreneurship and strengthen evidence for the role of contextual influences in shaping entrepreneurial entry.

**Key words:** entrepreneurship; economic sociology: economics and organization; diffusion of innovation: technology and innovation management

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## Introduction

Where do entrepreneurs come from? Research in sociology and organization theory has increasingly attributed transition to entrepreneurship to contextual influences (e.g., Aldrich and Ruef 2006, Thornton 1999). Scholars have examined the connection between entrepreneurship rates and social networks (e.g., Sorenson and Audia 2000, Stuart and Sorenson 2005), family background (e.g., Halaby 2003), and cultural or regional characteristics (Romanelli and Schoonhoven 2001, Saxenian 1994). Because entrepreneurship typically follows a period of employment in established firms (Freeman 1986), much attention has been recently devoted to prior employment affiliations to predict the rates of entrepreneurial entry (Audia and Rider 2006, Brittain and Freeman 1986, Dobrev and Barnett 2005, Freeman 1986, Kacperczyk 2012, Sørensen 2007). A number of studies have argued that entrepreneurs represent “organizational products” (Freeman 1986, p. 39) and that organizations act as “founts of entrepreneurship” (Sørensen and Fassiotto 2011) by providing employees with exposure to information (e.g., Aldrich and Ruef 2006, Saxenian 1994), social capital (e.g., Burton et al. 2002, Romanelli and Schoonhoven 2001), skills and knowledge (e.g., Lazear 2004, Shane 2000), and the motivation necessary to launch a new venture (e.g., Sorenson and Audia 2000, Stuart and Ding 2006).

Despite rapid progress made by the extant literature, we still know relatively little about the drivers behind an individual’s decision to leave current employment

in pursuit of a new venture (Sørensen and Fassiotto 2011). This study advances entrepreneurship theories by examining a form of contextual influence that has received little attention in entrepreneurship research to date: the social transmission of entrepreneurial behavior across university peers, defined as individuals with shared prior educational affiliation. By focusing on the influence of university peers on entrepreneurial behavior, this study complements the vibrant literature on the relationship between academic institutions and transition to entrepreneurship (e.g., Bercovitz and Feldman 2008, Roberts 1991, Shane 2004, Stuart and Ding 2006). Whereas the majority of research has attributed the effect of universities on entrepreneurial entry to structural and institutional attributes of academic institutions (Bercovitz and Feldman 2008, Mowery et al. 2004, Owen-Smith 2003, Etzkowitz 1998, Owen-Smith and Powell 2003, Murray 2002, Shane 2004, Powell 1996), I propose that universities impact the rate of entrepreneurship by structuring interpersonal influences among graduates even many years after the completion of education. My theory further dovetails with a broader set of scholars who consider social influences as an important determinant of transition to entrepreneurship. Whereas this line of work has predominantly focused on peers in the workplace (e.g., Gompers et al. 2005, Higgins 2005, Nanda and Sørensen 2010, Sorenson and Audia 2000, Stuart and Ding 2006) or in close geographic regions (Giannetti and Simonov 2009, Saxenian 1994, Sorenson and Audia 2000), much less attention has been accorded

to peers acquainted in other social contexts and their potential influence on entry into entrepreneurship.

The core argument in this study suggests that university peers influence entrepreneurship rates in two distinct ways. First, peers acquainted at a university will affect one's decision to enter entrepreneurship because they are particularly well positioned to transfer novel information about entrepreneurial opportunities. Studies of homophily (McPherson and Smith-Lovin 1982) and social foci (Feld 1982), which establish a causal link between common affiliation and the probability of social interaction, jointly imply direct contact and information exchange across individuals with a shared educational affiliation. Second, university peers should impact one's decision to become an entrepreneur by reducing uncertainty associated with entrepreneurial entry. Based on sociological theories that emphasize the role of social proximity in facilitating diffusion of novel and uncertain ideas (Katz and Lazarsfeld 1955, Katz and Shapiro 1985, Mansfield 1961, Rogers 1983), I argue that peers with a shared prior educational affiliation will alleviate the uncertainty associated with entrepreneurial process, triggering the transmission of entrepreneurial behavior.

Additionally, the study of university peer influences offers important methodological advantages pertaining to making causal inferences. First, focusing on university peers allows for clean identification of the causal mechanisms underlying the peer effect on entrepreneurship. Isolating social transmission of entrepreneurship is particularly challenging because the observed effects are largely susceptible to selection concerns. That is, the interpretation of a positive relationship between peers' past entrepreneurial experience and the transition to entrepreneurship is problematic because such a relationship may be correlated with unobserved dispositions of entrepreneurs themselves. The concern that social influence reflects self-selection is particularly credible when considering peers in the workplace or local region, because the choice of employment and regional environment is largely driven by an individual's values, preferences, and abilities (Sorenson and Audia 2000, Baron 1984, Jovanovic 1979) that are also, in part, responsible for entry into entrepreneurship (Elfenbein et al. 2010, Halaby 2003). By contrast, because educational affiliation typically precedes employment, the selection of university peers is less likely to be driven by an individual's future decision to become an entrepreneur. Moreover, because university peers are selected prior to those peers' entry into entrepreneurship, an expectation of specific gains for entrepreneurship is less likely to account for one's choice of any group of peers. Hence, social influence exerted by university peers is less susceptible to such differential selectivity along individual attributes that predict entrepreneurship.

Second, by examining the impact of university peers on entrepreneurial behavior, I am able to separate social influence from workplace effects more cleanly. Although prior research has documented coworkers' roles in transmitting entrepreneurial activity (e.g., Higgins 2005, Nanda and Sørensen 2010, Sorenson and Audia 2000, Stuart and Ding 2006), those findings are susceptible to the possibility that unobserved differences in workplace characteristics drive both an individual's decision to enter entrepreneurship and coworkers' past entrepreneurial behavior. Because university peer groups are formed outside the workplace, their influences are less likely to confound the peer effect with the potential impact of current employment. In short, by examining the influence of university peers on entrepreneurship, this study is more effective at identifying the causal mechanisms underlying the decision to become an entrepreneur.

To probe for university peer influence, this study uses rich data on new ventures formed in the hedge fund industry between 1979 and 2006. This industry is uniquely suited to investigate the relationship between university peers and entrepreneurship. First, although collecting exhaustive panel data on interpersonal influences is challenging, this empirical context offers a unique advantage of detailed career histories and extensive information on fund managers' university affiliations. Moreover, because financial services represent a knowledge-based industry, social influences based on shared educational affiliation should be particularly salient to employees. Finally, because the asset management industry experienced an unprecedented growth in the formation of new ventures over the study period, the transition to entrepreneurship can be easily observed in this context. In sum, by using data on hedge fund foundings, the present study seeks to expand the extant research on the contextual determinants of entrepreneurial entry.

## Theory and Hypotheses

### Social Influence and Entrepreneurship

Sociological theories of entrepreneurship have increasingly related entrepreneurship rates to contextual influences (e.g., Aldrich and Ruef 2006, Thornton 1999). Studies have recently emphasized the key role of skills, knowledge, and resources acquired in the workplace in fostering entrepreneurial entry (Audia and Rider 2006, Brittain and Freeman 1986, Freeman 1986, Lazear 2004, Sørensen 2007). A growing line of related research has linked the variation in entrepreneurship rates to differential exposure to interpersonal influences (e.g., Gianetti and Simonov 2009, Gompers et al. 2005, Higgins 2005, Nanda and Sørensen 2010, Sorenson and Audia 2000, Stuart and Ding 2006). This literature has attributed entrepreneurial entry to aspirational and informational benefits derived from interpersonal influences. Although

often measured at the level of a region (e.g., Giannetti and Simonov 2009, Saxenian 1994) or an organization (Gompers et al. 2005), the mechanisms underlying the relationship between social influence and by entrepreneurial activity have been mostly theorized at an individual level of analysis. In particular, the review of this literature suggests that social influence drives entrepreneurial behavior in two distinct ways: by transferring information about entrepreneurial opportunities and by enhancing an individual's motivation to become an entrepreneur.

First, because entrepreneurial actions hinge on having access to information about entrepreneurial opportunities, influential peers enhance entrepreneurial rates by providing information necessary to identify such opportunities. Some empirical support for these ideas can be found in research on peer influence in the workplace. Studies in this vein attribute an individual's differential access to private information necessary to recognize attractive entrepreneurial opportunities to differences in peers' career experiences (Nanda and Sørensen 2010, Stuart and Ding 2006). Through exposure to entrepreneurial peers, individuals engage in vicarious learning about the specific market opportunities that facilitate new venture founding.

Moreover, peers are thought to affect an individual's decision to enter entrepreneurship by transmitting entrepreneurial values and shaping career aspirations and attitudes toward entrepreneurship (Giannetti and Simonov 2009, Nanda and Sørensen 2010, Stuart and Ding 2006). In particular, by acting as role models, peers with entrepreneurial backgrounds can enhance the motivation and confidence to launch a new venture. For example, there is evidence indicating that people in regions with higher levels of entrepreneurial activity become motivated to transition to entrepreneurship possibly by learning to attach greater value to self-employment (Saxenian 1994). Other studies suggest that by interacting with entrepreneurial coworkers, individuals develop attitudes that favor transition to entrepreneurship. For example, academics are more likely to transition to commercial science (Stuart and Ding 2006) or to participate in technology transfer (Bercovitz and Feldman 2008) when they observe that their coworkers were engaged in a similar initiative in the past. Similarly, studies on workplace effects argue that when working aside those colleagues who have been previously involved in start-up companies, employees form attitudes and motivations favorable toward entrepreneurship (e.g., Gompers et al. 2005, Nanda and Sørensen 2010).

Finally, the transmission of entrepreneurial values and preferences has been documented by studies showing that children of entrepreneurial parents are more likely to enter entrepreneurship themselves (Aldrich et al. 1998, Halaby 2003). Research in this tradition typically

emphasizes the role of close social ties outside the workplace, including family, friends, and neighbors, in shaping entrepreneurial attitudes and aspirations (Aldrich and Zimmer 1986, Brüderl and Preisendorfer 1998, Giannetti and Simonov 2009, Renzulli et al. 2000). Together, these studies provide consistent evidence that individuals exposed to entrepreneurially inclined coworkers and neighbors tend to acquire tacit knowledge and information about lucrative entrepreneurial opportunities and that they become acquainted with norms that foster entrepreneurial transition.

There is a strong rationale to expect that university acquaintances will mold the decision to enter entrepreneurship, much as peers in the workplace and in the neighborhood. The extant research on the impact of academic institutions on entrepreneurship has mostly neglected the possibility that universities may affect entrepreneurship rates by structuring social interactions and social influence among same-university graduates even after the completion of education. Instead, an active empirical literature almost uniformly emphasized the role of commercially engaged universities in fostering entrepreneurial activity via patenting and the engagement of faculty members and scientists in founding spin-offs (e.g., Bercovitz and Feldman 2008, Colyvas and Powell 2006, DiGregorio and Shane 2003, Etzkowitz 1998, Powell 1996, Zucker et al. 1998). A relatively small number of related studies have nonetheless suggested a relationship between school peers' influence and the decision to become an entrepreneur. Yet these studies reveal inconclusive findings regarding the direction in which school peers impact one's transition to entrepreneurship. Falck et al. (2012) showed that adolescents are important in shaping their peers' entrepreneurial intentions and attributed that finding to the transfer of entrepreneurial identity across peers. By contrast, in their study of Harvard Business School peers, Lerner and Malmendier (2012) found that exposure to a higher share of peers with a pre-business-school entrepreneurial background reduced entrepreneurship rates. Their finding was driven by the rate of unsuccessful entrepreneurs; students exposed to a higher number of pre-MBA entrepreneurs were less likely to start unsuccessful ventures. The present study seeks to build on this small and inconclusive literature on the transmission of entrepreneurial activities and initiatives across same-university peers. In particular, I propose that individuals with shared prior educational affiliation open opportunities for transmission of entrepreneurial behavior in at least two ways: (1) they transfer novel information, and (2) they reduce the uncertainty typically associated with transition to entrepreneurship.

### **University Peers and Transition to Entrepreneurship**

First, inherent in entrepreneurial activity is the notion of novelty, stemming from innovative recombination of

existing materials and structures, or the identification of new market opportunities (Kirzner 1973, Schumpeter 1934). Extant sociological research on homophily and social foci provides a strong rationale to expect university peers to engage in social interactions that facilitate an exchange of novel information. Because social ties are typically formed via group affiliation and membership (e.g., McPherson and Smith-Lovin 1982), any two managers who share a university affiliation are likely to also share a social tie that transmits information. Similarly, because academic institutions structure opportunities for social interaction even after graduation, individuals with shared prior educational affiliations tend to participate in similar social activities and social settings that facilitate information transfer (Feld 1982, Jencks and Riesman 1968). Lending empirical support to this claim, past research has shown that shared educational backgrounds facilitate the probability of tie formation (Burt 2001, Marsden 1988) and that individuals extensively rely on school friends for support many years after completing their education (Suitor and Keeton 1997). There is a further rationale to believe that university peers should be particularly conducive to channeling nonredundant information. Sociologists have long attributed the diffusion of novel ideas to infrequent interactions that provide information not found in stronger relationships (Granovetter 1973, Rogers 1983). Because contact with university peers tends to be informal and sporadic (Granovetter 1974), those peers are particularly likely to transfer novel and nonredundant information difficult to access by outsiders.

Rich empirical evidence lends support to the claim that shared prior educational affiliations facilitate exchange of novel information. Cohen et al. (2008, 2010) found that prior-education contacts disseminated private information in financial markets. For example, mutual fund managers invested in the stocks of companies whose executives graduated from the same university as the manager, whereas equity analysts provided better recommendations for companies whose senior managers shared prior educational affiliation with the analysts. Similarly, in his study of private equity investors, Rider (2012) found that the probability of two organizations forming a coinvestment relationship increased with the number of prior educational affiliations shared by the organizations' employees. Lending further support to the notion that school ties confer informational advantages, Siegel (2007) showed that school peers exchanged political and business information in South Korea. Finally, graduates of the same academic institution have been documented to exchange information about strategic decisions such as executive compensation and acquisition policies (Shue 2012). Taken together, these studies imply that, because prior educational affiliation facilitates the transfer of novel information, same-university peers are likely to exchange information about new entrepreneurial opportunities.

Second, university peers may facilitate the transfer of entrepreneurial initiatives and attitudes by alleviating the uncertainty associated with entrepreneurial process. Insights from organizational sociology and organizational theory clearly indicate that founding an independent venture represents a task with a highly uncertain outcome; new ventures are inherently vulnerable to failure due to liability of smallness (Freeman et al. 1983), liability of newness (Stinchcombe 1965), and liability of disconnectedness (Powell et al. 1996). Entrepreneurship theories share their emphasis on uncertainty with theories of social influence, which suggest that new practices tend to diffuse in conditions of high uncertainty (Coleman et al. 1957, Katz and Lazarsfeld 1955, Rogers 1983). Central to these arguments is the claim that social proximity of previous adopters reduces uncertainty, because individuals tend to imitate socially proximate actors to infer an appropriate course of action (e.g., Coleman et al. 1957, Rogers 1983). Social proximity is further evoked by social learning theories and referent choice frameworks that relate one's attitudes and opinions to the influence of socially proximate referents, used as a guide through difficult and uncertain evaluations (Bandura 1986, Festinger 1954). Applied to the context of entrepreneurial entry, these studies jointly suggest that potential entrepreneurs will tend to use socially proximate peers as social referents. Because shared prior educational affiliation represents a salient indicator of social proximity and mutual trust (Useem and Karabel 1986), past behaviors of university peers will significantly shape the decision to become an entrepreneur. In sum, then, pressures to adopt entrepreneurial behavior will increase with the number of university peers who have already transitioned to entrepreneurship. More formally,

*HYPOTHESIS 1 (H1). The number of an individual's university peers who transitioned to entrepreneurship in the past should increase the probability that the focal individual transitions to entrepreneurship.*

### **Alternative Explanation: Social Influence vs. Institutional Influence**

Despite the theoretical rationale to expect a social transmission of entrepreneurial activity to occur across same-university peers, an alternative explanation would suggest the peer effect to be driven by common institutional influences, attributed to universities. This alternative explanation is particularly credible, given a host of studies that document the impact of universities' structural and institutional attributes on entrepreneurial rates (e.g., Bercovitz and Feldman 2008, Roberts 1991, Shane 2004, Stuart and Ding 2006, Zucker et al. 1998). Moreover, previous research has shown consistently that formal education programs act as a central pathway through which social norms and skills are transmitted (DiMaggio and Powell 1983). This line of

work implies that while attending universities, individuals may be exposed to common entrepreneurial norms and entrepreneurial training. To discern the two causal mechanisms, I examine whether observable individual characteristics modify the social influence effect in a systematic way. To the extent that certain individual characteristics alter the impact of university peers on entrepreneurship, the observed peer effect should be attributed to social influences.

Extensive research in sociology documents that social influences are considerably enhanced when individuals are interpersonally and spatially proximate. One dimension of interpersonal proximity, often evoked in the sociological literature, is gender. A well-established principle of homophily posits that individuals interact with those similar to them with respect to gender (McPherson and Smith-Lovin 1986). Empirical research provides further evidence that men and women interact within gender-segregated networks (e.g., Brass 1985, Ibarra 1992). Taken together, these studies imply that entrepreneurial peers of the same gender as the focal individual should exert a stronger influence on that individual's decision to launch a new venture than should peers of the opposite gender. I therefore expect social influence to have a stronger effect on the transition to entrepreneurship when exerted by university peers of the same gender as the focal actor. Hence, I predict the following.

**HYPOTHESIS 2 (H2).** *University peers of the same gender as the focal individual will exert a stronger influence on his or her decision to transition to entrepreneurship than will university peers of the opposite gender.*

Moreover, contemporaneous social interactions conducive to interactor influences should increase with geographic proximity of university peers. The claim that interaction between any two individuals increases with spatial propinquity has received wide empirical support across different literatures. For example, diffusion studies have attributed the rate of adoption to spatial proximity of adopters (e.g., Davis and Greve 1997). Other work has shown that knowledge spillovers are responsible for the success of regional economies (e.g., Saxenian 1994) and that such spillovers decline with distance (Audia et al. 2006, Rosenthal and Strange 2003). Spatial propinquity strengthens interactor influences by facilitating direct information exchange via face-to-face interaction and observability (e.g., Festinger et al. 1950). Therefore, if social influence underlines the observed similarity in entrepreneurial behavior, the peer effect should be stronger when peers are spatially proximate and more likely to engage in ongoing social interactions. More formally,

**HYPOTHESIS 3 (H3).** *Spatially proximate university peers will exert a stronger influence on the focal individual's decision to transition to entrepreneurship than will spatially distant university peers.*

## Methods and Analyses

### Empirical Context

This study seeks to extend previous research by testing the hypothesized relations in the context of the U.S. asset management industry. In particular, I examine how exposure to social influence affects a mutual fund manager's propensity to launch his or her own hedge fund. Mutual funds and hedge funds are similar in that they represent professionally managed collective investments that pool money from multiple investors and typically invest in investment securities, such as stocks or bonds. Any fund is supervised by a manager responsible for buying and selling securities, based on investment judgment and extensive financial research. A collection of funds that are bound together by a brand name, shared distribution channels, research managers, and traditions—e.g., Fidelity, Vanguard, American Funds, T. Rowe Price, and Janus—constitutes an organization called a management firm. Although mutual funds and hedge funds are similar along many dimensions, some major differences between the two types of organizations pertain to regulatory constraints and investment strategies.

Hedge fund foundings provide a fruitful empirical context in which to understand how social transmission of entrepreneurial behaviors and attitudes affects entrepreneurial entry. First, over the past three decades, the hedge fund industry has experienced an unprecedented growth, as numerous freestanding ventures have been developed and marketed by individual and organizational actors (Strachman 2000). The assets that hedge funds manage have grown from approximately \$50 billion to well over \$800 billion between 1990 and 2004 (Lehman Brothers 2004). Such growth occurred, partly, as a result of entrepreneurial efforts of asset management professionals, including fund managers, traders, or brokers. As Strachman noted, "It seems that everyone who wants to be in money management business wants to work for or own a hedge fund" (2000, p. 28).

Because asset management represents a knowledge-intensive industry in which skills and talent are easily portable and noncompete clauses are absent, mutual fund managers are highly mobile and able to easily deploy their talents to set up new ventures (Darragh et al. 1997). Over the past three decades, multiple fund managers have left to launch their own hedge funds. For example, in May 1996, Jeffrey Vinik, the head manager of Magellan—Fidelity's flagship and the largest actively managed mutual fund in the United States—defected from mutual funds to open Vinik Asset Management. In 1999, two high-profile managers at MFS Investment Management—John Brennan and Chris Felipe—quit to launch their own hedge fund, Sirios Capital Management. Similarly, Steve Watson, previously employed by Friess Associates (Brandywine Mutual Fund), left to start Watson Investment Partners in 1995.

Starting a hedge fund mirrors processes associated with launching any other entrepreneurial venture in a knowledge-intensive industry.<sup>1</sup> Important character traits include “ego, an entrepreneurial spirit, and guts,” as well as motivation for financial gains and autonomy (Strachman 2000, p. 46). As one industry expert describes the founders, “By opening up hedge funds they could be their own boss and know that they did not have to worry about how others performed. They just had to rely on themselves” (Strachman 2000, p. 57). Moreover, like any entrepreneur, a hedge fund founder faces the fundamental challenge of raising capital, typically through the patronage of a few wealthy investors. Capital may originate from large established hedge funds and money management firms that often place investment dollars with start-ups. Hence, successful founders typically have a large group of contacts that can bring potential investors to the table.

Moreover, launching a hedge fund is associated with considerable financial risks for an entrepreneur. Managers often use their own capital to start the firm and have their own stake in the business. Some managers put every penny they have into their own funds. One manager “was putting so much into his fund that the gas and electric company was threatening to cut off service to his home. His office assistant finally persuaded him to take some money out of the fund to live on, but...it was difficult because he believed so strongly in what he was doing that he wanted to have as much invested as possible” (Strachman 2000, p. 62). Like any entrepreneur, hedge fund founders use family money to start a fund. For example, Steve Watson of Watson Investment Partners started the fund with about \$700,000 from friends, family, and a number of chief executive officers and chief financial officers. Whereas personal financial stakes tend to be high, payoffs are often far from imminent. As a result, entrepreneurial managers typically start out with enough savings to cover their living expenses for several years so that earnings from the fund can be invested into the new venture to increase the stake.

Besides financial stakes, founders face considerable career risks. Although many abandon the security of large mutual funds to strike out on their own, the odds of failure are high because half of hedge funds that survive the first six months cease to exist two years later (Der Hovanesian 2001). A fund’s failure has a negative effect on a manager’s career and reputation. For example, former Fidelity manager Erin Sullivan launched Spheric Capital Management in Boston; after her fund failed, she would not return phone calls or speak to anyone (Der Hovanesian 2001). Another manager described the failure of a new hedge fund in the following way: “When Gilbert’s fund flamed out, he became paralyzed with depression, closed the curtains and refused to leave his bed. Wife Sharon was left to

tell his team of 12 that they no longer had jobs, and to liquidate the firm” (Biggs 2006, p. 56). In short, similar to any entrepreneur, hedge fund founders face significant financial, career, and reputational risks associated with launching a new venture.

In addition to offering a fruitful empirical context to observe entrepreneurship, the asset management industry represents an excellent research site to identify the transmission of activities and attitudes. An emerging body of work suggests that fund managers heavily rely on personal contacts to gather private information and to make important strategic decisions (e.g., Beunza and Stark 2004, Hardie and MacKenzie 2006). Access to timely information about what other market participants are doing is essential for successful decision making and is often considered even more important than a manager’s skills and human capital (Hardie and MacKenzie 2006). Managers are likely to obtain their information from personal relations, including close peers or even trusted competitors. In particular, because the mutual fund industry represents a knowledge-intensive context, one’s educational affiliation is likely to play a particularly salient role, increasing the probability of university peers to act as valuable channels of information and attitudinal influence (Cohen et al. 2008, 2010).

## Data Sources

I obtained data on mutual funds from the Center for Research in Security Prices (CRSP) Survivorship-Bias-Free US Mutual Fund Database on all live and defunct funds in the United States between 1979 and 2006. The main advantage of this database is that it provides rich monthly data on mutual funds’ characteristics, including information on their returns, age, and investment objectives. In addition to collecting information on funds and asset management firms, I collected detailed longitudinal career histories on fund managers. Using the Morningstar Mutual Funds OnDisc databases, I constructed each manager’s monthly career history in the industry; that is, I identified all the manager’s names, their mutual fund employers, dates when their tenures began and ended in any asset management firm, and the particular funds they supervised during the period of the study. The complete database includes the entire population of 8,013 mutual funds. The unit of analysis is manager-month to examine a manager’s transition into entrepreneurship. I then hand-collected detailed career history data on a relatively large subsample of fund managers; these data included information on each manager’s year of birth, gender, educational institutions attended, and graduation dates. Career histories were extracted from multiple sources, including *Nelson’s Directories* on investment managers from 2004 and 2005, online career search engines such as ZabaSearch, LinkedIn, and ZoomInfo, online Securities and Exchange Commission (SEC) filings, and mutual fund websites. Combining these resources, I obtained

extensive information on managers' career histories, including educational affiliations for 4,489 fund managers between 1979 and 2006.

Although I collected extensive career history data, 44% of all fund managers had missing educational records. Moreover, I lacked educational records for 0.04% of hedge fund founders. Managers with missing educational data were eliminated from the final sample, and data on those managers were not used to construct independent variables. One concern with this methodological approach is that managers with complete data records could be systematically different from those excluded from the sample, which would then introduce sample selection bias. I alleviated this concern by comparing the basic observable covariates for managers with complete and missing career history records. The results, reported in Table A.1 (see the appendix), show that comparative distributions of the observable covariates for fund managers with missing and nonmissing educational records are remarkably similar, addressing the sample selection concern. In supplementary analyses (unreported), I estimated the model of entrepreneurial entry on the full sample of fund managers, including individuals with missing and nonmissing educational records. I coded the *peer entrepreneurship* variable as 0 for managers with missing educational records. I additionally included a control equal 1 if educational data for any given manager are nonmissing, and 0 otherwise. The analyses show that including managers with missing data does not substantively impact the findings.

To identify hedge fund foundings, I used the Lipper TASS Hedge Fund Database. TASS tracks information on live and the defunct hedge funds and the managers in charge of them. The database is considered highly suitable for academic research because it provides the most complete and accurate information on hedge funds (Liang 2000). Amongst others, the data report the names of fund manager as well as a set of financial information, including net asset value, fund inception date, compensation structure, and investment objectives. Because the data report the name of each fund manager, they allow for identification of individuals who left the mutual fund industry to found a hedge fund. The entire data set contains information on 6,289 unique funds and 7,047 hedge fund managers.

## Variables

**Dependent and Independent Variables.** *Entrepreneurship:* The variable *entrepreneurship* is defined as an event whereby a mutual fund manager exits the parent company in the mutual fund industry to launch a hedge fund. To identify hedge fund founders, I merge the CRSP and TASS data by the unique names of fund managers, including the first and last names, and the middle initial of the manager. Specifically, I create two separate

lists of fund manager names and hedge funds manager names and search for matches. This allows me to identify managers who started up a hedge fund. To further ensure identification, I checked whether the data on managers' appearance in the TASS database coincide with the appearance of a hedge fund in the TASS database. Unfortunately, the TASS database does not report with precision the founder of a new hedge fund, and these data are not available. Nevertheless, it seems reasonable to assume that a manager whose participation in a new fund coincides with this fund's founding represents a founder or one of the cofounders of the fund.<sup>2</sup> This variable varies monthly and equals 1 if the manager transitions to entrepreneurship and 0 otherwise.

**Peer entrepreneurship (university):** For each focal fund manager, I identified his or her university peers—that is, fund managers who share an educational affiliation with the focal manager. Managers who earned a degree (i.e., BBA, BA, BSc, MBA, MA, JD, or Ph.D.) from more than one academic institution shared several educational affiliations with others. To construct the measure of *peer entrepreneurship*, I counted the number of managers who shared a university affiliation with the focal manager and who founded a hedge fund.<sup>3</sup> For each manager, I aggregated the count of same-university founders over a period of 12 months. This measure varies annually and can take different values for each focal manager in the sample. To facilitate causal inferences, I lagged the measure by one year. I chose a one-year lag for two reasons: First, the institutional features of the hedge fund industry suggest that starting a hedge fund can take anywhere from several months to one year, as the start-up process requires hiring personnel, raising capital from wealthy investors, and registering the new fund (e.g., Strachman 2000). Second, given that individuals disproportionately weigh salience of recent stimuli or observations (e.g., Kahneman et al. 1982), it is reasonable to focus on more recent peer behaviors as opposed to peer behaviors in the distant past. However, for robustness, I used 6-month and 18-month lags and found similar results (available from the author upon request).

**Peer entrepreneurship (same-gender university peers):** To test whether the influence of university peers on entrepreneurship is amplified across same-gender individuals, for each focal manager I counted other managers who fulfilled three conditions: (1) they are of the same gender as the focal manager, (2) they share a university affiliation with a focal manager, and (3) they launched a hedge fund. In addition, I controlled for hedge fund founders who shared the same gender but not the same university affiliation as the focal fund manager. Finding a positive and significant coefficient would indicate that social influence transmitted via same-gender university peers explains additional variance in entrepreneurial rates. Gender is inferred from

the managers' first names and coded 1 for male and 0 otherwise.<sup>4</sup> This variable is observed annually and lagged by one year.

*Peer spatial distance:* To examine whether social influence is amplified across spatially proximate peers, I constructed a continuous measure of the average university peers' distance from the focal manager. I calculated the distance between the focal manager and each of his or her university peers using latitude and longitude, converted from decimal degrees to radians. The CRSP data provide the zip codes to identify geographic location of mutual funds. Data on geographic location of funds are available for 71% of fund managers with complete educational records. I matched these zip codes with their corresponding longitude and latitude values, available from the U.S. Postal Service. Using the principles of spherical geometry applied to curved surfaces, I then calculated the distances between a focal manager and each of his or her university peers. The following formula was used to measure the distance between two points,  $i$  and  $j$ :

$$D_{ij} = C \{ \arccos[\sin(lat_i) \sin(lat_j) + \cos(lat_i) \cos(lat_j) \cdot \cos(long_i - long_j)] \},$$

where  $C$  is a constant based on the radius of the sphere that converts the result into linear units of measure. I converted the result to miles on the surface of the Earth using  $C = 3,437.9$  miles. For each focal individual, I calculated the average distance between that individual and his or her university peers. The higher the value of this measure, the larger the average distance between the focal manager and his or her peers. The measure is observed annually. To test the hypothesized moderating impact of peers' geographic proximity, I interacted the measure of peer influence with the measure of peers' average distance from the focal manager. Finding a negative and significant coefficient on the interaction term would indicate that peer influence decreases as peers' geographic distance to the focal manager increases.

*Control Variables.* A variety of additional covariates are included to control for alternative explanations. I controlled for the amount of a manager's task discretion by including a measure of a manager's control over funds under his or her supervision. Funds managed by multiple managers have diffused decision-making processes and provide any single manager with less control over key strategic decisions, such as the selection of stocks to buy or to sell. For each manager, the variable is equal to an inverse number of comanagers supervising a focal fund and takes a value from 0 to 1, where higher values indicate that the focal manager has fewer comanagers and is therefore endowed with greater task discretion. I further calculated average task discretion for managers who supervise more

than one fund. This variable is observed annually. Moreover, I accounted for the main demographics, including age and gender. A measure of a manager's tenure in the organization was also included because longer tenure should mitigate the probability of turnover. Furthermore, I controlled for a manager's human capital, because high-performing knowledge workers are more likely to found new organizations to derive returns on their human capital (Groysberg et al. 2009). I measured managers' performance using monthly total fund returns (in percentage per month) available via CRSP. For managers who supervise more than one fund, I calculated the average monthly fund return. I further included indicator variables to measure the manager's formal education. Educational attainment was coded 1 if the focal manager received a doctoral degree (Ph.D.), and 0 otherwise. Likewise, educational attainment was coded 1 if the focal manager earned an MBA, MA/MS, or JD, and 0 otherwise; bachelor's degree is the omitted category. In addition, I controlled formally for elite school education. Because graduates of elite universities are disproportionately employed by high-status organizations (Phillips and Zuckerman 2001) and more likely to advance to executive positions inside organizations (Useem and Karabel 1986), they may be systematically exposed to differential opportunities for new ventures. To measure elite university education, I constructed a binary variable equal to 1 if the focal manager attended an Ivy League school or other elite institution (see Useem and Karabel 1986), and 0 otherwise. The number of peers who share an educational affiliation with the focal manager was included to control for an entrepreneur's differential opportunity structure that may affect transition to entrepreneurship. Including the time-varying count of all university peers should mitigate the concern that the mere number of such peers accounts for an individual's decision to enter entrepreneurship. I further controlled for coworkers' influence by including, for each manager, a count of coworkers who founded a hedge fund. Both variables are observed annually and lagged by one year.

Furthermore, because firm-specific context has been shown to shape an employee's decision to enter entrepreneurship (e.g., Kacperczyk 2012), I accounted for organizational age, size, and performance. Prior literature has shown that older and bigger organizations provide exposure to fewer entrepreneurial opportunities and that they equip organizational members with limited skills to create independent ventures (Dobrev and Barnett 2005, Gompers et al. 2005, Sørensen 2007). To measure firm size, I used the natural logarithm of the total assets under management, a standard measure of firm size in mutual funds. The measure varies monthly. Firm age is the number of years since the firm's inception. I used the CRSP data to extract the date of incorporation for each mutual fund company. I further accounted for firm performance. Better-performing organizations

may equip their entrepreneurs with resources that facilitate the formation of independent ventures. Burton et al. (2002) found, for example, that entrepreneurs benefit from reputational and informational resources provided by their employers. Firm performance is calculated on a monthly basis as the average fund return for the focal firm using a value-weighted approach that involves multiplying each fund's return by its relative size in the firm and taking the sum across all weighted fund returns in the firm. I excluded the performance of the focal fund manager.

Additionally, I controlled for geographic concentration of hedge funds. An important concern may be that the correlation between peer influence and transition to entrepreneurship is spurious, if university peers and hedge funds tend to concentrate in similar geographic locations. An effective way to mitigate the concern pertaining to colocation would be to control for geographic concentration of hedge funds. If the observed effect arises because peers and hedge funds tend to collocate, then controlling for hedge fund geographic concentration should eliminate the main effect of university peers on transition to entrepreneurship. I use two proxies for hedge fund concentration across geographic space. First, because hedge funds are shown to heavily concentrate in the Northeast (Massa et al. 2010), I constructed an indicator variable, *Northeast*, equal to 1 if a fund manager works in a firm located in the Northeast, and 0 otherwise.<sup>5</sup> Moreover, I controlled for whether a fund manager works in a city, considered one of the main financial centers. By including this control, I accounted for the possibility that financial centers may attract a larger proportion of mutual fund managers and that they are characterized by a higher concentration of both university peers and hedge fund founders. Hence, I constructed an indicator variable, *financial center*, equal to 1 if a fund manager works in a city that represents a financial center, and 0 otherwise.<sup>6</sup>

### Analytical Strategy

Identifying social transmission of entrepreneurship across university peers is challenging because it is often difficult to separate social influence from unobserved influence of a third party (Van Den Bulte and Lilien 2001). First, the observed peer effect may be driven by unobserved differences across workplace characteristics that differentially influence the propensity of employees across organizations to transition to entrepreneurship. This concern is particularly credible given that workplace attributes are largely responsible for an individual's entry into entrepreneurship (e.g., Audia and Rider 2006, Freeman 1986, Sørensen and Fassiotto 2011). Because unobserved organizational factors may account for both an individual's entry into entrepreneurship and his or her coworkers' past entrepreneurial activity, it is difficult to make causal inferences. To

separate social influence and the potential workplace effects more cleanly, I estimated the results using the firm fixed effects specification. Because the results are estimated "within-firm," this empirical strategy helps identify social influence net of any between-workplace differences.

Another inferential challenge may pertain to the fact that individuals with traits that predict entrepreneurship sort differentially into institutions of higher education. If present, such sorting process could spuriously generate an association between the attributes of university peers and one's decision to transition to entrepreneurship. Although there is no direct empirical evidence to support the notion that traits that predict entrepreneurship should also be responsible for differential allocation of individuals across universities, such self-selection is nonetheless plausible. Because sorting process could spuriously generate an association between the attributes of university peers and the decision to transition to entrepreneurship, it is necessary to alleviate this concern. Accordingly, I estimated the results using the university fixed effects specification. By comparing outcomes for graduates of the same university, the fixed effect estimator offers a rigorous analytical strategy to mitigate the concern of selection at the university level. The estimated "within-university" results are therefore net of any between-university differences.

Finally, I included in the models the time fixed effects specification. This specification mitigates the concern that exogenous shifts in the opportunity structure may underlie the association between the focal employee's decision to launch a new venture and their peers' past entrepreneurial behavior. For robustness, I further interacted firm fixed and time fixed effects to mitigate the possibility that unobserved workplace attributes change over time. In short, my empirical strategy allows for a particularly conservative estimation of the potential influence of university peers on entrepreneurship.

### Model Specification

Because the dependent variable is dichotomous, the following logistic regression model is estimated to assess the effect of social influence on transition to entrepreneurship:

$$\kappa = \log \frac{\pi}{1 - \pi} = \alpha + X'\beta,$$

where  $\kappa$  represents the linear transformation of the log of the probability,  $\pi$ , of the dependent variable occurring divided by the probability of the variable not occurring. The dependent variable is defined as an individual's transition to entrepreneurship and coded as 1 if an individual founded a hedge fund, and 0 otherwise. The model estimates are a constant  $\alpha$  and  $\beta$ , estimated coefficients of  $X$ , a vector of the independent and control covariates. Throughout all of the specifications, the error terms are clustered at the manager level to account for autocorrelation in the data across individuals.

**Table 1 Descriptive Statistics for the Analysis of Transition to Entrepreneurship, 1979–2006**

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Entrepreneurship	0.002	0.04														
2 Peer entrepreneurship (university)—lagged	0.59	1.28	0.01													
3 Peer entrepreneurship (coworkers)—lagged	0.24	0.61	0.01	0.09												
4 University peers (lagged)	37.5	44.4	0.00	0.64	0.06											
5 Gender (1 = male)	0.89	0.30	0.01	0.00	-0.01	0.02										
6 Ph.D. (0–1)	0.02	0.14	0.00	0.04	-0.00	0.04	0.03									
7 Master's (0–1)	0.40	0.49	0.00	0.12	0.03	0.18	0.08	-0.11								
8 Employee's performance (% fund return)	0.28	0.04	0.00	-0.01	-0.00	-0.01	0.01	-0.00	0.01							
9 Employee's age (in years)	45	7.42	-0.01	0.05	-0.05	0.06	0.05	0.06	0.03	0.01						
10 Elite university (0–1)	0.23	0.49	0.00	0.32	0.04	0.47	0.04	0.05	0.55	-0.02	0.03					
11 Employee's tenure in organization (in years)	6.14	4.58	-0.01	0.10	0.03	0.11	0.03	0.01	0.17	0.01	0.37	0.12				
12 Employee's task discretion	0.65	0.31	-0.00	-0.03	-0.03	-0.05	-0.01	-0.02	-0.03	-0.01	0.02	-0.02	0.04			
13 Firm size (log total assets) (in millions)	8.22	2.77	-0.01	0.1	0.26	0.15	-0.06	-0.03	0.00	0.56	-0.09	0.05	0.01	-0.08		
14 Firm performance (weighted returns)	0.81	0.01	-0.00	-0.02	0.00	-0.01	0.01	0.00	0.01	-0.01	-0.01	0.02	-0.00	-0.00	-0.01	
15 Firm age (in years)	28.75	21.5	-0.00	0.03	0.13	0.06	-0.02	-0.05	-0.07	-0.01	-0.06	-0.03	0.08	-0.01	0.52	0.01

## Results

### Descriptive Statistics

Table 1 reports descriptive statistics and correlations for the main variables. The total sample consists of 4,489 portfolio managers with complete career history data, of which 506 (11%) launched a new hedge fund. The descriptive statistics reveal that 50% of fund managers with nonmissing geographic location records operate in the Northeast. Forty percent of fund managers are located in one of the main financial centers in the United States.

It is further apparent that elite university graduates are highly concentrated in the mutual fund industry. Twenty-one percent of fund managers graduated from an “elite university,” a group composed of Ivy League schools and seven other universities including Stanford; Northwestern; University of Michigan; University of California, Berkeley; University of California, Los Angeles; New York University; and the University of Chicago (Useem and Karabel 1986). Figure 1 illustrates

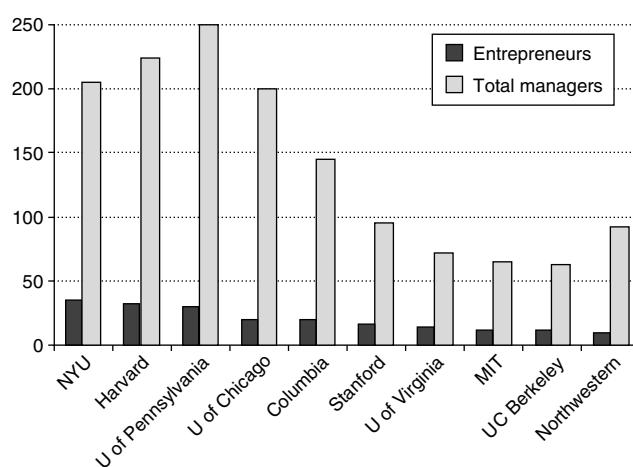
the 10 most represented managers’ university affiliations. Interestingly, 38% of hedge fund founders graduated from 1 of the 10 most represented universities. A heavy concentration of few university affiliations across fund managers suggests that university affiliation is likely to be salient in the industry and that university contacts may act as important channels of social influence.

### Transition to Entrepreneurship: Multivariate Analysis

Table 2 presents the results obtained by using logistic regression models to test the hypothesized effect of university peers’ past decisions to transition to entrepreneurship on the focal fund manager’s propensity to launch a new venture. The results provide support for the hypothesized transmission of entrepreneurial activities and attitudes across individuals who share a university affiliation: university peers’ past foundings are a strong predictor of the hazard of transitioning to entrepreneurship, and the estimated effect is highly significant statistically. As predicted by H1, the probability of a new venture founding increases with the number of university peers who formed a new venture in the past year. It merits noting that the results are substantial in magnitude. The coefficient in Model 2 indicates that a one-standard-deviation increase in university peer founding leads to a 20% increase in the focal individual’s predicted rate of entrepreneurship ( $\exp(0.142 * 1.28)$ ). By comparison, a one-standard-deviation increase in coworker peer founding is associated with a 14% increase in the probability of becoming an entrepreneur ( $\exp(0.227 * 0.61)$ ). These analyses indicate that a 20% increase represents a considerable absolute effect on the transition rates.

Models 2 and 3 additionally improve on prior research (Nanda and Sørensen 2010) by estimating the effect net of university and workplace attributes. Model 2

**Figure 1 Top 10 University Affiliations of Entrepreneurial and Nonentrepreneurial Fund Managers**



**Table 2 Logistic Regressions of Social Influence and Transition to Entrepreneurship**

Variables	Entrepreneurship (Model 1)	Entrepreneurship (Model 2)	Entrepreneurship (Model 3)	Conditional on turnover (Model 4)
<i>Peer entrepreneurship (coworkers)</i>	0.464*** (0.076)	0.227*** (0.085)	0.212** (0.086)	0.192** (0.098)
<i>University peers (count)</i>	-0.004** (0.002)	-0.003 (0.002)	-0.002 (0.002)	-0.002 (0.002)
<i>Gender (1 = male)</i>	1.255*** (0.307)	1.268*** (0.315)	1.401*** (0.322)	1.542*** (0.340)
<i>Ph.D.</i>	0.783*** (0.279)	0.911*** (0.315)	0.831** (0.330)	0.828** (0.371)
<i>Master's</i>	0.354*** (0.132)	0.403*** (0.146)	0.292* (0.162)	0.342** (0.177)
<i>Employee's performance</i>	1.495 (1.502)	1.504 (1.484)	0.491 (1.240)	3.288** (1.635)
<i>Employee's age</i>	-0.017** (0.007)	-0.017** (0.008)	-0.013 (0.008)	-0.014 (0.009)
<i>Elite university</i>	0.324** (0.157)	0.281 (0.198)	0.516* (0.286)	0.491 (0.308)
<i>Employee's tenure in organization</i>	-0.005*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.000 (0.001)
<i>Employee's task discretion</i>	0.045 (0.175)	-0.183 (0.212)	-0.151 (0.215)	0.355 (0.230)
<i>Firm size (log total assets)</i>	-0.055** (0.026)	-0.047 (0.076)	—	-0.035 (0.088)
<i>Firm performance</i>	-12.796 (10.793)	-13.190 (10.873)	—	-39.773*** (12.791)
<i>Firm age (log)</i>	-0.019 (0.015)	-0.001 (0.032)	—	-0.007 (0.034)
<i>Peer entrepreneurship (university)</i>	0.182*** (0.048)	0.142*** (0.050)	0.125** (0.050)	0.134** (0.060)
Observations	312,601	212,091	212,091	3,672
Pseudo R-squared	0.03	—	—	—
Log-likelihood	N/A	-2,194.9	-2,182.1	-374.2
Firm fixed effects	No	Yes	Yes	Yes
School fixed effects	No	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects * Time fixed effects	No	No	Yes	No

Note. Standard errors are in parentheses; clustered standard errors.

\*Significant at 10%; \*\*significant at 5%; \*\*\*significant at 1% (two-tailed tests).

incorporates a firm fixed effect estimator to absorb firm differences in the rate of entrepreneurship that may be correlated with changes in peers' transitions to entrepreneurship. Moreover, Model 2 includes university fixed effects to estimate results net of any between-university differences. When a firm fixed and university fixed effect specification is used, the size of the coefficient is reduced by 22%. This indicates that the observed effect arises, in part, as a result of unobserved firm and university differences. Model 3 further includes interacted firm fixed and time fixed effects to mitigate the possibility that unobserved firm attributes change over time. Findings are robust to this conservative empirical specification, revealing a positive and statistically significant coefficient on *peer entrepreneurship*. Combined, these models show that, even when accounting for the various sources of unobserved heterogeneity, the pattern of results remains unchanged. This indicates that the positive and statistically significant coefficient on

*peer entrepreneurship* cannot be attributed to unobserved firm or university characteristics.

In addition, I examined whether the observed social influence effect reflects instead a more general pattern of turnover. To assess this possibility, I conditioned the analyses on turnover. I combined two forms of turnover: an employee's move to another organization and an exit from the industry. The results, estimated using a logistic regression model with year fixed, firm fixed, and university fixed effects, are reported in Model 4. Findings show that, even conditional on turnover, social influence has a substantial and statistically significant effect on transition to entrepreneurship. The key point of these analyses is that the observed social influence effect on entrepreneurship does not arise as a result of the impact of social influence on job mobility alone.

Additional results presented in Table 2 report the impact of various individual and organizational attributes on an individual's propensity to transition to entrepreneurship. I do not find high-performing

managers to be more likely to transition to entrepreneurship, even though the coefficient is positive, as expected. However, there is strong support for the claim that graduates of elite universities are at higher risk of entering entrepreneurship, perhaps because elite university affiliation provides greater exposure to entrepreneurial opportunities. Age represents another strong predictor of entrepreneurial entry; an employee's age decreases the hazard of transitioning to entrepreneurship. Similarly, managers' tenure in the organization is negatively associated with the probability of a new venture founding, whereas greater discretion within the parent firm is not significantly related to entrepreneurial entry, despite the negative coefficient on that measure. The results presented in Models 1–4 further indicate that employees in larger organizations are at lower risk of transitioning to entrepreneurship, consistent with numerous studies that document that large organizations spawn fewer entrepreneurial ventures (e.g., Dobrev and Barnett 2005, Gompers et al. 2005). Although firm age and performance are negatively correlated with entrepreneurial entry, coefficients are statistically significant only in some models.

I further predicted that the observed effect should be amplified across interpersonally and spatially proximate individuals. To test Hypothesis 2, I included an additional covariate to account for the number of founders who share university affiliation and gender with the focal manager. Table 3 presents the results estimated using a logistic regression model to examine the moderating impact of gender similarity on the relation between social transmission of behaviors and entrepreneurial entry. Findings reported in Table 3 lend substantial support to Hypothesis 2. Model 1 shows that a one-standard-deviation increase in same-gender and same-university peer founding is associated with a 27% increase in the probability of becoming an entrepreneur ( $\exp(0.354 * 0.67)$ ). Accounting for gender homophily increases the magnitude of the university peer effect by 35%. This result is striking given that women represent only 11% of the total sample. One interpretation of these results may be that social transmission of entrepreneurial activity tends to be amplified mainly across male peers. In fact, there is systematic evidence that men have a higher tendency than women to rely on same-gender contacts in organizational settings (e.g., Gibson and Lawrence 2010). Because gender distribution tends to be skewed in organizations, fewer women are available to act as comparable social referents. Because of these constraints, women tend to rely on men for social interaction and social comparison (Kanter 1977, Lyness and Thompson 2000). Consistent with this claim, empirical research has shown that women in higher-level positions and male-dominated professions use men as career referents (Ibarra 1992).

To better understand the mechanism behind same-gender peer influence, I examined whether same-gender effect arises primarily because of male peers. To this end, I restricted the sample to males and ask whether the transmission of entrepreneurial activity is amplified across male peers with a shared university affiliation. Model 2 shows a positive and statistically significant coefficient on male university peers who formed a new venture in the past year. The results indicate that a one-standard-deviation increase in foundings by male peers with shared university affiliation is associated with a 29% increase in the probability of becoming an entrepreneur ( $\exp(0.359 * 0.71)$ ). It is worthwhile to note that the social influence effect for male-only peers is comparable to the effect of gender-segregated peers, estimated in Model 1 in Table 3 (0.354 versus 0.359). This indicates that the observed increase in the social influence effect for gender-segregated peers can be largely attributed to male peers. As expected, findings show that gender amplifies social transmission of entrepreneurial initiatives and motives mainly because of male peers.

Table 3 further reports the estimates to assess H3. I included an additional covariate to account for spatial distance of university affiliates. The results provide support for H3, showing that the university peer effect on entrepreneurship is amplified with geographic propinquity of university colleagues. A negative coefficient on the interaction term in Model 3 indicates that the odds of the focal fund manager launching a new fund in response to social influence exerted by his peers will increase as the average distance between that individual and his university peers decreases. A marginal effects calculation of the interaction effect, holding all other variables at their means, yields an interaction effect of 4.4%. However, as noted by Ai and Norton (2003) as well as Hoetker (2007), interpreting interaction effects in nonlinear models must be done with caution because it requires taking into account not only the coefficient on the interaction variable and those on the interacted variables but the values of all other variables in the model. Hence, to further verify that the *peer entrepreneurship* and *spatial distance* interactions were indeed significant, the algorithm of Norton et al. (2004) was used. This method computes the correct marginal effect of a change in two interacted variables by calculating the cross-partial derivatives required to evaluate a single two-way interaction effect for each observation. When applied to Model 3, this algorithm yields an average interaction effect of 1.5%, indicating that the simple marginal effects calculation overstated the magnitude of the interaction effect. The effect is significant at the 10% level for most observations, with a mean *z*-statistic of  $-1.33$ . These findings support the significance of the interaction term, suggesting that the effect of peer influence on entrepreneurship indeed decreases with geographic distance of university peers.

**Table 3 Logistic Regressions of Social Influence and Transition to Entrepreneurship (Gender and Geographic Proximity)**

Variables	Entrepreneurship (Model 1)	Entrepreneurship (men only) (Model 2)	Entrepreneurship (Model 3)
<i>Peer entrepreneurship (coworkers)</i>	0.163* (0.089)	0.187** (0.090)	0.576*** (0.120)
<i>University peers (count)</i>	-0.004 (0.002)	-0.004* (0.002)	-0.006** (0.003)
<i>Gender (1 = male)</i>	0.814* (0.479)	—	1.537*** (0.588)
<i>Ph.D.</i>	0.817** (0.338)	0.719** (0.349)	1.028** (0.435)
<i>Master's</i>	0.305* (0.165)	0.282* (0.167)	0.603*** (0.231)
<i>Employee's performance</i>	1.579 (1.493)	1.412 (1.504)	4.760* (2.522)
<i>Employee's age</i>	-0.011 (0.008)	-0.013 (0.009)	-0.007 (0.013)
<i>Elite university</i>	0.494* (0.292)	0.417 (0.301)	-0.074 (0.312)
<i>Employee's tenure in organization</i>	-0.005*** (0.001)	-0.004*** (0.001)	-0.002 (0.001)
<i>Employee's task discretion</i>	-0.206 (0.221)	-0.169 (0.224)	-0.327 (0.303)
<i>Firm size (log total assets)</i>	-0.050 (0.078)	-0.042 (0.079)	-0.075 (0.047)
<i>Firm performance</i>	-14.674 (11.125)	-14.269 (11.274)	-25.478 (17.624)
<i>Firm age (log)</i>	-0.010 (0.033)	-0.006 (0.033)	-0.004 (0.027)
<i>Peer entrepreneurship (same-gender university peers)</i>	0.354*** (0.099)	0.359*** (0.100)	—
<i>Peer entrepreneurship (same gender)</i>	0.017 (0.014)	0.012 (0.015)	—
<i>Peer entrepreneurship (university)</i>	—	—	0.601*** (0.167)
<i>Peer distance (average)</i>	—	—	0.028 (0.256)
<i>Peer entrepreneurship * Peer distance (average)</i>	—	—	-0.592** (0.247)
<i>Northeast</i>	—	—	0.397 (0.250)
<i>Financial center</i>	—	—	-0.130 (0.228)
Observations	205,189	182,150	151,895
Log likelihood	-2,123.6	-2,023.2	-948.4
Firm fixed effects	Yes	Yes	Yes
School fixed effects	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes

Note. Standard errors are in parentheses; clustered standard errors.

\*Significant at 10%; \*\*significant at 5%; \*\*\*significant at 1% (two-tailed tests).

Together, these results provide additional evidence that the observed peer effect arises as a result of interactor influences, rather than the institutional impact of academic institutions.

### Robustness Checks

*Self-Selection.* Despite strong evidence that university peer influence affects an individual's propensity to

launch a new venture, the causal inference of social mechanisms may still be threatened by the presence of alternative explanations. In particular, one inferential challenge pertains to the fact that individuals may self-select into universities with entrepreneurial peers based on unobserved dispositions, and that those dispositions also account for an employee's propensity to engage in entrepreneurship. Although my analyses include university fixed effects to alleviate this

inferential bias, for robustness, I also estimated the model with the individual fixed-effect specification. An important limitation of this method, however, is that it limits the analysis to employees who eventually transition to entrepreneurship. Although the results should be interpreted with caution, to the extent that differences in rates of entrepreneurship across individuals exposed to differential social influence are not driven by their time-invariant dispositions, introducing individual fixed effects in the model should not eliminate the main findings. The analyses (available from the author upon request) reveal that the coefficient of the count of university peers who transitioned to entrepreneurship in the past year retains its economic and statistical significance even after the inclusion of individual fixed effects ( $\beta = 0.145, p < 0.1$ ). In combination, these results lend substantial confidence to the claim that the positive effect of entrepreneurial peers on the decision to transition to entrepreneurship does not arise solely as a result of selection processes.

However, the fixed-effect estimator only addresses the issues of time-invariant unobserved heterogeneity among universities, not the possibility that the influence exerted by academic institutions may additionally vary by cohort. For example, it may be that Stanford University began to foster entrepreneurial norms only after the emergence of the biotech industry. To address this concern, I incorporated a cohort fixed-effect estimator that allowed me to compare outcomes for graduates of the same cohort and the same university. A cohort comprises students that overlap in the timing of university attendance. Because the completion of a bachelor's degree typically takes four years, individuals who graduated within a four-year window are considered as belonging to the same cohort. The results are shown in Table 4. Model 1 reports results estimated with the inclusion of cohort fixed and university fixed effects. The positive and statistically significant coefficient on *peer entrepreneurship* indicates that university peers exert a significant influence on entrepreneurship, even when accounting for between-university and between-cohort differences. These results thus lend substantial confidence to the conclusion that the university peer effect cannot be attributed to sorting of individuals into universities with unobserved fixed or time-varying attributes that correlate with entrepreneurship.

*Alternative Measures of University Peer Influence.* As a further robustness check, I used alternative measures of university peer influence. Using the educational affiliation to proxy for interpersonal influence is particularly valuable to the extent that it facilitates the assessment of aggregate patterns of social influence in the absence of complete network data. However, one concern may be that the estimates lack precision, because the amount of

influence channeled is likely to be diluted by nonsignificant contacts. To the extent that using affiliation has limitations, the measure may only underestimate the peer effect on entrepreneurship. Nevertheless, I mitigated this concern by constructing additional measures that proxy for interpersonal influence more precisely. That is, I considered the timing and the degree of studies to better reflect the probability that individuals with shared educational affiliation will tend to transmit social influence. First, to construct *peer entrepreneurship (same-degree university peers)*, I counted the number of managers who share a university affiliation with the focal manager, who obtained the same type of degree from that university (bachelor's, master's, or doctorate) and who founded a hedge fund in the past year. For each individual in the sample, I then aggregated the count of same-university and same-degree founders over the period of 12 months. To facilitate the causal interpretation, I lagged the variable by 12 months. Moreover, I collected data on fund managers' graduation dates to construct the measure of *peer entrepreneurship (same-timing university peers)*. I chose a four-year window to identify whether any two same-university affiliates overlapped in timing of their studies. That is, for each manager in the sample, I counted the number of other same-university affiliates who graduated up to three years before or up to three years after the focal manager's graduation. For each manager, I aggregated this count over the period of 12 months. To facilitate the causal interpretation, I lagged the variable by 12 months.

The robustness analyses for the operational definition of university peer influence are presented in Models 2 and 3, reported in Table 4. These estimates are consistent with the main finding: past entrepreneurial decisions of university peers impact an individual's propensity to transition to entrepreneurship. It is further interesting to note that university peers who overlapped in the timing of their studies tend to act as a stronger channel of social influence ( $\beta = 0.536, p < 0.01$ ) than university peers who obtained the same degree ( $\beta = 0.240, p < 0.01$ ). Moreover, both channels of social influence, presented in Table 4, are stronger than influence exerted by individuals with a shared university affiliation alone. In sum, these results lend substantial confidence to the claim that university peers play an important role in transferring entrepreneurial activity.

*Alternative Model Specifications.* Finally, I considered different alternatives to the logit model. First, I estimated the hazard rate of entrepreneurship using continuous-time event history analysis. The main advantage of this analysis is that it takes into account time dependence and the possibility of temporal variations in the probability of transition to entrepreneurship (Blossfeld and Rohwer 1995). On the other hand,

**Table 4 Logistic Regressions of Social Influence and Transition to Entrepreneurship (Robustness Checks)**

	Entrepreneurship (Model 1)	Entrepreneurship (Model 2)	Entrepreneurship (Model 3)
<i>Peer entrepreneurship (coworkers)</i>	0.204** (0.085)	0.207** (0.086)	0.157* (0.088)
<i>University peers (count)</i>	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)
<i>Gender (1 = male)</i>	1.363*** (0.323)	1.399*** (0.322)	1.389*** (0.324)
<i>Ph.D.</i>	0.626* (0.334)	0.897*** (0.331)	0.839** (0.329)
<i>Masters's</i>	0.004 (0.168)	0.248 (0.163)	0.303* (0.163)
<i>Employee's performance</i>	1.384 (1.470)	1.466 (1.476)	1.440 (1.474)
<i>Employee's age</i>	-0.001 (0.020)	-0.013 (0.008)	-0.012 (0.008)
<i>Elite university</i>	0.516* (0.288)	0.470 (0.288)	0.514* (0.284)
<i>Employee's tenure in organization</i>	-0.006*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)
<i>Employee's task discretion</i>	-0.113 (0.217)	-0.172 (0.215)	-0.189 (0.215)
<i>Firm size (log total assets)</i>	-0.068 (0.078)	-0.058 (0.077)	-0.075 (0.076)
<i>Firm performance</i>	-12.793 (10.921)	-12.879 (10.884)	-12.979 (10.880)
<i>Firm age (log)</i>	-0.003 (0.032)	-0.000 (0.032)	-0.000 (0.032)
<i>Peer entrepreneurship (university)</i>	0.119** (0.050)	—	—
<i>Peer entrepreneurship (same-degree university peers)</i>	—	0.240*** (0.075)	—
<i>Peer entrepreneurship (same-timing university peers)</i>	—	—	0.536*** (0.109)
Observations	212,091	212,100	212,094
Log-likelihood	-2,223.3	-2,192.9	-2,187.79
Firm fixed effects	Yes	Yes	Yes
School fixed effects	Yes	Yes	Yes
Cohort fixed effects	Yes	No	No
Time fixed effects	Yes	Yes	Yes

Note. Standard errors are in parentheses; clustered standard errors.

\*Significant at 10%; \*\*significant at 5%; \*\*\*significant at 1% (two-tailed tests).

such models do not easily allow the incorporation of the standard fixed effects estimator. Therefore, I used the conditional logistic regression as the closest approximation (Allison and Christakis 2006) and conducted continuous-time event history analysis for robustness. Given that my initial nonparametric analyses revealed no clear pattern regarding the effect of time on the hazard rate, I estimated the semiparametric Cox model (Cox 1972) that makes no particular assumption about the effect of time on the hazard rate. These additional analyses (available from the author upon request) reveal a similar pattern of findings, with positive and statistically significant coefficients of the count of university peers' past transitions to entrepreneurship.

Another concern may be rare events bias attributable to low occurrence of entrepreneurship in the sample

(0.16% of entrepreneurship rate). Rare events bias can produce inflated standard errors for the coefficients responsible for the infrequently occurring outcome. I took two steps to alleviate this potential concern. First, I used a yearly rather than monthly sampling frequency. I estimated the logistic model on the aggregated sample and found quantitatively and qualitatively similar results. The coefficient on *peer entrepreneurship* is positive and statistically significant ( $\beta = 0.106$ ,  $p < 0.1$ ). Second, I estimated the rare events logit that adjusts for rare events bias in an explicit fashion and generates robust standard errors (King and Zeng 2001). The differences between standard logit results and rare events corrected results are negligible. The coefficient on *peer entrepreneurship* is positive and statistically significant ( $\beta = 0.157$ ,  $p < 0.001$ ).<sup>7</sup>

## Discussion and Conclusion

One of the sociological contributions to the theories of entrepreneurship lies in providing evidence that contextual features significantly affect entrepreneurial behavior (Aldrich and Ruef 2006, Shane 2003, Sørensen 2007, Thornton 1999). There is consistent empirical evidence that entrepreneurs are shaped by contextual influences, ranging from social networks (e.g., Sorenson and Audia 2000, Stuart and Sorenson 2005) to the workplace (Audia and Rider 2006, Brittain and Freeman 1986, Kacperczyk 2012, Dobrev and Barnett 2005, Freeman 1986, Kacperczyk 2012, Sørensen 2007). This study advances the current understanding of the decision to launch a new venture by documenting the impact of a prior educational affiliation on the transition to entrepreneurship. In particular, I provide empirical evidence consistent with the notion that entrepreneurship is socially transmitted via individuals with a shared prior educational affiliation. The findings presented in the study indicate that employees are at a higher risk of entering entrepreneurship when a greater number of their university peers had entered entrepreneurship in the past. Moreover, the impact of entrepreneurial university peers is amplified for same-university peers who overlapped in the timing of their studies or who share an educational degree. Although few would be surprised to find that nascent entrepreneurs are influenced by frequent interactions with close work associates, it is interesting that peers acquainted at academic institutions well before an individual's entry into employment play a substantial role in fostering entrepreneurship rates, even many years after graduation.

Moreover, the findings herein suggest that the observed impact of university peers on entrepreneurship is unlikely to arise as a result of institutional influences of academic institutions. This claim is strongly supported by several pieces of empirical evidence. First, the results reveal that the social transmission of entrepreneurship is amplified across same-university peers who also share the same gender. In particular, findings indicate that social transmission of entrepreneurial activity tends to be amplified mainly across male peers, suggesting that males are more likely than females to refer to same-gender contacts when deciding to enter entrepreneurship. Additionally, the propensity to transition to entrepreneurship decreases with university peers' spatial distance, consistent with past research suggesting that spatial propinquity strengthens interactor influences (e.g., Festinger et al. 1950). In combination, these results lend consistent support to the claim that social transmission across peers, rather than institutional influences of academic institutions, underlies the relationship between the similarity of university peers' entrepreneurial activities and the focal individual's decision to become an entrepreneur.

The results presented in this study extend the current theories of entrepreneurship in several ways. First, the findings dovetail with the literature on workplace effects and entrepreneurship (Audia and Rider 2006, Brittain and Freeman 1986, Dobrev and Barnett 2005, Freeman 1986, Kacperczyk 2012, Sørensen 2007, Sørensen and Fassiotto 2011). Consistent with this line of work, this study suggests that entrepreneurs are indeed "organizational products" (Freeman 1986, p. 39) in that they are primarily shaped by organizational characteristics. However, I also document that entry into entrepreneurship is driven by influences that arise outside the workplace: peer groups formed at academic institutions play an important role in fostering entrepreneurship. Moreover, because university peers exert social influence outside the workplace, I am able to more cleanly separate social influence from any potential workplace effects. Similarly, by estimating the results "within-firm," I mitigate the concern that unobserved organizational characteristics account for the observed peer effect. The findings reveal that among individuals exposed to similar organizational influences, those exposed to entrepreneurial university peers are more likely to transition to entrepreneurship. In sum, the results extend the literature on peer effects in the workplace (Gompers et al. 2005, Nanda and Sørensen 2010, Stuart and Ding 2006) by providing compelling evidence that social transmission of entrepreneurial behavior is separate from the effects of the workplace.

Additionally, the study contributes to the vibrant research on the relationship between academic institutions and entrepreneurship (Bercovitz and Feldman 2008, Etzkowitz 1998, Mowery et al. 2004, Murray 2002, Owen-Smith 2003, Owen-Smith and Powell 2003, Powell 1996, Shane 2004, Stuart and Ding 2006). Whereas the majority of studies in this vein have attributed the effect of a university on entrepreneurial entry to structural and institutional attributes of academic institutions, including university training and policies shown to provide individuals with bountiful resources, skills, and expertise conducive to entrepreneurship, this study documents an alternative channel through which academic institutions impact one's decision to become an entrepreneur. The results suggest that universities facilitate the transmission of entrepreneurial motivations and information by structuring social influence across same-university graduates, even many years after graduation.

By documenting the positive relationship between peers' past entrepreneurial behaviors and the transition to entrepreneurship, this study further sheds light on the types of peer attributes that give rise to the social transmission of entrepreneurial activities. The analyses imply that social proximity acts as an important trigger of interactor influences in entrepreneurship. By contrast, previous research has made an implicit assumption that a successful social transmission of entrepreneurial

activities is largely limited to the impact of local peers and contacts, with whom individuals engage in frequent face-to-face interactions (Gompers et al. 2005, Nanda and Sørensen 2010, Stuart and Ding 2006, Sorenson and Audia 2000). Because coworkers share mutual dependencies in the execution of work-related tasks, they tend to engage in frequent face-to-face interactions that foster the formation of strong ties (Krackhardt 1992). Similarly, because workplace and neighborhood peers typically locate in spatial proximity, interactions with those peers should occur frequently (e.g., Festinger et al. 1950). Findings reported in the study significantly extend this literature by emphasizing social proximity as an important factor that drives the imitation of entrepreneurial behavior.

Furthermore, by identifying peer groups formed before an individual's selection into employment, this study was able to disentangle more cleanly the effect of social influence from selection. Although the choice of employment or regional environment is particularly susceptible to selection (Baron 1984, Jovanovic 1979, Saxenian 1994) along traits plausibly related to entrepreneurship (e.g., Elfenbein et al. 2010, Halaby 2003), the concern that differential sorting may have occurred at the university level is less credible. Findings presented in this study provide additional confidence that social influence operates as a causal force. To mitigate the self-selection concern even further, I estimated the effects for "within-university," "within-firm," and "within-cohort" variation and found robust results. The use of university peers combined with the variety of analytical tools that help account for the remaining confounds related to unobserved heterogeneity increases confidence in nonspurious peer influence on entrepreneurship. In combination, this set of stringent tests and a conservative setting provide compelling evidence that social influence is causally linked with entrepreneurship, and that the observed effect does not arise as a result of self-selection. More broadly, these findings represent a significant contribution to the accumulated set of empirical evidence regarding social transmission of behaviors and attitudes across individuals. Although such transmission has been widely discussed, this literature has been equally widely critiqued for its limited ability to measure social influence in the presence of selection effects (Mouw 2006). This concern is particularly salient in the context of transition to entrepreneurship, in which it may often be difficult to separate social influence from factors that give rise to social influence in the first place. By taking advantage of the fortuitous research design, this study contributes to the further advancement of a long line of sociological inquiry on social influence effects.

Although the framework presented here has implications for all types of industries, there are nonetheless important scope conditions associated with the theory. In particular, the mutual fund industry

grew exponentially during the period under study. Consequently, the framework developed here is less powerful for understanding transition to entrepreneurship in more mature industries. Because entrepreneurial opportunities are less abundant and inherently less uncertain in more mature industries, in such contexts university peers should play a less important role in transmitting entrepreneurial information, attitudes, and aspirations. Future research may further examine whether and how interpersonal influences impact the propensity to enter entrepreneurship in mature industries.

Similarly, the study highlights other important avenues for future research. First, findings in this study suggest that sociological approaches to entrepreneurship should pay greater attention to social influence exerted by university peers to explain variation in individual rates of entrepreneurship. An extension of this research could examine in greater detail how social influence operates to affect transition to entrepreneurship. It is plausible, for example, that sporadic interactions with acquaintances, such as university peers, may affect entrepreneurial entry by predominantly transferring novel information and tangible resources. By contrast, frequent interactions with closer contacts, such as coworkers, are likely to shape entrepreneurship by mostly transmitting attitudes and beliefs. This possibility further dovetails with the claim that weak ties are useful in spreading information, whereas strong ties may be more advantageous in accessing trust and obligation (Bian 1997). In a similar vein, future research may further investigate the characteristics of educational ties that facilitate or constrain social influence in the context of entrepreneurial activity. My analyses provide evidence that social transmission of entrepreneurial attitudes and motivations is stronger across those university peers who additionally overlapped in timing of their studies or who obtained the same degree. Future work may extend this research by examining the role of university status or its geographic location in driving transmission of entrepreneurial activity.

Finally, although the focus on university peers helps disentangle selection from social influence, future work could advance an understanding of those mechanisms by making use of an experimental setting with a random assignment of individuals at the risk of transitioning to entrepreneurship. More broadly, a further understanding of entrepreneurial transition hinges on the ability to carefully model and discern among multiple mechanisms that appear to underlie the act of new venture founding.

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## Appendix

**Table A.1. Comparative Distributions of Covariates for Managers with Missing and Nonmissing Educational Records**

Sample attribute/ statistic	Included		Excluded		Included-excluded		
	Mean	Median	Mean	Median	Mean	Median	p-Value (means)
<i>Firm attributes</i>							
Performance	0.81	0.77	0.74	0.56	0.04	0.21	0.514
Size (log)	8.22	8.58	8.13	8.6	0.09	-0.02	0.247
Age (in years)	28.75	27	27.86	27	0.88	0.000	0.191
<i>Manager attributes</i>							
Gender (men = 1)	0.89	1	0.87	1	0.02	0.000	0.001
Tenure (in years)	6.14	4.58	3.54	2.33	2.6	2.25	0.000
Age (in years)	45.01	45	45.27	46.61	-0.27	-1.61	0.334
Performance (in %)	0.28	0.63	0.66	0.41	-0.04	-0.13	0.616
Discretion	0.65	0.5	0.68	0.5	-0.03	0	0.401

## Endnotes

<sup>1</sup>Entrepreneurial efforts to launch a new hedge fund involve four essential steps. Managers must first set up a legal entity and draft the required legal documents. Moreover, setting up a new business requires finding a broker who serves as office manager and an execution clerk who provides fund managers with custody and clearing. Such brokerage firms often provide managers with other essential components of a new firm, including office space, data feeds, and a phone line. In addition, launching a hedge fund requires finding an accountant who brings validity to the track record once a hedge fund starts operating and also helps with marketing and money raising (Strachman 2000).

<sup>2</sup>I additionally used various Internet sources (e.g., company Web pages) to confirm that managers identified in my data as hedge fund founders correspond to those listed as founders by other Internet sources.

<sup>3</sup>I constructed an alternative measure of social influence that excludes individuals affiliated with both the same university and the same workplace.

<sup>4</sup>For names with no clear corresponding gender, I used various Internet search engines, such as the ZoomInfo database, and online SEC filings to identify the masculine ("Mr.") or the feminine prefix ("Ms.") prefix.

<sup>5</sup>The Northeast comprises New York, Connecticut, Rhode Island, Vermont, Maine, Pennsylvania, New Hampshire, Massachusetts, and New Jersey.

<sup>6</sup>The following cities are considered main financial centers: New York, Boston, Atlanta, San Francisco, Los Angeles, and Chicago.

<sup>7</sup>For additional robustness, I estimated the rare events logit on the aggregated sample and found similar results ( $\beta = 0.133$ ,  $p < 0.05$ ).

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