

Outside Directors at Early-Stage Startups

Buvaneshwaran Venugopal*

Vijay Yerramilli†

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Abstract

We use unique hand-collected data to understand why early-stage startups appoint outside directors, the type of outside directors they appoint, and the consequent effects on their future performance. Early-stage startups with better performance and less severe agency conflicts with their investors are more likely to appoint outside directors. An individual is more likely to be appointed to this role if he has invested in that startup, shares a past professional connection with the startup's founder or investors, has past entrepreneurial or board experience, and whose experience complements that of the founder. A start-up is more likely to attract future directors and future investors that share a past professional connection with the early-stage outside director. Early-stage startups with outside directors raise larger amounts in later-stage rounds, are more likely to attract VC funding, file more patents, and are more likely to exit successfully, especially through IPOs than similar startups without outside directors. Interestingly, startups whose early-stage investors serve as directors take longer to exit, are more likely to exit via acquisition rather than IPO, and file fewer patents than similar startups with non-investor directors.

*College of Business, University of Central Florida; email: eshwar@ucf.edu

†C. T. Bauer College of Business, University of Houston; email: vyerramilli@bauer.uh.edu

Introduction

Board of directors are considered critical to the proper oversight of companies, because of their role in monitoring and advising top managers. In particular, regulators and corporate governance reformers believe that outside (i.e., non-employee) directors enhance corporate governance because of their independence from management. Although public corporations are required to have adequate representation of outside directors on their boards, we have a limited understanding of how firms build their board structures over time before they become public.¹ In this paper we examine startup firms at the Series A stage (“early-stage” startups) to answer some fundamental questions about outside directors: Why and when do startups hire outside directors? What type of outside directors do they hire and what skills do they seek in them? How do outside directors affect startups’ future performance and exit strategy?

The boards of startups at the seed and pre-seed stages are mostly comprised of insiders. However, startups that survive till the Series A stage begin focusing on establishing a viable business model to scale up their operations, which may also involve professionalizing the company’s board of directors. Importantly, unlike public corporations, startups do not have to hire outside directors to satisfy regulatory mandates, and will do so only in response to specific governance needs. We can also observe board formation from scratch and can conduct analysis at the startup-director level in the year the director is hired. These features enable us to understand the factors that determine the two-sided matching between startups and directors, with a specific focus on the skill sets that startups seek from outside directors. Moreover, although causal inference is challenging, we can exploit the cross-sectional heterogeneity in our sample to examine how the choice of early-stage outside directors correlates with future performance of the startups, in terms of fund-raising activity and exit strategies.

We obtain information on startups and their investors from CrunchBase (www.crunchbase.com), which is the largest crowd-sourced database on start-up firms, and AngelList (angel.co), which is the leading on-line fund-raising platform for start-ups. Among other things, these two databases also provide information on directors appointed to the boards of startups. We col-

¹See [Adams, Hermalin, and Weisbach \(2010\)](#) and [Hermalin and Weisbach \(2003\)](#) for surveys of the theoretical and empirical literature on boards of directors, including the role played by outside directors.

lect additional biographical information on directors from the BoardEx database and LinkedIn ([linkedin.com](https://www.linkedin.com)). By combining these databases, we are able to identify the year of appointment for each director-startup combination. Our sample comprises 44,815 startups at the series A stage, whose future progress we are able to track. Please see section 1 below for more details.

Theory highlights two primary roles for directors: monitoring and advising. If the main role of outside directors is to monitor managers and ameliorate agency conflicts (e.g., see [Hermalin and Weisbach \(1998\)](#) and [Raheja \(2005\)](#)), then the appointment of outside directors should be more likely in startups that are less promising and have greater potential for agency conflicts.² On the other hand, if the main role of outside directors is to set strategy and advise the startup's management team ([Adams and Ferreira \(2007\)](#) and [Harris and Raviv \(2008\)](#)), then higher quality startups that enjoy a greater degree of coordination with their investors should be more likely to appoint outside directors. To resolve these conflicting predictions, we examine how the propensity to appoint outside directors varies with observable measures of startup quality and the degree of coordination between founders and investors.

We find that the propensity to appoint early-stage outside directors correlates positively with measures of startup quality and the degree of coordination between founders and investors. Specifically, early-stage startups that raised more funds in the seed and series A stages, especially from venture capital (VC) firms and well-connected lead investors, and those in which the founder shares a past professional or educational connection with one of the early-stage investors are both more likely to appoint outside directors, and to have one their early-stage investors serve as an outside director.³ These findings suggest that primary role of outside directors at early-stage startups is to advise the management team and help in setting strategy.

Early-stage startups are also more likely to appoint outside directors when the local demand for directors is low and the local supply of potential directors is high, where local demand and supply are measured at the level of the product market category and city. The latter result is in line with the finding in [Knyazeva, Knyazeva, and Masulis \(2013\)](#) that the local supply of directors affects the

²On a related note, the extant literature on venture capital contracting also highlights the importance of agency conflicts in determining the allocation of control rights between entrepreneurs and venture capitalists (e.g., see [Cumming \(2008\)](#), [Kaplan and Stromberg \(2003\)](#) and [Kaplan and Stromberg \(2004\)](#)).

³We define as a past professional connection to exist between the founder and the investor if they worked for the same employer during an overlapping period, or if the investor either invested in or served as director on the founder's previous startup.

proportion of outside directors at public corporations. Interestingly, within the subsample of early-stage startups with outside directors, early-stage investors of the startups are more likely to serve as outside directors when the local demand for directors is high and the local supply of directors is low. These findings suggest that outside directors are a scarce resource, and that early-stage investors are more likely to serve as outside directors when there is a local scarcity of directors.

Next, we investigate the factors that determine the two-sided matching between startups and directors. For each actual startup-director combination, we create several *control* pairs of startup-director combinations that are very similar but did not result in an actual match. Our analysis aims to uncover why the startups chose their specific directors from a larger pool of potential directors, and vice versa. We repeat this analysis separately for outside director appointments at the early, growth and late stages of startups.

Our analysis uncovers some interesting patterns about the matching between startups and directors. First, all else equal, an individual is more likely to be appointed as outside director if he is an investor in the startup or has a social connection with the startup's founder and investors. The effect of social connections is mostly driven by past professional connections rather than educational connections. Interestingly, the appointment of growth-stage directors and late-stage directors also seem to depend on their past professional connections with the early-stage directors, even after controlling for the connections with the founder and early-stage investors. This suggests that early-stage directors play an important role in attracting future directors.

Second, past experience or expertise plays a crucial role in the appointment of directors. Formally, we measure the expertise of individuals along five dimensions that seem important for startup firms: past entrepreneurial experience in having founded a startup, past board experience at either a public or a private firm, past professional experience as a C-suite executive at a public or private firm, past professional experience in finance or law in a non-C-suite role, and past patenting experience. We find that board experience and entrepreneurial experience matter the most for outside director appointments at all stages. Interestingly, public board experience is much more important for the choice of later-stage directors, whereas private board experience is marginally more important for the choice of early-stage outside directors. Patenting experience matters only for the choice of early-stage directors, whereas C-suite experience matters only for the choice of late-stage directors.

Third, all else equal, an individual is more likely to be hired as an early-stage or growth-stage director when the *vector difference* (along the five dimensions noted above) between his expertise and that of the startup's founder is high. In other words, startups mostly hire those individuals as early-stage and growth-stage outside directors whose expertise *complements* those of the founders. When we decompose the vector difference into its individual components, we find that the effect for early-stage directors is mostly driven by difference in board experience, entrepreneurial experience, and professional experience. In sharp contrast, when it comes to patenting experience, founders seek early-stage directors who are actually similar to them.

Identifying the causal effect of early-stage outside directors on the startup's future performance and exit strategies is challenging because, as we have shown, the choice of whether and who to hire as outside director is endogenous, and may depend on a host of unobserved factors that we cannot control for. Following [Knyazeva et al. \(2013\)](#), we try to circumvent these endogeneity concerns by exploiting the role of the local labor market in supplying directors to startup firms. As we showed above, the choice to appoint an early-stage outside director, as well as the choice between investor-directors and non-investor-directors is affected by the local demand for and supply of directors in the startups' product market and city. We use these findings to perform two-stage analysis of the effects of outside directors on startups' future performance and exit strategies.

We find that early-stage startups that appoint outside directors raise larger amounts in later stages, are more likely to attract VC funding, progress quicker to the series B (i.e., "growth") stage, have higher patenting activity, and are more likely to exit successfully, especially through IPOs, compared with otherwise similar early-stage startups that did not appoint outside directors. Among the subset of early-stage startups that appointed outside directors, those startups whose early-stage investors serve as directors obtain larger amounts in later stages and are more likely to attract VC funding compared to otherwise similar startups with non-investor outside directors. Interestingly, however, startups whose early-stage investors serve as directors file fewer patents, take longer to exit, and are more likely to exit via acquisitions rather than IPOs compared to similar startups with non-investor-directors. This is reminiscent of the result in [Cumming \(2008\)](#) that stronger VC control rights increase the likelihood of exit by an acquisition.

What is the channel through which early-stage outside directors affect future outcomes of startups? One possibility is that early-stage outside directors leverage their network connections to

attract new investors to invest in the startup's later-stage funding rounds. To investigate this possibility, we analyze the two-sided matching between startups and later-stage investors, and how it varies with the presence and characteristics of early-stage outside directors. We find that investors are more likely to participate in later-stage funding rounds of startups that hired early-stage outside directors, especially those in which an early-stage investor serves on the board. Interestingly, all else equal, an investor is more likely to participate in later-stage funding rounds if he is connected to the early-stage director, especially if the connections were formed by working together on a previous startup (e.g., as co-investors, co-directors, or as investor and director). These results are robust to controlling for any connections that later-stage investors may have with startups' founders and early-stage investors. While past literature highlights that startups benefit by raising financing from well-connected investors (see [Hochberg, Ljungqvist, and Lu \(2007\)](#)), our results suggest that they may also benefit from having well-connected directors serve on their boards.

With a few notable exceptions, which we discuss below, the extant literature on the determinants of board structure has mostly focused on the boards of public corporations. Because public corporations are required by law to have outside directors, the literature has mostly focused on either aggregate measures of board composition, such as size and the fraction of outside directors (e.g., see [Lehn, Patro, and Zhao \(2009\)](#), [Coles, Daniel, and Naveen \(2008\)](#), [Linck, Netter, and Yang \(2008\)](#), and [Boone, Field, Karpoff, and Raheja \(2007\)](#)), or specific director attributes, such as industry expertise ([Dass, Kini, Nanda, Onal, and Wang \(2013\)](#)), venture capital expertise ([Field, Lowry, and Mkrtchyan \(2013\)](#)), executive experience ([Fich \(2005\)](#) and [Fahlenbrach, Low, and Stulz \(2010\)](#)), acquisition experience ([Harford and Schonlau \(2013\)](#) and [Field and Mkrtchyan \(2017\)](#)), financial expertise ([Guner, Malmendier, and Tate \(2008\)](#)), and political connections ([Agrawal and Knoeber \(2001\)](#) and [Goldman, Rocholl, and So \(2009\)](#)). One significant drawback with public corporations is that their boards are sticky and reflect the cumulative effects of decisions made over long periods of time, some of which were made to satisfy regulatory mandates, which makes it hard to understand how the board structures evolved endogenously in response to specific governance needs. Moreover, the literature has little to say about which director skill sets matter (see [Adams, Akyol, and Verwijmeren \(2017\)](#)).

Our paper contributes to the extant literature on determinants of board structure by examining why and when early-stage startups hire outside directors, the skills they seek in outside directors,

and the effect of outside directors on firm performance. The main advantages of focusing on early-stage startups is that they do not have to hire outside directors to satisfy regulatory mandates, we can observe board formation from scratch and can conduct analysis at the startup-director level in the year the director is hired. In this respect, our strategy is similar to that used by [Denis, Denis, and Walker \(2015\)](#) who examine the formation of de novo boards following corporate spinoffs, and [Boone et al. \(2007\)](#) who track corporate board development from a firm's IPO through 10 years later.

A few papers examine the boards of later-stage start-up firms that are financed by VCs. In their recent work, [Larcker and Tayan \(2018\)](#) seek to understand the evolution of corporate governance in pre-IPO companies using data collected from 47 companies that undertook an IPO in the U.S. between 2010 and 2018. [Baker and Gompers \(2003\)](#) examine board characteristics of firms at the time of their IPO, and show that VC-backed firms have more outside directors (also see [Hochberg \(2012\)](#)). [Cumming \(2008\)](#) finds that strong VC control rights — i.e., VC board control combined with the right to replace the founding entrepreneur as CEO — are associated with a higher probability of acquisitions and a lower probability of IPOs. [Kaplan and Stromberg \(2003\)](#) examine how the allocation of control rights, which include board seats and voting rights, between the entrepreneur and the VC vary with startup characteristics. In contrast to all these papers, we examine board formation among early-stage startups and the consequent effect on the startup's late-stage fund-raising activity, ability to obtain VC financing, and the probability of successful exit through an IPO or acquisition.

Our paper also contributes to the debate regarding the effect of outside directors on firm performance. The evidence from early studies is either mixed or lacking in significance (e.g., see [Bhagat and Black \(2002\)](#), [Hermalin and Weisbach \(2003\)](#), and a survey of the literature in [Coles et al. \(2008\)](#)), which may be attributable to endogeneity issues relating to board structure. More recent work tackles the endogeneity issue in various ways. [Nguyen and Nielsen \(2010\)](#) examine stock market reaction to sudden director deaths, and conclude that independent directors have a positive effect on shareholder value. [Duchin, Matsusaka, and Ozbas \(2010\)](#) examine outside director additions following regulatory changes, and conclude that adding outside directors to the board does not affect firm performance on average, but outsiders significantly improve performance when their information cost is low. [Knyazeva et al. \(2013\)](#) use local director pools as an instrument for board

independence, and show that board independence has a positive effect on firm value. We employ a similar identification strategy and conclude that outside directors have a positive effect on startup performance.

1. Data and Sample Collection

1.1. Data Sources

Startups and Investors: We obtain detailed information on startups and their fund-raising activity from CrunchBase (www.crunchbase.com), which is the largest crowd-sourced database on startups, and AngelList (angel.co), which is the leading on-line fund-raising platform for startups.

CrunchBase is a graph database organized around several collection endpoints. We use the “Organization” endpoint to extract detailed information on startups’ founders, founding date, website domain address, location, fund-raising dates, stage information on fund-raising rounds (i.e., seed, series A, etc.), amount of funds raised, identity of investors who participated in various financing rounds, and board members.⁴ A representative snapshot of the information available for Uber is available at <https://www.crunchbase.com/organization/uber>.

Similar to CrunchBase, AngelList also provides data on fund-raising activity of startups and biographical information of founders, investors and directors. We use a vectorial decomposition algorithm on startup names and website domain addresses followed by a manual check to eliminate duplications between CrunchBase and AngelList.⁵ We find an overlap in coverage of around 75% between the two datasets. In general, CrunchBase has better coverage on fund-raising dates and amounts raised by startups, whereas AngelList provides more details on the investors who participated in each round and the founding teams of startups.

⁴In entrepreneurial finance, start-ups are generally classified into the following life-cycle stages: seed, series A, series B, series C, series D, etc. Please see the Appendix for the generally accepted definitions of these stage classifications in the industry. The academic literature (e.g., see [Gompers \(1995\)](#)) refers to seed and series A as “early stage,” series B as “expansion stage,” and series C and D as “late stage.”

⁵A 3-gram vectorial decomposition algorithm to match names works as follows: Suppose we have two strings – “Mathew” and “Matthew” – to match. The algorithm creates vectors by breaking each string into rolling substrings of 3 characters each; i.e., $A = \{\text{“mat”, “ath”, “the”, “hew”}\}$ and $B = \{\text{“mat”, “att”, “tth”, “the”, “hew”}\}$. We then compute a similarity score between the two vectors defined as $s \equiv \frac{|A \cap B|}{|A \cup B|}$, where $s \in [0, 1]$. We apply this algorithm separately to match startup names and website domain addresses (after removing domain suffixes such as .com, .net, etc.) to compute two similarity scores. If either of the similarity scores exceeds 0.8, we manually check the matches to verify if it is the same company in both databases.

Board of Directors: CrunchBase and AngelList also identify the individuals who serve on the boards of startups. Detailed biographical information on directors is available from the BoardEx North America file, which tracks the profiles of 96,974 individuals who sit on the boards of 12,949 public and private companies. By matching the director names and company names in our sample with those in BoardEx database, we are able to identify each director’s year of appointment at the startup (if this information is not available on CrunchBase or AngelList) and all the past director appointments of the individual at public and private companies. We also obtain additional biographical information from the LinkedIn profile pages of directors.⁶

Patenting Activity: We collect information on patenting activity of all individuals in our sample (i.e., founders, directors, and investors) from USPTO’s PatentView database. We employ the vectorial decomposition method described above to match company, founder, investor and director names in our dataset with the names of assignees, inventors and lawyers in the patent database. We also verify whether the individual was located in the same state during the same year according to both datasets in order to increase the accuracy of matches.

1.2. Sample Selection

Startups at the pre-seed or seed stages do not have any real need to appoint outside directors to their boards, and just under 25% of seed-stage startups manage to survive till the series A stage (see [Venugopal and Yerramilli \(2018\)](#)). However, startups that survive till the Series A stage begin focusing on establishing a viable business model to scale up their operations, which may also involve professionalizing the company’s board of directors by hiring outside directors. Therefore, given the main focus of our study, it is sensible to focus attention only on startups that have survived till series A. Indeed, most startups in our sample that appoint outside directors do so at series A stage or after. After imposing this restriction, we are left with a sample of 44,815 startups that have reached series A stage, for which we have information on future fund-raising rounds, investors, and identities of directors.

In Table 1, we provide a breakdown of our sample by “product-market” category (using the

⁶Crunchbase contains the LinkedIn profile links of all individuals covered in the database. We used this to download profile pages of individuals in our sample. In cases where the link was unavailable, we turned to AngelList and web searches to obtain profile links.

definitions provided by CrunchBase) and city for the top 10 product market categories and cities, respectively. As expected, many cities in the San Francisco Bay Area feature in the top 10 cities list, which altogether account of around 32% of all startups.

2. Key Variables and Descriptive Statistics

2.1. Outside Directors

Our main variable of interest is *Early Director*, which is a dummy variable that identifies startups that appointed an outside (i.e., non-employee) director at the series A stage. (For brevity, we omit the word “Outside” from our variable names, although all our director variables refer only to outside directors). To create this variable, we match the name of each director with the names of founders and all employees of the startup to identify directors whose primary employment is not with the startup. Similarly, we define dummy variables *Growth-Stage Director* and *Late-Stage Director* to identify startups that appoint outside directors during the growth stage (i.e., series B) and late stage (i.e., series C and beyond), respectively.

Outside directors could either be investors that have invested in the startup (“investor directors”) or other individuals that are not directly affiliated with the startup (“non-investor directors”). We define the dummy variable *Investor as Director* to identify startups that appoint one of their existing investors as outside director. Similarly, we define *Investor as Early Director* to identify startups that appoint one of their early-stage as an early-stage outside director. To create these variable, we name-match each outside director with the list of current individual investors as well as with the list of senior executives (e.g., fund manager and general partner) at institutional investors that may have invested in the startup, such as VC funds, private equity firms, or angel groups.

2.2. Network Measures

Network connections may play an important role in startups’ ability to attract outside directors and investors. We use the procedure in [Venugopal \(2018\)](#) to map the network connections among founders, investors, and directors. Specifically, we construct a panel containing every pair of individuals (e.g., Founder-Investor, Founder-Director, Investor-Investor, etc.) in each year from the year they first appeared in the sample. We define a pair of individuals as connected if either of

the following conditions is met: (a) the pair attended the same college or university during an overlapping time period (“Education Channel”); or (b) the pair either worked for the same employer during an overlapping time period or worked together on a previous startup venture (“Work Channel”).

We use the definition above to define dummy variables to identify the presence of a connection between outside directors and founders, outside directors and investors, investors and founders, late-stage outside directors and early-stage outside directors, and late-stage investors and early-stage investors. Moreover, we decompose each of these dummy variables into two separate dummies to identify whether the connection, if any, is through an education channel or a work channel.

We also map the co-investment networks of investors using the procedure in [Venugopal and Yerramilli \(2018\)](#). Formally, we define a co-investment connection as being formed between two investors when they invest together for the first time in the same funding round of a startup. At any given point, the co-investment network reflects all the past interactions between investors since they first appear in our data, which in some cases, goes as far back as 1998. To measure the importance of an investor to the network, we define *Degree Centrality* of an investor as the number of co-investment connections an investor has with other investors as of year ‘t’ (see Chapter 2 of [Jackson \(2008\)](#)).

2.3. Experience Measures

We track the past experience or expertise of founders and directors across five dimensions: entrepreneurial experience in having founded a startup, board experience at either a public or a private firm, executive experience as a C-suite executive at a public or private firm⁷, professional experience in finance or law in a non-C-suite role, and patenting experience. We consider an individual to have professional experience in finance if he has either served in a finance or accounting role, or holds a bachelors degree or higher in finance or accounting. Similarly, we consider an individual to have professional experience in law if he has either served in a legal role (e.g., General Counsel, Lawyer, IP Lawyer, etc.) or has a degree in law. For each of these experience dimensions, we create a dummy variable to proxy for the individual’s experience along that dimension, as well

⁷To avoid double-counting, we exclude founder-CEOs of startups while constructing the C-suite experience dummy because their experience already counts under entrepreneurial experience.

as numerical measures – e.g., no. of startups founded, no. of directorships held, no. of patents filed, etc. – to measure the extent of the individual’s experience.

For each individual, we define *Experience Index* as an aggregate measure of experience that is obtained by adding the five experience dummies listed above. Thus, *Experience Index* is a category variable that takes values from 0 to 5, where 0 denotes lack of any experience and 5 denotes experience in all dimensions.

To compare and contrast the experiences of a founder-director pair, we create a variable called *Experience Distance*, which is the normalized Euclidean vector distance between the experience vectors of the director and founder. If F and D denote the experience vectors of the founder and the director, respectively, the *Experience Distance* between the founder and director is defined as $d(F, D) = \sqrt{\sum_{i=1}^5 (F_i - D_i)^2} / \sqrt{5}$. Thus, *Experience Distance* takes values between 0 and 1, where 0 denotes that the two individuals have identical experience, and 1 denotes that their experiences are perfectly complementary.⁸ In general, a higher value of *Experience Distance* denotes greater *complementarity* between the skill sets of the founder and director.

2.4. Startup Performance

We measure the performance of startups using their fund-raising activity in later-stage rounds (i.e., series B stage and beyond), patenting activity, and the likelihood of a successful exit via IPO or acquisition. We define the dummy variable *Survived till Series B* to identify startups that successfully progress to series B, and the following additional variables to measure the fund-raising performance in later-stage rounds of startups that do manage to survive till series B: *Years from Series A to B* is the time it took (in years) for the startup to progress from its first series A round to the first series B round; *Later-stage Funds* is the total funds raised by the startup in all later-stage rounds; and *VC in Later-Stages* is a dummy variable which indicates whether the startup was able to attract venture capital funding in later-stage funding rounds.

Similarly, we define the dummy variable *Successful Exit* to identify startups that successfully

⁸For example, suppose founder has entrepreneurial experience, professional experience and patenting experience, but no board experience and C-suite experience, so that his experience vector is $F = [1, 0, 0, 1, 1]$. Suppose the director has board experience, C-suite experience, and professional experience, but lacks entrepreneurial experience and patenting experience, so that his experience vector is $D = [0, 1, 1, 1, 0]$. Then, the *Experience Distance* between the founder and director is given by $d(F, D) = \sqrt{\sum_{i=1}^5 (F_i - D_i)^2} / \sqrt{5} \simeq 0.8944$.

exit via an IPO or acquisition. We define the following variables only for the subset of startups that manage to exit successfully: dummy variables *IPO* and *Acquisition* to identify the mode of exit, and *Years to Successful Exit* to measure the time taken (in years) from the first series A round to eventual exit.

2.5. Descriptive Statistics

Recall that our sample comprises 44,815 startups that survived till the series A stage. We provide descriptive statistics for this sample in Panel A of Table 2. As can be seen, 6% of startups have founders with past entrepreneurial experience, and 54% obtained some VC funding in the early stages (mostly at the series A stage). In 22% of startups, one of the founders has a past educational or professional connection with one of the early-stage investors. There is substantial cross-sectional variation and skewness in the total amount of early-stage funding: whereas the average startup raised \$7.98 million, the median startup raised only \$2.2 million. The average startup took 3.26 years to progress from seed to series A.

Examining board characteristics, we find that only 13,673 startups (31% of the sample) appointed an outside director at the early stage, and out of these, only 35% appointed one of their early-stage investors to this role. Among the startups that appointed an early-stage outside director, the median number of outside directors is 2. The early-stage director has a past professional or educational connection with the startup's founder in 36% of startups, and has a past professional or educational connection to the early-stage investor in 28% of startups.

The most common experience that early-stage outside directors possess is board experience, which is found in 58% of startups that appointed early-stage outside directors. This is followed by patenting experience and entrepreneurial experience, which are present in 21% and 15%, respectively, of startups with early-stage outside directors. The median experience distance between the founder and early-stage director is 0.48, which suggests that their experience vectors differ on 1.152 dimensions.

In terms of later-stage outcomes, only 14,748 startups (33% of the sample) successfully progress from series A to series B, which is considered to be the beginning of the growth stage. Among this subsample, 70% obtain VC funding in later stages. Only 18% of early-stage startups in our sample (or 7,944 startups) successfully exit via an IPO or acquisition. Of the 7,944 startups with

successful exits, 79% exited via an acquisition and 21% via an IPO.

In Panel B of Table 2, we describe the stages at which startups appoint their first outside director. Recall that early stage refers to series A, growth stage refers to series B and C, and late stage refers to series D and beyond. The first column shows the number of startups, and the corresponding fraction in parentheses, in our sample that survive till each stage. As can be seen, only 33% of the sample survives till the growth stage, and only 23.7% of the sample survives till the late stage. Most of the startups that appoint an outside director do so at the early stage: 31% appoint their first outside director at the early stage, 8.4% do so during the growth stage, and 6.8% do so at the late stage. The same patterns hold for startups that appoint their investors as outside directors.

Panel C provides the cumulative numbers of startups at each stage that have appointed any outside director (*Director* = 1) and an investor-director (*Investor as Director* = 1), regardless of the stage at which they were appointed. As can be seen, 67.1% of startups that survive till the late stage have an outside director, and 39.1% of these have an investor-director. Put differently, almost 33% of startups that survive till the late stage do not have a single outside director on their board.

3. Appointment of Outside Directors

3.1. Propensity to Appoint Outside Directors

We estimate variants of the following Probit regression to examine how the propensity to appoint outside directors vary with startup characteristics:

$$\text{Early Director}_i = \Phi(\alpha + \beta * X + \mu_t + \mu_{Mkt} + \mu_{Loc} + \epsilon_i) \quad (1)$$

We control for the quality of early-stage startups using the funds they raised at the seed and series A stage (*Early-Stage Funds*), the speed with which they progressed from the seed to the series A stage (*Years from Seed to Series A*), whether they obtained VC funding in the early stages (*VC in Early Stage*), and by the connectedness of the lead investor that financed them during the early stage (*Early-Stage Investor Degree*). We use the dummy variable *Connected Founder & Investor*

to control for the degree of coordination between the founder and the early-stage lead investor.

We also control for the local demand for and the local supply of outside directors using the variables *Director Demand* and *Director Supply*, respectively. For each startup, we define *Director Demand* as the number of startups at the series A stage or above in the same product market and city that have not yet appointed an outside director, and *Director Supply* as the number of potential directors (i.e., founders and investors of startups, and directors) that have been active in the same product market and city over the past 3 years. We include fixed effects for the startup's founding year (μ_t), product market category (μ_{Mkt}), and city (μ_{City}) in all specifications. Inclusion of so many fixed effects in a Probit model may give rise to the incidental parameter problem. To alleviate these concerns, we also verify that our results are robust to a linear OLS specification. The results of our estimation are presented in Table 3.

The dependent variable in columns (1) and (2) is *Early Director*, which is a dummy variable that identifies startups that appointed an outside director at the early stage. The results broadly indicate that startups that appoint early-stage outside directors tend to be of higher quality on average, as proxied by the funds they raised in the early-stage rounds, the connectedness of investors from which they raised early-stage funds, and the participation by VCs in their early-stage financing rounds; the only exception to this pattern is that startups that took longer to progress from seed to the series A stage are more likely to appoint outside directors at the early stage. Startups in which there is better coordination between founders and early-stage investors, as proxied by the *Connected Founder & Investor* dummy, are also more likely to hire outside directors. Also, startups whose founders have past entrepreneurial experience or board experience are more likely to appoint outside directors. The fact that higher-quality startups that enjoy better coordination with their investors are more likely to appoint outside directors suggests that the primary role of outside directors at early-stage startups may be to advise the management team and help in setting strategy, rather than to mitigate agency conflicts between founders and investors.

The positive coefficient on $\ln(1+Director\ Supply)$ indicates that an early-stage startup is more likely to appoint an outside director if there is a larger supply of potential directors in its product market category and city. This is in line with the finding in Knyazeva et al. (2013) that the local supply of directors affects the proportion of outside directors at public corporations. The negative coefficient on $\ln(1+Director\ Demand)$ indicates that an early-stage startup is less likely to appoint

an outside director if there are a large number of startups in the same product market category and city without outside directors. One interpretation of this result is that outside directors are a scarce resource, and hence, a higher local demand for outside directors makes it harder for an early-stage startup to find a suitable outside director. Alternatively, it may be that an early-stage startup's choice to appoint an outside director is affected by the decisions of its peer firms.

The dependent variable in columns (3) and (4) is *Investor as Early Director*, which is a dummy variable that identifies startups that appoint one of their early-stage investors as outside director. We estimate this regression on the subsample of early-stage startups that appointed an outside director. Hence, for this subsample, *Investor as Early Director* = 0 indicates that the startup appointed a non-investor as outside director. The coefficients on startup characteristics are broadly similar in sign to those in columns (1) and (2), except that the propensity to appoint an investor-director is negatively related to the startup's age at the time it received seed funding, and does not vary with the time it took to progress from seed to series A stage. Also, startups whose founders have prior board experience are less likely to appoint investor-directors; i.e., they are more likely to prefer appointing non-investors as outside directors.

Interestingly, the coefficients on $\ln(1+Director\ Supply)$ and $\ln(1+Director\ Demand)$ in columns (3) and (4) have opposite signs compared to columns (1) and (2), and indicate that, early-stage investors are more likely to serve as outside directors when the local demand for outside directors is high and when the local supply of outside directors is low. These findings suggest that outside directors are a scarce resource, and that early-stage investors are more likely to serve as outside directors when there is a local scarcity of directors.

In column (5), we estimate an ordered probit with *Director Appointment Stage* as the dependent variable, which identifies the stage at which the first outside director was appointed and takes the following values: 1 for early-stage appointments, 2 for growth-stage appointments, 3 for late-stage appointments, and 4 for startups that never appointed outside directors at any stage. Therefore, any startup characteristic that is associated with early (later or no) appointment of outside directors will have a negative (positive) coefficient on it. As can be seen, the results of column (3) are broadly consistent with those in column (1).

3.2. Matching between Startups and Outside Directors

Next, we investigate the factors that determine the two-sided matching between startups and outside directors. For each actual startup-director combination, we create eight *control* pairs of startup-director combinations that are very similar but did not result in an actual match. Specifically, we create four control pairs in which the actual startup is paired with another individual who could have potentially served as a director on the startup's board but did not, and four control pairs in which the actual director is paired with another startup in which he could have potentially served but did not. We define the set of potential directors for the startup as individuals who were appointed as directors to another startup in the same product market category or city over the past five years; if we have more than four matches, we randomly pick four control directors from this set. Similarly, we define the set of potential startups for each director as all other startups in the same product market category or city.

We then estimate linear probability regressions to understand the startup and director characteristics that explain why startups chose their specific directors from a larger pool of potential directors, and vice versa. (We use linear probability regressions instead of Probit to avoid incidental parameter problem that may arise from the large number of fixed effects and dummy variables in our regression, although our main results are robust to a Probit specification.) We repeat this analysis separately for outside director appointments at the early, growth and late stages of startups. The results of our analysis are summarized in Table 4. The dependent variable is *Early-Stage Director* in columns (1) and (2), *Growth-Stage Director* in columns (3) and (4), and *Late-Stage Director* in columns (5) and (6).

In Panel A, we focus on the effect of social connections in determining the match between startups and directors. The positive and significant coefficients on *Investor* in all columns indicate that an individual is more likely to be appointed as outside director if he is an investor in that startup. The results in column (1) also indicate that an individual is more likely to be appointed as outside director if he has a social connection with the startup's founder and investors. When we distinguish between educational connections and professional connections in column (2), we find that the effect of social connections is mostly driven by past professional connections rather than educational connections. Indeed, an educational connection with the startup's founder seems to

have no significant effect on the startup-director match, whereas an educational connection with the startup's investor only has a small effect.

The results relating to growth-stage director appointments (columns (3) and (4)) and late-stage director appointments (columns (5) and (6)) are qualitatively similar to those relating to early-stage director appointments, except that social connections with the startup's founder matter significantly more than social connections with the startup's investors in determining the startup-director match at the growth and late stages. For instance, the results in column (3) show that the coefficient on *Connected to Founder* is almost three times as large as the coefficient on *Connected to Investor*. Interestingly, the large positive coefficients on *Connected to Previous Director* in columns (3) and (5) indicate that the appointment of growth-stage directors and late-stage directors also seem to depend on their social connections with the early-stage directors, even after controlling for the connections with the founder and early-stage investors, and this effect is significantly stronger than that of connections with investors. The effect of these social connections with early-stage directors is also primarily driven by professional connections rather than educational connections. These results suggests that early-stage directors play an important role in attracting future directors.

In Panel B, we focus on the effect of the past experience or expertise in the appointment of directors, after controlling for all the variables from Panel A. Recall that we measure experience of individuals along five dimensions: entrepreneurial experience, board experience, C-suite executive experience, professional experience in finance or law in a non-C-suite role, and patenting experience. The results in column (1) indicate that board experience and entrepreneurial experience are significantly more important for early-stage director appointments than patenting experience or professional experience, whereas C-suite executive experience seems irrelevant at this stage. The results in column (2) indicate that board experience at a private firm matters slightly more for early-stage director appointments than board experience at public firms.

Although entrepreneurial experience and board experience are also important for appointments of growth-stage directors (columns (3) and (4)) and late-stage directors (columns (5) and (6)), there are a few notable differences worth emphasizing. First, unlike with early-stage director appointments, board experience at public firms is significantly more important than board experience at private firms for director appointments at the growth and late stages. Second, C-suite executive experience is very important for late-stage director appointments, although it has no effect

for director appointments at early stage and growth stage. Third, unlike with early-stage director appointments, patenting experience has no effect on director appointments at the growth stage and late stage.

Do startups seek directors whose experiences are similar to those of the founders or different from those of the founders? We investigate this question in Panel C where we examine the effect of *Experience Vector Difference* on the startup-director matching, after controlling for all the variables from panels A and B. The positive and significant coefficients on *Experience Vector Difference* in columns (1) and (3) indicate that startups seek to appoint outside directors at the early stage and growth stage whose experiences *complement* (i.e., are different from) those of the founder. When we decompose the vector difference into its individual components, we find that the effect for early-stage directors is mostly driven by difference in board experience, entrepreneurial experience, and professional experience. Interestingly, when it comes to patenting experience, founders seek early-stage directors who are actually similar to them.

4. Early-Stage Directors and Future Performance of the Startup

Do early-stage outside directors affect the startup's future performance? Identifying the causal effect of early-stage outside directors on the startup's future performance and exit strategies is challenging because, as we have shown, the choice of whether and who to hire as outside director is endogenous, and may depend on a host of unobserved factors that we cannot control for. Following [Knyazeva et al. \(2013\)](#), we try to circumvent these endogeneity concerns by exploiting the role of the local labor market in supplying directors to startup firms.

4.1. Instrumental Variables Regression

As we showed in Table 3, the decision to appoint an early-stage outside director, as well as the choice between investor-directors and non-investor-directors, depends on the local demand for and local supply of outside directors. Therefore, we use *Director Demand* and *Director Supply* as instruments for *Early Director* in our sample of early-stage startups to perform two-stage analysis of the effects of outside directors on startups' future performance and exit strategies.⁹ Similarly,

⁹In unreported tests, we verify that the results are robust to using either *Director Demand* or *Director Supply* as the only instrument.

within the subsample of startups that appointed an early-stage outside director (i.e., startups with *Early Director* = 1), we use these as instruments for *Investor as Early Director* to understand how the choice of investor-directors versus non-investor directors affects future performance of startups.

A key property of an instrument is that it must satisfy the exclusion restriction. In the context of our study, the identifying assumption is that *Director Demand* and *Director Supply* do not have a direct effect on the future performance of the startup, conditional on all the other covariates. Note that our instruments are time-varying variables constructed at the product market-city level. Hence, we are confident about the identifying assumption because we include product-market fixed effects and city fixed effects in the regression.

Panel A of Table 5 presents the results of IV regressions aimed at examining the effect of *Early Director* on the startups' future performance and exit strategies. We implement these regressions using the two-stage least squares (2SLS) estimator. To conserve space, we only present the results of the second-stage regression. Following Staiger and Stock (1997), it is common to examine first stage power using the F -statistic for the excluded instrument in the first-stage regression. Accordingly, we report the first-stage F -statistic in all columns. With two exogenous instruments, the first-stage F -statistic must exceed 11.59 for the 2-SLS inference to be reliable (see Table 1 in Stock, Wright, and Yogo (2002)). We note that the F -statistic comfortably exceeds this threshold in all columns.

The results in Panel A indicate that early-stage startups which appoint outside directors raise larger amounts in later stages (column (1)), are more likely to attract VC funding in later stages (column (2)), progress quicker to the series B stage (column (3)), develop more patents (column (7)), and are more likely to exit successfully (column (4)), especially through IPOs (column (5)), although they take longer to exit (column (6)) compared with otherwise similar early-stage startups that did not appoint outside directors.

In Panel B we estimate the IV regression model over the subsample of early-stage startups that appointed an outside director, and seek to understand how the future performance and exit strategies vary with the presence of an investor-director. The results indicate that, among the startups that appoint an early-stage outside director, those that appoint investor-directors raise larger amounts in later stages (column (1)), are more likely to attract VC funding in later stages (column (2)), progress quicker to the series B stage (column (3)), and are more likely to exit

successfully (column (4)) compared to similar startups that chose to appoint non-investors as early-stage outside directors. Interestingly, however, startups which appoint early-stage investor-directors are less likely to exit via IPO (column (5)), take longer to exit (column (6)), and are have fewer patents (column (7)) compared to similar startups that chose to appoint non-investors as early-stage outside directors.

As an alternative to the IV regression model, we also estimate an endogenous treatment regression model (Heckman (1978); Maddala (1983)) in which we examine how future performance and exit strategies vary with the presence of an early-stage outside director (the “treatment”) after adjusting for the endogeneity of the appointment of the early-stage director. We estimate a first-stage Probit regression to model the startup’s choice of appointing an early-stage director as a function of startup characteristics. As in the IV regression model, we use *Director Demand* and *Director Supply* as the excluded instruments in the first-stage Probit regression. We then estimate second-stage OLS regressions in which the outcome variable is some measure of the startup’s future performance, after augmenting these regressions with the Inverse Mill’s Ratio computed from the first-stage regression.

To conserve space, we report the results of this estimation in Table IA.1 of the Internet Appendix. We estimate the model on the entire sample in Panel A with *Early Director* as the key independent variable of interest. In Panel B, we estimate the model on the subsample of early-stage startups with outside directors, and the key variable of interest is *Investor as Early Director*. As can be seen the results are broadly consistent with those of the IV regression model in Table 5.

4.2. Early-Stage Outside Directors and Later-Stage Investors

What is the channel through which early-stage outside directors affect a startup’s future performance and exit strategies? One possibility is that early-stage outside directors leverage their network connections to attract new investors to invest in the startup’s funding rounds in growth stage or late stage (jointly referred to as “later” stages). Recall that we already showed in Panel A of Table 4 that early-stage directors play a role in attracting later-stage outside directors to serve on the startup’s board.

To investigate this possibility, we need to understand the factors that determine the matching between startups and investors in later stage rounds. We follow a similar empirical methodology

that we used to examine the two-sided matching between startups and outside directors. For each actual startup-investor combination, we create eight *control* pairs of startup-investor combinations that are very similar but did not result in an actual match; four pairs in which the actual startup is paired with a potential investor, and four pairs in which the actual investor is paired with a potential startup. We define the set of potential investors for the startup as those who invested in another growth-stage startup or late-stage startup in the same product market category or city over the past five years, and randomly pick four control investors from this set if we have more than four matches. Similarly, we define the set of potential startups for each investor as all other growth-stage or late-stage startups in the same product category or location, and randomly pick four startups from this set if we have more than four matches. We then estimate linear probability regressions to understand the determinants of the two-sided matching between startups and investors in later stage funding rounds, and how it varies with the presence and characteristics of early-stage outside directors. The results of these regressions are presented in Table 6.

The results in column (1) indicate that investors are more likely to participate in later-stage funding rounds of startups that hired early-stage outside directors, which is consistent with the earlier findings from Table 5. The coefficients on the social connections variables indicate that investors are more likely to participate in later-stage funding rounds of startups when they share a social connection with the startup's founder and early-stage investors.

In column (2) we examine the subset of startups that appointed early-stage outside directors, and find that investors are more likely to participate in later-stage funding rounds of startups in which an early-stage investor serves on the board. Interestingly, an investor's participation is also more likely if he shares a social connection with an early-stage director. These results are robust to controlling for any connections that later-stage investors may have with startups' founders and early-stage investors. While past literature highlights that startups benefit by raising financing from well-connected investors (see [Hochberg et al. \(2007\)](#)), our results suggest that they may also benefit from having well-connected directors serve on their boards.

In column (3), we try to understand the effects of different types of social connections between investors and early-stage directors on the investors' propensity to invest in later-stage funding rounds of the startup. We find that the most important connections are those that were formed by the investor and early-stage director having worked together on a previous startup as co-investors,

co-directors, or as investor and director.

5. Conclusion

In this paper, we use unique hand-collected data on boards of directors of early-stage startups to answer some fundamental questions about outside directors: Why and when do startups hire outside directors? What type of outside directors do they hire and what skills do they seek in them? How do outside directors affect startups' future performance and exit strategy? The main advantage of focusing on early-stage startups is that, unlike public corporations, they are not required to hire outside directors and must form their boards of directors from scratch. Hence, this is an ideal setting in which to understand the factors that determine the two-sided matching between startups and directors, with a specific focus on the skill sets that startups seek from outside directors and the role of social connections.

We find that startups with better early-stage performance and less severe agency conflicts with their investors are more likely to appoint outside directors. An individual is more likely to be appointed as outside director on an early-stage startup if he has invested in that startup, shares a past professional connection with the firm's founders or investors, has past entrepreneurial or board experience, and whose experience complements that of the founder. All else equal, a startup is more likely to attract future directors and future investors that share a past professional connection with the early-stage outside director. Startups with early-stage outside directors raise larger amounts in later-stage rounds, are more likely to attract VC funding, develop more patents, and are more likely to exit successfully, especially through IPOs. Interestingly, startups whose early-stage investors serve as directors take longer to exit, are more likely to exit via acquisition instead of IPO, and develop fewer patents compared to startups with non-investor outside directors.

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Table 1 Distribution of Startups

This table provides a breakdown of our sample by product-market category (using the definitions provided by CrunchBase) and city for the top 10 product market categories and cities, respectively. The sample includes 44,815 startups that were founded between 1990 to 2015 and have survived till the series A stage.

Product Market Category	Startups	% of Total Sample	City	Startups	% of Total Sample
Biotechnology	4392	9.80	San Francisco	3993	8.91
Health Care	2926	6.53	New York	3602	8.04
Hardware	2675	5.97	Austin	998	2.23
Commerce and Shopping	2653	5.92	Seattle	916	2.04
Software	2535	5.66	Boston	913	2.04
Data and Analytics	2257	5.04	San Diego	865	1.93
Internet Services	2134	4.76	San Jose	780	1.74
Information Technology	1968	4.39	Palo Alto	760	1.70
Financial Services	1799	4.01	Mountain View	746	1.66
Advertising	1609	3.59	Chicago	742	1.66
Total	24948	55.67		14315	31.94

Table 2 Descriptive Statistics and Director Appointment Stages

Panel A of this table presents the summary statistics for the key variables used in our analysis. Each observation corresponds to a startup. The sample includes 44,815 startups that were founded between 1990 to 2015 and have survived till the series A stage. All variables are defined in the Appendix.

Panel B reports the number of startups that appoint their first outside director at each financing stage (column (2)), and whether the outside director is also an investor (column (3)). We scale the number in each cell by the total number of startups in the sample (44,815) and report the percentage in parentheses. Panel C reports the cumulative number of startups at each that have an outside director in place, regardless of the stage at which the outside director is appointed. The numbers in parentheses denote the fraction of surviving firms at that stage that have an outside director (column (2)) and an investor-director (column (3)).

Panel A: Summary statistics						
Variable	Mean	SD	p25	p50	p75	N
<i>Early-stage Startup Characteristics</i>						
Age at Seed	2.40	2.05	0.35	1.94	5.19	44815
Serial Entrepreneur	0.06	0.24	0.00	0.00	0.00	44815
Connected Founder & Investor	0.22	0.41	0.00	0.00	0.00	44815
Early-stage Funds	7.98	18.01	0.05	2.20	7.50	44815
Early-stage Investor Degree	53.64	117.62	0.00	2.00	44.00	44815
VC in Early-stages	0.54	0.50	0.00	1.00	1.00	44815
Yrs. to Series A	3.26	3.50	0.47	2.16	4.67	44815
<i>Later-stage Outcomes</i>						
Survived till Series B	0.33	0.47	0.00	0.00	1.00	44815
Later-stage Funds	31.63	52.43	4.25	14.00	35.65	14748
VC in Later-stages	0.70	0.46	0.00	1.00	1.00	14748
Successful Exit	0.18	0.38	0.00	0.00	0.00	44815
Acquired	0.79	0.41	1.00	1.00	1.00	7944
IPO	0.21	0.41	0.00	0.00	0.00	7944
Yrs. to Successful Exit	7.76	4.72	4.21	7.05	10.34	7940
<i>Early Director Characteristics</i>						
Early Director	0.31	0.46	0.00	0.00	1.00	44815
Investor as Early Director	0.35	0.48	0.00	0.00	1.00	13673
No. of Directors	3.27	3.97	1.00	2.00	4.00	13673
Connected Founder & Director	0.36	0.46	0.00	0.00	1.00	13673
Connected Investor & Director	0.28	0.38	0.00	0.00	0.50	13673
<i>Early-stage Director Expertise</i>						
Director Experience Index	1.20	0.69	1.00	1.00	1.67	13673
Experience Distance	0.44	0.22	0.33	0.48	0.58	13673
Entrepreneurial Experience	0.15	0.28	0.00	0.00	0.20	13673
Board Experience	0.58	0.41	0.14	0.60	1.00	13673
C-suite Experience	0.07	0.20	0.00	0.00	0.00	13673
Other Professional Experience	0.06	0.19	0.00	0.00	0.00	13673
Patent Experience	0.21	0.32	0.00	0.00	0.33	13673
Industry Experts	0.27	0.37	0.00	0.00	0.50	13673
Industry Exp. Herfindhal Index	0.19	0.15	0.11	0.15	0.22	13673

Panel B: Stage at which first outside director is appointed			
Stage	Startups surviving	Director=1	Investor as Director=1
Early	44815 (1.000)	13673 (0.305)	4826 (0.108)
Growth	14748 (0.329)	3777 (0.084)	2011 (0.045)
Late	10624 (0.237)	3043 (0.068)	1752 (0.039)

Panel C: Stage-wise breakup of startups with outside directors			
Stage	Startups surviving	Director=1	Investor as Director=1
Early	44815	13673 (0.305)	4826 (0.108)
Growth	14748	8304 (0.563)	4513 (0.306)
Late	10624	7163 (0.674)	4151 (0.391)

Table 3 Propensity to Appoint Outside Directors

This table reports results of regressions aimed at understanding how the propensity to appoint outside directors varies with startup characteristics. The dependent variable in columns (1) and (2) is *Early Director*, which is a dummy variable that identifies startups that appointed an early-stage outside director. The dependent variables in columns (3) and (4) is *Investor as Early Director*, which is a dummy variable that identifies startups that appoint one of their early-stage investors as outside director. The sample in columns (3) and (4) only includes startups that appointed an early-stage outside director. The dependent variable in column (5) is *Director Appointment Stage*, which takes values ‘1’ if as outsider was appointed as director for the first time in seed or series A stages, ‘2’ if an outsider was appointed for the first time in growth stages, ‘3’ if an outsider was appointed for the first time in late stages, and ‘4’ if an outsider was never appointed to the startup’s board. We estimate a Probit specification in columns (1) and (3), an OLS specification in columns (2) and (4), and an ordered Probit in column (5). All regressions include fixed effects for the startups’ founding year, product market and city. The standard errors (reported in parentheses) are heteroskedasticity robust. All variable are defined in the Appendix.

	Early Director		Investor as Early Director		Director Appointment Stage
	(1)	(2)	(3)	(4)	(5)
Outside Director Demand	-0.365*** (0.025)	-0.193*** (0.007)	0.149*** (0.026)	0.092*** (0.009)	0.371*** (0.023)
Outside Director Supply	0.150*** (0.010)	0.090*** (0.003)	-0.071*** (0.013)	-0.039*** (0.004)	-0.165*** (0.010)
Connected Founder & Investor	0.844*** (0.058)	0.299*** (0.021)	1.146*** (0.028)	0.372*** (0.010)	-0.990*** (0.021)
Startup Characteristics					
Ln(1+Age at Seed)	0.017 (0.025)	0.001 (0.006)	-0.170*** (0.040)	-0.045*** (0.010)	0.068** (0.033)
Ln(1+ Yrs. from Seed to Series A)	0.154*** (0.025)	0.041*** (0.007)	0.037 (0.035)	0.012 (0.039)	-0.105*** (0.013)
Ln(1+Early-stage Funds)	0.198*** (0.018)	0.054*** (0.005)	0.063*** (0.022)	0.019*** (0.006)	-0.103*** (0.012)
Ln(1+Early-stage Investor Degree)	0.067*** (0.005)	0.021*** (0.002)	0.038*** (0.013)	0.011*** (0.004)	-0.054*** (0.006)
VC in Early-stages	0.325*** (0.026)	0.087*** (0.007)	0.463*** (0.063)	0.102*** (0.017)	-0.153*** (0.031)
Ln(1+Market Funds in Founded Yr)	-0.020 (0.015)	-0.004 (0.004)	-0.011 (0.023)	-0.003 (0.006)	0.011 (0.017)
Founder Experience					
Entrepreneurial Exp.	0.070** (0.035)	0.019* (0.010)	-0.043 (0.038)	-0.020 (0.012)	-0.040*** (0.028)
Board Exp.	0.075** (0.032)	0.023** (0.010)	-0.060* (0.029)	-0.017* (0.009)	-0.066*** (0.025)
C-Suite Exp.	0.020 (0.033)	0.009 (0.010)	-0.036 (0.044)	-0.012 (0.014)	0.002 (0.026)
Other Professional Exp.	-0.040 (0.058)	-0.011 (0.017)	0.001 (0.060)	0.001 (0.019)	0.056 (0.041)
Patent Exp.	-0.043 (0.037)	-0.014 (0.011)	-0.041 (0.029)	-0.010 (0.009)	0.027 (0.025)
Obs.	44815	44815	13673	13673	44815
<i>Pseudo/Adj. R²</i>	0.249	0.284	0.211	0.236	0.166
Founded Yr, Prod. Market, Location F.E.	Yes	Yes	Yes	Yes	Yes
Model	Probit	OLS	Probit	OLS	Ordered Probit
Sample	Full		Early Director=1		Full

Table 4 Matching between Startups and Outside Directors

This table reports the results of regressions aimed at understanding the factors that determine the two-sided matching between startups and outside directors. The unit of observation is a startup-director pair. For each actual startup-director combination, we create four control pairs in which the actual startup is paired with a control director who they could have potentially appointed but did not, and four control pairs in which the actual director is paired with a control startup on which he could have potentially served but did not. We define the set of potential directors for each startup as individuals who were appointed as directors to another startup in the same product market category or city over the past five years, and randomly choose four individuals if we have more than four matches. Similarly, we define the set of potential startups for each director as all other startups in the same product market category or city. We then estimate linear probability regressions on a sample that includes the actual startup-director pair and the corresponding control pairs, and the dependent variable is a dummy variable that identifies the actual startup-director pair. We do this exercise separately for outside director appointments at the early stage (columns (1) and (2)), growth stage (columns (3) and (4)), and late stage (columns (5) and (6)).

We examine the effect of social connections in Panel A, the effect of director experience in Panel B, and the effect of the matching of director experience and founder experience in Panel C. The regressions in each panel control for the variables presented in the previous panel and the startup characteristics from Table 3, although we suppress these coefficients to conserve space. We include fixed effects for the actual startup-director pair in all fixed effects. Standard errors (reported in parentheses) are robust to heteroskedasticity and clustered at product market level. We use ***, **, and * to denote statistical significance at 1%, 5% and 10% levels, respectively. All variable are defined in the Appendix.

<i>Panel A: Effect of social connections</i>						
	Early-stage Director		Growth-stage Director		Late-stage Director	
	(1)	(2)	(3)	(4)	(5)	(6)
Investor	0.090*** (0.003)	0.076*** (0.004)	0.129*** (0.002)	0.118*** (0.003)	0.155*** (0.005)	0.144*** (0.005)
Network Connections						
Connected to Founder	0.093*** (0.002)		0.099*** (0.003)		0.094*** (0.005)	
School Channel		-0.007 (0.006)		-0.005 (0.004)		-0.022 (0.019)
Work Channel		0.089*** (0.002)		0.093*** (0.003)		0.104*** (0.005)
Connected to Investor	0.071*** (0.002)		0.032*** (0.004)		0.022*** (0.005)	
School Channel		0.007*** (0.002)		0.005** (0.002)		0.005 (0.003)
Work Channel		0.081*** (0.004)		0.040*** (0.005)		0.041*** (0.006)
Connected to Previous Director			0.088*** (0.006)		0.119*** (0.006)	
School Channel				0.016** (0.007)		0.002 (0.005)
Work Channel				0.081*** (0.005)		0.128*** (0.006)
Obs.	319493	319493	39761	39761	14083	14083
Adj. R^2	0.501	0.467	0.611	0.581	0.510	0.468
Sample	Early Appointments		Growth Appointments		Late Appointments	
Startup Controls	Yes	Yes	Yes	Yes	Yes	Yes
Group F.E.	Yes	Yes	Yes	Yes	Yes	Yes

<i>Panel B: Effect of director experience</i>						
	Early-stage Director		Growth-stage Director		Late-stage Director	
	(1)	(2)	(3)	(4)	(5)	(6)
Experience						
Entrepreneurial Exp.	0.032*** (0.004)	0.031*** (0.004)	0.039*** (0.005)	0.040*** (0.005)	0.020*** (0.005)	0.020*** (0.005)
Board Exp.	0.056*** (0.003)		0.069*** (0.005)		0.100*** (0.009)	
Public		0.043*** (0.003)		0.115*** (0.008)		0.110*** (0.008)
Private		0.069*** (0.003)		0.046*** (0.008)		0.009 (0.019)
C-suite Exp.	-0.005 (0.003)		0.032 (0.036)		0.116* (0.068)	
Public		-0.011 (0.008)		0.023 (0.149)		0.168* (0.097)
Private		0.028* (0.015)		0.031 (0.030)		0.082 (0.171)
Other Professional Exp.	0.011*** (0.003)		0.008** (0.004)		0.020*** (0.004)	
Public		0.014*** (0.003)		0.010* (0.010)		0.029*** (0.006)
Private		0.004* (0.002)		0.007 (0.005)		0.010** (0.005)
Patent Exp.	0.025* (0.014)	0.030** (0.015)	-0.004 (0.003)	-0.004 (0.003)	0.005 (0.006)	0.005 (0.006)
Obs.	319493	319493	39761	39761	14083	14083
Adj. R^2	0.511	0.511	0.606	0.606	0.516	0.517
Sample	Early Appointments		Growth Appointments		Late Appointments	
Startup Controls	Yes	Yes	Yes	Yes	Yes	Yes
Connection Controls	Yes	Yes	Yes	Yes	Yes	Yes
Group F.E.	Yes	Yes	Yes	Yes	Yes	Yes

Panel C: Effect of experience distance between founders and directors

	Early-stage Director		Growth-stage Director		Late-stage Director	
	(1)	(2)	(3)	(4)	(5)	(6)
Experience Vector Distance						
Experience Distance	0.099*** (0.009)		0.113*** (0.041)		0.061 (0.069)	
Entrepreneurial Exp. Distance		0.072*** (0.007)		0.028*** (0.003)		0.002* (0.001)
Board Exp. Distance		0.079*** (0.008)		0.104*** (0.021)		0.145*** (0.031)
C-suite Exp. Distance		-0.011 (0.009)		0.020*** (0.004)		0.040** (0.019)
Other Prof. Exp. Distance		0.083** (0.036)		0.030*** (0.003)		0.073 (0.131)
Patent Exp. Distance		-0.025*** (0.004)		-0.014*** (0.005)		-0.010 (0.008)
Obs.	319493	319493	39761	39761	14083	14083
Adj. R^2	0.508	0.509	0.605	0.606	0.508	0.510
Sample	Early Appointments		Growth Appointments		Late Appointments	
Startup Controls	Yes	Yes	Yes	Yes	Yes	Yes
Connection Controls	Yes	Yes	Yes	Yes	Yes	Yes
Experience Controls	Yes	Yes	Yes	Yes	Yes	Yes
Group F.E.	OLS	OLS	OLS	OLS	OLS	OLS

Table 5 Early-Stage Directors and Startup Performance

Panel A reports the results of instrumental variables (IV) regressions, estimated using the 2SLS estimator, aimed at understanding the effect of early-stage outside directors on startups' future performance and exit strategies. The key independent variable of interest is *Early Director*, which we instrument using *Director Demand* and *Director Supply*.

Panel B reports the results of IV regressions aimed at understanding the effect of investor-directors on startups' future performance and exit strategies, for the subset of startups that appointed an early-stage outside director (i.e., startups with *Early Director*= 1. The key independent variable of interest is *Investor as Early Director*, which we instrument using *Director Demand* and *Director Supply*.

In both panels we suppress the results of the first-stage regressions to conserve space, and only report the results of the second-stage regression for the various outcome variables. We control for startup characteristics from Table 3 in all specifications (but suppress the coefficients to conserve space), and include fixed effects for startups' founding year, product market, and city. Standard errors (reported in parentheses) are robust to heteroskedasticity and are clustered at the product market level. We use ***, **, and * to denote statistical significance at the 1%, 5%, and 10% levels, respectively. All variable are defined in the Appendix.

Panel A: Effect of Early Director

	(1) Ln(1+Later-stage Funds)	(2) VC in Later-stages	(3) Ln(1+ Yrs. from Series A to B)	(4) Successful Exit	(5) IPO	(6) Ln(1+Yrs. to Successful Exit)	(7) Ln(1+# Patents)
Early Director	0.386*** (0.058)	0.114*** (0.017)	-0.422*** (0.034)	0.181*** (0.018)	0.167*** (0.037)	0.084* (0.045)	0.111** (0.053)
Connected Founder & Director	0.405*** (0.077)	0.076*** (0.017)	-0.124*** (0.024)	0.008 (0.015)	0.126*** (0.036)	-0.049 (0.037)	0.410*** (0.069)
Connected Founder & Investor	1.088*** (0.041)	0.295*** (0.012)	-0.207*** (0.022)	-0.017 (0.012)	-0.031 (0.022)	0.129*** (0.027)	0.223*** (0.038)
Director Exp. Index	0.164*** (0.031)	0.062*** (0.009)	-0.232*** (0.018)	0.071*** (0.009)	0.048*** (0.017)	-0.001 (0.020)	0.078*** (0.007)
Experience Distance	0.115*** (0.034)	0.052*** (0.012)	-0.189*** (0.027)	0.057*** (0.012)	0.054** (0.021)	-0.009 (0.025)	0.201*** (0.025)
Obs.	44815	44815	44815	44815	7940	7940	44815
Adj. - R^2	0.317	0.291	0.339	0.114	0.211	0.455	0.065
Test of Endogeneity (F-stat)	95.419***	46.072***	34.486***	76.772***	47.206***	41.395***	127.324***
F-stat of Excluded Instruments (Stage 1)	409.646***	409.646***	409.646***	409.646***	60.551***	60.551***	409.646***
Startup Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Founded Yr, Prod. Market, Location F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Full				Success=1		Full

Panel B: Effect of Investor as Early Director

	(1) Ln(1+Later-stage Funds)	(2) VC in Later-stages	(3) Ln(1+ Yrs. from Series A to B)	(4) Successful Exit	(5) IPO	(6) Ln(1+Yrs. to Successful Exit)	(7) Ln(1+# Patents)
Investor as Early Director	0.274*** (0.072)	0.100** (0.048)	-0.376*** (0.095)	0.085** (0.038)	-0.170*** (0.054)	0.108** (0.052)	-0.126** (0.060)
Connected Founder & Director	0.334*** (0.072)	0.057*** (0.016)	-0.123*** (0.026)	0.015 (0.016)	0.106** (0.047)	-0.060* (0.035)	0.422*** (0.068)
Connected Founder & Investor	0.490*** (0.066)	0.113*** (0.018)	-0.302*** (0.036)	0.058*** (0.022)	0.069* (0.038)	-0.017 (0.037)	0.796*** (0.068)
Director Exp. Index	0.167*** (0.020)	0.084*** (0.006)	-0.150*** (0.011)	0.009 (0.006)	0.012 (0.015)	0.025* (0.015)	0.001 (0.022)
Experience Distance	0.102*** (0.025)	0.046*** (0.007)	-0.072*** (0.014)	0.002 (0.006)	0.012 (0.013)	-0.000 (0.014)	0.085*** (0.024)
Obs.	13673	13673	13673	13673	3162	3162	13673
Adj. - R^2	0.341	0.328	0.171	0.104	0.098	0.411	0.055
Test of Endogeneity (F-stat)	78.138***	29.510***	38.213***	65.528***	28.852***	31.755***	29.835***
F-stat of Excluded Instruments (Stage 1)	39.087***	39.087***	39.087***	39.087***	21.498***	21.498***	39.087***
Startup Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Founded Yr, Prod. Market, Location F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Early Director=1				Early Director=1 & Success=1		Early Director=1

Table 6 Early-Stage Outside Directors and Later-Stage Investors

This table reports the results of regressions aimed at understanding how the two-sided matching between startups and later-stage investors is affected by early-stage directors. The unit of observation is a startup-investor pair. For each actual startup-investor combination, we create four control pairs in which the actual startup is paired with a control investor who could have potentially invested in it but did not, and four control pairs in which the actual investor is paired with a control startup in which he could have potentially invested but did not. We define the set of potential investors for the startup as those who invested in another growth-stage or late-stage startup in the same product market category or city over the past five years, and randomly pick four control investors from this set if we have more than four matches. Similarly, we define the set of potential startups for each investor as all other growth-stage or late-stage startups in the same product category or location, and randomly pick four startups from this set if we have more than four matches. We then estimate linear probability regressions on a sample that includes the actual startup-investor pair and the corresponding control pairs, and the dependent variable is a dummy variable that identifies the actual startup-investor pair.

We control for the startup characteristics from Table 3 in all specifications (but suppress the coefficients to conserve space), and also include fixed effects for the actual startup-director pair. Standard errors (reported in parentheses) are robust to heteroskedasticity and clustered at product market level. We use ***, **, and * to denote statistical significance at 1%, 5% and 10% levels, respectively. All variable are defined in the Appendix.

	Later-stage Investment		
	(1)	(2)	(3)
Early Director	0.112*** (0.019)		
Investor as Early Director		0.079*** (0.020)	0.072*** (0.020)
Network Connections			
Connected Director & Later-stage Investor		0.074*** (0.010)	
<i>Director-Later Investor Connection Channels</i>			
Co-Investor			0.069*** (0.023)
Co-Director			0.048** (0.022)
Co-Founder			0.058 (0.049)
Past Investor/Director			0.082*** (0.023)
Employment			0.037*** (0.015)
Connected Founder & Investor	0.026*** (0.004)	0.037*** (0.007)	0.035*** (0.008)
Connected Early & Later-stage Investor	0.101*** (0.010)	0.094*** (0.011)	0.094*** (0.011)
Director Exp. Index	0.002** (0.001)	0.002 (0.002)	0.002 (0.002)
Experience Distance	0.035 (0.048)	0.044 (0.068)	0.045 (0.068)
Obs.	121371	57916	57916
Adj. R^2	0.414	0.435	0.435
Startup Controls	Yes	Yes	Yes
Group F.E.	Yes	Yes	Yes
Sample	Late-stage Investors	Early Director=1 & Late-stage Investors	

Appendix: Variable Definitions

Description of Start-up Financing Stages

Start-ups raise funds at various stages of their life cycle. Industry participants classify these financing stages as *Seed*, *Series A*, *Series B*, *Series C*, and so on. The academic literature (e.g., see Gompers (1995)) sometimes refers to series A as “early stage,” series B as “expansion stage,” and series C and beyond as “late stage.” The informal definitions of these stages are as follows:¹⁰

- *Seed stage*: The purpose of the series seed is for the startup to figure out the product it is building, the market it is in, and the user base. Typically, a seed round helps the company scale to a few employees past the founders and to build and launch an early product.
- *Series A*: Startups that get to this stage have figured out their product and user base, and are trying to establish a viable business model and scale up their operations.
- *Series B*: Startups that reach this stage have an established product and business model, and are trying to scale up their business model and user base.
- *Series C*: This stage is used by startups to accelerate their growth beyond the Series B stage; e.g., by going international or by making acquisitions. Firms requiring more funds raise them in stages Series D, E, etc.

The startups disclose the financing stage when they raise funds, and this information is reported by CrunchBase and AngelList. Each financing stage may itself involve multiple funding rounds.

Startup Characteristics:

- *Age at Seed* is the number of years from the startup’s founding date to its first seed round.
- *Serial Entrepreneur* is a binary variable that indicates whether at least one of the startup’s founders has founded another startup in the past.
- *Early-stage Funds* is the total funds (in \$ millions) raised by a start-up in seed and series A rounds.
- *Early-stage Investor Degree* is the “Investor degree centrality” of early-stage lead investors.
- *VC in Early-stages* is a binary variable that identifies whether a venture capitalist participated in the early-stage funding rounds of the startup.
- *Years to Series A* is the number of years between the startup’s first seed round and the first series A round.
- *Early Director* is a dummy variable that identifies whether the startup has appointed an outside (i.e., non-employee) director at the series A stage.
- *No. of Early Directors* is the total number of outside directors appointed at the series A stage.
- *Investor as Early Director* is a dummy variable that identifies whether the startup has appointed one of its early-stage investors as an outside director at the series A stage.

¹⁰See <http://blog.eladgil.com/2011/03/how-funding-rounds-differ-seed-series.html> for a more detailed description of these funding stages.

Social Connections

We define a pair of individuals as connected if either of the following conditions is met: (a) the pair attended the same college or university during an overlapping time period (“Education Channel”); or (b) the pair either worked for the same employer during an overlapping time period or worked together on a previous startup venture (“Work Channel”). We use this definition to define the following *dummy* variables:

- *Connected Founder & Director* to identify a connection between an outside director and any of the founders.
- *Connected Investor & Director* to identify a connection between the outside director and any of the early-stage investors.
- *Connected Founder & Investor* to identify a connection between any of the early-stage investors and any of the founders.
- *Connected to Previous Director* to identify a connection between later-stage outside directors and early-stage outside directors.
- *Connected Director & Late-Stage Investor* to identify a connection between the early-stage director and a late-stage investor.
- *Connected Early & Late-Stage Investors* to identify a connection between a late-stage investor and an early-stage investor.

We also decompose each of the above dummy variables into two separate dummies to identify whether the connection is through an education channel or a work channel.

Experience Measures:

- *Entrepreneurship Experience* is a dummy identifies whether the individual has founded a startup before.
- *Board Experience* is a dummy variable that identifies whether the individual has served as a director in a public or private firm. We decompose this into two dummy variables to separately identify board experience in public and private firms.
- *C-suite Experience* is a dummy variable that identifies whether the individual has executive experience in a C-suite level title at a public or private firm. To avoid double-counting, we exclude founder-CEOs of startups while constructing the C-suite experience dummy because their experience already counts under entrepreneurial experience. We decompose C-Suite Experience into two dummy variables to separately identify executive experience in public and private firms.
- *Other Professional Experience* is a dummy variable that identifies whether the individual has professional experience in finance or law in a non-C-suite role. We consider an individual to have professional experience in finance if he has either served in a finance or accounting role, or holds a bachelors degree or higher in finance or accounting. Similarly, we consider an individual to have professional experience in law if he has either served in a legal role (e.g., General Counsel, Lawyer, IP Lawyer, etc.) or has a degree in law.

- *Patent Experience* is a dummy variable that identifies whether the individual has ever applied for a patent.
- *Experience Index* is the sum of the five experience dummies defined above. It is a category variable that takes values from 0 to 5, where 0 denotes lack of any experience and 5 denotes experience on all dimensions.
- *Experience Distance* is the normalized Euclidean vector distance between the experience vectors of the director and founder. If F and D denote the experience vectors of the founder and the director, respectively, the *Experience Distance* between the founder and director is defined as $d(F, D) = \sqrt{\sum_{i=1}^5 (F_i - D_i)^2} / \sqrt{5}$. Thus, *Experience Distance* takes values between 0 and 1, where 0 denotes that the two individuals have identical experience, and 1 denotes that their experiences are perfectly complementary.

Later-stage Outcomes:

- *Survived till Series B* is a dummy variable to identify startups that successfully progress to series B.
- *Years from Series A to B* is the time it took (in years) for the startup to progress from its first series A round to the first series B round, and is defined only for startups that survive till series B.
- *Later-stage Funds* is the total funds (in \$ millions) raised by the startup in all later-stage rounds (i.e., series B and beyond), and is defined only for startups that survive till series B.
- *VC in Later-Stages* is a dummy variable which indicates whether the startup was able to attract venture capital funding in series B or beyond, and is defined only for startups that survive till series B.
- *Successful Exit* is a dummy variable to identify startups that successfully exit via an IPO or acquisition. The dummy variables *IPO* and *Acquisition* identify the mode of exit.
- *Years to Successful Exit* is the time taken (in years) from the first series A round to eventual exit, and is only defined for startups that have a successful exit.

Internet Appendix: Additional Tests

Table IA.1 Early Board formation, Later-stage Outcomes and Successful Exits: Endogenous Treatment Regressions

This table reports the effect of Early Director on fund-raising activity in growth and late stages and the likelihood of successful exit by startups. We run a 2-stage endogenous treatment regression for each dependent variable. Column (1) shows the first-stage. The dependent variables in columns (2)-(7) are: *Later-stage funds*, is the funds raised (in \$ million) by the startup from series B onward; *VC in Later-stages* indicates whether a new VC (who did not invest in early-stages) participated in later funding rounds (series B and above); *Years from Series A to B* is the time it took for a startup from series A to series B stage; *Successful Exit* indicates whether a startup successfully exited via an IPO or Acquisition; *IPO* takes a value '1' if the startup exited via IPO and '0' if exited via acquisition; and *Years to Successful Exit* is the number of years it took for a startup to go public or get acquired since its first seed round; and *# Patents* is the number of patents filed by the founder during our sample period after appointing an outside director. We use the natural logarithm of *Outside Director Demand* and *Outside Director Supply* as the instruments in our first stage. For each startup that reached series A in year 't', we define *Outside Director Demand* as the number of series A and above startups in the same Product Market and Location in year 't' that have not yet appointed an outsider. Similarly, we define *Outside Director Supply* as the number of individuals (founders, investors and directors) who were active in the last three years in the same Product Market and location in year 't'.

We include fixed effects for the start-up's founding year (μ_t), product market category (μ_{Ind}) and start-up location (μ_{Loc}). Heteroskedasticity robust standard errors are reported in parentheses. We use ***, **, and * to denote statistical significance at 1%, 5% and 10% levels, respectively. All variables are defined in the Appendix.

Panel A: Effect of early board formation

	(1) Ln(1+Later-stage Funds)	(2) VC in Later-stages	(3) Ln(1+ Yrs. from Series A to B)	(4) Successful Exit	(5) IPO	(6) Ln(1+Yrs. to Successful Exit)	(7) Ln(1+# Patents)
Early Director	0.634*** (0.069)	0.196*** (0.020)	-0.662*** (0.038)	0.293*** (0.020)	0.155*** (0.043)	0.081 (0.052)	0.173*** (0.064)
Connected Founder & Director	0.404*** (0.046)	0.076*** (0.013)	-0.119*** (0.025)	0.006 (0.013)	0.124*** (0.028)	-0.049 (0.034)	0.394*** (0.042)
Connected Founder & Investor	1.172*** (0.040)	0.314*** (0.012)	-0.213*** (0.022)	-0.031*** (0.012)	-0.045** (0.020)	0.156*** (0.024)	0.598*** (0.037)
Director Exp. Index	0.175*** (0.008)	0.054*** (0.002)	-0.130*** (0.004)	0.024*** (0.002)	0.013*** (0.005)	0.020*** (0.006)	0.020*** (0.007)
Experience Distance	0.224*** (0.023)	0.064*** (0.007)	-0.152*** (0.013)	0.013 (0.007)	-0.012 (0.014)	0.009 (0.017)	0.123*** (0.021)
Hazard λ	0.106*** (0.041)	0.024** (0.012)	0.126*** (0.022)	-0.089*** (0.012)	0.060** (0.026)	0.079** (0.032)	-0.197*** (0.038)
Obs.	44815	44815	44815	44815	7940	7940	44815
$(\beta = 0), \chi^2/Pseudo - R^2*$	29405.924	27114.559	34200.375	16953.904	4546.413	8298.798	18038.646
$(\beta = 0), p - val$	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Startup Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Founded Yr, Prod. Market, Location F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Full			Success=1		Full	

Panel B: Effect of investor on early board

	(1) Ln(1+Later-stage Funds)	(2) VC in Later-stages	(3) Ln(1+ Yrs. from Series A to B)	(4) Successful Exit	(5) IPO	(6) Ln(1+Yrs. to Successful Exit)	(7) Ln(1+# Patents)
Investor as Early Director	0.509** (0.210)	0.107* (0.060)	-0.336*** (0.097)	0.110* (0.060)	-0.160*** (0.063)	0.144* (0.078)	-0.119** (0.053)
Connected Founder & Director	0.318*** (0.053)	0.053*** (0.015)	-0.086*** (0.024)	0.001 (0.015)	0.121*** (0.029)	-0.046 (0.032)	0.379*** (0.049)
Connected Founder & Investor	0.460*** (0.041)	0.149*** (0.012)	-0.225*** (0.019)	0.034*** (0.012)	-0.025 (0.019)	-0.037* (0.022)	0.437*** (0.038)
Director Exp. Index	0.371*** (0.020)	0.114*** (0.006)	-0.260*** (0.009)	0.015*** (0.006)	-0.012 (0.010)	0.037*** (0.011)	0.021 (0.018)
Experience Distance	0.160*** (0.021)	0.046*** (0.006)	-0.109*** (0.009)	0.000 (0.006)	-0.000 (0.011)	0.004 (0.012)	0.079*** (0.019)
Hazard λ	0.160*** (0.025)	0.122*** (0.036)	-0.346*** (0.058)	0.016 (0.036)	0.111** (0.051)	-0.242*** (0.072)	-0.142 (0.115)
Obs.	13673	13673	13673	13673	3162	3162	13673
$(\beta = 0), \chi^2/Pseudo - R^{2*}$	12904.775	11672.460	12810.396	7845.767	2860.135	4761.401	7337.606
$(\beta = 0), p - val$	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Startup Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Founded Yr, Prod. Market, Location F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Early Director=1				Early Director=1 & Success=1		Early Director=1