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Angels Don’t Fall From Heaven

Jacek Piosik

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Address:
The ROCKWOOL Foundation Research Unit
Ny Kongensgade 6
1472 Copenhagen, Denmark

Telephone +45 33 34 48 00
E-mail: kontakt@rff.dk
en.rockwoolfonden.dk/research/

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Angels Don't Fall From Heaven

Jacek Piosik, Copenhagen Business School

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I investigate the impact of angel investors' human and social capital in informal venture capital markets. I assemble a novel dataset that identifies the population of angel investors in Denmark, and I use prior experience in management and governance related roles to proxy for human and social capital. I find that angel investors with high management experience, relative to founders, obtain equity at discounted valuations, and also observe superior post-investment firm outcomes. The effects are progressive and amplified when experience is acquired in entrepreneurship. In contrast, high governance experience does not affect valuations or outcomes. These findings suggest that managerial human capital generates surplus for investees, and therefore commands an investment premium, while governance-related human capital or overall social capital does not yield similar effects. The findings provide a rationale for targeted rather than generic investment policies.

1 Introduction

Angel investors are informal venture capitalists, who invest their own wealth directly into private firms, and subsequently provide them with active support (Wetzel (1983), Lerner (1998), Prowse (1998), Mason and Harrison (2002), Wong, Bhatia, and Freeman (2009)). They constitute the primary source of external financing of early-stage firms, and account for investment volumes that are comparable to those of venture capital funds (Wilson (2011)). The importance of angel investors in financing entrepreneurship, innovation, and job-creation is well-understood, and supported by investment policies worldwide (Lerner (2009), Hellmann and Thiele (2019), Hellmann, Schure, and Vo (2021)). Yet, there is limited knowledge about this segment of equity investment, because of the inherently private and opaque nature of angel markets (Tenca, Croce, and Ughetto (2018)). Despite the consistently documented presence of experienced founders, CEOs, and other executives in these markets, the precise role of their experience has not been clearly established (White and Dumay (2017)). In particular, the perceived relationship between angel investors' experience and enhanced firm outcomes remains largely anecdotal and empirically understudied (Becker-Blease and Sohl (2007), Mason and Harrison (2008), Shane (2008), Kerr, Nanda, and Rhodes-Kropf (2014)). Moreover, the

aspect of how this experience influences investment premiums has not been examined in the finance literature.

In this study, I investigate the relationship between angel investors' executive experience, investment valuations, and firm outcomes. I ask the pertinent question: Is the human and social capital derived from executive experience valued in angel markets, and does this purported value translate to superior post-investment outcomes? I study these questions using a novel dataset, that identifies the population of angel investors in Denmark.

An extensive literature has covered the topic of resource dependence among early-stage firms (Aldrich and Auster (1986), Cassar (2004)), paying particular attention to the role of financial constraints (Chan (1983), Ueda (2004), Winston & Yeramilli (2008), Hellmann, Lindsey & Puri (2008)), as well as human and social capital constraints (Becker (1964), Coleman (1988), Hite and Hesterly (2001), Davidsson and Honig (2003)), emphasizing their impact on the long-term survival and performance of young organizations. A strand of this literature points to the emergence of private equity markets with specialized investors, such as angel investors and venture capital funds, that provide equity financing, and undertake screening, monitoring and value-adding activities (Gompers and Lerner (2001), Denis (2011)). The characteristics of these markets have been documented extensively in the context of venture capital funds (Metrick and Yasuda (2010)), emphasizing heterogeneity in investor skills (Gompers and Lerner (2005), Hochberg, Ljungqvist, and Lu (2007)), the role of value-adding activities (Bottazzi, Hellmann, and Rin (2008)), two-sided preferences and assortative matching (Sørensen (2007)), utility transfers (Hsu (2002)), and performance persistence of experienced investors (Kaplan and Schoar (2005), Korteweg and Sorensen (2015)). Angel investors have received considerably less attention in this literature, due to a lack of systematic longitudinal data. This study draws on the main insights from the venture capital literature, while acknowledging fundamental differences between venture capital funds and angel investors. In particular, angel investors invest in earlier stages of the firm life-cycle, and their active involvement is often more hands-on, extending to activities like mentoring, strategic guidance, monitoring and resource provisioning (Politis (2008)). Heterogeneity is also more pronounced among angel investors, and angel investors are not subject to fiduciary duties or other investment constraints that characterize professionally managed funds, and they may be more susceptible to non-pecuniary investment motives (Wong, Bhatia, and Freeman (2009)).

I assemble a novel dataset, that identifies the population of angel investors in Denmark. The dataset combines multiple sources of administrative register data, that I use to map all shareholders, CEOs, directors, employees and family relations in limited liability corporations (LLCs). The comprehensive information is used to identify the owners of each firm and classify them as either founders or investors. Angel investors are specifically identified under the definition, that, they are: i) not active in the operations of portfolio firms, ii) not related to founders, iii) manage their own investments, iv) invest in minority shares, and v) invest at

least 100,000 DKK (15,000 USD) at the time of entry. The definition is consistent with extant literature, that generally emphasizes these primary characteristics of angel investors (Wetzel (1983), Lerner (1998), Prowse (1998), Mason and Harrison (2002), Wong, Bhatia, and Freeman (2009))[1]. I delineate a sample of 2,711 unique investment deals, between 2000-2021, that I use to analyse the effects of angel investors' executive experience on equity valuation, as well as on ex-post firm outcomes, which serves the identification of a relationship between outcomes and investment premiums.

I use Principal Component Analysis (PCA) to construct three composite measures of accumulated executive experience, that I refer to as Management factor, governance factor and enterprise factor. Each ranges on the scale 0-10, and applies equally to angel investors and founders in the data. These factors are based on comprehensive data on founders, CEOs, private investors and directors, that encompass the universe of firms (not limited to LLCs), and account for the duration and scope of individuals' experience in each executive role. The management factor pertains to roles as founder or manager, governance factor pertains to roles as investor or director, and enterprise factor encompasses all roles. This segmentation of executive experience serves an examination of differences between human capital acquired in management and governance related experience, where the enterprise factor implies substitutability and acts as a proxy for social capital.

To examine the effects of angel investors' executive experience on valuation, I set up a hedonic regression model, that explains variability in premoney valuation in the cross-section of investment deals, controlling for year and industry fixed effects (FE) and a comprehensive battery of deal, firm and founder characteristics, that are likely to influence firm value. I interact the model with variables that indicate if investors hold superior experience, relative to founders, as indicated by higher management, governance, and enterprise factors. By construction, the estimated valuation effects are measured relative to the reference category of investment deals where angel investors hold similar or lower experience, relative to founders, in each respective experience domain.

The primary identification concern in the basic regression setup lies in the feature of unobserved firm quality, that is not captured by regression controls, as well as assortative matching that drives the pairing between more experienced investors and high-quality firms along these unobserved dimensions. This matching behaviour may potentially bias the coefficient of interest downwards, and underestimate the valuation effect of executive experience, that is of primary interest. To address these concerns, I exploit the subsamples of firms with repeat investments (558 out of 2,711 observations), and of investors with repeat investments (798 out of 2,711 observations), to control for unobserved firm quality and non-random matching characteristics in the data. I estimate a series of regression models that test the valuation effects of various combinations of superior executive experience, embedded in the management,

[1] Some recent studies, including Bach, Baghai, Stromberg, et al. (2023), which is closely related to this work, emphasize repeat investment in the definition of angel investors. I consider the subsample of repeat investors in detail in the analysis section.

governance and enterprise factors.

The main findings are the following. Investment deals where angel investors hold superior management experience, relative to founders, are robustly associated with significantly discounted equity valuations. On the other hand, superior governance experience as well as overall enterprise experience (assuming substitutability between experience domains) do not affect valuations. The baseline effect of superior management experience amounts to 10% lower premoney valuation, on average, and 25% when controlling for firm and investor fixed effects (FE), underscoring the importance of assortative matching in the data. These results are robust to unobserved matching characteristics, and a range of alternative valuation metrics, such as postmoney valuation, price-to-book ratio and price-to-sales ratio. The findings that superior governance and enterprise experience have no effect on valuation, indicate that the human capital derived from management experience is uniquely valued in angel investments, while the human and social capital derived from governance or overall enterprise experience is not. These findings relate to Politis (2012), who identifies the four main value-adding activities of angel investors, suggesting that the capacity for mentoring and strategic guidance is more important to investees than the capacity for monitoring and resource provisioning.

Expanding from this main result, I investigate channels that amplify or diminish the observed management discount. Specifically, I find that the management discount is amplified in the segment of deals, where founders have low endowments of management experience, increasing the baseline effect to 14%, and to 26% in the subsamples with repeat investments. The results indicate that the resources embedded in superior management experience exhibit declining marginal utility to founders, but may also reflect higher risk or higher effort associated with this segment of deals. I also investigate variation in the management discount, associated with the relative distance in experience between founders and angel investors. I find that high relative distance substantially amplifies the valuation discount, increasing to more than 40% when controlling for investor fixed effects (FE). Given that this effect captures the management discounts enjoyed by the most experienced angel investors in the sample, the result evidences substantial utility transfers in the matching process of angel markets, which stands in contrast to prior to literature on matching in venture capital markets (Sørensen (2007), Hsu (2002)). Lastly, I examine the nature of investors' management experience, and variation in the management discount. I find that higher founder experience is associated with progressively higher discounts. I also find that broad and narrow industry similarity is related to progressively higher discounts.

I contrast these findings with post-investment firm outcomes, to establish if the mechanism behind valuation discounts is consistent with value-creation. I use the same metric of superior management experience, that is associated with discounted equity valuations, and I interact it in regression models where I estimate variation in survival rates, revenue growth rates, employment growth rates, as well patenting rates. I find that superior management

experience is robustly associated with higher post-investment outcomes across all these measures. Moreover, the main factors that amplify valuation discounts also consistently amplify the positive effect on outcomes. The exception is broad and narrow industry similarity, which is consistently and progressively related to lower effects on ex-post outcomes. The later result may be suggestive of inefficiencies stemming from a lack of diversification in human capital.

The overall findings suggest a robust relationship between angel investors' management experience, equity valuations and post-investment outcomes of portfolio firms. The main interpretation is, that, the human and social capital acquired in management experience generates surplus in angel markets, and therefore commands an investment premium. It follows arithmetically that angel investors with high management experience earn significantly higher returns than other investors in angel markets, providing an empirical explanation of the consistent entry of seasoned executives into these markets. The findings also provide a rationale for targeted rather than generic investment policies, as they highlight the differences in socioeconomic impact of investors with different backgrounds.

This study contributes to an emerging literature on angel investments. It is closely related to a few other studies that exploit administrative micro-data to identify angel investments in population data. Andersson and Lodefalk (2020) use Swedish register data to identify 156 firms that are likely financed by angel investors, with identification relying on the entry of wealthy board members, without information about investments or equity ownership. Bach, Baghai, Strömberg, et al. (2023) use Swedish register data to identify 720 angel investors, applying a similar procedure to the one used in this study, while restricting the definition to serial investors with at least two investments in the data. The study documents the characteristics of angel investors, and highlight the disproportionate entry of experienced executives into angel investment. Kisseleva, Mjøs, and Robinson (2022) study the returns to early-stage investment using Norwegian register data, and find that firms exhibit increased performance after the entry of angel investors. This study is the first to empirically investigate the relationship between angel investors' executive experience, investment valuations and post-investment outcomes.

This work also contributes to a more general literature on venture capital, studying the role of active investors in these markets. It is most closely related to Sørensen (2007), who studies the role of bilateral preferences in matching outcomes and ex-post performance of firms, and Hsu (2002), who documents the prevalence of utility transfers in this matching process. This study documents similar market characteristics in informal venture capital markets, and highlights the specific role of management experience in matching, valuation and performance.

2 Data

The starting point of the analysis is to identify the population of angel investments in Denmark and characterize all firms, founders, investors and investment deals in detail. The main agenda is to investigate the effects of investors' human and social capital (HSC) on the pricing of investment deals and on post-investment firm performance. I construct a novel dataset that is well-suited to address these research questions.

I combine multiple sources of administrative data on firms and individuals, to generate a comprehensive mapping of all direct and indirect shareholders, board members, CEOs and employees of private limited liability corporations (LLCs) that are active between 1995-2021. I also account for family relations between individuals in the data. Exploiting this information set, I identify the owners of each firm and I classify them as either founders or external investors. Specifically, I identify angel investors under the definition that they are not related to any founders, not involved in the management or operations of the firm, manage their own investments, and invest at least 100,000 DKK (15,000 USD) at the time of entry. Following this definition, I identify 2,714 unique investment deals in the data, along with detailed information about each transaction.

To obtain relevant measures of individuals' HSC related to enterprise experience, which are key to the purpose of this study, I exploit the comprehensive mapping of founders, managers, investors and directors in all private and public firms since 1995 (not limited to LLCs), and I summarize the careers of all individuals in each of these roles. I aggregate this information using Principal Component Analysis (PCA) to obtain composite measures of management experience, governance experience, as well as an overall measure of enterprise experience.

This section describes the main data sources used for the construction of the data set. I describe the structure of the data, the measurement of economic variables, and the algorithm that I use to identify angel investments. I also provides summary statistics of the main sample used in the analysis.

2.1 Data Sources

The main data sources used for construction of the dataset are the Danish Central Business Register, Experian Denmark, and Statistics Denmark.

Administered and published by the Danish Business Authority, the Central Business Register serves as a main information repository for Danish firms. It comprises both current and historical information on all registered firms, and encompasses all legal forms, including Limited Liability Corporations (LLCs), Limited Partnerships (LPs), Unlimited Partnerships (UPs), Sole Proprietorships (SPs), and the range of institutional legal forms. In the case of LLCs, the register specifically details the identities, as well as the timing of entry and exit, of all board members, CEOs, and direct shareholders owning more than 5% equity, including their

respective equity shares. I use shareholder information to identify the ultimate owners of each firm and the vehicles through which they own equity shares. The comprehensive information about CEOs and board members is then used to classify the owners that are involved in the management and governance of each firm, as well as owners who are not involved.

Furthermore, the CVR register includes comprehensive information on all primary market transactions registered in LLCs at least since 1990. These data cover the number of shares issued, the price per share, and the transaction mode (i.e. cash, debt, assets, equity). This information provides direct measures of investment amounts, equity shares, and equity valuations in each investment deal, which is crucial to the analysis of investment deals.

The dataset is further supplemented with firm-specific data from the commercial database Experian. These data contain detailed income statements and balance sheets of Danish LLCs, collated from mandatory annual reports submitted between 1995 and 2021. It includes data on assets, equity and earnings (EBIT), which I use to track the financial characteristics and performance of LLCs in the data. The Experian database also includes manually collected information about shareholders in LLCs, which complements and enhances the information available in the Central Business Register. I combine the firm data with information on patent registrations submitted by Danish firms during the data period, which are kindly provided by the Danish Patent and Trademark Organization.

The data on firms and individuals are then integrated with register data from Statistics Denmark. These registers are sourced directly from relevant authorities, such as the Tax Authority, that are authorized to collect and retain private information about firms and residents in Denmark, which ensures universal coverage of these populations.

Statistics Denmark's registers contains comprehensive demographic information about individuals. This includes primary characteristics such as gender, age, income and wealth. It also includes links between parents, children and spouses, that I expand to account for all siblings, grandparents, cousins, uncles/aunts and in-laws as well. Information about family relations is used to identify investors that are related to founders, which is a key criterion for exclusion of angel investments (reference). I combine the primary demographic information with detailed education data, that include the level and field of education, and the GPA score in secondary school. I code the education level in terms of equivalent years of schooling, ranging over the values 9, 12, 15, 17 and 20, that correspond to primary school, secondary school, BSc degree, MSc degree, and PhD degree, respectively.

The register also includes universal labor market data that is sourced from income tax statements reported by employers. These data offer comprehensive links between all employers and employees between 1995 and 2021, and include detailed information such as salaries, hours and occupational codes. I use this information to identify any shareholders that are also employees of a given firm, which is another key criterion for exclusion of angel investments, as well as for identification of founders. The labor market data is also used to account for the

real employment level of all firms in the data, excluding any salaries that are paid to owners. I code firm employment in terms of full-time equivalents (FTE), which amounts to 1924 hours during a year by Danish standards.

Furthermore, Statistics Denmark provides comprehensive revenue data of all firms that are subject to VAT collection. This applies to essentially all LLCs in the data, as well as most other legal forms, with some few exceptions in the health and education sectors. The data is obtained from mandatory VAT statements reported to the Tax Authority. The comprehensive revenue data, as well as firm-level employment data, are used to supplement the financial information on LLCs in the main sample of angel investments, and to account in detail for firm characteristics (not limited to LLCs) in the classification of individuals' experience records from enterprise activities.

2.2 Identification of Angel Investments

I develop an algorithm, that identifies angel investors within the larger population of individual shareholders in privately owned LLCs. While the ownership structures of LLCs can be complex and involve multiple levels of intermediate ownership, such as holding or investment vehicles, ultimate shareholders are per definition either individuals or institutions. I refer to ultimate shareholders as owners. I identify all owners with respect to each firm, and I classify an eligible subset of them as angel investors.

The starting point is 588,784 LLCs that are active between 1995-2021, with all direct shareholders recorded over the life-cycle, including their respective equity shares. I derive the owners of each LLC, as well as any vehicles that lie between them, by recursively tracking shareholder information through all levels of upstream and downstream ownership. This process generates a comprehensive and time consistent mapping between LLCs that emerge in the bottom levels, any number of intermediate vehicles, and the owners that emerge in the top level. All owners are identified as either individuals, institutions, or foreign direct investors, and in some few cases they remain unclassified in the data. The mapping of ownership across the network of LLCs allows for identification of any investment or acquisition events that occur in the data, as well as the vehicles and owners that participate in these transactions.

The population of firms, that I consider as investment targets of angel investors, are all operating firms, that are either organized in a single LLC, with no downstream investments, or in a closed-circuit enterprise structure, that is characterized by a parent LLC that wholly owns one or more subsidiaries. In the later case, the level of investment is the parent LLC. In keeping with prior literature, I exclude firms in the financial and real estate sectors. I also exclude professional service firms in the fields of consulting, law and accounting (reference).

I classify individual owners of each firm as either founders or external investors under the main assumption that external investors are not active in the management or operations of their portfolio firms. This classification extends to the level of the investment vehicle, where

applicable. In practice I classify all owners that hold a CEO position or receive salary from the firm as founders. In addition, I consider as 'founders' (or friends, family and fools) any relatives of founders, as well as any shareholders that enter at the time of incorporation when all shares are issued at par value, or in a single security class. I consider seed stage investments in cases with multiple security classes issued during the year.

I identify investment events by corresponding changes in direct shareholder composition with coinciding primary market transactions. If there are no primary market transactions, the event is classified as a (partial) acquisition. I assume that investors enter by means of cash or debt conversion, and I disregard any share issues at par value. When there are multiple securities issued during the year (which affects few cases), I rank them by the highest share price and allocate issued shares according to quoted equity ownership in the shareholder register. I classify investors at the level of vehicle, where relevant, by the ownership composition and involvement of owners. Vehicles that are owned primarily by institutions or foreign direct investors are classified as 'private equity funds'. I classify as angel investors any vehicles (or direct investors), that are primarily owned by individuals, and are actively managed by their owners. The later restriction excludes professionally managed investments and corporate investments, that are also classified as 'private equity funds' for simplicity.

Focusing on investments between 2000-2021, that involve between 5% and 50% of share capital and a minimum investment amount of 100,000 DKK (15,000 USD), I identify all deals with participation of angel investors. With the research question in mind, I exclude deals that are co-invested with private equity funds. I also exclude deals with no active founders in the target firm (i.e. professionally managed firms). These criteria result in a main sample of 2,711 unique investment deals, that involve 2,414 firms, 5,639 investors and 6,414 founders.

Using the transaction data from the Central Business Register I record the investment amount, the amount of shares issued and the total amount of share capital relevant to each transaction. These metrics are used to calculate postmoney valuation, which is defined as the market capitalization at the issued share price, as well as premoney valuation, which is defined as postmoney valuation excluding the investment amount.

2.3 Measurement of Human and Social Capital

To quantify the human and social capital acquired in previous enterprise experience, which is central to this study, I summarize the accumulated experience of all individuals in the roles of founders, managers, investors, and directors. I use all available data, at least since 1995, and I consider any experience acquired within firms that have at least one regular employee. I include all eligible LLCs, Sole Proprietorships, Limited and Unlimited Partnerships, Institutions, Foundations, and Public Organizations. I assign one main role for each individual-firm relation over time, such that the 4 experience categories are mutually exclusive and collectively

exhaustive.[2]

I consolidate all experience records, where I consider the number of years and firms associated with each role, the average and maximum firm size in terms of employment, as well as the average and maximum total employment in cases that involve the same role in multiple firms. I also document the primary industry for each role, and the average equity shares held in each role (by construction managers and directors own no significant equity shares). These metrics are grouped into three main categories: management, governance, and enterprise. Management refers to roles as founder or manager, governance refers to roles as investor or director, and enterprise encompasses all roles. By design, management and governance are mutually exclusive categories, and enterprise is a composite of the two categories. The distinction between management and governance captures the fundamentally different activities that are associated with actively managing or actively monitoring firms, which are likely to engender different specializations in human capital, that may in turn have different impact in the context of angel investments. The composite category, enterprise experience, captures the aggregate human and social capital acquired in all prior roles, without regard for differences in human capital specialization, and is a useful starting point for analysing the impact of investors' experience.

To capture the intensity and scope of each type of experience, I use Principal Component Analysis (PCA) to generate a composite index for each category. I estimate three separate PCA models, each using the same set of variables and their interactions. I focus on average and maximum firm employment, as well as total employment, that accounts for simultaneous roles in multiple firms. I do not interact the models with experience duration to mitigate the influence of data censoring in 1995. All input variables are winsorized to the 99. percentile and normalized to reduce the influence of extreme outliers and scale discrepancies. Only individuals with positive experience are included in the estimates. I retain the first principal component for each model. Table 14 in the appendix reports the eigenvalues, explained variance and factor loadings for the three PCA models. The first principal component in each model has an eigenvalue greater than 4, explains more than 80% of variance, and all input variables exhibit positive factor loadings greater than 0.80, which ensures a robust correspondence between input criteria and predicted factor scores.

The log-normalized factor scores of individuals are used as proxies for the level of HSC associated with each experience category. To provide a meaningful segmentation of individuals based on these factor scores, I use a clustering algorithm to group individuals into 10 factor tiers, that minimize within-group variance in factor scores, while maximizing between-group variance. This method generates an unequal distribution of individuals across tiers, but allows for a more clear interpretation of the data. In particular, belonging to a higher tier is associated

[2] Conceptually, founders are defined as shareholders that either receive salary or hold a management position in the firm, and conversely, investors are shareholders that neither receive salary nor hold management positions in the firm. Professional managers and directors are defined as executives that may receive salary, but are not shareholders in the firm. Regular employees receive salary but are neither managers, directors, nor shareholders.

with substantially higher experience. The results presented in this study are however robust to other grouping mechanisms for capturing differences between individual factor scores, such as quintiles, or even discrete differences in predicted scores.

I introduce the ordinal variables MANAGEMENT, GOVERNANCE, and ENTERPRISE, each spanning a scale from 0 to 10, that present a distinct hierarchical structure of individuals within each experience domain, which applies to both investors and founders in the data. Table 1 provides a breakdown of mean experience records across these divisions. The lowest tier consists of individuals with no recorded experience, while the subsequent tiers are consistently associated with elevated mean values of the input criteria. For example, belonging to the highest management tier, is associated with managing 1,150 employees in the the record year, and 14.6 years of experience on average. I refer to these variables as management factor, governance factor and enterprise factor, respectively.

Table 1. Average Experience Records in Each Factor Category and Factor Tier

The table reports the mean experience records and number of observations across factor categories management, governance and enterprise, and across tiers within each category, ranging between 0 and 10. Individuals in tier 0 have no recorded experience in the relevant category. The variables n years and n firms denote the total number of years and firms that an individual has held in the roles relevant to each category. Peak employment denotes the record number of employees (measured in FTEs) across all firms associated with each category in a given year. Equity is a composite index, ranging between 0 and 1, which measures the mean ownership share associated with each factor category.

FACTOR TIER	0	1	2	3	4	5	6	7	8	9	10
MANAGEMENT											
EMPLOYMENT RECORD	0.0	1.7	4.6	10.8	19.4	26.3	40.2	65.7	117.2	299.6	1150
N YEARS	0.0	2.9	6.5	9.4	10.6	11.1	12.7	13.8	14.3	14.8	14.6
N FIRMS	0.0	1.2	1.5	2.0	2.3	2.5	3.1	2.9	3.7	4.4	4.2
EQUITY (PCT)	0.0	0.46	0.43	0.35	0.35	0.35	0.33	0.29	0.25	0.21	0.10
GOVERNANCE											
EMPLOYMENT RECORD	0.0	1.9	4.6	9.3	15.3	22.3	35.2	71.3	149.6	349.8	2189
N YEARS	0.0	2.4	3.8	5.1	5.6	6.4	7.7	8.9	10.3	11.8	13.6
N FIRMS	0.0	1.2	1.7	2.3	2.9	3.7	4.3	6.4	9.3	15.0	24.5
EQUITY (PCT)	0.0	0.17	0.16	0.14	0.12	0.13	0.13	0.10	0.09	0.09	0.07
ENTERPRISE											
EMPLOYMENT RECORD	0.0	2.1	4.4	6.8	11.8	22.7	43.3	81.2	165.7	480.3	2631
N YEARS	0.0	3.1	5.3	7.5	9.0	10.1	12.0	13.5	14.8	15.6	16.1
N FIRMS	0.0	1.3	1.7	2.1	2.6	3.6	5.2	6.7	9.5	16.2	25.8
EQUITY (PCT)	0.0	0.42	0.39	0.39	0.35	0.30	0.27	0.22	0.19	0.14	0.09

2.4 Summary Statistics

This section presents summary statistics of the main sample used in the analysis. The sample contains 2,711 unique investment deals that involve 2,414 firms, 6,414 founders and 5,639 investors. In order to characterize the interactions between founders' and investors' factors at the level of investment deals, I consider the highest factor tiers within each team in cases

with more than one agent on either side. I also define the binary variables ENTERPRISE$^+$ and ENTERPRISE$^-$, that indicate if investors belong to a higher factor tier than founders, or to a lower (or similar) factor tier. Similar variables are defined for management and governance factors.

Table 2 present the main characteristics of firms, founders, investors and investment deals in the sample, segmented between deals where investors have higher or lower enterprise factors, compared to founders. The breakdown of variables reveals that differences in characteristics, unrelated to HSC, are generally small across the divisions ENTERPRISE$^+$ and ENTERPRISE$^-$. Significant differences amount to higher revenue and employment, as well as larger and older founder teams in the segment of ENTERPRISE$^+$ deals. The most notable differences are however present investors' factor levels, which are substantial. On average, investors lie 3.68 factor tiers higher in terms of enterprise factor, and 3.53 in terms of management factor in ENTERPRISE$^+$ deals. The main focus of the analysis is on the relationship between investors' higher experience factors, and the pricing of investment deals. The table shows insignificant differences in pricing metrics premoney valuations, price-to-book, and price-to-sales ratios across the two segments, but all measures these measures are generally higher for the reference group. However, investors in the ENTERPRISE$^+$ group may either have higher management factor, higher governance factor, or both.

Two-sided matching preferences are a general feature of angel markets, which is also evident in the main sample data. Table 8 and Table show the average matching outcomes of founders an investors in the sample, for observations in each factor tier. These figures display a tendency of both founders and investors to match with more experienced counter-parties, as they become increasingly more experienced, evidencing assortative matching patterns in the market.

Table 2. Main Characteristics: Firms, Founders, Investors and Investment Deals

The table presents main characteristics of firms, founders, investors and investment deals in the main sample, containing 2,714 unique deals. The sample is segmented between deals where founders have respectively 'low' or 'high' enterprise factors, which corresponds to factor tiers 1, 2 and factor tiers higher than 2. Each subsample is also split between deals with superior enterprise factors, ENTERPRISE$^+$, and deals with inferior (or similar) enterprise factors, ENTERPRISE$^+$. The table reports sample means and difference in means. Management, governance and enterprise refers to the maximum factor in each category across founder and investor teams. Premoney valuation is defined as market capitalization at the issued share price, excluding the investment. Price-to-book and price-to-sales are defined as premoney valuation divided by book assets and revenue respectively, and are only defined for firms with non-zero assets or revenue. Seed stage refers to deals that occur during the year of incorporation, and debt conversion is an indicator for use of debt securities in the transaction. P-values of difference-in-means tests are not reported, (*), (**) and (***) indicate statistical significance at the 10%, 5% and 1% level, respectively.

	ALL DEALS		ENTERPRISE$^-$		ENTERPRISE$^+$		DIFFERENCE
	MEAN	SD	MEAN	SD	MEAN	SD	(-) - (+)
FIRMS:							
AGE	3.59	4.86	3.77	4.76	3.47	4.93	0.29
ASSETS (M DKK)	6.50	13.19	7.45	15.34	5.87	11.46	1.58**
REVENUE (M DKK)	7.50	24.24	7.83	27.39	7.28	21.85	0.55
EMPLOYEES (FTES)	3.81	9.54	4.45	12.44	3.38	6.89	1.07**
PATENTS (YES = 1)	0.09	0.28	0.10	0.30	0.08	0.27	0.02
POSITIVE EBIT (YES = 1)	0.44	0.50	0.44	0.50	0.44	0.50	0.00
FOUNDERS:							
AGE	43.67	9.29	45.55	9.15	42.39	9.17	3.15***
TEAM SIZE	2.37	1.32	2.74	1.43	2.11	1.17	0.63***
MALE (YES = 1)	0.87	0.27	0.88	0.23	0.85	0.29	0.028**
EDUCATION (YEARS)	14.08	2.24	14.02	2.08	14.11	2.34	−0.09
MANAGEMENT FACTOR	3.90	3.17	5.45	3.44	2.85	2.48	2.60***
GOVERNANCE FACTOR	3.06	2.99	4.46	3.46	2.11	2.15	2.34***
ENTERPRISE FACTOR	4.09	3.15	5.80	3.29	2.94	2.45	2.86***
INVESTORS:							
MANAGEMENT FACTOR	5.68	3.40	3.57	3.05	7.11	2.84	−3.53 ***
GOVERNANCE FACTOR	4.73	3.40	2.98	2.75	5.92	3.28	−2.94 ***
ENTERPRISE FACTOR	6.03	3.17	3.83	2.96	7.52	2.33	−3.68 ***
DEALS:							
INVESTMENT (M DKK)	1.87	3.20	1.86	3.27	1.89	3.15	−0.03
PREMONEY	8.84	14.97	9.45	16.27	8.42	14.00	1.02
P/B	4.36	8.82	4.58	9.53	4.22	8.31	0.36
P/S	12.91	37.32	13.51	36.24	12.51	38.03	1.00
DEAL ROUND (1, 2+)	1.17	0.37	1.22	0.42	1.13	0.33	0.10***
SEED STAGE	0.20	0.40	0.18	0.38	0.21	0.41	−0.04 *
DEBT SECURITIES	0.19	0.40	0.20	0.40	0.19	0.39	0.15
OBSERVATIONS	2,711	2,711	1,095	1,095	1,616	1,616	

Figure 1. Founders' Experience Levels and Counter-party Matching Outcomes

The figures show average matching outcomes in the main sample (y-axis), conditional on the factor tier of founders (x-axis). The factor categories enterprise and management are represented in the left and right panels respectively. The upper panels show the average factor level of matched investors for each tier of founders, compared to the average factor level of investors in the sample (denoted random match). The lower panels show the share of matches that involve investors with 'high' factor levels, defined as above median factor scores in the pool of investors, as well as investors that belong to factor tiers 9 or 10. All matching outcomes are averaged across sample years and weighted by the number of observations in each year.

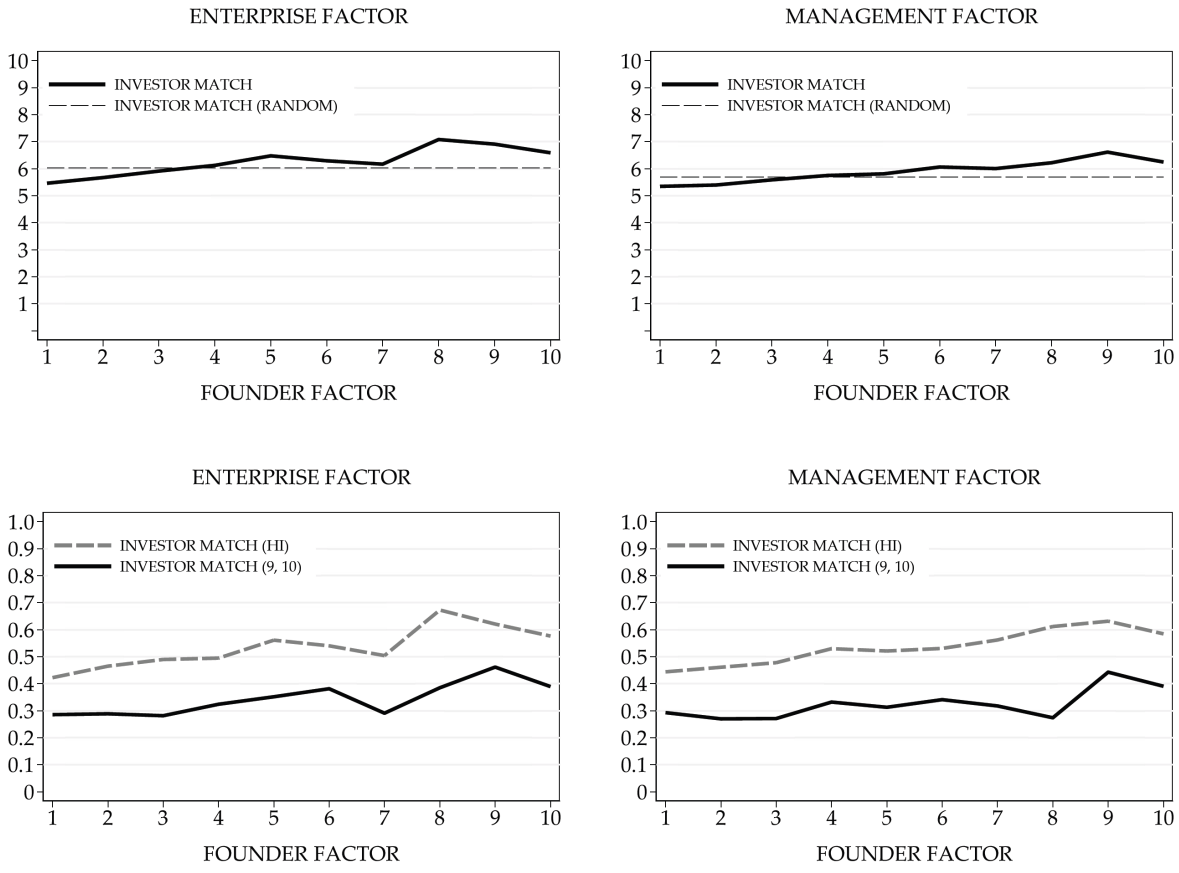
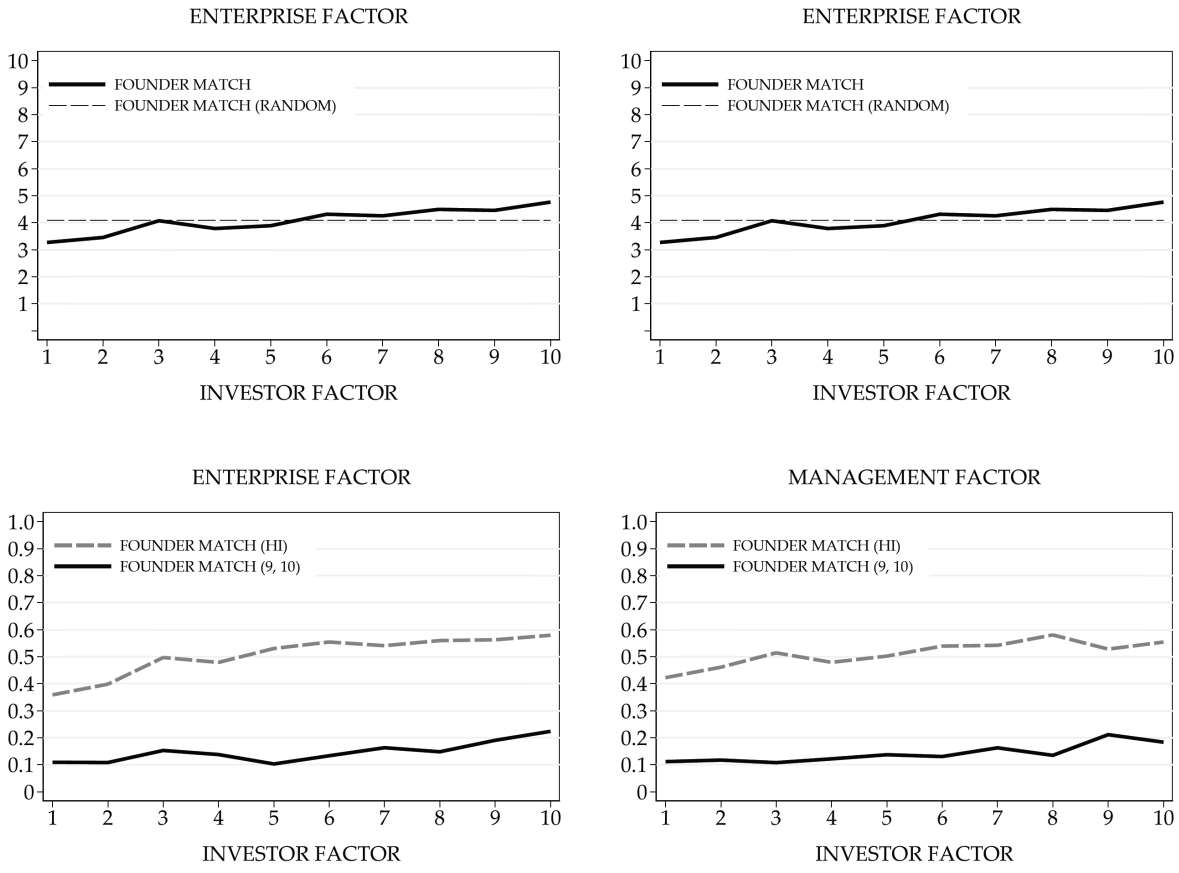


Figure 2. Investors' Experience Levels and Counter-party Matching Outcomes

The figures show average matching outcomes in the main sample (y-axis), conditional on the factor tier of investors (x-axis). The factor categories enterprise and management are represented in the left and right panels respectively. The upper panels show the average factor level of matched founders for each tier of investors, compared to the average factor level of founders in the sample (denoted random match). The lower panels show the share of matches that involve founders with 'high' factor levels, defined as above median factor scores in the pool of founders, as well as founders that belong to factor tiers 9 or 10. All matching outcomes are averaged across sample years and weighted by the number of observations in each year.



3 Analysis

This section provides an empirical analysis of the hypotheses outlined in the introduction. In the first part I present evidence that investors with superior enterprise factors invest at discounted equity valuation. I analyse the components of the enterprise factor in detail and demonstrate that the valuation discount is entirely attributed to superior management factor, after controlling for factor correlations. Expanding from this key finding, I examine moderating effects of other characteristics related to the matching of founders and investors. In particular, I show that the valuation discount is amplified when founders have low management factor, and when the relative magnitude of investors' management factor is high. The discount is also amplified when investors' management factor is acquired in a founder role, or within the industry of the target firm. In the second part of the analysis, I demonstrate that superior management factor is related to higher ex-post firm performance, thus reciprocating the effects on equity valuation. I also show that the moderating factors identified in the valuation analysis amplify the positive effects of superior management factor on firm performance, except for industry congruence that shows opposite effects.

3.1 Part 1: Investment Valuation

The first step of the analysis is to create a regression model that explains equity valuation based on observable characteristics of the economic environment, firms, founders, and investment deals. This will be used as a benchmark model for estimating any additional effects of investors' HSC. In practice I estimate these effects by including a binary variable that indicates if investors have higher factors than founders, which provides for a direct comparison between investors' HSC in the cross section of investment deal. I use the following regression formulation to analyse investment valuation throughout this section (subscripts omitted):

$$\text{LOG(PREMONEY)} = \beta_0 + \beta_1 \text{ENTERPRISE}^{+} + \beta_2 \text{X} + \text{F} + \text{I} + \mu + \varepsilon \tag{1}$$

The dependent variable LOG(PREMONEY) denotes logged premoney valuation in the investment deal. This is an absolute measure of firm value, which is generally preferred in the context of entrepreneurial finance, as comparative metrics like assets, revenue, or earnings can be particularly volatile and sensitive to accounting deficits in the early stages of the firm's life cycle. However, I test the robustness of the main estimates using other pricing metrics below. The main explanatory variable, ENTERPRISE^{+}, indicates if investors have higher enterprise factor than founders. X is a vector of control variables, F denotes firm fixed effects (FE), I denotes investor fixed effects (FE), and μ contains fixed effects (FE) by industry and year. ε is an error term. Three main sets of control variables are included, which take into account characteristics of the investment deal, the firm, and the founder team, that are likely to

influence the firm's equity valuation. Deal controls include the logged investment amount and its square and its square. They also include an indicator of seed stage, defined as the year of incorporation, the financing round number (coded as 1 or 2+), an interaction term that measures logged investment from previous rounds, and a binary variable that indicates if shares are issued by means of debt conversion. Firm controls include firm age and logged revenue, assets and employment. They also include the leverage ratio, the revenue growth rate, an indicator of positive EBIT, and an indicator of patent holdings. Founder controls include the main characteristics of all founders, including any inside investors from previous rounds. These include team size (capped at 5), gender composition, mean age and education, as well as the highest factors in each respective category, management, governance and enterprise, that are included as linear terms. They also include an indicator of foreign or institutional minority interests. In order to avoid multicollinearity issues that could distort the estimated effects, investor characteristics are not included in the model. These are likely to serve as 'bad controls' in a context where focus is primarily on the effects of superior enterprise experience.

I include firm fixed effects (FE) and investor fixed effects (FE) in the model to control for unobserved time-invariant firm and investor characteristics that might simultaneously influence matching and equity valuation. I exploit the subsamples with repeat investments within firms (558 out of 2,711 observations) and within investors (798 out of 2,711 observations) to include these estimators, while acknowledging the potential attrition bias in the respective subsamples. In particular, firms with repeat investments are likely to be of higher quality, and serial investors are on average more experienced. However, given that matching is non-random in angel markets, the primary identification concern is that unobserved firm quality and assortative matching with more experienced investors along this dimension may bias the coefficient of interest downwards. Firm fixed effects (FE) and investor fixed effects (FE) are particularly useful in addressing these concerns. I discuss some issues related to the inclusion of these estimators and their interpretation below.

The results of regression model (1) are presented in Table 3. The table shows 7 successive regressions, that each incorporate progressively more controls. The initial results show that ENTERPRISE^{+} is robustly associated with lower equity valuation, when controlling for industry and year FE (2), deal characteristics (3), firm characteristics (4) and founder characteristics (5), with a positive and significant coefficient of -0.0860***, implying that investors with higher enterprise factor obtain equity at lower prices, relative to investors without. However, when accounting for firm fixed effects (FE) in model (6), the significance diminishes, and when including investor fixed effects (FE) in model (7) the coefficient becomes positive. The valuation discount associated with higher enterprise factor is evidently not robust to controlling for unobserved, time-invariant firm or investor characteristics, suggesting that the initially observed effects are driven by other factors. These last results might also be attributed to limited variation in the explanatory variable within firms and investors. Either way, this initial

finding paves the way for a more in-depth analysis, focusing on the two main components of the enterprise factor, which are management and governance factors.

Table 3. Primary Effects of Superior Enterprise Factor on Equity Valuation

The table presents OLS regression results, with dependent variable log(premv), that measures the logged premoney valuation of investment deals, regressed on the explanatory variable, ENTERPRISE$^+$, that indicates if investors are superior in enterprise factor and a comprehensive set of controls. Each model includes progressively more controls. Year and industry fixed effects (FE) are included first. Deal controls include the logged investment amount and its square, the financing round number (coded 1 or 2+), and an interaction term that measures logged investment from previous rounds. Deal controls also include an indicator for seed stage, defined as investment during the initial year of incorporation, and an indicator for debt securities used in the transaction. Firm controls account for firm age and logged values of revenue, assets and employees. They also include the debt ratio, revenue growth rate, and indicators of positive EBIT and patent holdings. Founder controls include the main characteristics of all founders, including any informal investors from previous financing rounds. These include team size (1-5), mean age, gender, years of education, and indicators of institutional or foreign minority interests. They also include the highest values of enterprise, governance and management factors (tiers) across the founder team. The last two models include firm fixed effects (FE) and investor fixed effects (FE) respectively. (*), (**) and (***) indicate statistical significance at the 10%, 5% and 1% level, respectively.

LOG(PREMONEY)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ENTERPRISE$^+$	-0.0951*	-0.0966*	-0.120***	-0.114***	-0.0860***	-0.0893	0.0501
	(0.0509)	(0.0505)	(0.0289)	(0.0286)	(0.0317)	(0.0860)	(0.110)
YEAR FE		+	+	+	+	+	+
INDUSTRY FE		+	+	+	+	+	+
CONTROLS DEAL			+	+	+	+	+
CONTROLS FIRM				+	+	+	+
CONTROLS FOUNDER					+	+	+
FIRM FE						+	
INVESTOR FE							+
R^2	0.00129	0.0317	0.691	0.702	0.714	0.671	0.731
OBSERVATIONS	2,711	2,711	2,711	2,711	2,711	2,711	2,711
PANELS						2,414	2,216

The initial results indicate that a superior enterprise factor is related to discounted valuations. As this factor is a composite of management and governance experience, the next regressions dissects this factor into its primary components, to examine more closely the specific drivers behind the observed effect. Given the intrinsic correlation between these three factors, a 'horse race' regression framework is employed to assess each factor's contribution to the observed discount, by incorporating them in various combinations. The regression model in (1) is adapted to include the indicator variables GOVERNANCE$^+$ and MANAGEMENT$^+$. The model is estimated including the full set of controls and the additional variables are introduced in combination to assess their relative significance.

Table 4 presents the main results of the regression analysis. The table presents six regressions, where the first three models include one indicator at the time, and the subsequent three models incorporate all three simultaneously, with the last two also including firm fixed effects (FE) and investor fixed effects (FE), respectively. The results indicate that, when included individually, all three factors are associated with negative and significant effects on equity valuation, where superior management factor exerts the largest effect, with the coefficient

-0.103*** representing a substantial economic effect, that amounts to approximately 10% lower valuation on average. Interestingly, when all three factors are included simultaneously in model (4), the coefficients of enterprise and governance factors, which were previously negative and significant, become insignificant, while the coefficient on management factor is largely unaffected. Including firm fixed effects (FE) and investor fixed effects (FE) in models (5) and (6), the negative valuation effect of MANAGEMENT$^+$ increases to -0.251** and -0.250**, respectively, implying substantially larger effects when controlling for unobserved firm and investor characteristics in the data. The coefficient estimates of MANAGEMENT$^+$ are remarkably similar in the two subsamples, and are likely attributable to unobserved firm quality, as well as assortative matching on this dimension, that drives the pairing of more valuable firms with more experienced investors. This feature of the data leads to a downward bias in the baseline coefficient estimate when firm or investor fixed effects (FE) are not included. Interpretation and generalization of the results in the last two models requires some caution however, as they pertain to within-firm and within-investor variation in the explanatory variables across smaller subsamples, that are characterized by potentially higher firm quality and investors with higher factor scores.

The results imply that, after accounting for the valuation effect of superior management factor, higher governance or enterprise factors, that are per construction mainly related to investment and director experience, do not entail any valuation discount. Table 15 in the appendix reports additional regression results where the three factors are evaluated pairwise. These results confirm that only MANAGEMENT$^+$ remains significant when included with the other factors, which leads to the conclusion that their effects are primarily driven by correlation with superior management factor.

Relating these findings to prior literature, Politis (2008) identifies the four main value-adding activities of angel investors as mentoring, strategic guidance, monitoring and resource provisioning, relating by varying degree to the human and social capital of investors. One interpretation of the regression results is, that, founders attach more value to the mentoring and strategic guidance that an investor with higher management factor might provide, beyond the monitoring capacity and resource provisioning of investors that are primarily experienced in governance roles, and connect to larger networks than founders. Evidently the human and/or social capital embedded in higher governance or higher enterprise factors does not affect valuations.

In order to evaluate the robustness and generality of these key findings, I estimate the same regression models where I include as dependent variable the four main pricing metrics used in the finance literature, which are postmoney valuation, price-to-book ratio, price-to-assets ratio and price-to-earnings ratio. The relative metrics are only applicable to firms that have positive values of the denominator, resulting in a varying number of observations across specifications. Table 5 displays the main results with the full set of controls across

all these measures, which confirm the robustness of the main findings. The results from the previous analysis are robust across all pricing metrics, all though not significant in the case of price-to-earnings ratio. In all cases, when controlling for the presence of higher management factor, investors with higher governance or enterprise factors are not associated with valuation effects. These results also hold in the subsamples with firm fixed effects (FE) and investor fixed effects (FE), which are not reported.

Overall, these results confirm that investors with higher management factor invest at substantially lower equity valuations, compared to investors without. They suggest that the human capital specialization of investors is more important than their social capital (proxied by higher governance and enterprise factors), and imply human capital cultivated in management roles is uniquely valued. These key findings are central contributions of this study, that demonstrate the importance of management experience in angel markets, and contribute to our understanding of the role of investors' human and social capital. In particular they provide a first order rationale for the disproportionate entry of experienced founders and managers into angel markets.

Table 4. Joint Significance of Enterprise, Governance and Management Factors

The table presents OLS regression results, with dependent variable log(premv), that measures the logged premoney valuation of investment deals, regressed on explanatory variables ENTERPRISE$^+$, GOVERNANCE$^+$ and MANAGEMENT$^+$, that indicate if investors are superior in each respective factor and a set of controls. Year and industry fixed effects (FE) are included. Deal controls include the logged investment amount and its square, the financing round number (coded 1 or 2+), and an interaction term that measures logged investment from previous rounds. Deal controls also include an indicator for seed stage, defined as investment during the initial year of incorporation, and an indicator for debt securities used in the transaction. Firm controls account for firm age and logged values of revenue, assets and employees. They also include the debt ratio, revenue growth rate, and indicators of positive EBIT and patent holdings. Founder controls include the main characteristics of all founders, including any informal investors from previous financing rounds. These include team size (1-5), mean age, gender, years of education, and indicators of institutional or foreign minority interests. They also include the highest values of enterprise, governance and management factors (tiers) across the founder team. The last two models include firm fixed effects (FE) and investor fixed effects (FE) respectively. (*), (**) and (***) indicate statistical significance at the 10%, 5% and 1% level, respectively.

LOG(PREMONEY)	(1)	(2)	(3)	(4)	(5)	(6)
ENTERPRISE$^+$	-0.0860***			0.0132	0.0534	0.170
	(0.0317)			(0.0528)	(0.124)	(0.131)
GOVERNANCE$^+$		-0.742**		-0.0466	0.0403	0.118
		(0.0297)		(0.0366)	(0.0956)	(0.106)
MANAGEMENT$^+$			-0.103***	-0.0935**	-0.251**	-0.250**
			(0.0308)	(0.0454)	(0.110)	(0.124)
YEAR FE	+	+	+	+	+	+
INDUSTRY FE	+	+	+	+	+	+
CONTROLS DEAL	+	+	+	+	+	+
CONTROLS FIRM	+	+	+	+	+	+
CONTROLS FOUNDER	+	+	+	+	+	+
FIRM FE					+	
INVESTOR FE						+
R^2	0.714	0.714	0.714	0.715	0.677	0.728
OBSERVATIONS	2,711	2,711	2,711	2,711	2,711	2,711
PANELS					2,414	2,216

Table 5. Robustness of Main Valuation Effects under Alternative Pricing Metrics

This table presents the results of ordinary least squares (OLS) regressions with five different outcome variables regressed on explanatory variables ENTERPRISE$^+$, GOVERNANCE$^+$, MANAGEMENT$^+$, that indicate if investors are superior in each respective factor and a comprehensive set of controls. The outcome variables log(premv) and log(postmv) measure the logged premoney and postmoney valuations of investment deals, while LOG(P/B), LOG(P/S) and LOG(P/E) measure the logged ratios of premoney valuation divided by book assets, revenue and earnings (EBIT), respectively. The fraction metrics are only applicable to firms positive positive values of the numerator. All models are estimated using the same set of controls. Year and industry fixed effects (FE) are included. Deal controls include the logged investment amount and its square, the financing round number (coded 1 or 2+), and an interaction term that measures logged investment from previous rounds. Deal controls also include an indicator for seed stage, defined as investment during the initial year of incorporation, and an indicator for debt securities used in the transaction. Firm controls account for firm age and logged values of revenue, assets and employees. They also include the debt ratio, revenue growth rate, and indicators of positive EBIT and patent holdings. Founder controls include the main characteristics of all founders, including any informal investors from previous financing rounds. These include team size (1-5), mean age, gender, years of education, and indicators of institutional or foreign minority interests. They also include the highest values of enterprise, governance and management factors (tiers) across the founder team. (*), (**) and (***) indicate statistical significance at the 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)
	LOG(PREMONEY)	LOG(POSTMONEY)	LOG(P/B)	LOG(P/S)	LOG(P/E)
ENTERPRISE$^+$	0.0132	0.0156	0.00713	0.0738	0.0143
	(0.0528)	(0.0420)	(0.0550)	(0.0600)	(0.135)
GOVERNANCE$^+$	-0.0466	-0.0368	-0.0388	-0.0557	0.0908
	(0.0366)	(0.0291)	(0.0381)	(0.0415)	(0.0946)
MANAGEMENT$^+$	-0.935**	-0.0769**	-0.110**	-0.141***	-0.0953
	(0.0454)	(0.0361)	(0.0473)	(0.0516)	(0.117)
YEAR FE	+	+	+	+	+
INDUSTRY FE	+	+	+	+	+
CONTROLS DEAL	+	+	+	+	+
CONTROLS FIRM	+	+	+	+	+
CONTROLS FOUNDER	+	+	+	+	+
R^2	0.708	0.796	0.695	0.839	0.437
OBSERVATIONS	2,711	2,711	2,660	2,413	1,201

3.2 Moderating Factors of the Management Discount

The findings above show that superior management experience is associated with significantly discounted equity valuations. Expanding from this result, I examine channels that might attenuate or amplify the main effects.

I first test the moderating effects of founders' management factors, denoted FOUNDER_M. This relates to the endowment hypothesis, discussed in the introduction, arguing that the HSC of investors is more valuable to inexperienced founders, potentially leading to larger discounts in this segment. In order to test the hypothesis, I segment founder teams into two categories, denoted FOUNDER_M$_L$ and FOUNDER_M$_H$, that pertain to factor tiers 0, 1, 2, and tiers higher than 2, respectively. The division corresponds roughly to the sample median among founder teams. I interact these variables in turn with the main explanatory variable, MANAGEMENT$^+$, to evaluate any changes in the observed discount.

Table 6 reports the regression results, using the full set of controls in all specifications,

and including firm fixed effects (FE) and investor fixed effects (FE) in the last two models. Panels (1) and (2) show that the negative coefficient on MANAGEMENT$^+$ changes from -0.103*** to -0.158*** when including an interaction with the linear term, FOUNDER_M, denoting founders' management tier. The higher coefficient on MANAGEMENT$^+$ now represents the baseline effect when the interaction term is zero, i.e. when founders belong to the lowest tier. Evidently, the least experienced founders encounter the largest discounts. In models (3), (4) and (5) I partition MANAGEMENT$^+$ into interactions with FOUNDER_M$_{\text{L}}$ and FOUNDER_M$_{\text{H}}$ to highlight the differences between inexperienced and experienced founders. The results in panel (3) show that inexperienced founders are associated with discounts that are approximately twice the magnitude of experienced founders, comparing coefficients -0.141*** and -0.0707*. Adding firm fixed effects (FE) and investor fixed effects (FE) in models (5) and (6) increases the effects across both groups, but the relative difference in coefficients is largely preserved, which implies that the moderating effects of founders' experience are robust to unobserved firm and investor characteristics. These findings demonstrate that the discount effect of MANAGEMENT$^+$ is more pronounced in deals with inexperienced founders, consistent with the endowment hypothesis.

Table 6. Moderating Effects of Founder Teams' Management Factor Endowment

The table presents output from OLS regressions, where the dependent variable, log(premv), that measures the logged premoney valuation of investment deals, is regressed on the main explanatory variable MANAGEMENT^{+}, interaction variables, and a set of controls. MANAGEMENT^{+} indicates if investors are superior in management factor, compared to founders and the variable FOUNDER_M measures the maximum management factor of founders, and ranges between 1 and 10. FOUNDER_M$_{L}$ indicates 'low' factors, pertaining to tiers 1 and 2, while FOUNDER_M$_{H}$ indicates 'high' factors, pertaining to all tiers between 3 and 10. All five models are estimated using the same set of basic controls, and the last two models also include firm fixed effects (FE) and investor fixed effects (FE), respectively. Year and industry fixed effects (FE) are included. Deal controls include the logged investment amount and its square, the financing round number (coded 1 or 2+), and an interaction term that measures the logged investment amount from previous rounds. Deal controls also include an indicator for seed stage, defined as investment during the initial year of incorporation, and an indicator for debt securities used in the transaction. Firm controls account for firm age and logged values of revenue, assets and employees. They also include the debt ratio, revenue growth rate, and indicators of positive EBIT and patent holdings. Founder controls include the main characteristics of all founders, including any informal investors from previous financing rounds. These include team size (1-5), mean age, gender, years of education, and indicators of institutional or foreign minority interests. They also include the highest values of enterprise, governance and management factors (tiers) across the founder team. The last two models include firm fixed effects (FE) and investor fixed effects (FE) respectively. (*), (**) and (***) indicate statistical significance at the 10%, 5% and 1% level, respectively.

LOG(PREMONEY)	(1)	(2)	(3)	(4)	(5)
MANAGEMENT^{+}	-0.103***	-0.158***			
	(0.0308)	(0.0480)			
MANAGEMENT^{+} · FOUNDER_M		0.0145			
		(0.00974)			
MANAGEMENT^{+} · FOUNDER_M$_{L}$			-0.141***	-0.263**	-0.264*
			(0.0392)	(0.116)	(0.150)
MANAGEMENT^{+} · FOUNDER_M$_{H}$			-0.0707*	-0.180**	-0.162
			(0.0370)	(0.0895)	(0.108)
YEAR FE	+	+	+	+	+
INDUSTRY FE	+	+	+	+	+
CONTROLS DEAL	+	+	+	+	+
CONTROLS FIRM	+	+	+	+	+
CONTROLS FOUNDER	+	+	+	+	+
FIRM FE				+	
INVESTOR FE					+
R^2	0.714	0.715	0.715	0.677	0.726
OBSERVATIONS	2,711	2,711	2,711	2,711	2,711
PANELS				2,416	2,216

Investigating the role of relative distance between founders' and investors' management factors, I estimate a regression model that explores how valuation discounts fluctuate based on this metric. I use the log-normal factor scores of founders and investors to obtain a metric of relative distance, and I define the variables D_L and D_H, that denote relative distance below and above the sample median. These variables are integrated into the main regression model and interacted with the MANAGEMENT^+ variable.

Table 7 presents the results of the regression analysis. The initial regressions in panels (1) and (2) show little invariance in effects between low-distance and high-distance investors, a theoretically surprising outcome. However, incorporating firm fixed effects (FE) and investor fixed effects (FE) in panels (3) and (4) alters this result and presents substantially larger discounts in favor of the most experienced investors, reaching more than 40% relative to the reference category. This shift is potentially due to assortative matching where highly experienced investors, represented by the term, D_H, pair with high-quality firms along dimensions that are unobserved in the data. As this is not captured by regression controls, the coefficient adjusts when including investor fixed effects (FE). Panels (5), (6), (7) partition the sample further between founders with low and high experience, revealing similar coefficient adjustments across both founder groups when including firm and investor fixed effects (FE), and confirming discounts of more than 40% when investors' experience is relatively high.

Overall the results suggest that the relative scale of investors' experience substantially amplifies the management discount. Interpretation of these results does requires some caution, as they rely on a smaller sample of repeat investors. However, the coefficient adjustments are consistent with a large body of literature emphasizing the role of assortative matching in early-stage investments (Sorensen (2007)), which is likely more pronounced in angel markets, given the inherent heterogeneity of investors and the informal nature of the matching process. When highly experienced investors invest in relatively inexperienced founders, these founders are likely to run more valuable firms.

Table 7. Moderating Effects of the Relative Distance of Management Factors

The table presents output from OLS regressions, where the dependent variable, log(premv), that measures the logged premoney valuation of investment deals, is regressed on the main explanatory variable MANAGEMENT^{+}, interaction variables, and a set of controls. MANAGEMENT^{+} indicates if investors are superior in management factor, compared to founders. FOUNDER_M$_{L}$ and FOUNDER_M$_{H}$ indicate 'low' and 'high' management factors of founders, respectively, where L pertains to factor tiers 1 and 2, and H pertains to factors tiers between 3 and 10. The variables D$_{L}$ and D$_{H}$ indicate the relative distance in factor scores between investors and founders, where L and H indicate values below and above the sample median, respectively. All models are estimated using the same set of basic controls. Year and industry fixed effects (FE) are included. Deal controls include the logged investment amount and its square, the financing round number (coded 1 or 2+), and an interaction term that measures the logged investment amount from previous rounds. Deal controls also include an indicator for seed stage, defined as investment during the initial year of incorporation, and an indicator for debt securities used in the transaction. Firm controls account for firm age and logged values of revenue, assets and employees. They also include the debt ratio, revenue growth rate, and indicators of positive EBIT and patent holdings. Founder controls include the main characteristics of all founders, including any informal investors from previous financing rounds. These include team size (1-5), mean age, gender, years of education, and indicators of institutional or foreign minority interests. They also include the highest values of enterprise, governance and management factors (tiers) across the founder team. Models (3) and (5) include firm fixed effects (FE) and models (4) and (6) include investor fixed effects (FE). (*), (**) and (***) indicate statistical significance at the 10%, 5% and 1% level, respectively.

LOG(PREMONEY)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MANAGEMENT^{+}	-0.103***						
	(0.0308)						
MANAGEMENT^{+} · D$_{L}$		-0.102***	-0.193**	-0.194*			
		(0.0343)	(0.0906)	(0.108)			
MANAGEMENT^{+} · D$_{H}$		-0.104***	-0.225*	-0.424**			
		(0.0381)	(0.113)	(0.159)			
MANAGEMENT^{+} · FOUNDER_M$_{L}$ · D$_{L}$					-0.157***	-0.321**	-0.235
					(0.0486)	(0.137)	(0.167)
MANAGEMENT^{+} · FOUNDER_M$_{L}$ · D$_{H}$					-0.136***	-0.233*	-0.454**
					(0.0435)	(0.138)	(0.177)
MANAGEMENT^{+} · FOUNDER_M$_{H}$ · D$_{L}$					-0.0673	-0.137	-0.194*
					(0.0412)	(0.0994)	(0.117)
MANAGEMENT^{+} · FOUNDER_M$_{H}$ · D$_{H}$					-0.0786	-0.296**	-0.412**
					(0.0609)	(0.147)	(0.163)
YEAR FE	+	+	+	+	+	+	+
INDUSTRY FE	+	+	+	+	+	+	+
CONTROLS DEAL	+	+	+	+	+	+	+
CONTROLS FIRM	+	+	+	+	+	+	+
CONTROLS FOUNDER	+	+	+	+	+	+	+
FIRM FE			+			+	
INVESTOR FE				+			+
R^2	0.714	0.714	0.677	0.728	0.715	0.669	0.728
OBSERVATIONS	2,711	2,711	2,711	2,711	2,711	2,711	2,711
PANELS			2,414	2,216		2,414	2,216

Proceeding to an examination of the composition of management factor, I construct a founder index, using a composite measure of equity ownership associated with previous management roles, that ranges between 0 and 1, and is denoted INVESTOR_F. The measure represents the degree of founder experience embedded in investors' management factor. I also define indicator variables, INVESTOR_F_0, INVESTOR_F_L, INVESTOR_F_H, that indicate zero, below median and above median founder experience, as implied by the index. I integrate these variables in the main regression specification with MANAGEMENT^+ to test the moderating effects founder experience on management discounts. I do not include investor fixed effects (FE), due to limited variation in these metrics within investors.

Table 8 presents the results of the regression analysis. Including the linear interaction term INVESTOR_F in panel (2) decreases the coefficient on MANAGEMENT^+, implying that low values of the founder index are associated with lower discounts. In panels (3) and (4) I include the 3 categorical indicators, showing that founder experience is related to progressively higher discounts, displaying coefficients -0.0898** and -0.121*** on the interactions with categories L and H. Including firm fixed effects (FE) in model (4) concentrates the discount among investors with highest founder experience, implied by the coefficient -0.369***. One interpretation of the results is, that, founders acquire unique dimensions of human capital in the risky process of establishing and growing a business, which are valued in angel markets, but not available to professional managers. Relating these findings to the value-adding activities of angel investors discussed in the introduction, founders are likely to possess higher mentoring capacity than other managers (Politis (2008)).

The last moderating effect I test is similarity in human and social capital. I use the indicators denoted SECTOR^+ and SECTOR^- to indicate if investors' management experience is acquired primarily in the same (broad) sector as the target firm, or not. I define similar indicators for (narrow) industries, INDUSTRY^+ and INDUSTRY^-.[3] These variables act as proxies for the similarity (or congruence) in human and social capital between investors and investees, and are integrated with the main explanatory variable, MANAGEMENT^+, to test the moderating effects of these characteristics on the management discount. I do not include firm fixed effects (FE) or investor fixed effects (FE), because of limited variation in these variables within firms and investors.

Table 9 shows the results of the regression analysis. The results in panel (2) and (3) show that the management discount increases to -0.140*** when investors' experience is acquired in the target sector, and increases further to -0.190*** when acquired in the target industry. These findings suggest that similarity is associated with progressively larger discounts, which is potentially due to reduced asymmetric information associated with these investments.

[3] Sector is defined by NACE nomenclature at one-digit level, corresponding to an aggregation into 10 sectors. Narrow industry is defined by NACE nomenclature at two-digit level, corresponding to aggregation into 88 industries.

Table 8. Moderating Effects of Founder Experience within Management Factor

The table presents output from OLS regressions, where the dependent variable, log(premv), that measures the logged premoney valuation of investment deals, is regressed on the main explanatory variable MANAGEMENT$^+$, interaction variables, and a set of controls. MANAGEMENT$^+$ indicates if investors have a superior factor, compared to founders. The variable INVESTOR_F is a composite ownership index, ranging between 0 and 1, that measures equity ownership associated with prior management experience. The variables INVESTOR_F$_0$, INVESTOR_F$_L$, INVESTOR_F$_H$ indicate if the ownership index is 'zero', 'low' or 'high', respectively, corresponding to zero, below median and above median values. All models are estimated using the same set of basic controls. The logged ownership index is included in controls. Year and industry fixed effects (FE) are included. Deal controls include the logged investment amount and its square, the financing round number (coded 1 or 2+), and an interaction term that measures the logged investment amount from previous rounds. Deal controls also include an indicator for seed stage, defined as investment during the initial year of incorporation, and an indicator for debt securities used in the transaction. Firm controls account for firm age and logged values of revenue, assets and employees. They also include the debt ratio, revenue growth rate, and indicators of positive EBIT and patent holdings. Founder controls include the main characteristics of all founders, including any informal investors from previous financing rounds. These include team size (1-5), mean age, gender, years of education, and indicators of institutional or foreign minority interests. They also include the highest values of enterprise, governance and management factors (tiers) across the founder team. The last model includes firm fixed effects (FE). (*), (**) and (***) indicate statistical significance at the 10%, 5% and 1% level, respectively.

LOG(PREMONEY)	(1)	(2)	(3)	(4)
MANAGEMENT$^+$	-0.103***	-0.0871**		
	(0.0308)	(0.0392)		
MANAGEMENT$^+$ · INVESTOR_F		-0.0535		
		(0.122)		
MANAGEMENT$^+$ · INVESTOR_F$_0$			-0.0728	-0.226
			(0.0530)	(0.196)
MANAGEMENT$^+$ · INVESTOR_F$_L$			-0.0898**	-0.190
			(0.0375)	(0.133)
MANAGEMENT$^+$ · INVESTOR_F$_H$			-0.121***	-0.369***
			(0.0426)	(0.124)
YEAR FE	+	+	+	+
INDUSTRY FE	+	+	+	+
CONTROLS DEAL	+	+	+	+
CONTROLS FIRM	+	+	+	+
CONTROLS FOUNDERS	+	+	+	+
FIRM FE				+
R^2	0.715	0.715	0.715	0.682
OBSERVATIONS	2,711	2,711	2,711	2,711
PANELS				2,414

Table 9. Moderating Effects of Industry Similarity within Management Factor

The table presents output from OLS regressions, where the dependent variable, log(premv), that measures the logged premoney valuation of investment deals, is regressed on the main explanatory variable MANAGEMENT$^+$, interaction variables, and a set of controls. MANAGEMENT$^+$ indicates if investors have superior factor, compared to founders. The variables SECTOR$^+$ and SECTOR$_-$ indicate if investors' management factor is primarily acquired in the target firm's (broad) sector (+) or in other sectors (-). The variables INDUSTRY$^+$ and INDUSTRY$_-$ indicate if investors' management factor is primarily acquired in the target firm's (narrow) industry (+) or in other industries (-). All models are estimated using the same set of basic controls. Year and industry fixed effects (FE) are included. Deal controls include the logged investment amount and its square, the financing round number (coded 1 or 2+), and an interaction term that measures the logged investment amount from previous rounds. Deal controls also include an indicator for seed stage, defined as investment during the initial year of incorporation, and an indicator for debt securities used in the transaction. Firm controls account for firm age and logged values of revenue, assets and employees. They also include the debt ratio, revenue growth rate, and indicators of positive EBIT and patent holdings. Founder controls include the main characteristics of all founders, including any informal investors from previous financing rounds. These include team size (1-5), mean age, gender, years of education, and indicators of institutional or foreign minority interests. They also include the highest values of enterprise, governance and management factors (tiers) across the founder team. (*), (**) and (***) indicate statistical significance at the 10%, 5% and 1% level, respectively.

LOG(PREMONEY)	(1)	(2)	(3)
MANAGEMENT$^+$	-0.103***		
	(0.0308)		
MANAGEMENT$^+$ · SECTOR$^-$		-0.0858***	
		(0.0332)	
MANAGEMENT$^+$ · SECTOR$^+$		-0.140***	
		(0.0410)	
MANAGEMENT$^+$ · INDUSTRY$^-$			-0.0893***
			(0.0316)
MANAGEMENT$^+$ · INDUSTRY$^+$			-0.190***
			(0.0556)
YEAR FE	+	+	+
INDUSTRY FE	+	+	+
CONTROLS DEAL	+	+	+
CONTROLS FIRM	+	+	+
CONTROLS FOUNDER	+	+	+
R^2	0.715	0.715	0.715
OBSERVATIONS	2,711	2,711	2,711

3.3 Part II. Firm Performance

This part of the analysis examines post-investment outcomes, focusing on the effects of management factor, MANAGEMENT$^+$, compared to the reference category. I specifically analyse if the same measures that predict valuation discounts are related to ex-post firm performance. I present evidence that MANAGEMENT$^+$ deals exhibit significantly higher performance in terms of survival rates, revenue growth, employment growth, and in terms of patent registrations, a frequently used measure of innovation growth. I show that the first three moderating factors identified in the previous analysis, inexperienced founders, relative distance, and founder experience, consistently amplify the positive effects on ex-post performance. I also show that congruence in HSC is consistently and progressively associated with lower ex-post performance.

The most common outcome measures used in the entrepreneurial finance literature

are liquidation (failure), exit through acquisition or IPO, or achievement of milestones like subsequent funding rounds or investment from venture capital funds. These are all tangible indicators of failure and success in settings where real returns are rarely observed, and often subject to observational bias. In keeping with the literature, I identify four binary outcomes in the data within a time-frame of five years from each investment deal; liquidation, acquisition, external funding and venture capital funding. Liquidation events are reported directly in the Central Business Register. Acquisition events are identified in the data as the entry of investors that control at least 90% equity. External funding is identified as the entry of new investors and a minimum investment of 100,000 DKK (15,000 USD). Venture capital funding is identified as the entry of private equity funds and a minimum investment of 1,000,000 DKK (150,000 USD).

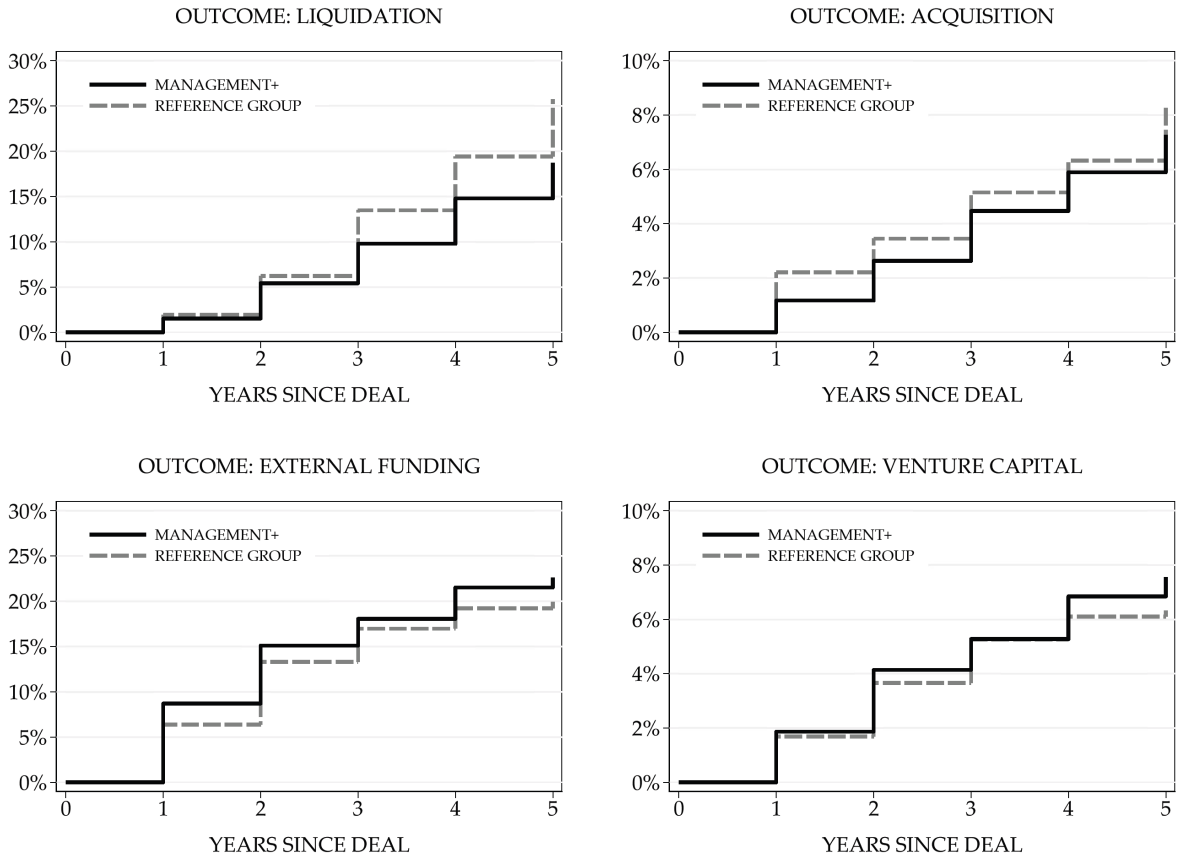
Figure 3 presents the incidence of these four outcomes during the first five years that proceed each deal. The results are presented in Kaplan-Maier survival diagrams that are used to illustrate differences in event rates between MANAGEMENT^{+} and the reference category, while controlling for data censoring. The figure displays that the MANAGEMENT^{+} category performs better during all five years in terms of survival, external funding and venture capital funding. The reference group performs better in terms of acquisitions. In the case of acquisition, external funding and venture capital funding, the differences in outcome rates are relatively small and statistically insignificant. In the case of liquidation rates, differences in outcome rates are both statistically and economically significant. After five years the MANAGEMENT^{+} category has a failure rate of approximately 19%. Compared to the reference category (26%), this amounts to a 27% lower liquidation rate, and represents a substantial economic effect. While this analysis does not control for differences in confounders between groups, results with matched samples generally indicate similar findings, and are not reported for brevity.

Focusing on the differences in liquidation rates, I estimate hazard ratios using Cox Proportional Hazards regressions, that leverage the same basic controls from the valuation analysis, under which a higher management factor is robustly associated with valuation discounts. In these regressions I quantify the impact of MANAGEMENT^{+} and its moderators on failure rates, while controlling for confounders.

Table 10 provides the main results of the analysis. Panel (1) reports hazard ratios using the full set of controls, corresponding to the valuation model. The hazard ratio of MANAGEMENT^{+} is 0.756**, indicating that investors with higher management factor experience significantly lower propensity for failure. Panel (2) presents an interaction between the MANAGEMENT^{+} indicator and variables pointing to inexperienced and experienced founders, FOUNDER_M$_{\text{L}}$ and FOUNDER_M$_{\text{H}}$. The hazard ratio reduces to 0.602*** in the case of inexperienced founders, whereas the effect dissipates in the case of experienced founders. Panel (4) highlights the interaction of superior factor with indicators D$_{\text{L}}$ and D$_{\text{H}}$, that indicate low and high distance in management factor between founders and investors. Both interactions

Figure 3. Post-investment Binary Outcomes: Failure and Success Probabilities

The figures show the results of survival analysis represented in Kaplan-Maier diagrams. The main outcome variables are liquidation (failure), acquisition, external funding and venture capital. Liquidation is defined as the dissolution of the firm's legal status, which occurs in the process of bankruptcy, or in voluntary liquidation when there are no creditor claims. Acquisition is defined as the entry of external shareholders that control more than 90% of equity at entry. External funding is defined as a subsequent investment event of at least 100,000 DKK (15,000 USD) with the entry of new external investors. Venture capital is defined as an investment event of at least 1,000,000 DKK (150,000 USD), where the majority of limited shareholders are institutions or foreign direct investors. Observations are tracked for up to five years from the time of investment deals, and any outcome information after the fifth year is censored. The Kaplan-Maier diagrams show realized outcomes over time in proportion to the number of subjects at risk in each period. The results are presented for treatment and control group respectively. The treatment group includes investment deals where investors have higher management factor than founders ($\text{MANAGEMENT}^{+} = 1$), and the control group comprises investment deals where investors have similar or lower management factor ($\text{MANAGEMENT}^{+} = 0$). The analysis is conducted with the full sample of investment deals and includes 2,714 observations (1,529 treatment, 1,185 controls).



show hazard ratios below one, with a more pronounced effect for the high-distance group which is lower than the baseline effect. Panel (5) examines the interaction of management factor with founder experience. The hazard ratio is only significant for the segment with high founder experience, which also stands below the baseline estimate. The last two panels show how hazard ratios are moderated by sector and industry similarity. The perhaps surprising results indicate lower hazard ratios in the case of no similarity, SECTOR$^-$ and INDUSTRY$^-$. Interestingly, the hazard ratio increases to above one in the case of INDUSTRY$^+$, implying a progressively negative effect of similarity in HSC on liquidation outcomes.

Overall, the results suggest that MANAGEMENT$^+$ diminishes the likelihood of liquidation, which is a positive outcome that reciprocates the previously identified management discount. The three main factors that amplify this positive effect on liquidation, inexperienced founders, relative distance, and founder experience, also echo their negative on the management discount. These findings demonstrate a robust relationship between the effects that MANAGEMENT$^+$ exerts on valuation, and on subsequent firm outcomes, suggesting that these investors generate added value for their investment targets, and obtain lower equity valuations in expectation of these effects.

The data allows for tracking of post-investment outcomes in terms of revenue and employment growth, as well as growth in patent registrations. Figure 4 illustrates the trajectories of revenue and employment between MANAGEMENT$^+$ deals and the reference group, where values are indexed to 100 at the time of investment, and averaged across firms and years. The indication is higher growth rates in both revenue and employment associated with higher management factor. To further quantify the effects on these outcomes, I employ OLS regressions with firm fixed effects (FE) that account for firm-level performance up to 5 years before and after investment deals. In these regressions, the dependent variables are logged revenue, logged employment, and patent registrations. I include the indicator MANAGEMENT$^+$ interacted with a post-investment indicator, denoted POST, and I include interactions with the moderators identified in the valuation analysis, which serve to examine variation in outcomes within these groups.

The results of these analyses are presented in Tables 11, 12, and 13. The effects observed in all three performance measures are remarkably similar and align with the positive effects of MANAGEMENT$^+$, as well as its moderators, previously identified in relation to liquidation rates. Specifically, the baseline effects on logged revenue, logged employment and patent registrations are 0.216***, 0.310***, and 0.0254**, respectively. These coefficients represent substantial economic effects, translating to approximately 20% higher revenue growth, 30% higher employment growth, as well as a 7% higher patent registration, on average. Furthermore, the effects are markedly more pronounced in all models for inexperienced founders and deals where relative distance in experience is high. The moderating effects of founder experience are also evident, showing heightened effects in the categories L and H, relative to investors

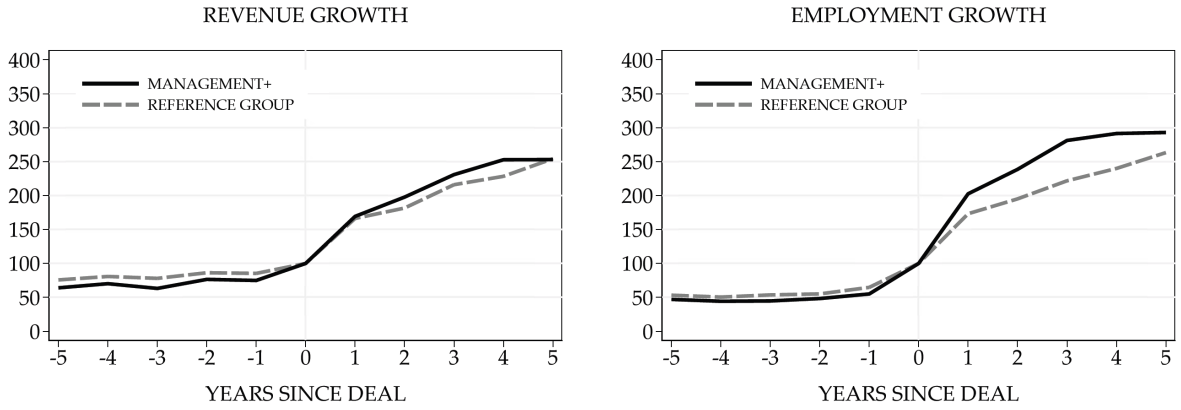
Table 10. Effects of Superior Management Experience and Moderators on Failures

The table presents output from Cox Proportional Hazard regressions, where the outcome variable, that indicates liquidation events, is regressed on the main explanatory variable, MANAGEMENT^{+}, interactions, and a set of controls. MANAGEMENT^{+} indicates if investors have superior factor, compared to founders. FOUNDER_M$_{L}$ and FOUNDER_M$_{H}$ indicate if founders have 'low' or 'high' management factors, respectively, where L pertains to tiers 1 and 2, and H pertains to tiers between 3 and 10. d_{L} and d_{H} indicate the relative distance in factor scores between investors and founders, where L and H indicate values below and above the sample median, respectively. INVESTOR_F$_{0}$, INVESTOR_F$_{L}$, INVESTOR_F$_{H}$ indicate the share of ownership associated with investors' management experience, where 0 indicates no ownership, and L and H indicate shares below and above the sample median, respectively. All models are estimated using the same set of basic controls. Year and industry fixed effects (FE) are included. Deal controls include the logged investment amount and its square, the financing round number (coded 1 or 2+), and an interaction term that measures the logged investment amount from previous rounds. Deal controls also include an indicator for seed stage, defined as investment during the initial year of incorporation, and an indicator for debt securities used in the transaction. Firm controls account for firm age and logged values of revenue, assets and employees. They also include the debt ratio, revenue growth rate, and indicators of positive EBIT and patent holdings. Founder controls include the main characteristics of all founders, including any informal investors from previous financing rounds. These include team size (1-5), mean age, gender, years of education, and indicators of institutional or foreign minority interests. They also include the highest values of enterprise, governance and management factors (tiers) across the founder team. (*), (**) and (***) indicate statistical significance at the 10%, 5% and 1% level, respectively.

EVENT: LIQUIDATION	(1)	(2)	(3)	(4)	(5)	(6)
MANAGEMENT^{+}	0.756**					
	(0.0841)					
MANAGEMENT^{+} · FOUNDER_M$_{L}$		0.602***				
		(0.0822)				
MANAGEMENT^{+} · FOUNDER_M$_{H}$		0.965				
		(0.131)				
MANAGEMENT^{+} · d_{L}			0.793*			
			(0.0996)			
MANAGEMENT^{+} · d_{H}			0.705***			
			(0.101)			
MANAGEMENT^{+} · INVESTOR_F$_{0}$				0.858		
				(0.159)		
MANAGEMENT^{+} · INVESTOR_F$_{L}$				0.830		
				(0.113)		
MANAGEMENT^{+} · INVESTOR_F$_{H}$				0.646***		
				(0.0965)		
MANAGEMENT^{+} · SECTOR^{-}					0.696***	
					(0.0854)	
MANAGEMENT^{+} · SECTOR^{+}					0.898	
					(0.134)	
MANAGEMENT^{+} · INDUSTRY^{-}						0.688***
						(0.0802)
MANAGEMENT^{+} · INDUSTRY^{+}						1.206
						(0.218)
YEAR FE		+	+	+	+	+
INDUSTRY FE		+	+	+	+	+
CONTROLS DEAL		+	+	+	+	+
CONTROLS FIRM		+	+	+	+	+
CONTROLS FOUNDER		+	+	+	+	+
OBSERVATIONS	2,579	2,579	2,579	2,579	2,579	2,579
OUTCOMES	385	385	385	385	385	385

Figure 4. Post-investment Outcomes: Growth Rates in Revenue and Employment

The figure shows the average changes in revenue and employment 5 years before and after investment deals (year = 0), in the subsets of investment deals, MANAGEMENT$^+$ = 1, and MANAGEMENT$^+$ = 0, where investors have respectively higher management factor than founders, or similar or lower factor (reference group). Employment and revenue is indexed at the time of the investment deal, and only firms with more than 0.1M DKK in revenue or 0.1 FTE are included. Firms' indices winsorized at the 5. and 95. percentiles, and averaged over each time period, where data is available. The figures do not account for industry or time differences across the sample.



with no founder experience. The most significant effects are however located in the middle group, denoted L, which indicates below-median founder index. The moderating variables that indicate sector and industry similarity, SECTOR$^+$ and INDUSTRY$^+$ are consistently related to lower performance relative to their reference categories, i.e. no similarity, and INDUSTRY$^+$ is consistently associated with lower performance than SECTOR$^+$, suggesting that similarity in HSC is progressively detrimental to investees.

In conclusion, the results show a strong and robust relationship between MANAGEMENT$^+$ and post-investment firm performance. The converging tendencies of the main effects, as well as the three moderating factors, which echo their effects on valuation discounts, substantiate the intrinsic link between investment valuation and firm performance. These findings suggest that the observed discount is related to expected value creation from the influence of investors' superior HSC, represented by the MANAGEMENT$^+$ category. It follows arithmetically that these investors generate surplus in angel markets, and also earn substantially higher returns than other investors. The finding that industry similarity commands progressively larger valuation discounts, while being related to consistently worse outcomes, are indicative of inefficiencies or systematically lower firm quality related to these investments, that warrant additional exploration.

Table 11. Effects of Management Factor and Moderators on Revenue Growth

The table presents output from OLS regressions with firm fixed effects (FE), where the dependent variable log(revenue), is regressed on a post-investment period indicator (post), and its interaction with the main explanatory variable, MANAGEMENT^{+}, interactions, and a set of controls. The time period used in the estimation spans up to 5 years before and 5 years after investment deals, and all firms in the main sample are included. MANAGEMENT^{+} indicates if investors have superior factor, compared to founders. FOUNDER_M$_{L}$ and FOUNDER_M$_{H}$ indicate if founders have 'low' or 'high' management factors, respectively, where L pertains to tiers 1 and 2, and H pertains to tiers between 3 and 10. d$_{L}$ and d$_{H}$ indicate the relative distance in factor scores between investors and founders, where L and H indicate values below and above the sample median, respectively. INVESTOR_F$_{0}$, INVESTOR_F$_{L}$, INVESTOR_F$_{H}$ indicate the share of ownership associated with investors' management experience, where 0 indicates no ownership, and L and H indicate shares below and above the sample median, respectively. All models are estimated with firm and year FE. (*), (**) and (***) indicate statistical significance at the 10%, 5% and 1% level, respectively.

LOG(REVENUE)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
P (POST)	0.140***	0.0192	0.0134	0.0182	0.0187	0.0189	0.0198
	(0.0323)	(0.0389)	(0.0389)	(0.0389)	(0.0389)	(0.0389)	(0.0389)
P · MANAGEMENT^{+}		0.217***					
		(0.0388)					
P · MANAGEMENT^{+} · FOUNDER_M$_{L}$			0.314***				
			(0.0445)				
P · MANAGEMENT^{+} · FOUNDER_M$_{H}$			0.0788				
			(0.0497)				
P · MANAGEMENT^{+} · D$_{L}$				0.182***			
				(0.0459)			
P · MANAGEMENT^{+} · D$_{H}$				0.256***			
				(0.0475)			
P · MANAGEMENT^{+} · INVESTOR_F$_{0}$					0.129*		
					(0.0703)		
P · MANAGEMENT^{+} · INVESTOR_F$_{L}$					0.325***		
					(0.0496)		
P · MANAGEMENT^{+} · INVESTOR_F$_{H}$					0.145***		
					(0.0492)		
P · MANAGEMENT^{+} · SECTOR^{-}						0.251***	
						(0.0426)	
P · MANAGEMENT^{+} · SECTOR^{+}						0.141***	
						(0.0546)	
P · MANAGEMENT^{+} · INDUSTRY^{-}							0.238***
							(0.0401)
P · MANAGEMENT^{+} · INDUSTRY^{+}							0.0724
							(0.0781)
YEAR FE	+	+	+	+	+	+	+
FIRM FE	+	+	+	+	+	+	+
R^2	0.099	0.101	0.102	0.101	0.101	0.101	0.101
OBSERVATIONS	18,137	18,137	18,137	18,137	18,137	18,137	18,137
PANELS	2,711	2,711	2,711	2,711	2,711	2,711	2,711

Table 12. Effects of Management Factor and Moderators on Employment Growth

The table presents output from OLS regressions with firm fixed effects (FE), where the dependent variable log(employment), is regressed on a post-investment period indicator (post), and its interaction with the main explanatory variable, MANAGEMENT^{+}, interactions, and a set of controls. The time period used in the estimation spans up to 5 years before and 5 years after investment deals, and all firms in the main sample are included. MANAGEMENT^{+} indicates if investors have superior factor, compared to founders. FOUNDER_M$_{L}$ and FOUNDER_M$_{H}$ indicate if founders have 'low' or 'high' management factors, respectively, where L pertains to tiers 1 and 2, and H pertains to tiers between 3 and 10. d_{L} and d_{H} indicate the relative distance in factor scores between investors and founders, where L and H indicate values below and above the sample median, respectively. INVESTOR_F$_{0}$, INVESTOR_F$_{L}$, INVESTOR_F$_{H}$ indicate the share of ownership associated with investors' management experience, where 0 indicates no ownership, and L and H indicate shares below and above the sample median, respectively. All models are estimated with firm and year FE. (*), (**) and (***) indicate statistical significance at the 10%, 5% and 1% level, respectively.

LOG(EMPLOYMENT)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
P (POST)	0.213***	0.0391	0.0341	0.0376	0.0386	0.0387	0.0399
	(0.0315)	(0.0378)	(0.0378)	(0.0378)	(0.0378)	(0.0378)	(0.0378)
P · MANAGEMENT^{+}		0.311***					
		(0.0377)					
P · MANAGEMENT^{+} · FOUNDER_M$_{L}$			0.393***				
			(0.0433)				
P · MANAGEMENT^{+} · FOUNDER_M$_{H}$			0.192***				
			(0.0483)				
P · MANAGEMENT^{+} · d_{L}				0.259***			
				(0.0446)			
P · MANAGEMENT^{+} · d_{H}				0.368***			
				(0.0462)			
P · MANAGEMENT^{+} · INVESTOR_F$_{0}$					0.232***		
					(0.0684)		
P · MANAGEMENT^{+} · INVESTOR_F$_{L}$					0.423***		
					(0.0482)		
P · MANAGEMENT^{+} · INVESTOR_F$_{H}$					0.232***		
					(0.0478)		
P · MANAGEMENT^{+} · SECTOR^{-}						0.360***	
						(0.0414)	
P · MANAGEMENT^{+} · SECTOR^{+}						0.202***	
						(0.0531)	
P · MANAGEMENT^{+} · INDUSTRY^{-}							0.338***
							(0.0389)
P · MANAGEMENT^{+} · INDUSTRY^{+}							0.124
							(0.0760)
YEAR FE	+	+	+	+	+	+	+
FIRM FE	+	+	+	+	+	+	+
R^{2}	0.131	0.135	0.135	0.135	0.135	0.135	0.135
OBSERVATIONS	18,137	18,137	18,137	18,137	18,137	18,137	18,137
PANELS	2,711	2,711	2,711	2,711	2,711	2,711	2,711

Table 13. Effects of Management Factor and Moderators on Patent Registration

The table presents output from OLS regressions with firm fixed effects (FE), where the dependent variable, patents, is regressed on a post-investment period indicator (post), and its interaction with the main explanatory variable, MANAGEMENT^{+}, interactions, and a set of controls. The time period used in the estimation spans up to 5 years before and 5 years after investment deals, and all firms in the main sample are included. MANAGEMENT^{+} indicates if investors have superior factor, compared to founders. FOUNDER_M$_{L}$ and FOUNDER_M$_{H}$ indicate if founders have 'low' or 'high' management factors, respectively, where L pertains to tiers 1 and 2, and H pertains to tiers between 3 and 10. d_{L} and d_{H} indicate the relative distance in factor scores between investors and founders, where L and H indicate values below and above the sample median, respectively. INVESTOR_F$_{0}$, INVESTOR_F$_{L}$, INVESTOR_F$_{H}$ indicate the share of ownership associated with investors' management experience, where 0 indicates no ownership, and L and H indicate shares below and above the sample median, respectively. All models are estimated with firm and year FE. (*), (**) and (***) indicate statistical significance at the 10%, 5% and 1% level, respectively.

PATENTS	(1)	(2)	(3)	(4)	(5)	(6)	(7)
P (POST)	0.00337	-0.00922	-0.00903	-0.0101	-0.00942	-0.00936	-0.00889
	(0.00991)	(0.0119)	(0.0119)	(0.0119)	(0.0119)	(0.0119)	(0.0119)
P · MANAGEMENT^{+}		0.0225*					
		(0.0119)					
P · MANAGEMENT^{+} · FOUNDER_M$_{L}$			0.0194				
			(0.0137)				
P · MANAGEMENT^{+} · FOUNDER_M$_{H}$			0.0271*				
			(0.0153)				
P · MANAGEMENT^{+} · d_{L}				-0.00714			
				(0.0141)			
P · MANAGEMENT^{+} · d_{H}				0.0557***			
				(0.0146)			
P · MANAGEMENT^{+} · INVESTOR_F$_{0}$					-0.0175		
					(0.0216)		
P · MANAGEMENT^{+} · INVESTOR_F$_{L}$					0.0668***		
					(0.0152)		
P · MANAGEMENT^{+} · INVESTOR_F$_{H}$					-0.00507		
					(0.0151)		
P · MANAGEMENT^{+} · SECTOR^{-}						0.0426***	
						(0.0131)	
P · MANAGEMENT^{+} · SECTOR^{+}						-0.0216	
						(0.0168)	
P · MANAGEMENT^{+} · INDUSTRY^{-}							0.0338***
							(0.0123)
P · MANAGEMENT^{+} · INDUSTRY^{+}							-0.0542**
							(0.0240)
YEAR FE	+	+	+	+	+	+	+
FIRM FE	+	+	+	+	+	+	+
R^{2}	0.131	0.135	0.135	0.135	0.135	0.135	0.135
OBSERVATIONS	18,137	18,137	18,137	18,137	18,137	18,137	18,137
PANELS	2,711	2,711	2,711	2,711	2,711	2,711	2,711

4 Conclusion

I investigate the role of investors' executive experience in angel markets. I use comprehensive data on shareholders, CEOs, directors, employees and family relations in private corporations, to identify the population of angel investors in Denmark. I analyse a sample containing 2,711 unique investment deals, and comprehensive data on firms, founders, investors, and deal transactions. I find that angel investors with higher management experience, relative to founders, obtain equity at significantly lower valuation, 10% on average, and 40% when relative experience is high. Higher governance experience, related to previous director or investor activities, however, does not affect valuations. The management discount is amplified when founders have low experience, and when angel investors' experience is acquired in founder roles, or within the industry of the target firm. I test the effects of management experience on post-investment outcomes, and find that the management discount is reciprocated in higher ex-post survival, growth and innovation rates, suggesting that management experience generates surplus in angel markets, and commands a premium at the time of investment. The three main channels that amplify valuation discounts also amplify the positive effects of management experience on firm outcomes, which serves to establish the robustness of the main results. Overall, the results suggest that the human and social capital of investors' with higher management experience is valuable in angel markets. The findings provide an explanation for the disproportionate entry of experienced executives into angel markets. These findings also suggests that investment policies that aim to maximise socioeconomic welfare, might be more effective if targeted at investors with demonstrated management experience.

5 Appendix

Table 14. Principal Components: Eigenvalues, Explained Variance and Loadings

This table presents the principal component analysis (PCA) results for the experience categories ENTERPRISE, GOVERNANCE, and MANAGEMENT. The variables firm employment (mean) and (peak) denotes the average and maximum employment per firm (measured in FTEs). Total employment (mean) and (peak) denotes average and maximum employment across multiple firms within a reference year. All measures are computed using the records available since 1995. The reported eigenvalues reflect the total variance captured by the respective principal component. A higher eigenvalue indicates greater explanatory power. The proportion of variance explained designates the share of total variation explained by the principal component relative to the input data.

PCA MODEL	ENTERPRISE	GOVERNANCE	MANAGEMENT
FIRM EMPLOYMENT (PEAK)	0.942	0.925	0.988
FIRM EMPLOYMENT (MEAN)	0.848	0.831	0.959
FIRM EMPLOYMENT (MEAN) · FIRM EMPLOYMENT (PEAK)	0.892	0.875	0.942
TOTAL EMPLOYMENT (PEAK)	0.943	0.934	0.972
TOTAL EMPLOYMENT (MEAN)	0.959	0.953	0.972
TOTAL EMPLOYMENT (MEAN) · TOTAL EMPLOYMENT (PEAK)	0.890	0.888	0.953
EIGENVALUE	5.00	4.88	5.55
VARIANCE EXPLAINED	0.83	0.81	0.92

Table 15. Paired Significance of Enterprise, Governance and Management Factors

The table presents OLS regression results, with dependent variable Ln(PREMV), that measures logged premoney valuation of investment deals, regressed on explanatory variables ENTERPRISE$^+$, GOVERNANCE$^+$ and MANAGEMENT$^+$, that indicate if investors are superior in each respective factor and a set of controls. Year and industry fixed effects (FE) are included in all models. Deal controls include the logged investment amount and its square, and the financing round (coded 1, 2, 3+), and an interaction term that measures previous investment in the case of later rounds. They also include an indicator for post-seed stage (with reference category seed stage), and whether the transaction includes debt conversion. Firm controls account for firm age and logged values of revenue, assets and employees. They also include debt-to-assets ratio, revenue growth rate, and it's interaction with firm revenue, an indicator of positive earnings (EBIT), and it's interaction with ROA, as well as indicators for patent holdings and firms with zero assets. Team controls include the main characteristics of all founders, including informal investors from previous financing rounds. These include team size, mean age, gender distribution, education, and indicators of foreign or institutional minority shares,, and they include the founder team's enterprise, governance and management factors, respectively. The last two models include firm fixed effects (FE) and investor fixed effects (FE).

LOG(PREMV)	(1)	(2)	(3)	(4)	(5)	(6)
ENTERPRISE$^+$	-0.0604	-0.0186		0.0132	0.0534	0.170
	(0.0389)	(0.0465)		(0.0528)	(0.124)	(0.131)
GOVERNANCE$^+$	-0.0414		-0.0423	-0.0466	0.0403	0.118
	(0.0365)		(0.0322)	(0.0366)	(0.0956)	(0.106)
MANAGEMENT$^+$		-0.0895**	-0.858**	-0.0935**	-0.251**	-0.250**
		(0.0454)	(0.0334)	(0.0454)	(0.110)	(0.124)
YEAR FE	+	+	+	+	+	+
INDUSTRY FE	+	+	+	+	+	+
CONTROLS DEAL	+	+	+	+	+	+
CONTROLS FIRM	+	+	+	+	+	+
CONTROLS FOUNDER	+	+	+	+	+	+
FIRM FE					+	
INVESTOR FE						+
R^2	0.714	0.714	0.715	0.715	0.677	0.728
OBSERVATIONS	2,711	2,711	2,711	2,711	2,711	2,711
PANELS					2,414	2,216

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