Do alumni have an advantage? Evidence from venture capital investment

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Abstract

The role of venture capital in enhancing enterprise competitiveness and driving sustainable development is well acknowledged. However, the intricacies of how venture capitalists formulate investment decisions receives limited attention within the existing literature. This study addresses this gap by leveraging comprehensive investment event-level data from the Chinese context. Our focus is on investigating alumni relationships' influence on venture capitalists' investment choices and assessing their post-investment performance. To achieve this, we developed a matching approach based on the methodology proposed by Chung et al. (2018). Specifically, we used propensity score matching (PSM) to pair each alumni-related investment observation with a non-alumni-related investment observation, employing nearest-neighbor matching with replacement. This process resulted in a matched sample of 2,356 observations, which we used to estimate the likelihood of alumni-related investments. Furthermore, we conducted an empirical analysis of the economic consequences of venture capital investments using multivariate regression on the actual alumni-related investment sample. Our analysis yields several key findings: First, we observe a discernible inclination among venture capitalists towards investing in firms connected through alumni relationships. Second, investments facilitated by such alumni connections demonstrate notably superior post-investment performance compared to those lacking such affiliations. Third, these alumni relationships elevate the probability of venture capitalists opting for subsequent reinvestments and amplify the likelihood of successful exits through initial public offerings. Collectively, our findings underscore the crucial role of alumni networks in the allocation of investment resources and the enhancement of competitiveness. These results can provide valuable practical guidance for venture capital institutions and entrepreneurs.

Keywords: *venture capitalists, competitiveness, alumni relationship, pre-investment decisions, post-investment performance*

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1 INTRODUCTION

In this study, our focus lies in scrutinizing the impact of alumni relationships on the investment determinations of venture capital (VC) entities. We address two pivotal inquiries: (1) Does affiliation through alumni networks confer a competitive edge in VC decision-making? (2) Do venture capitalists with such alumni connections outperform their counterparts? Our exploration unfolds within an overlooked arena: the emerging market of China. Over recent decades, VC has emerged as a linchpin, augmenting the competitive stance of entrepreneurial ventures and galvanizing economic progress, particularly in burgeoning economies (Gu & Qian, 2019). While capital infusion is a cornerstone, Venture capitalists also bestow intangible assets like supervision, support, and control (Sahasranamam & Nandakumar, 2020; Otchere & Vong, 2016; Bottazzi et al., 2008). The forces molding VC institutions' investment choices and their economic implications have sustained scholarly fascination.

Prior research has underscored the influence of social relationships on investment resolutions in mature markets such as the United States (e.g., Gompers et al., 2016; Hochberg et al., 2010; Massa & Simonov, 2011; Hasan et al., 2020; Fracassi, 2017). Notably, social relationships emerge as a chief fount of investment resources (Gompers et al., 2020), shaping VC investment decisions through both direct and indirect mechanisms. Among these, personal bonds between venture capitalists and entrepreneurs/managers of target firms wield more influence over investment verdicts than the mere presence of esteemed venture capitalists during high market uncertainty (Wuebker et al., 2015).

Nonetheless, the operational mechanics of social relationships within emerging markets, often devoid of established formal institutions on which venture capitalists traditionally rely, remain underexplored. These nascent economies assign augmented importance to social relationships, potentially substituting or complementing formal institutional frameworks (Ru et al., 2020; Gu et al., 2019). For instance, the rise of alumni networks in China, such as the "Tsinghua-Peking Circle", "Post and Telecom System", and alumni-driven investment platforms like the "Nankai Good Project", has not only facilitated the flow of private information but also relied on members' professional expertise and collective sense of honor to drive the competitiveness and sustainability of associated enterprises. Alumni connections, as unique social relationships imbued with diverse values, wield extraordinary influence among market participants. Previous studies have explored how alumni ties affect the behavior of market participants, such as individual investors (Massa & Simonov, 2011), analysts (Cohen et al., 2010), auditors (Guan et al., 2016), and fund managers (Gu et al., 2019). However, their impact on venture capitalists' decision-making processes has received relatively little attention. Among the limited literature, alumni ties are often treated as part of broader social relationships (e.g., Wuebker et al., 2015; Gompers et al., 2016; Wang, 2016) or examined narrowly within the context of mutual fund managers, focusing on how alumni relationships influence portfolio allocation and fund performance (Massa & Simonov, 2011; Qi et al., 2020; Lin et al., 2021). These studies fall short of fully uncovering the unique role of alumni ties in the allocation of investment resources, especially for the impact of alumni relationship on the market competitiveness of both VC firms and the invested enterprises during the investment process. Distinct from prior research, this study addresses the gap by revealing the multifaceted effects of alumni connections. It examines their influence on pre-investment decision-making by venture capitalists and the post-investment performance of invested enterprises in China. By doing so, this study deepens our understanding of the interaction between social relationships and VC dynamics, as well as their impact on the competitiveness of both parties.

China presents an exceptional backdrop for addressing our research inquiries, owing to three key factors. Firstly, the global significance of entrepreneurship is underscored by its heightened prevalence in emerging economies, stemming from reduced entry barriers and amplified demand (Omri, 2020). As a pivotal financing source for entrepreneurial ventures, venture capitalists' success aligns with their potent role in enhancing competitiveness within burgeoning markets like China (Gompers et al., 2020). Secondly, China, renowned as the largest emerging economy, is renowned for its inherent unpredictability, volatility, and a less codified institutional landscape (Allen et al., 2012; Ru et al., 2020). While prior evidence establishes the impact of social relationships on venture capitalists' decision-making within developed contexts, China's distinctive institutional milieu bestows distinct practices and long-term performance upon venture capitalists, distinct from those of developed markets (Otchere & Vong, 2016). Thirdly, within China's relationship-centered economic ecosystem, alumni relations hold substantial sway (Guan et al., 2016). The nation has long championed robust social bonds as fundamental tenets of economic and social structures (He et al., 2017; Gu et al., 2019). Given the potent foundation provided by alumni relationships for fostering meaningful connections and value-driven interactions, we anticipate more pronounced economic repercussions of alumni relationships within China, casting a discernible influence upon the practices and performance of venture capitalists.

We posit that alumni relationships exert influence over venture capitalists' investment choices through a triad of channels. Primarily, these relationships alleviate information asymmetry, facilitating the seamless transfer of tacit knowledge. This equips venture capitalists with a more holistic grasp of investee firms' standing, thereby enhancing the quality of decision-making. Secondly, alumni connections amplify the efficacy of reputation as an incentive for entrepreneurs, fostering a symbiotic alignment of interests between venture capitalists and investee entities. Thirdly, a sense of alma mater affiliation can impel venture capitalists to direct investments toward alumni-linked enterprises. Consequently, we postulate that ventures connected via alumni ties carry a distinctive allure, potentially surpassing non-affiliated counterparts. This distinct charm, in turn, augments the likelihood of venture capitalists choosing alumni-associated firms for investment. Our empirical findings validate this conjecture by revealing that investments facilitated through alumni ties yield superior post-investment performance in contrast to those without such connections. Moreover, the presence of alumni relationships enhances the prospects of subsequent VC reinvestments and successful exits through initial public offerings (IPOs), thereby strengthening the market competitiveness of both venture capital firms and the invested enterprises.

Our study makes notable contributions to the existing literature on several fronts. Firstly, it extends the horizon of research concerning the economic implications of alumni relationships. Our findings spotlight the crucial role of alumni relationships as a competitive determinant within VC markets, thus illuminating the growing significance of alumni networks within emerging economies. Secondly, our study delves deeper into the role of social relationships in allocating investment resources within burgeoning markets. While earlier research has indicated the sway of social relationships on venture capitalists' choices in developed markets like the United States (e.g., Gompers et al., 2016; Hochberg et al., 2010; Massa & Simonov, 2011; Hasan et al., 2020), an in-depth understanding of the evidence in emerging markets has remained elusive. Thirdly, our study stands as one of the pioneering empirical endeavors to rigorously assess the effects of alumni relationships on VC investment decisions. Prior related research has predominantly relied on qualitative methodologies (e.g., semi-structured interviews) (Bustamante et al., 2021) or experimental approaches (Wuebker et al., 2015), both of which carry inherent methodological limitations. Experimental studies, for instance, can oversimplify contextual complexities, potentially compromising the validity and practicality of their outcomes. Lastly, in contrast to much of the extant research that primarily scrutinizes the influence of social relationships on pre-investment determinations, our study extends the literature by encompassing post-investment performance evaluation. Beyond highlighting the preference of venture capitalists for alumni-linked enterprises, our study establishes that such alumni relationships not only influence investment choices but also significantly enhance post-investment performance, thus bolstering overall market competitiveness.

The rest of the paper is structured as follows. In Section 2, we discuss the theoretical background. Section 3 develops our hypotheses, explains the research design, and introduces the sample. Section 4 presents the main results and discussion. Section 5 concludes the paper.

2 THEORETICAL BACKGROUND

2.1 VC Investment Decisions

VC plays a pivotal role in furnishing essential capital to entrepreneurial ventures. In comparison to conventional financial intermediaries, VC investments are characterized by elevated levels of uncertainty and information asymmetry. Through the lens of venture capitalists, once an investment choice is made, it becomes nearly immobile, with its subsequent performance contingent largely upon the actions of the entrepreneurs or managers steering the investee enterprise. These managers are evaluated on diverse dimensions, including personal integrity, practicality, leadership acumen, work history, and managerial competence. Gompers et al. (2020) underscore this viewpoint by highlighting that venture capitalists attribute greater significance to the management team in investment selection, surpassing even business-related attributes. This orientation extends to the ultimate assessment of investment outcomes, with the management team bearing a more substantial role in determining the investment's success or failure than the business itself.

In the realm of factors influencing VC investment determinations, existing research highlights that venture capitalists' personal attributes (such as gender, experience, confidence, and perceived control) (Vogel et al., 2014), syndication networks (including aspects like network centrality and positions) (Ozmel et al., 2013), and social relationships (Gompers et al., 2016; Wuebker et al., 2015) all wield the potential to shape investment choices. Scholars emphasize that the symbiotic rapport between venture capitalists and entrepreneurs holds greater sway over the success of VC investments than mere capital infusion, playing a pivotal role in both pre-investment decisions and post-investment performance (Guler & Guillén, 2010; Hallen et al., 2014). The cooperative dynamics between venture capitalists and entrepreneurs, underscored by social relationships, are illuminated by Lim and Cu (2012). Foremost, social relationships have evolved into a pivotal reservoir of investment resources for venture capitalists, progressively surpassing business plans in securing these vital assets (Gompers et al., 2020). In the early investment stages, venture capitalists employ relational mechanisms to ameliorate agency risks and foster cooperative alliances with entrepreneurs. Hoi et al. (2019) underscore how social relationships expedite the transfer of information and mitigate information asymmetry. A comprehensive adaptive choice-based conjoint experiment encompassing 3,132 investment decisions, as conducted by Wuebker et al. (2015), discerns that venture capitalists' personal relationships wield greater influence over investment choices compared to the presence of high-status venture capitalists, particularly amidst heightened market uncertainty. Gompers et al. (2016) provide insights into how venture capitalists' personal connections shape investment determinations by influencing their syndication networks. Notably, venture capitalists sharing common ethnic, educational, or vocational backgrounds exhibit a higher propensity to syndicate, thereby facilitating investment resolutions. Yet, despite these strides in research, an empirical gap persists concerning the precise impact of VC alumni relationships on investment propensity and the ensuing economic ramifications post-investment.

2.2 Alumni Relationship and VC Investment Decisions

Prior research highlights social networks' ability to complement or replace weak formal institutions (Ru et al., 2020). Alumni relationships, a unique social network, foster bonding and value-based interaction (Massa & Simonov, 2011). Scholars note their impact on various market players, including investors, analysts, auditors, and fund managers (Massa & Simonov, 2011; Gompers et al., 2016; Cohen et al., 2010; Gu et al., 2019). Much of the prevailing research accentuates the favorable economic implications of these relationships, such as mitigating information asymmetry, curbing opportunistic behaviors, enabling access to external resources, and facilitating the unobtrusive transfer of tacit knowledge.

Alumni relationships exert influence over venture capitalists' investment choices through three distinct avenues. Firstly, when other factors remain constant, these relationships counteract information asymmetry and expedite the tacit transfer of knowledge. Notably, venture capitalists contend with the persistent challenge of information asymmetry among entrepreneurs (Colombo, 2021). Social relationships offer an efficient conduit for overcoming these asymmetries by facilitating information exchange between venture capitalists and entrepreneurs (Ru et al., 2020). Furthermore, venture capitalists navigate a vast, uncertain information landscape that demands their attention and stretches their information processing capacity (Gompers et al., 2020). In this context, an effective and reliable information channel becomes imperative. As an adjunct to formal channels, alumni relationships can diminish venture capitalists' information gathering costs and offer a robust route to accessing private insights regarding entrepreneurs' competencies and inclinations towards opportunistic behavior. This, in turn, empowers VCs to clarify uncertainties in their decisions (Massa and Simonov, 2011). Moreover, personal interactions beyond business alliances between venture capitalists and entrepreneurs expand the realm of knowledge exchange, enhancing the flow of intricate, tacit knowledge (Phan et al., 2020). This expansion facilitates a more comprehensive understanding of the investee firms' status, thereby enabling venture capitalists to render more precise judgments.

The second pathway through which alumni relationships exert influence on VC investment decisions is by enhancing the potency of reputation mechanisms in incentivizing and constraining entrepreneurs. VC investments hinge upon cooperation and mutual trust between venture capitalists and invested firms, and a robust reputation is paramount for fostering this relationship. Within the VC realm, an entrepreneur's reputation emerges as a crucial criterion for pre-investment evaluation, effectively tempering uncertainty by escalating the repercussions of trust breach. Notably, the circles of alumni formed through these relationships wield binding force, intensifying the clout of reputation mechanisms. Within these circles, transgressions are met not only with disfavor from fellow alumni but also the potential loss of entire alumni networks and the embedded social capital therein. This substantial cost tied to trust violation amplifies the rational choice for upholding trustworthiness within alumni circles, thereby stimulating a convergence of interests between venture capitalists and investee entities. This alignment nurtures enduring, mutually advantageous, and cooperative relationships.

The third avenue through which alumni relationships exert their influence is the emotional driver. Emotions rooted in alma mater allegiance significantly shape venture capitalists' decision-making. The lens of social network theories reveals that people tend to connect, engage, and establish bonds with those who share similar characteristics and backgrounds. Within such connections, reciprocal social obligations often emerge, motivating individuals to exhibit generous behaviors towards one another (Gupta et al., 2018). Notably, Gompers et al. (2016) ascertain that individual venture capitalists lean towards collaborating with peers who share their ethnicity, educational background, or career trajectory. In aggregate, the emotive ties to alma mater can potentially furnish alumni relationships with a competitive edge, rendering them appealing conduits for attracting venture capital. Synthesizing the aforementioned, we formulate our primary hypothesis:

H1. Ceteris paribus, venture capitalists are inclined to invest in firms with alumni connections.

2.3 The Economic Consequences of VC Investment Based on Alumni Ties

Past research underscores the role of reputation and private information in influencing a manager's investment preferences (Butler & Goktan, 2013; Bammens & Collewaert, 2014). Pool et al. (2012) posit that unfamiliar companies may evoke greater investor pessimism. Within the alumni network, the exchange of private information, the incentivizing impact of reputation mechanisms, and the familiarity among alumni collectively bolster the trust venture capitalists place in the alumni CEOs of invested enterprises. This, in turn, curtails negotiation costs, bolsters cooperation (Phan et al., 2020), enhances investment performance and inclines venture capitalists towards subsequent investments. From this perspective, we articulate our second and third hypotheses:

H2. Ceteris paribus, an alumni relationship between the venture capitalist and the CEO of the invested enterprise correlates with higher returns.

H3. Ceteris paribus, a venture capitalist's alumni relationship with the CEO of the invested enterprise leads to a greater likelihood of subsequent investments.

From a performance standpoint, the pinnacle of the investment process entails recuperating investment costs and securing exit benefits during the exit phase, often manifested through an initial public offering (IPO). An IPO signifies investment triumph, facilitating maximum returns and bolstering competitive recognition between investors (Bock & Schmidt, 2015). For venture capitalists, the critical IPO exit factor resides in adeptly selecting and nurturing high-quality new projects. Information asymmetry can lead to erroneous judgments on project quality, while moral hazards within invested firms can hinder efficient project cultivation. VC entities armed with greater information can wield enhanced control, enhancing their potential to opt for an IPO (Wang & Wu, 2020). Concurrently, alumni relationships function to mitigate information asymmetry and facilitate tacit knowledge transfer. This equips venture capitalists with a comprehensive understanding of investee firms, facilitating informed IPO decisions that align with both VC and entrepreneur goals of maximizing returns. Consequently, we posit our final hypothesis:

H4. Ceteris paribus, VC firms with alumni relationships between venture investors and invested enterprise CEOs demonstrate a heightened likelihood of opting for an IPO exit.

3 RESEARCH DESIGN

3.1 Methodology

We test the first hypothesis by examining whether the alumni relationship affects the probability that a VC will invest in alumni-connected firms. The VC investments database records the VC proceeded with investment decisions only. Therefore, we innovatively developed the matching approach adopted by Chung et al. (2018; originally proposed by Rhodes-Kropf & Robinson,2008, and Gompers et al.,2016) to generate hypothetical VC investment deals that do not achieve investment decisions to match with the actual sample of venture capitalists with investment decisions to form the final sample.

Chung et al. (2018) select the hypothetical acquirer for each actual acquirer on a one-to-one basis based on the similarity in their study examining the impact of CEO home bias on the choice of acquisition targets. Their approach "does not measure the probability that a given company will choose to engage in an acquisition. Instead, the regressions estimate the likelihood that an actual acquirer-target pair will be selected instead of its hypothetical counterpart" (Chung et al., 2018, p. 12). Different from their study, we examine the probability that a given VC institution will invest in alumni-connected firms. Therefore, we take advantage of their idea and revise their approach to construct our sample. Specifically, we use the propensity score matched (PSM) approach to match each alumni-connected investment observation with one observation from a non-alumni-connected investment, using the nearest neighbor match method with replacement. We have 270 observations (135 pairs) after this procedure. If the matched observation comes from the same year, we then allocate this matched observation with an investment decision (*SchoolInv*=1). Otherwise, we consider this matched observation to be without an investment decision (*SchoolInv*=0). Next, we use the same method to find the matched observation for each non-alumni-connected investment observation. This procedure yields 2,086 observations (1,043 pairs). Similarly, *SchoolInv* equals 1 if the matched observation comes from the same year and 0 otherwise. The procedure yields the likelihood of an alumni-connection in our matched sample as 0.5 (the mean of our independent variable in this matched sample is 0.5). Finally, we obtain 2,356 matched observations and use this matched sample to estimate the following specification:

$$ScholInv_{i,j,t} = \beta_0 + \beta_1 SchoolRel_{i,j,t} + Controls_{i,j,t} + Year + Industry + \varepsilon_{i,j,t} \quad (1)$$

where $SchoInv_{i,j,t}$ is the dummy variable that equals one if the VC institution *i* makes the investment decision and invests in enterprise *j* in year *t*, and zero otherwise. $SchoolRel_{i,t}$ is the variable of our interests. It equals one if the investor of venture capital institution *i* and the CEO of the invested firm *j* are alumni, and zero otherwise. The mean value of this variable in our matched sample is 0.5. $Control_{i,t}$ are our control variables, including the number of years of a VC establishment when an investment event occurs (*VCYear*), the number of registered capital of VC institutions (*VCSize*), the nature of VC institutions (*VCOwn*), the gender of the VC institution manager (*VCsSex*), the educational background (*VCsEdu*), the variable describing whether the registration place of the VC institution and the invested enterprise is in the same province (*Location*) and the investment stage (*Stage*). We control for the year-fixed effect and the industry-fixed effect in the specification.

In addition, to examine the economic consequences of VC investment based on alumni ties (verify H2, H3, and H4), we develop the following empirical specification:

$$Consequences_{i,j,t} = \beta_0 + \beta_1 SchoolRel_{i,j,t} + Controls_{i,j,t} + Year + Industry + \varepsilon_{i,j,t} \quad (2)$$

Where $Consequences_{i,j,t}$ is $Return_{i,j,t}$, $Round_{i,j,t}$ and $IPO_{i,j,t}$. $Return_{i,j,t}$ is the performance level of VC invested by VC institution *i* in enterprise *j* in the year *t*, and takes the value of the book return (multiple) of the VC institution *i*. $Round_{i,j,t}$ is the investment round of VC institution *i* investing in enterprise *j* during the year *t*, and when the investment round is greater than 1, it equals 1; otherwise, 0. We set the dummy variable IPO to reflect the probability of the risk investment IPO exit. When the VC successfully withdraws from the IPO, the variable $IPO_{i,j,t}$ equals 1, otherwise 0. The explanatory and other modeling specifications are the same as those in Equation (1).

3.2 DATA

Our actual sample of VC events was obtained from the investment events in the China Venture Source[1] investment database and exit events in the Private Equity database.[2] The data sample includes VC institutions, invested companies, investment amounts, investment time, investment stages, investment rounds, the investor's name, and the investment event's exit status. Then, we manually collected data on the personal information of venture capitalists and the CEOs of the investee firms through websites such as Skyeyes, IT Orange, Baidu, etc. Consequently, for each VC and CEO of the VC-backed firms, the dataset includes the gender,

[1] https://data.cvsource.com.cn
[2] https://www.pedata.cn

education, school, age, and work start time. We excluded observations with missing data in CEOs' personal information and observations with missing values. Our final samples consist of 1,182 observations, including 135 alumni-connected investments and 1,047 non-alumni-connected investments, spanning 1999 to 2018. To mitigate the effect of outliers, we Winsorize all the continuous variables at the 1% level in both distribution tails.

The descriptive statistics of our sample are reported in Table 1. The proportion of the total alumni-connected investment to the total annual investment is, on average, 19.7%, and 11.4% of VC investors and the invested enterprise CEO have alumni relations. By comparison, the descriptive statistical results of this paper are consistent with the relevant studies.

Tab. 1 – Descriptive statistics of variables. Source: own research

Variable	N	Mean	Median	Min	Max	SD
SchoolInv	1,182	1	1	1	1	0
Investment	1,182	0.197	0	0	1	0.334
SchoolRel	1,182	0.114	0	0	1	0.318
Major	1,182	0.480	0	0	1	0.500
Age	1,182	6.569	5	0	27	5.910
Time	1,182	18.370	19	15	22	2.011
VCYear	1,182	6.849	5	0.500	46	6.276
VCSize	1,182	10.070	0.500	0.007	350	37.550
VCOwn	1,182	0.030	0	0	1	0.172
VCsSex	1,182	0.914	1	0	1	0.281
VCsEdu	1,182	2.789	3	1	4	0.673
Location	1,182	0.459	0	0	1	0.499
Stage	1,182	2.712	3	1	4	0.940

Note: N - Number of Samples. The statistical sample is the full sample with investment decisions.

4 RESULTS AND DISCUSSION

4.1 VC and alumni relations

The regression results of Equation (1) are reported in Table 2. Column (1) in Table 2 includes *SchoolRel* as the only independent variable to control for possible negative weights issue. The estimated coefficient on *SchoolRel* is significant at a 1% level. Column (2) adds the control variables. The coefficient on *SchoolRel* is 0.126 and remains significant at a 1% level even after adding the controls variable. Column (3) and Column (4) further control year and industry fixed effects, respectively. Column (5) controls year and industry fixed effects, and the coefficient of *SchoolRel* remains statistically and economically significant in all specifications. From Column (5), the alumni relationship has increased the probability of venture capital institutions investing in alumni enterprises by 13.0%. These regression results indicate that when VC investors and the invested enterprise CEO have an alumni relationship, the VC investor tends to invest in the alumni enterprise when making investment decisions, which is consistent with our theoretical expectation. Alumni relationships, as a significant external resource, help alumni-affiliated firms access more market opportunities. These relationships compensate for the imperfections and institutional deficiencies in emerging markets, thereby enhancing the competitiveness of alumni firms in securing VC.

Tab. 2 – The impact of alumni relations on VC decision. Source: own research

Variable	SchoInv				
	（1）	（2）	（3）	（4）	（5）
SchoolRel	0.115***	0.126***	0.124***	0.122***	0.122***
	(4.899)	(4.262)	(4.372)	(4.083)	(4.233)
CV	No	Yes	Yes	Yes	Yes
YEAR	No	No	Yes	No	Yes
INDUSTRY	No	No	No	Yes	Yes
N	2356	2356	2356	2356	2356
Pseudo R-squared	0.061	0.148	0.164	0.161	0.174

Note: Robust t-statistics based on standard errors clustered by the firm level are reported in parentheses. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels. “YES” or “NO” means if the model specifications include controlling variables (CV), year effect (YEAR), or industry effect (INDUSTRY). The matched sample is used.

Further, we conducted the following robustness and endogenous tests to further validate the main tests and present the results in Table 3. First, we used the ratio of the total alumni-induced VC investment to the total investment of the VC institution to enterprise (*Investment*) as the substitute dependent variables using actual sample of VC events. Panel A shows the results, which are consistent with the main tests. Second, we excluded the observations that the tenure of the VC manager is less than three years to address the potential reverse causality, that is, the alumni resource drives the VC institutions to appoint specific venture capitalists. The results in Panel B are consistent with the main tests. Third, we examined the potential impact of unobserved confounding variables to address the concern of omitted variables (Larcker and Rusticus, 2010; Karampatsas et al., 2014; Christensen, 2016). The estimated impact threshold for a confounding variable (ITCV) for the focal variable *SchoolRel* in Panel C is much higher than the partial correlation of other control variables, suggesting the omitted variable is unlikely to overturn the results. Finally, we followed the method from Lewbel (2012) and constructed heteroscedasticity-based instruments to mitigate the endogeneity issues (Bhattacharya et al., 2020; Mavis et al., 2020; Campbell et al., 2021). The predicted *SchoolRel* by instruments are positive and statistically significant in Panel D, consistent with our main results.

Tab. 3 – Robustness and endogenous tests. Source: own research

Panel A: Dependent Variable: *Investment*

Variable	Investment				
	（1）	（2）	（3）	（4）	（5）
SchoolRel	0.691***	0.676***	0.676***	0.674***	0.674***
	(6.074)	(5.480)	(5.238)	(5.504)	(5.334)
CV	No	Yes	Yes	Yes	Yes
YEAR	No	No	Yes	No	Yes
INDUSTRY	No	No	No	Yes	Yes
N	1,182	1,182	1,182	1,182	1,182
Pseudo R-squared	0.433	0.448	0.471	0.464	0.486

Panel B: Excluding investors with a term of less than three years

	SchoolInv	*Investment*
Variable	（1）	（2）
SchoolRel	0.144***	0.670***
	(3.80)	(5.091)
CV	Yes	Yes
YEAR	Yes	Yes

INDUSTRY	Yes	Yes
N	1,730	1,000
Pseudo R-squared	0.265	0.491

Panel C: Impact of threshold for a confounding variable-partial correlations of control variable

	SchoolInv	*Investment*
VCsSex	0.0077	-0.0007
Stage	0.0002	-0.0001
VCYear	0.0001	0.0000
VCOwn	0.0000	-0.0001
VCSize	-0.0001	0.0000
Location	-0.0007	0.0005
VCsEdu	-0.0011	-0.0058
ITCV	0.0602	0.0657
VCsSex	0.0077	-0.0007

Panel D: Results of heteroscedasticity-based instrument approach

	SchoolInv	*Investment*
Variable	（1）	（2）
SchoolRel	0.184***	1.174***
	(3.638)	(7.692)
CV	Yes	Yes
YEAR	Yes	Yes
INDUSTRY	Yes	Yes
N	2,356	1,182
Pseudo R-squared	0.129	0.284

Note: Robust t-statistics based on standard errors clustered by the firm level are reported in parentheses. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels. “YES” or “NO” means if the model specifications include controlling variables (CV), year effect (YEAR), or industry effect (INDUSTRY).

4.2 Alumni investment performance

Table 4 reports the regression results of VC performance level (*Return*) to validate hypothesis H2. The result shows that the coefficients on *SchoolRel* remain positive and statistically significant in all columns. Specifically, the coefficient on *SchoolRel* in Column (4) is 0.105, which indicates that when the venture investor and the invested enterprise CEO have alumni relationship, the VC’s book return (multiple) is increased by 10.5%. This result supports the claims of private information and reputation mechanisms. The sharing of private information in the alumni network and the constraints and incentives of the reputation mechanism can reduce transaction costs and potential moral hazards, further improving venture capitalists’ performance. Agency conflicts may also exist in alumni investment and could harm VC performance, but private information and reputation mechanisms play a leading role overall. It suggests that alumni networks provide venture capitalists with a unique competitive advantage. Through alumni connections, venture capitalists can more efficiently access industry information, technological resources, and talent support. This ability to acquire resources not only improves their financial performance but also enhances their reputation and appeal in the market, further solidifying their competitiveness within the industry.

Tab. 4 – Regression results of alumni investment performance. Source: own research

Variable	*Return*			
	（1）	（2）	（3）	（4）
SchoolRel	0.414***	0.345***	0.234***	0.105***
	(4.434)	(4.363)	(4.255)	(4.113)
CV	Yes	Yes	Yes	Yes
YEAR	No	Yes	No	Yes
INDUSTRY	No	No	Yes	Yes
N	705	705	705	705
R-squared	0.013	0.096	0.057	0.141

Note: Robust t-statistics based on standard errors clustered by the firm level are reported in parentheses. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels. "YES" or "NO" means if the model specifications include controlling variables (CV), year effect (YEAR), and industry effect (INDUSTRY).

4.3 Alumni investment rounds

Table 5 reports the regression results regarding the VC round (*Round*) to test hypothesis H3. The result shows that the coefficients on *SchoolRel* remain positive and statistically significant in all columns. Specifically, the regression coefficient on *SchoolRel* in Column (4) is 0.041, which indicates that when the venture capitalist and the invested enterprise CEO have alumni relations, the probability of additional investment by the VC investor increases by 4.2%. Alumni relationships increase the possibility of VC institutions making additional investments. Due to the shared educational background and trust foundation among alumni, venture capitalists can more easily access high-quality project information within alumni networks. This informational advantage enables venture capitalists to identify promising projects more accurately and to continue investing in subsequent funding rounds, thereby improving their investment return rates. These high returns not only directly reflect the competitiveness of venture capitalists but also create a reputation effect that attracts more high-quality projects, further solidifying their market position. At the same time, for the investee companies, multiple rounds of investment not only provide sustained financial support but also help drive technological innovation and market expansion through post-investment management. This continued support significantly enhances the competitiveness of the investee companies, which, in turn, contributes to the success of the venture capitalists. This reciprocal relationship further strengthens the venture capitalists' competitive edge in the market.

Tab. 5 – Return results of investment rounds. Source: own research

Variable	*Round*			
	（1）	（2）	（3）	（4）
SchoolRel	0.042**	0.038***	0.044***	0.041***
	(4.179)	(3.982)	(4.109)	(4.005)
CV	Yes	Yes	Yes	Yes
YEAR	No	Yes	No	Yes
INDUSTRY	No	No	Yes	Yes
N	1,182	1,182	1,182	1,182
R-squared	0.004	0.039	0.026	0.059

Note: Robust t-statistics based on standard errors clustered by the firm level are reported in parentheses. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels. "YES" or "NO" means if the model specifications include variables (CV), year effect (YEAR), and industry effect (INDUSTRY).

4.4 Alumni investment withdrawal method

Table 6 reports the regression results regarding the IPO to test hypothesis H4. The results in Columns (1) to (4) show that the coefficients on *SchoolRe* are positive and significant at the 1% level. Specifically, the coefficient on *SchoolRel* in Column (4) is 0.045, which indicates that when the VCinvestor and the invested enterprise CEO have an alumni relationship, the probability that the venture capital institution will exit by IPO increases by 4.6%. Alumni relationships make it easier for VC institutions to exit by IPO. In addition to the possibility that alumni relationships can reduce information asymmetry and moral hazard, this result may also be driven by the ex-ante project selection or post-investment monitoring and support efforts of venture capitalists. An IPO, as a high-return exit strategy, not only showcases the venture capitalist's capabilities in project selection and post-investment management but also enhances its competitiveness within the industry through strong market performance. This success, in turn, attracts more high-quality project opportunities, further solidifying the venture capitalist's position in the market.

Tab. 6 – Regression results of IPO exit. Source: own research

Variable	*IPO*			
	（1）	（2）	（3）	（4）
SchoolRel	0.045***	0.051***	0.043***	0.045***
	(3.889)	(4.048)	(3.851)	(4.906)
CV	Yes	Yes	Yes	Yes
YEAR	No	Yes	No	Yes
INDUSTRY	No	No	Yes	Yes
N	705	705	705	705
R-squared	0.030	0.107	0.172	0.228

Note: Robust t-statistics based on standard errors clustered by the firm level are reported in the parentheses. ***, ** and * indicate significance at the 0.01, 0.05 and 0.10 levels. "YES" or "NO" means if the model specifications include controlling variables (CV), year effect (YEAR), industry effect (INDUSTRY).

5 CONCLUSION

This study delves into the impact of alumni relationships on venture capitalists' investment choices and their subsequent economic outcomes. We discover a pronounced inclination for venture capitalists to invest in firms with alumni connections. Furthermore, we unearth a noteworthy enhancement in book returns when an alumni relationship exists between the VC investor and the CEO of the invested enterprise. Intriguingly, alumni relationships also augment the likelihood of subsequent VC reinvestments and successful IPO exits. These findings underscore the potency of private information sharing and reputation-driven constraints in mitigating transaction costs and potential moral hazards. This dynamic interplay, encompassing VC project selection and post-investment monitoring, translates to more opportune and profitable exits. The long-term strategic layout formed by alumni investments not only provides sustained financial support to invested companies but also facilitates their technological innovation and market expansion through post-investment management. This long-term support mechanism significantly enhances the competitiveness of invested companies, which, in turn, reinforces the VC firm through their success. By building a strong market reputation, the VC can continually attract high-quality project opportunities through reputation effects, enabling it to maintain a competitive advantage over the long term. In essence, the empirical outcomes harmonize with our theoretical projections, affirming the potential of alumni relationships to effectively link VC investors and startup CEOs, thereby facilitating the acquisition of valuable resources from this network. Alumni networks further enrich companies by bestowing abundant, high-quality social resources, thus substantially elevating a company's competitive edge. The significance of this paper to literature is embodied in the following two aspects. Regarding theoretical contributions, our results strongly support that the alumni relationship network influences VC investment decisions. Also the competitiveness of VC firms and the invested enterprises can be enhanced.

Specifically, our findings enhance the understanding of the growing importance of alumni networks in emerging financial markets. These findings have important implications for VC investment decisions, regulatory practices, and the sustainable development of entrepreneurial ventures. They also provide valuable insights for further empirical research into entrepreneurial competitiveness. The relationship between VC and social resources is not only significant in emerging markets like China but also plays a critical role in developed markets such as the United States and Europe. In developed markets, characterized by long-term economic stability, mature legal frameworks, and trust mechanisms, social relationships primarily function as informal social capital, focusing on personal connections and information exchange. For instance, Gompers et al. (2016) demonstrated that social relationships facilitate better investment decisions for venture capitalists through information-sharing mechanisms. Similarly, Kaplan and Strömberg (2004) pointed out that detailed contractual terms and stringent regulatory requirements make the VC investment process more standardized. In contrast, in emerging markets like China, social relationships not only serve similar purposes but also act as a crucial mechanism to address market imperfections (Ru et al., 2020). China's collectivist culture and deeply rooted interpersonal networks (*guanxi*) significantly influence how alumni relationships function. Unlike the primarily individual-focused relationships in developed markets, Chinese alumni networks emphasize collective success and development (Qi et al., 2020). While alumni ties globally exert an important influence on VC decision-making, the mechanisms and effects vary across different market contexts. In developed markets, alumni relationships rely more on individual capabilities and achievements (Sorenson & Stuart, 2001). In contrast, in emerging markets like China, alumni networks help bridge gaps in market mechanisms, facilitate trust building and information flow, and significantly reduce transaction costs and potential moral hazards in investments. Alumni relationships, as a form of social capital, can influence investment decisions across different cultural contexts by reducing information asymmetry and enhancing trust. In China, the uniqueness of such relationships lies in their role in addressing market imperfections and being driven by a strong sense of collective honor. This makes their impact on VC decision-making and post-investment outcomes particularly significant. These findings are crucial for understanding the mechanisms behind investment decisions and enhancing corporate competitiveness in emerging markets, while also offering valuable insights into similar studies in developed markets.

Despite its contributions, this study harbors limitations that warrant exploration in future research. Firstly, recognizing the pivotal role of various corporate executives beyond VC investors and startup CEOs in risk investment decisions, future investigations could encompass a broader spectrum by extending to larger samples of corporate executives within alumni networks. Secondly, while metrics like book return on investment, investment rounds, and VC exit strategies gauge VC investment efficiency, our findings hint at the benefits of alumni affiliation for invested enterprises through multiple investment rounds and IPO exits. Future studies might pivot towards in-depth analyses of startups, delving into the intricate interplay between alumni-linked investors and assessing the sustained effects of such VC on companies post-IPO. Lastly, this study primarily explores the cooperative dynamics forged by alumni relationships, spotlighting how alumni-related investment bolsters performance. Future inquiries could diversify into other types of social networks like hometown, kinship, and friendship. This expanded exploration could uncover how these informal networks interact under varying contexts, influencing venture capitalists' actions and economic outcomes.

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