Seoul Journal of Business
Volume 28, Number 1 (June 2022)
DOI: https://doi.org/10.35152/snusjb.2022.28.1.002

Venture Capitalists in the Entrepreneurial Ecosystem and Fitness-reducing Competition*

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ABSTRACT

Although the role of venture capital (VC) in entrepreneurship is undeniable, we address possible risks associated with the over-dependence of the ecosystem on VC firms. In particular, we examine whether the supply of VC promotes or undermines the creation of entrepreneurial value in a community even when VC firms serve as an effective selector of such value. With an agent-based model of entrepreneurship where entrepreneurs are uninformed of the capabilities of the potential business partners, we suggest that the local efficiency of VC firms in the matching process may lead to the information-cascade type of herding behavior among entrepreneurs, which undermines paradoxically the overall efficiency of the ecosystem. With this implication, we seek to contribute to the literature on entrepreneurship by highlighting the possibility that competition-promoting institutions may destabilize the market itself such that VC firms as the efficient selector of entrepreneurial opportunities may induce uninformed, non-VC-backed startups to imitate the investments of VC firms, thereby

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* This study was supported by the Institute of Management Research at Seoul National University.
We are obliged to comments from two anonymous reviewers as well as feedbacks from program participants in the SNU Entrepreneurship Center. The supports from the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2020S1A3A2A02093277) are also appreciated.
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reducing the diversity of entrepreneurial activities and thus the stability of the entrepreneurial ecosystem.

Key words: entrepreneurship; matching failure; agent-based modeling; partner selection; venture capital

INTRODUCTION

Theorists and practitioners alike have long acknowledged that venture capitalists perform a pivotal role in the development of the entrepreneurial ecosystem (Ante 2008; Florida and Kenney 1988; Gompers and Lerner 2001). They have observed that venture capitalists promote entrepreneurial activities by alleviating liquidity constraints on nascent entrepreneurs and advising entrepreneurs of the operation of new ventures (Evans and Jovanovic 1989; Kaplan and Stromberg 2001; Gompers and Lerner 2001). For example, geographical co-location of venture capital (VC) firms and start-ups alone, a well-established empirical regularity, indicates a complementary relationship between VC and entrepreneurship (Samila and Sorenson 2011; Shane and Cable 2002; Stuart and Sorenson 2003). Direct evidence mounts such that the equity stakes of VC into startups is positively associated with the performance of these startups (Fitza, Matusik, and Mosakowski 2009; Jain and Kini 1995; Megginson and Weiss 1991; Stuart, Hoang, and Hybels 1999) and that VC-backed startups tend to be technologically more innovative than non-VC backed ones (Hellman and Puri 2000; Kortum and Lerner 2000).

Despite these theoretical and empirical supports for venture capitalists, a concern arises over whether theorists and practitioners overstate the role of VC to promote entrepreneurship. Indeed, Baum and Silverman (2004) suggested that the ability of VC firms to select promising startups is not without limitations. Lazonick and Tulum (2011) further observed that venture capitalists eager to exit their investments in a relatively short time horizon via initial public offering may not have an incentive to keep innovative and thus unproven startups in their portfolios. In a similar vein, Engel and Keilbach (2007) pointed to selection bias such that innovative ventures are likely to receive funding from VC firms, not that startups funded by VC firms are likely to be innovative.

Furthermore, Zucker and her colleagues (1998) showed that once the effect of knowledge asset in a region was controlled for, the supply of VC was negatively associated with entrepreneurship in the biotechnology industry in that region.

Although the role of VC in entrepreneurship is undeniable, we in this study address possible risks associated with the over-dependence of the ecosystem on VC firms. The current debate centers around the ability of VC firms to select productive or innovative startups that help create new value and wealth in the ecosystem. We however go beyond this debate and examine whether the supply of VC promotes or undermines the creation of entrepreneurial value at the community level – the level of the entrepreneurial ecosystem – even when VC firms serve as an effective selector of such value. With an agent-based computational model of entrepreneurship where entrepreneurs are uninformed of the capabilities of the potential business partners, we suggest the following: the local efficiency of VC firms in the matching process may lead to the information-cascade type of herding behavior among entrepreneurs (e.g., Bikhchandani, Hirshleifer, and Welch 1992), which undermines paradoxically the overall efficiency of the ecosystem. Accordingly, venture capitalists in good times may expose entrepreneurs to matching failure out of proportion to returns of such matching.

In particular, our model shows: (1) capable VC firms, i.e., effective selectors, may facilitate the matching of entrepreneurs, i.e., idea holders, and their business partners, i.e., factor providers, and yet at the expense of increased competition among entrepreneurs to seek business partners of better capabilities; (2) the herd behavior of entrepreneurs not receiving VC investments becomes stronger as to the selection of business partners when the supply of VC increases in the market. This in turn leads to the large-scaled matching failure between entrepreneurs and potential business partners, which is the waste of resources at the community level; and (3) the supply of VC may be detrimental to the creation of new values at the community level when entrepreneurs search locally for potential partners in the abundant market, whereas it may be instrumental to value creation when the market is unfavorable.

Given that the supply of VC in bad times – in the unfavorable markets such as bear markets – is on the decrease (Lerner 2012), this model further suggests that VC firms may undermine the

creation of entrepreneurial value at the community level by aggravating competition among entrepreneurs in good times and by reducing their investment in bad times. With this implication, we seek to contribute to the literature on entrepreneurship by highlighting the possibility that competition-promoting institutions may destabilize the market itself such that VC firms as the efficient selector of entrepreneurial opportunities may induce uninformed, non-VC-backed startups to imitate the investments of VC firms, thereby reducing the diversity of entrepreneurial activities and thus the stability of the entrepreneurial ecosystem.

METHODS

The role of VC in entrepreneurship presumes two observations. First, idea discovery differs from idea execution, which requires conventional, managerial skills and resources. Yet, entrepreneurs do not necessarily have such skills and resources that allow them to act upon their business ideas (Bae 2021; Kirzner 1973; Schumpeter 1934). Second, VC firms are designed to provide managerial skills and resources to entrepreneurs whose unproven business ideas are too risky for the traditional financial institutions to valuate and support (Florida and Kenney 1988; Gompers and Lerner 2001). The proposed role of VC firms is however open to logical inconsistency when we consider the exit strategy of the VC firms.

In an attempt to pay off their investors sensitive to short-term fluctuations in the market, venture capitalists prefer to liquidate the investments into yet-to-growing startups via initial public offerings or mergers and acquisitions. The challenge herein is that VC firms have to convince the equity market or incumbent organizations of the value of their startups whose current performance is not indicative of their potential value. Here comes a logical inconsistency. When supposedly informed venture capitalists sell their investments to the traders in the equity market, a deal may take place at a fair price in either of the following conditions.

One is the informed equity market where investors are aptly making the valuation of unproven entrepreneurial business. Yet, it is theoretically problematic because the entrepreneur decides to start a business when investors or traditional financial institutions do not agree with her on the value of her unproven idea. If the

conventional investors are well informed, the entrepreneur by definition does not need to rely upon alternative institutions such as venture capital for the access to resources and skills. The other is mere luck, which has nothing to do with the ability of the investors to assess unproven entrepreneurial activities. Unless such luck is repeatable and persistent, this again leaves little room for VC firms, for venture capitalists cannot bet on such an unreliable equity market for liquidating their investments. Either way, the exit strategy of VC firms theoretically precludes the role of VC firms in entrepreneurship (e.g., Lerner 2012).

In their analysis of the Japanese IPO market reform in 2000, for example, Eberhart and his colleagues (2013) found that although the Japanese reform in the equity market was made in 2000 to facilitate the exit strategy of VC firms, this policy appeared to have either little or in some cases negative impact on the creation of entrepreneurial value from VC-backed startups, measured by sales growth. The TIPS (Tech Incubator Program for Startup) program, launched in 2013 in Korea, also reflects the inherent tensions of venture capitalist investments, i.e., those of screening innovative ideas in the long run and profiting from their investments in the short run. The program run by the Korean government was designed to facilitate the supply of capital to early-staged startups such that the government provided a matching-fund grant to the startups selected and invested by accelerators and venture capitalists. To the extent that those startup intermediaries are concerned with follow-on investments or IPO prospects, they are likely to make a safe investment in startups whose business models are readily comprehensible and whose valuations are relatively easy to make. A pitfall in this process is that the easy-to-value startup is not necessarily innovative. Moreover, fads and fashions in the startup process are inevitable when attentions are given to safe investments. The equity investments into bustling businesses in the last decade such as platform business and AI-enabled services illustrate this tendency.

Besides the ability of VC firms to select promising startups as well as the perfection of the equity markets, attention is also given to the declining role of VC in the current market environment. With the declining cost of entry in web or mobile based services, the lean startup, a recent trend in entrepreneurship, encourages nascent entrepreneurs to start a new business without receiving sizeable

investments from VC firms (Blank and Dorf 2012: xviii). Indeed, the 2014 yearbook of National Venture Capital Association reports that the number of VC-backed IPOs declined steadily from 280 in 1999 to 81 in 2013. Furthermore, Lerner (2012: 93-96) warned that given the cyclic pattern in VC investments the venture capital finance has not been an indisputable carrier of entrepreneurship because the supply of venture capital decreases in bad times when the entrepreneurs struggle with financing their business. For example, the startup boom during the Covid-19 pandemic in Korean as well as global markets is partly associated with excess liquidity in the capital market. In a similar vein, the shortage of VC investments in the economic downturns in an endemic phase of Covid-19 well demonstrates that VC investments are rather procyclical, not pre-cyclical. The team of Y-combinator, a prestigious startup accelerator, warned in year 2022 that "(..) during economic downturns even the top tier VC funds with a lot of money slow down their deployment of capital"(Chosunilbo, May 24, 2022).

We take a different approach to this debate by undertaking a rather conservative test of the role of VC firms. Rather than tracking the ex post performance of VC backed startups, we seek to examine whether venture capitalists fail to promote the creation of entrepreneurial value even when they are effective selectors of entrepreneurial ideas. In so doing, we do not question the function of VC firms in individual startups, but raise a question of whether well-functioning VC firms are compatible with the value creation at the level of the entrepreneurial system. To this end, we draw attention to the interaction of well-informed venture capitalists and uninformed entrepreneurs and their business partners as to the potential value of entrepreneurial opportunities. The details of our approach are the following.

Behavioral Assumptions

The startup process is a way of betting on big ideas, which constitutes so-called entrepreneurial risk. Schumpeterian rents in turn rewards such risky investments by entrepreneurs. Any idea however may not have intended effects unless ideas are implemented in practical terms, an obstacle that resource-poor entrepreneurs may overcome by cooperating with and persuading doubtful trading partners who control necessary resources such as production

facilities and distribution channels and who do not necessarily agree on the commercial value of a given idea. Indeed, the most important trading partners for nascent entrepreneurs are candidates for senior management such as CEO and CFO, whose managerial skills are not found in the founding members of a startup. Venture capitalists as market makers come into play when transactional frictions such as disagreement over an idea impede the execution of a novel idea. Their investment serves as a warranty of a doubtful idea and their business networks provide reliable referrals to entrepreneurs who are ignorant of capable trading partners.

First, opportunity recognition is an essential aspect of entrepreneurship as a risky business (Kirzner 1997; Schumpeter 1934; Shane and Venkataraman 2000). Owing to either their insights or cognitive biases, entrepreneurs start a business when they discover new opportunities that are neither exploited nor favorably evaluated by incumbent organizations (Audretch 1995; Busenitz and Barney 1997; Forbes 2005; Shane 2000). In this regard, entrepreneurship is an act of disagreeing with others on unproven, novel opportunities; when every market participant agrees on the value of the opportunities, incumbents may already preempt those opportunities by readily available resource under control. However, ideas alone do not constitute entrepreneurship (Alvarez, Barney, and Anderson 2013; Klein 2008; Schumpeter 1934). Entrepreneurs typically lack resources and skills that are required to execute new business ideas (Cagetti and De Nardi 2006; Evans and Jovanovic 1989). They thus need to develop the cooperation with those who provide relevant resources and skills, namely, business partners. Hence, the challenge facing such entrepreneurs is to persuade potential business partners to endorse their risky ideas.

Second, entrepreneurship is not free from fads and fashions. Herd behavior ensues whenever nascent entrepreneurs facing uncertain market situations are likely to imitate the actions of successful entrepreneurs, including the target industry, product concept, and business model (Francois and Lloyd-Ellis 2003; Minniti 2005; Lieberman and Asaba 2006; Ziegler 1985).

Third, venture capitalists may facilitate entrepreneurship by screening promising entrepreneurial ideas and introducing relevant business partners to entrepreneurs. The primary function of VC firms is the provision of financial resources to entrepreneurs that

suffer from liquidity constraints. However, a fundamental difference between the VC finance and the conventional financial institutions lies in that VC firms serve as a knowledge broker by consulting inexperienced entrepreneurs on their business and signaling the potential value of the entrepreneurial business to potential business partners (Florida and Kenney 1988; Gompers and Lerner 2001; Kaplan and Stromberg 2001). Giving advice on the startup's strategic focus and helping hires at the senior management level are a case in point. Uninformed business partners are likely to cooperate with VC-backed startups rather than non-VC-backed ones as they trust the ability of VC firms to select promising entrepreneurs.

With these behavioral assumptions about venture capitalists, entrepreneurs and their business partners, we develop the following model for the entrepreneurial ecosystem and examine possible risks associated with the overdependence of the ecosystem on VC firms with respect to the wealth creation in the ecosystem.

Computational Model

We develop an agent-based computational model in which venture capitalists, entrepreneurs, and their business partners interact with one another to create entrepreneurial value. The entrepreneurial process of value creation involves the cooperation between entrepreneurs and their business partners. This means that ideas alone do not create any value.

Value Creation. The setup of our model draws on the Schumpeterian view of entrepreneurial process that nascent entrepreneurs do not necessarily control all the resources needed for the execution of their ideas and that the market impact or the commercial potential of their ideas is subject to the way to recombine productive inputs to execute such ideas. Accordingly, the value of entrepreneurial process in our model is defined as that of matching between an entrepreneur and a partner such that the realized value of an idea equates with the capability of a partner to cooperate with. With a vision advantage granted, venture capitalists in our model are in an advantageous position relative to other types of players, i.e., entrepreneurs and their exchange partners. The vision advantage indicates that venture capitalists are informed of the true quality of trading partners who help entrepreneurs to execute their novel ideas.

We first define each actor's belief over new business opportunities as her location in a two-dimensional opportunity space. The opportunity space is a spatial representation of similarity or dissimilarity among actors in their beliefs or attitudes about entrepreneurial opportunities. In particular, entrepreneurs as well as potential business partners are dispersed in an opportunity space such that their distance in this space indicates the degree of disagreement between entrepreneurs and potential partners over the value of the novel opportunities that are discovered by the entrepreneurs (Audretsch 1995; Busenitz and Barney 1997; Forbes 2005; Shane 2000). In other words, a location in the space does not refer to the content or quality of an opportunity discovered by the entrepreneur. It only reflects how remote an entrepreneur is from the rest of the ecosystem as to the valuation of a unique opportunity that she discovers. When every social actor is placed in the same location, namely, a niche, the business opportunity of each entrepreneur would be readily acceptable in the ecosystem. The initial niche occupied by each type of actors in the opportunity space is randomly determined. The details are as follows.

First, new opportunities arrive exogenously at each entrepreneur. That is, the discovery of new opportunity is an exogenous shock in this model. Moreover, we assume that each entrepreneur identifies a unique opportunity.

Second, each entrepreneur in every period decides to stay in or to move to a given niche so as to search for a business partner. That is, an entrepreneur decides to stick to her original plan or is willing to modify it. Relocation in the space thus indicates the efforts of the entrepreneur to re-frame the opportunity in a way that increases its popularity in the eyes of the potential partners.

Each entrepreneur moves incrementally in north, south, west or east in the space to minimize the valuation disagreement with as many potential partners as possible. In comparison, potential partners as well as venture capitalists travel incrementally to a niche where entrepreneurs are densely populated. In other words, entrepreneurs seek to persuade the potential partners, who themselves look for new opportunities to work on.

The incremental move of entrepreneurs as well as business partners indicates that they cannot reach an agreement on the valuation immediately in one period. In other words, it takes time to persuade the others or to modify their own beliefs or attitudes.

Accordingly, entrepreneurs in our model are likely to repeat *prior ties* over time, i.e., cooperation with a given partner may continue in the subsequent periods unless venture capitalists inform entrepreneurs of better alternatives (e.g., Shane and Cable 2002).

Third, potential partners are heterogeneous with respect to the ability to execute novel opportunities, which is denoted by θ and which is uniformly distributed on the interval of [0,10]. Non-VC-backed entrepreneurs are not informed of the θ of a potential partner, whereas VC-backed entrepreneurs are informed of the θ. As discussed above, venture capitalists select entrepreneurs and help them to identify which potential partners have a better ability to execute novel opportunities (Evans and Jovanovic 1989; Gompers and Lerner 2001; Kaplan and Stromberg 2001). When entrepreneurs receive investments from venture capitalists, they thus enjoy information advantage over those without such investments with respect to the ability of potential partners to execute opportunities. This information advantage is reflected into entrepreneurs' search activities, a key stage in the entrepreneurial process of value creation.

Lastly, cooperation between an entrepreneur and a business partner takes place when both parties agree over the value of a novel opportunity, which means that both parties stay in the same niche of the opportunity space. This cooperation leads to the creation of entrepreneurial value, $V(\theta)$, which is monotonically increasing in θ. While any monotonic function would suffice, we let $V(\theta) = \theta$ for simplicity. For the creation of new value, an entrepreneur in this model needs only one business partner to work with. Note that cooperation with a capable partner creates more value than cooperation with a less capable one. This is meant to reflect the observation that not the idea per se but the execution of the idea determines the realized value of entrepreneurial opportunities (Alvarez, Barney, and Anderson 2013; Klein 2008; Schumpeter 1934).

Zone of Acceptance. The incremental move of actors in the opportunity space is reflected in the zone of acceptance. Each type of actors in this model does not interact with all the others in the opportunity space. They do not consider interacting with others whose valuation of opportunities is dissimilar to their own, i.e., whose niche in the space is remote from their current niche. Actors thus limit their attention to nearby others who are likely to agree on their valuation

of opportunities. The zone of acceptance refers to the degree of 'disagreement allowable', i.e., the scope of search by each type of actors in the opportunity space. It is the neighborhood of a current niche in which a given type of an actor is placed.

Carrying Capacity. The commercial potential of a novel opportunity is eventually subject to the size of the output market, for which a new business is aimed (Audretsch 1995; Kirzner 1997; Zucker, Darby, and Brewer 1998). Carrying capacity in the model is designed to reflect the size of the potential market, namely, the total addressable market as well as the financial liquidity in the exit market. Entrepreneurs in a niche of high carrying capacity, i.e., in good times, should enjoy the sizeable demand for their business and make an easy access to capital that supports their efforts of combining productive inputs available from other trading partners.

Accordingly, we characterize the upper bound of viable ideas or opportunities in the opportunity space as a carrying capacity of a niche in the space. Suppose that twelve entrepreneurs and as many business partners are located in the same niche whose carrying capacity is ten. Every entrepreneur in this niche has an equal probability of obtaining cooperation with any of twelve different business partners in the niche. However, only ten cases of cooperation between entrepreneurs and business partners are feasible owing to the carrying capacity of the niche. In short, carrying capacity in the model helps facilitate the matching of entrepreneurs and their exchange partners.

The above discussion is summarized in the algorithm for the model. Suppose an opportunity space S that consists of a set of niches. Let $N(e, i)$ and $N(p, i)$ be the numbers of entrepreneurs and potential business partners in niche i and $i \in S$. For an entrepreneur in niche i, let Z_i denote the zone of acceptance such that $Z_{i \neq j} = \{j : j \in S\}$. Moreover, let $\eta(i)$ be the carrying capacity of niche i. Then, the interplay of venture capitalists, entrepreneurs, and their partners proceeds as follows.

1. A non-VC-backed entrepreneur in niche i moves to niche j if $N(p, i) < N(p, j)$ and $j \in Z_i$. Otherwise, this entrepreneur stays in niche i. The same rule applies to the movement of business partners and venture capitalists. That is, they move to niche j if $N(e, i) < N(e, j)$ and $j \in Z_i$. A VC-backed entrepreneur in niche i moves in direction of niche j, which belongs to the zone of

acceptance, and which involves a potential partner whose θ is the highest in the zone. The order of movement is the following. Business partners move first, venture capitalists take next turn and entrepreneurs move last. For each type of actors, the order of the decision to move is randomly chosen. Accordingly, the moves taken by actors are not simultaneously made but sequentially determined.

2. As long as $\eta(i) \geq N(e, i)$, a non-VC-backed entrepreneur decides to cooperate with a business partner that is randomly drawn from niche i unless the entrepreneur has a prior tie to repeat. A VC-backed entrepreneur decides to cooperate with a business partner whose θ is the highest in niche i.
3. As long as $\eta(i) < N(e, i)$, as many entrepreneurs as $\eta(i)$ are randomly drawn in niche i and the rule of the second stage is repeated.
4. Finally, new entrepreneurial value is created when cooperation takes place.
5. Potential business partners who fail to enter cooperation with entrepreneurs in the ten consecutive periods cease to operate, i.e., fail to exist in the opportunity space.
6. This routine is repeated in every period.

Owing to the stage five, the input market for entrepreneurs become less abundant over time. This indicates that the window of opportunity is rather temporary and that competition among nascent entrepreneurs for these resources is intense. This again places VC-backed entrepreneurs over non-VC-backed entrepreneurs.

To run the model, we employ MATLAB version 8.4.0 (R2014b). In particular, the opportunity space consists of 30*30 grid cells, which refer to niches. The zone of acceptance includes niches that fall within a radius of 5 cells from a current niche. Figure 1 illustrates this. As is the case with local interaction models (Page 2018), the actor's move in the zone of acceptance is designed to model the set of neighbors, with whom a focal actor seeks to interact. What matters here is that a focal actor's interaction is not global, meaning that she will work with only a subset of the population of actors, whose size is predetermined in the model. The variation in the size of neighborhood may affect the degree of behavioral divergence in local and global interactions, an emergent property that this model seeks to uncover. Note that the type of search, discussed later, is a

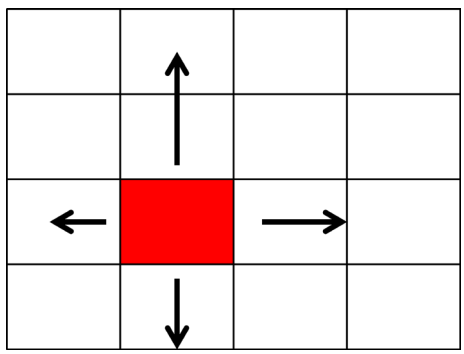


Figure 1. Opportunity Space and Movement

model parameter that determines the size of neighborhood, which is varying in our model.

In every period, each type of actors moves only across the zone of acceptance. The numbers of entrepreneurs and potential partners are 300, respectively. Note that the number of entrepreneurs equals that of business partners such that all the entrepreneurs by design should afford to work with business partners and survive in the opportunity space even without the supply of VC money in the ecosystem.

The number of venture capitalists as well as the level of carrying capacity is the treatment effect of the experiments that we undertake with the computational model. The number of venture capitalists varies from zero to 150, whereas the level of carrying capacity rises from one to ten. Note that the selection process does not take place at all when the number of venture capitalists equals entrepreneurs. Given that only a few startups succeed in receiving VC investments, selection takes on realistic implications as longs the number of venture capitalists to entrepreneurs is smaller or as high as 0.5, a cut-off rate. The data for each condition are garnered from a total of 100 independent runs, each of which has 300 periods.

RESULTS

To see the role of VC firms in the creation of entrepreneurial value, we simulate two different sets of entrepreneurial activities. One set of computations concerns actors who change incrementally

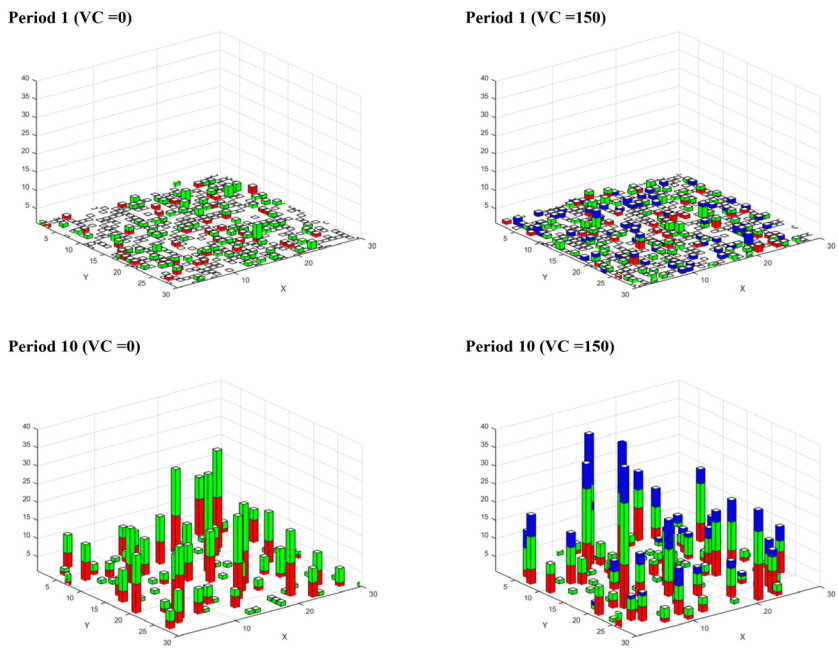
their valuation of opportunities, namely, making local search, whereas the other set of computations focuses on those who alter their valuation rather radically, i.e., making global search. Another difference between these two sets of computations is whether each actor learns from their previous search or not. Under local search, an entrepreneur does not learn in the sense that she still attends to a popular partner who declined to cooperate with her in the previous period. She would fail to cooperate with her chosen partner when the partner is already selected by another entrepreneur. The chance of such failure is likely to be high when this partner has the highest theta and competing entrepreneurs are many within her zone of acceptance. In contrast, an entrepreneur with distant search learns such that she moves beyond her zone of acceptance whenever she fails to cooperate with her chosen partners in M consecutive periods. Accordingly, risk preference is indirectly incorporated into global search. Consistent with a choice model of below-aspiration (Cyert and March 1963), entrepreneurs in this model avoid being stuck in a crowded niche so that they move beyond their zone of acceptance when they fail to enter cooperation repeatedly.

To the extent that venture capitalists serve as an effective selector of entrepreneurial opportunities, there should be a positive association between the number of venture capitalists and the sum of entrepreneurial values created in the entrepreneurial ecosystem. Otherwise, the total sum of created value may not increase with the number of venture capitalists in the system. The following sets of computational simulations are designed to test these conjectures.

Experiment 1 (Local Search)

We examine the way that entrepreneurial opportunities materialize to the ecosystem in which three hundred entrepreneurs seek to cooperate with as many business partners. Given that ideas alone do not produce any value, entrepreneurs search for capable partners, denoted by theta, with whom they seek to realize their novel and idiosyncratic opportunities. The role of venture capitalists in this process is to support entrepreneurs by providing information on capable potential partners within each entrepreneur's zone of acceptance.

Figure 2 illustrates how the opportunity space evolves as simulation proceeds. Red, green, and blue cubes represent

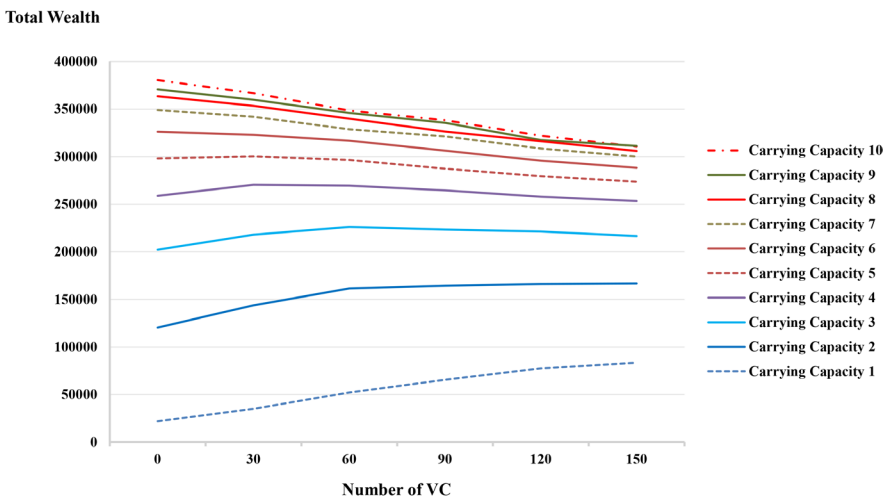


Notes: Each cube refers to different actors in the simulation. The red ones refer to entrepreneurs, the green ones to potential business partners and the blue ones to venture capitalists (VC); Local search is activated; $\sum_i N(e,i) = \sum_i N(p,i) = 300$; $\eta(\mathrm{i}) = 4$ for all $i \in S$.

Figure 2. The Evolution of the Opportunity Space

entrepreneurs, potential partners, and venture capitalists, respectively. In period one, each type of actors is randomly distributed on the opportunity space. As simulation proceeds, entrepreneurs (potential partners) adjust their views, i.e., move across the space, and stay close to as many potential partners (entrepreneurs) as possible. In a niche crowded by entrepreneurs and potential partners, those who enter cooperation will realize novel opportunities and those who fail to cooperate will not realize them. In what follows, we compare the creation of such value between situations with and without the intervention of venture capitalists.

Given the above-mentioned role of VC, we look into the effect of VC on the creation of entrepreneurial value at the community level. Figure 3 gives the variation in value creation across various combinations of carrying capacity and the number of venture



Notes: Total wealth, the sum of $V(\theta)$, is the sum of θ of an entrepreneur's partners; Local search is activated; $\sum_i N(e,i) = \sum_i N(p,i) = 300$.

Figure 3. Venture Capital and Value Creation

capitalists. The X axis refers to the number of venture capitalists in the ecosystem, whereas the Y axis refers to total wealth in the ecosystem, i.e., the sum of values that are created by entrepreneurs after entering the cooperation with business partners. As the level of carrying capacity rises, the total wealth for a given number of VC increases as well. Yet, a deeper analysis of the graphs depicted in Figure 3 unveils an interesting pattern.

First, there is a positive association between total wealth and the number of VC in adverse environmental conditions. A niche whose carrying capacity is one, for example, indicates that at most one case of cooperation is feasible in this ecosystem. Either weak demand in the output market or IPO during bear markets are cases in point. As is shown in figure 3, the total wealth in this condition increases from 35,039 when the number of VC is 30 to 83,702 when the number of VC is 150.

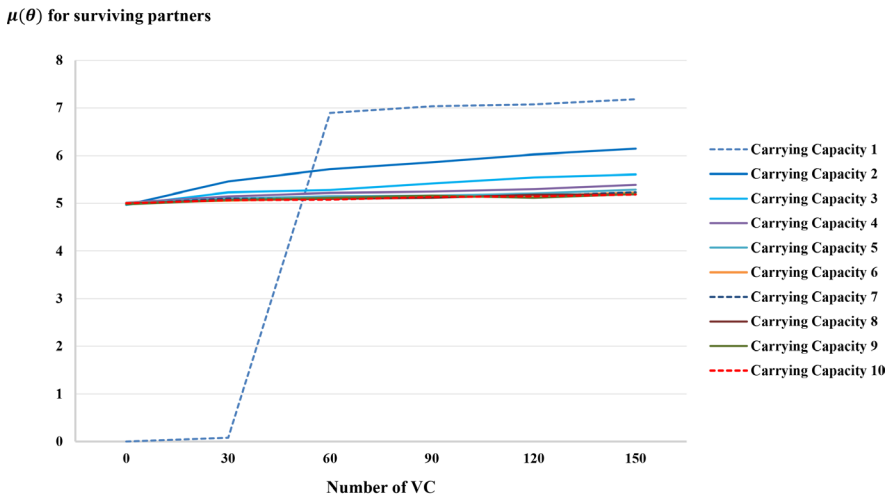
Second, there is a negative association between total wealth and the number of VC in favorable environmental conditions. For an ecosystem whose carrying capacity is ten, for example, the total wealth declines steadily even though the number of VC increases. This pattern is incompatible with the conventional view of venture

capitalists because they are actually reducing the amount of total wealth created in the ecosystem.

Of course, the absolute level of wealth creation is much higher when the market is abundant. Yet, what we care about is the marginal effect of VC on wealth creation. Why does the role of VC get weakened when the market is abundant?

One possibility is that VC does not play a positive role when the environment is favorable. Another possibility is that as Lerner (2012) argued, VC creates fads and fashions in the system by inducing entrepreneurs to attend to popular ways of executing business. If so, such fads and fashions would be detrimental to the creation of value in a favorable environment, and yet such effect may not be salient in an unfavorable environment. To examine this possibility, we undertake further analyses, whose results are summarized in figures 4 and 5.

What is shown in figure 4 is however incompatible with the first possibility which is mentioned above. The X axis refers to the number of venture capitalists in a given ecosystem, whereas the Y axis refers to the level of θ, i.e., the average capability of business partners that enter the cooperation with entrepreneurs. Except for



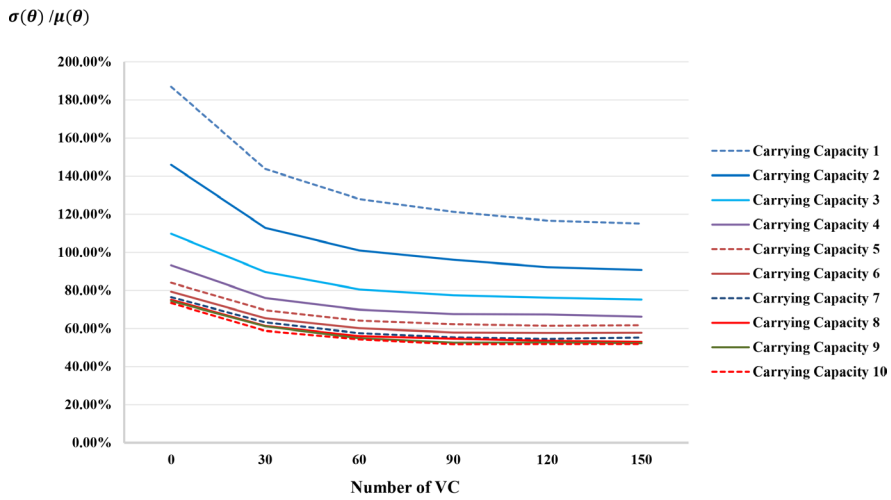
Notes: Y axis refers to the average capabilities of business partners that enter the cooperation with entrepreneurs; Local search is activated; $\sum_i N(e,i) = \sum_i N(p,i) = 300$.

Figure 4. The Capabilities of Partners in Cooperation

the extremely unfavorable environment, i.e., a case in which the carrying capacity of a niche is set to be one, the average capability of partners in cooperation with entrepreneurs increases linearly with the number of venture capitalists in the ecosystem. This indicates the positive information role of venture capitalists such that as the supply of VC increases, entrepreneurs informed by venture capitalists are able to select and cooperate with capable partners than otherwise is possible. Note however that the marginal effect of VC declines rapidly as the carrying capacity of a niche becomes abundant.

Figure 5 illustrates the diversity of business opportunities that are created in the ecosystem, namely, opportunity diversity, which is defined as the standard deviation of total wealth divided by the mean of total wealth. The high value of this indicates that business partners of diverse capabilities are involved in the creation of entrepreneurial values. We expect that this value will be smaller as the ecosystem suffers from fads and fashions, i.e., cooperation concentrated into a few popular partners.

Two patterns merit attention. First, opportunity diversity is



Notes: Y axis refers to the standard deviation of the capabilities of business partners, divided by the average capabilities of business partners that enter the cooperation with entrepreneurs; Local search is activated; $\sum_i N(e,i) = \sum_i N(p,i) = 300$.

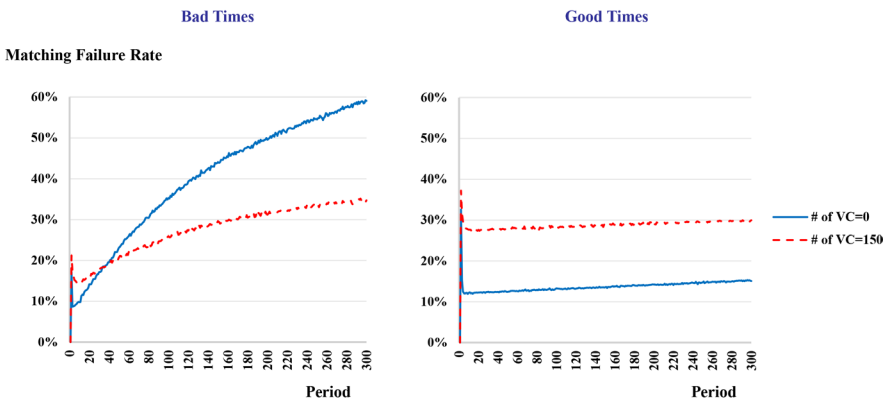
Figure 5. Venture Capital and Opportunity Diversity

smaller in favorable environments, i.e., niches of high carrying capacity. Second, opportunity diversity decreases more rapidly when the level of carrying capacity is low. In a niche whose carrying capacity is one, opportunity diversity decreases by 19.9 percent when the number of VC increases from 30 to 150. In contrast, it decreases by 11.8 percent when the level of carrying capacity is ten. The second pattern reflects the base rate effects, where the initial level of idea diversity is already higher in a niche of low carrying capacity. Together with the downward sloping curves, this indicates that VC leads the diversity of realized opportunities to decline and the decline is less severe when the market is abundant.

Figure 3 suggests that VCs in bad environments may contribute to the creation of entrepreneurial value and yet those in good environments may not. In comparison, figure 5 indicates that VCs may reduce idea diversity and more so in bad environments. What mechanism would underlie the patterns of figures 3 and 5?

One may argue that the supply of VC may increase the competition among entrepreneurs for capable partners, which in turn raises the risk of the failure to cooperate with such capable partners. The risk is a kind of matching failure, which precludes any realization of potential values. Matching failure takes place whenever multiple entrepreneurs in a niche offer a deal to a potential partner. Unless this partner has a prior tie to any of these rival entrepreneurs, an entrepreneur who succeeds in securing cooperation from this partner is randomly determined in our simulation runs. To the extent that a crowded niche attracts the attention of entrepreneurs and potential partners alike, the negative impact of matching failure would be substantial in favorable environments whose high carrying capacity affords 'crowded' niches in the opportunity space. This would underlie the findings of figure 3.

Indeed, figure 6 offers a support for the conjecture that VC-induced competition may be detrimental to value creation in favorable environments. The rate of matching failure is defined as the cases of failed cooperation in a niche divided by the cases of attempted cooperation in the niche. The dashed line in the graph refers to a case where the number of venture capitalists is 150, whereas the straight line depicts the case where there is no venture capitalist in the ecosystem. Note that the number of attempted cooperation in a given niche cannot exceed the carrying capacity of the niche.



Notes: Y axis refers to the number of failed cooperation in a niche, divided by that of attempted cooperation in a niche; For bad times, $\eta(i)$ = 2, whereas for good times, $\eta(i)$ = 5; Local search is activated; $\sum_i N(e,i)$ = $\sum_i N(p,i)$ = 300.

Figure 6. Matching Failure and Venture Capital

In the absence of VC, the failure rate surges over time, a pattern that reflects the effect of prior ties in this model. As prior ties repeat between pairs of entrepreneurs and business partners, entrepreneurs newly locating in a crowded niche fail to enter cooperation with business partners that are already connected to other entrepreneurs. The role of VC in this process is in helping VC-backed entrepreneurs to break up prior ties and to initiate new cooperation. This would produce the reduction in the failure rate (e.g., Puri and Zarutskie 2012). At the same time, however, VC-backed entrepreneurs may create competition with non-backed ones for a capable partner, thus elevating the rate of matching failure in a given niche. As is discussed below, the net effect turns out to vary with the level of the carrying capacity of a niche.

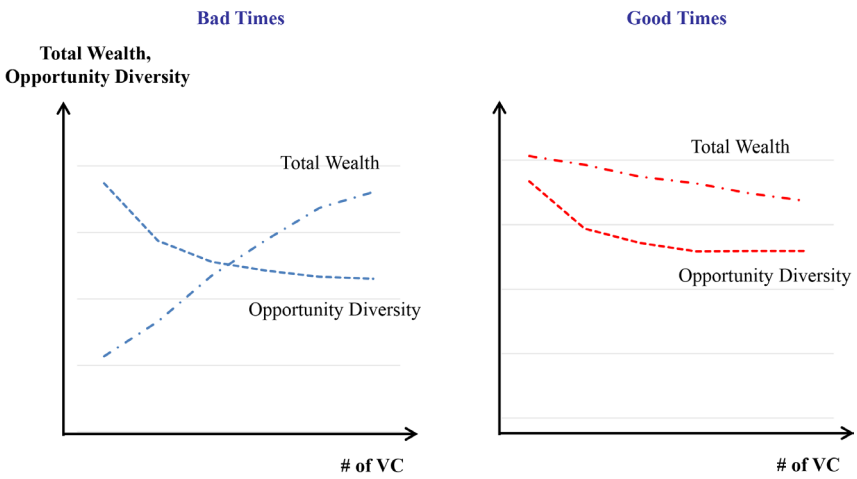
As is shown in the graph on the left hand side, matching failure drops rapidly in response to the elevated supply of VC in a niche whose carrying capacity is two. In contrast, the risk of matching failure rises as the supply of VC increase in a niche whose carrying capacity is 5. This strongly suggests that an effective VC in favorable environments directs the attention of entrepreneurs to a few popular partners, thereby leading the rate of matching failure to escalate. Such herd behavior is the waste of resources that are otherwise

redeployed to the execution of alternative opportunities.

Note that the supply of VC would mitigate the depletion of opportunities (opportunity effect) and yet the VC-induced herding (competition effect) should offset the positive impact of VC on the matching process. The two opposing effects of VC supply may invoke within-niche variations in failure rates as well as between-niche variations. First, the base rate of matching failure in bad times simply indicates that prior ties, i.e., early successes in matching, would deplete potential partners who are yet to get connected. Second, entrepreneurs in bad times may face the severe threat of opportunity depletion, whereas those in good times may not. For example, entrepreneurs in good times who fail to match with the best partners may switch into the second-best candidates that are available in a niche. In contrast, such second best options may not be readily available to those in bad times. Accordingly, the failure rates in bad times escalates over time more rapidly than in good times. Third, the competition effect of VC-induced herding may offset substantially the VC-induced opportunity effect in a niche of high carrying capacity. Without the support of VC, alternative opportunities are easily available to entrepreneurs in good times. Accordingly, the competition effect of herding in good times should outweigh the opportunity effect. In contrast, the opportunity effect should be higher than the competition effect when the matching takes place in bad times where opportunities deplete rapidly.

The discussion so far apparently suggests that the VC finance system is instrumental to entrepreneurship when the environment is adverse. This is well summarized in figure 7. Note that the reduction in opportunity diversity is a mere reflection of VC-induced herding behavior. The net effect of wealth creation therefore draws on the tradeoffs of opportunity and competition effects, mentioned above. However, we need to settle down two additional issues before making a verdict on the role of VC.

One is a stylized fact that the supply of VC in fact decreases in unfavorable environments. In the United States, the supply of VC has steadily declined since the dot-com bubble burst in 2001. What is behind this tendency is the cyclic fluctuation in VC investment. For example, a sample of yearly observations drawn from 1985 to 2014 yields a pairwise correlation of 0.685 between the amount of VC investment and Nasdaq composite index. If this is the case, the actual effect of VC in adverse environments would be negative



Notes: Total wealth refers to the sum of capabilities of business partners that enter cooperation with entrepreneurs; Opportunity diversity refers to the standard deviation of the capabilities of business partners, divided by the average capabilities of business partners that enter the cooperation with entrepreneurs; Local search is activated. Data for Fig 7 are obtained from Fig 3. Those for bad times are obtained from a case of carrying capacity = 1 whereas those for good times are from a case of carrying capacity =10.

Figure 7. Value Creation, Opportunity Diversity, and Venture Capital

because venture capitalists reduce their investments even when entrepreneurs need their services painfully.

The other issue is that entrepreneurs may learn from their failure and avoid competing for popular partners. Given that the first set of simulations does not allow for this learning process, it is necessary to see whether the patterns found in the first experiment are robust to the process of learning. To this end, we undertake the following set of simulations.

Experiment 2 (Distant Search)

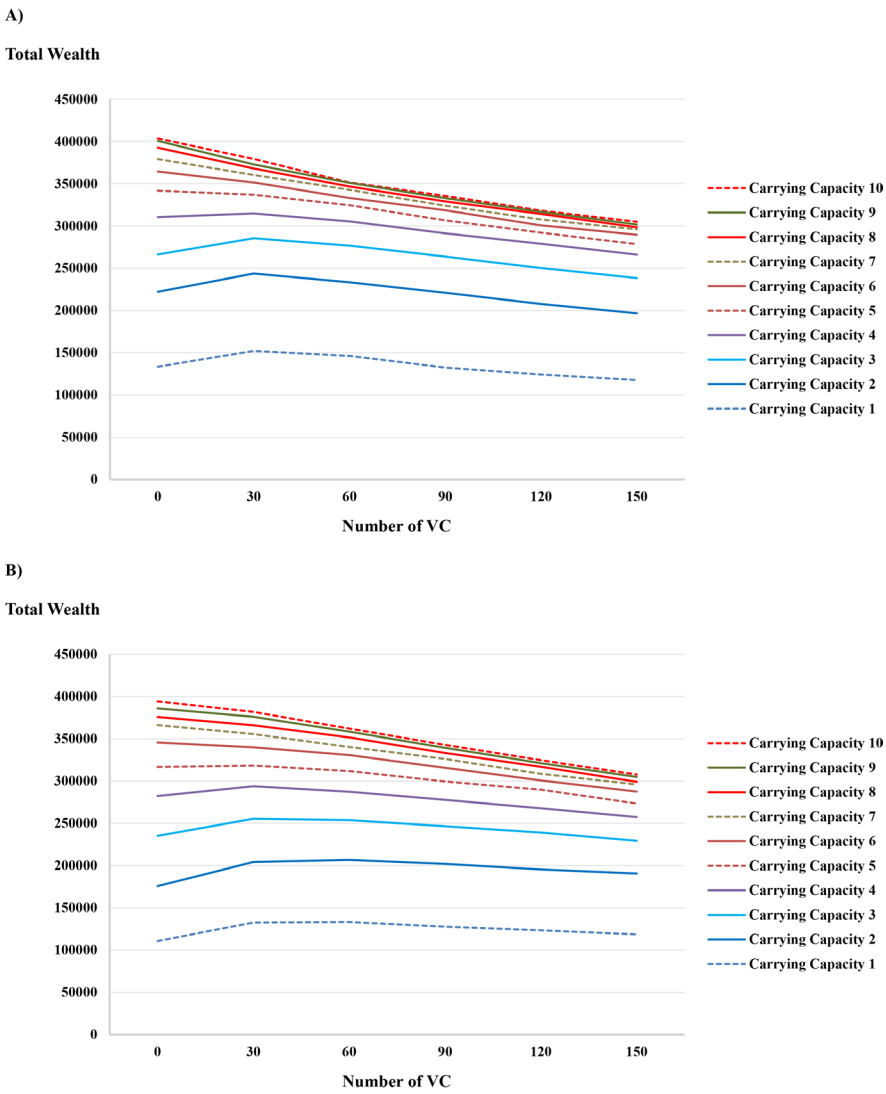
The conditions for simulation are as same as those for experiment 1. Note also that potential partners that fail to enter cooperation in ten consecutive periods are forced to exit from the

opportunity space. One change added to this simulation is that each "entrepreneur" learns from past failures. In particular, an entrepreneur moves beyond her current niche whenever she fails to cooperate with her chosen partners in *M* consecutive periods. As the value of *M* is smaller, entrepreneurs learn faster. In a similar vein, business partners as well as venture capitalists move away from a current niche whenever they fail to find an entrepreneur to work with in *M* consecutive periods. In particular, we experimented with two different values of *M*, i.e., three and six. Whenever distant search is activated in the opportunity space, the entrepreneur moves twice in a given period. Accordingly, her zone of acceptance becomes two times as large as the zone with local search. This indicates that the entrepreneur becomes more tolerant of different opinions and less reluctant to modify her views.

Figure 8 gives the results of value creation in the presence of distant search. Unlike the results of local search, there is a stable and negative association between VC and total wealth created across all the levels of carrying capacity. It is true that a small number of VC, say 30, helps the creation of entrepreneurial value relative to a situation without VC. Yet, this positive effect disappears as the supply of VC increases further. When we compare the amount of total wealth created between slow and fast-learning entrepreneurs (i.e., *M*= 6 and 3 respectively), this negative association remains intact. In other words, VC may not be conducive to entrepreneurship in this ecosystem irrespective of whether entrepreneurs are fast or slow learners.

One direct consequence of distant search would be that each entrepreneur avoids staying in a crowded niche so that her chance of cooperating with alternative partners and materializing her opportunities should be higher. As entrepreneurs freely modify their views of novel opportunities, matching failure should be lower as well. Yet, the pattern shown in figure 9. strongly suggests otherwise. Apparently, VC-backed entrepreneurs run the risk of competing in a crowded niche.

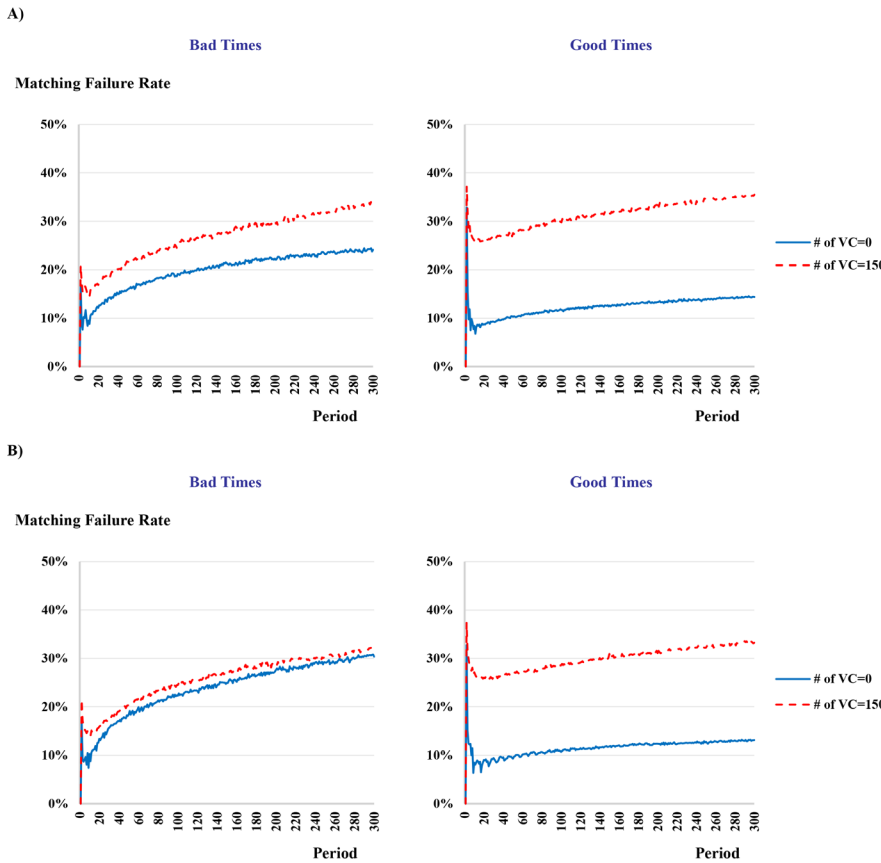
In an unfavorable niche whose carrying capacity is two, VC-backed entrepreneurs face a more risk of matching failure than non-VC-backed counterparts do. In fact, the increase in matching failure is larger for fast-learning entrepreneurs (i.e., $M = 3$) than for slow-learning ones (i.e., $M = 6$). This indicates that fast learners would be better off without venture capitalists because they could



Notes: Total wealth refers to the sum of capabilities of business partners that enter cooperation with entrepreneurs; Distant search is activated and (A) $M = 3$ and (B) $M = 6$; $\sum_i N(e,i) = \sum_i N(p,i) = 300$.

Figure 8. Distant Search and Value Creation

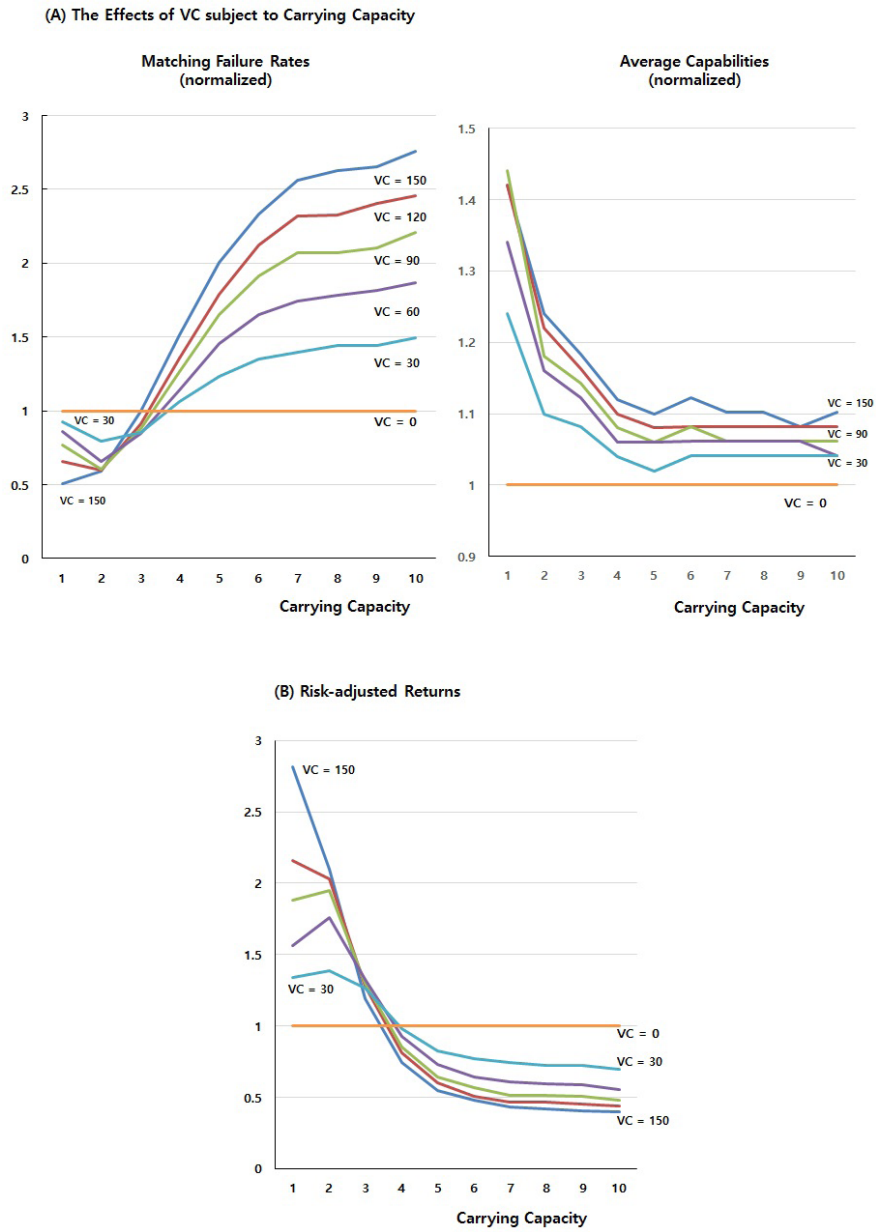
avoid competing in a crowded niche. Moreover, in a favorable niche whose carrying capacity is five, VC-induced competition raises the risk of matching failure more substantially. For example, in period



Notes: Y axis refers to the number of failed cooperation in a niche, divided by the that of attempted cooperation in a niche; Distant search is activated and (A) M = 3 and (B) M = 6; For bad times, $\eta(i)$ = 2, whereas for good times, $\eta(i)$ = 5; $\sum_i N(e,i) = \sum_i N(p,i) = 300$.

Figure 9. Distant Search and Matching Failure

ten, fast-learning entrepreneurs in the ecosystem of 150 venture capitalists face the increase in matching failure from 8 percent to 26 percent. It is approximately three times as high as the risk of failure in the absence of VC. The elevated matching failure for slow-learning entrepreneurs is virtually identical in that it increases from 8 percent to 27 percent in period ten. In short, VC does not contribute to the reduction in matching failure irrespective of whether carrying capacity is low or not when entrepreneurs learn from past failures.



Notes: Graphs of (a) are obtained by normalizing each failure rate or partner capability with respect to the case of zero-VC condition. Risk-adjusted returns are ones that are normalized average capabilities, i.e., the values of startups, divided by normalized failure rates; $\sum_i N(e,i) = \sum_i N(p,i) = 300$.

Figure 10. Risk-adjusted Return (Local Search)

The mechanism behind these findings is that venture capitalists present a vision advantage to entrepreneurs, as is consistent with the literature and specified in the model. Entrepreneurs' efforts to match with exchange partners then become clustered around most capable partners in a niche. That is, the fads and fashions towards a certain set of partners emerge. As a result, the attempts to match with capable partners mostly fail and are thus redirected to less attractive partners in the subsequent periods.

These patterns are further analyzed in the following two graphs in figure 10, which summarizes the VC-induced competition effect vis-à-vis the opportunity effect. First, the more venture capitalists in the ecosystem, the higher matching failure rates. Second, the more venture capital in the system, the more ideas are executed and yet the variation in the value of ideas become negligible in the system of high carrying capacities. Everybody seeks for partners to create big ideas and yet in vain. Most entrepreneurs earn little while paying a high failure risk of matching. Only a few entrepreneurs afford to cooperate with the capable partners, which leads to the increase in matching failure and the marginal decrease in the realized value of ideas at the system level. Accordingly, venture capitalists in good times may expose entrepreneurs to matching failure out of proportion to returns of such matching. We further conducted a sensitivity test across different search conditions such as distant search and found the pattern to remain intact.

CONCLUSION

In this study, we model an entrepreneurial process of value creation as a task of matching idea held by entrepreneurs with resources held by business partners. VC performs a pivotal role in matching nascent entrepreneurs with potential partners by informing the entrepreneurs of those partners who are capable and may agree on the entrepreneurs' novel ideas. With this model, we run an agent-based simulation and assess its theoretical implications with respect to the creation of entrepreneurial value at the level of the entrepreneurial ecosystem.

The key finding of our model is that venture capitalists in good times may expose entrepreneurs to matching failure out of proportion to returns of such matching. With a vision advantage

granted, VCs in our model indeed serve to increase the efficiency of profitable matching of entrepreneurs and their exchange partners. What our model unveils however is that the marginal effect of VC investment would be declining rapidly in a niche of high carrying capacity. The supply of VC underlies locally clustered efforts of matching, which resembles information cascade that economizes on Bayesian learning of less informed actors who monitor the behavior of their rivals (e.g., Bikhchandani, Hirshleifer, and Welch 1992). Fads and fashions in business ideas emerge not because venture capitalists work badly but because they work better. Accordingly, entrepreneurs pay risks more than their rewards.

The details of our findings are the following:

First, there is a positive association between the supply of VC and the average capability of business partners that cooperate with entrepreneurs. Whether entrepreneurs are involved in local search or distant search, this association remains stable across the various levels of carrying capacity (figure 4).

Second, there is a negative association between the supply of VC and the diversity of realized opportunities. As VC-backed entrepreneurs are well informed of the quality of potential partners, a few capable partners receive most offers from entrepreneurs and the remaining fail to survive in the opportunity space (figures 5 and 7).

Third, when the carrying capacity of a niche is high, the risk of matching failure increases with the supply of VC. When the carrying capacity of a niche is low, the variation in matching failure depends on whether entrepreneurs opt for local search or not. In the presence of local search, the supply of VC leads to the reduction in matching failure (figure 6). In contrast, the supply of VC in the presence of global search leads to the increase in matching failure (figure 9).

Fourth, the creation of new value at the ecosystem level decreases with the supply of VC when entrepreneurs opt for distant search (figure 8). In comparison, this pattern becomes reversed only when entrepreneurs opt for local search in a niche whose carrying capacity is low (figure 3).

In short, although VC would be valuable for a few individual entrepreneurs, the VC finance system may not necessarily be instrumental to the creation of entrepreneurial value at the ecosystem level. The local efficiency of VCs in the matching process

may lead to the information-cascade type of herding behavior among entrepreneurs, which undermines paradoxically the overall efficiency of the ecosystem. One exception is a situation in which entrepreneurs fail to learn from performance feedback from the market, i.e., they continue to rely on local search, and a niche in the opportunity space is too sterile to support many opportunities. However, empirical tendency in the VC finance system runs counter to this exception because the supply of VC in bad times decreases for those in need.

Before discussing theoretical implications of our findings, it is important to evaluate the key features of our model. As noted above, our model is a conservative test of venture capitalists as market makers such that venture capitalists are given the vision advantage, which allow them to have an advantage over the other two players, i.e., entrepreneurs and their trading partners. The matching per se may represent various aspects of the startup process. One would be the execution of ideas, as is already denoted in our model. Alternatively, one may view the matching as a process of designing a market model that incorporates the entrepreneur's vision of new services or products. To the extent that the startup process is to draft alternative market institutions and to overcome the failure of the current market, the entrepreneurship is an effort to present a new market model to unmet demand (Bae 2021). The matching in this case would indicate a realization of a specific market model, which dictates types of value chain partners to deliver the entrepreneur's vision. Either way, the matching algorithm of our model should reflect the Schumpeterian recombination of productive inputs.

Our model observes that the value of entrepreneurial ideas should be indeterminate until these ideas are matched with relevant business partners who control resources needed for the realization of the potential of these ideas. This means that entrepreneurial ideas are exogenously given to the system and that the interactions in the model are directed around the matching of ideas and resources. As is the case with the market process that underlies the prices of commodities, the value of an idea is an attribute of the startup process (e.g., Barth 1967). Individual difference in the ability to match with relevant partners is not considered in the model, which is beyond the scope of this study, and which should be acknowledged as the limitation of our study.

Regarding the role of VC in entrepreneurship, our analysis has the following theoretical implications.

First, the supply of VC has a competition effect such that the resources needed for the execution of novel ideas are concentrated in the hands of a few entrepreneurs. This VC-induced competition is reflected into the survival of a few ways of executing novel opportunities, as captured by the average theta of surviving partners and its variance in our simulation (figure 5). The flip side of this competition is that a few entrepreneurs that survive are those who adjust their views to the tastes of most popular business partners in the opportunity space. This in turn suggests that even though VC performs its intended role effectively, the over-supply of VC would reduce the fitness of the entrepreneurial ecosystem as a whole by precluding the realization of less popular opportunities.

Accordingly, this study allows for recasting the negative, partial effect of VC on entrepreneurship, reported by Zucker and her colleagues (1998), as an argument that VC-inducing competition may lead to distortions in the allocation of resources such as human capital at the regional level. From the perspective of individual entrepreneurs, this competition effect induces them to imitate successful and popular ways of executing business, thus aggravating the competition effect again. This may eventually lead to hurting the very nature of entrepreneurship, i.e., the diversity of ideas or the ability to disagree with the conventions. From the perspective of transaction cost economics, it is certainly the case of selective intervention that fails (Williamson 1985). Venture capitalists exert an equity control over entrepreneurs who are ill-informed of capable, potential business partners. Owing to the effect of competition at the system level, the intervention of VC may not outperform the decentralized decisions and search of independent entrepreneurs when these entrepreneurs learn from past decisions and their market is not thin.

Second, insofar as competition among entrepreneurs for capable partners renders the entrepreneurs to ignore less popular business models, i.e., ways of executing entrepreneurial opportunities, VC-inducing competition may underlie fads and fashions in the entrepreneurial ecosystem. In the absence of VC, the effect of prior ties in our computational model reflects habituation in opportunity space. Without the intervention of VC, entrepreneurs in our computational model repeat the prior ties with given business

partners. They search locally in opportunity space and are lock in old business partners that are readily available in their zone of acceptance. The role of VC in this entrepreneurial process is to help serial entrepreneurs to move beyond their prior ties.

However, as is shown in Fig 6, the intervention of VC is constrained by the level of carrying capacity in each niche of the opportunity space. The intervention of venture capitalists is conducive to the creation of value at the level of the ecosystem only in adverse situations where entrepreneurs are stubbornly inflexible and the size of demand is too small to support a large number of startups opting for a certain type of product or service. In favorable situations where entrepreneurs are engaged in distant search and market demand is strong, the intervention of VC directs the attention of entrepreneurs to a few visible successes, leading to fads in the opportunity space.

Lastly, the entrepreneurial ecosystem that is viable and sustainable may not need to rely solely on so-called the Silicon Valley model with a good emphasis on VC. Although copying the Silicon Valley is nowadays considered a panacea for promoting entrepreneurship in a region, the limited role of VC as depicted by our computational model, should shed light on alternative ways of entrepreneurship. Indeed, a regional economist, Saxenian (1994) already documented that the entrepreneurship in the U.S. in the 20th century had two distinct and complementary modes, one in the Silicon Valley with innovative startups and the other in the Boston area with large incumbents. Lerner (2012) also noted in this regard that a mixture of these two modes of entrepreneurship would be an alternative to consider before making recommendations for would-be entrepreneurs and policy makers in the coming years.

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Received March 3, 2022
Revised May 19, 2022
Accepted June 10, 2022

APPENDIX. AN EXAMPLE OF INFORMATION CASCADE

When we ignore the issues of carrying capacity and actor heterogeneity, we may reduce the startup process back to a case of information cascade (Alevy, Haigh, and List 2007). The setup is the following.

Suppose that the unknown demand for an entrepreneurial idea, i.e., a big idea, takes either of the following two states, success (S) and failure (F). The prior probabilities of S and F are p and 1-p, respectively. Let p be 0.5. And assume that each entrepreneur receives a payoff of 1 if the true state of the demand is S; otherwise, she receives nothing. Accordingly, the expected payoff from pursuing a big idea is zero so far.

Suppose that each entrepreneur may or may not receive investments from venture capitalists (VCs), a signal that unveils information about pursuing a big idea is good or not. With a vision advantage granted to venture capitalists, VC Investment is a positive signal (s), which indicates that pursuing the idea is good, whereas the failure to receive VC investments is a negative signal (f). Assume that a vision advantage is substantial such that $p[s|S] = p[f|F] = q > 0.5$. Let q be 2/3.

Suppose that an entrepreneur has a big idea of platform business and that this entrepreneur receives an investment (s_1) from a venture capitalist. When each entrepreneur updates her beliefs over the unknown demand according to Bayes's rule, the posterior probability that platform business is a big idea is computed as follows.

$$p(S \mid s_1) = \frac{p(s_1 \mid S)\, p(S)}{p(s_1 \mid S)\, p(S) + p(s_1 \mid F)(F)} = \frac{2}{3}$$

If the second entrepreneur receives an investment (s_2) on her idea of platform business, then the posterior probability will update as follows: $p(S \mid s_1, s_2) = \frac{4}{5}$

To the extent that the remaining entrepreneurs maximize their expected payoffs, the best strategy for them would be to follow the herd, i.e., following the idea that a platform business is the next big thing to bet on. That way, fads and fashions may emerge in the

ecosystem even when VCs with vision advantage efficiently select the best ideas of entrepreneurs.