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High-tech Start-up Ecosystems in East Asian Agglomerations: Are They Different From the West?

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Abstract

Start-up ecosystems within regional agglomerations have been intensively studied in Western countries, but much less in East Asia. Therefore, little is known about the specific features of East Asian start-up ecosystems. We study the high-tech start-up ecosystems within four leading East Asian agglomerations: Tokyo, Seoul, Suzhou and Chongqing. Our case studies of these start-up ecosystems reveal that they differ in various important aspects from their Western counterparts. They are located within very large urban agglomerations. Consequently, start-up firms are co-located with many leading domestic and international firms, and research institutions. However, the networks with these partners tend to be relatively weak and segregated. Government support is strong and results in broad financial assistance for start-ups. We also find differences in the growth and internationalization across the four East Asian start-up ecosystems which can be related to features of the national economies they are located in. Overall, our findings suggest that studies of start-up ecosystems need to consider their regional institutional and cultural context, as there are strong differences between Western and East Asian countries.

Keywords: start-up ecosystem, agglomeration, network, high-tech industry, East Asia

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Introduction

Regional economic agglomerations, defined as the spatial concentration of economic activity in cities (Strange, 2008), have been studied for a long time (Schumpeter, 1954). In recent decades, agglomeration studies have particularly focused on innovation dynamics (Carlino & Kerr, 2015). Specifically, it has been proposed that intense knowledge exchange between various types of organizations which are co-located within an agglomeration, including large and established firms, newly created firms which are designed to grow (start-ups), venture capitalists, public and private research institutions, and universities, may enhance the performance of these organizations and contribute to innovation (Saxenian, 1994). Various frameworks have been developed to analyze the innovation dynamics within agglomerations, including regional innovation systems (Cooke, Uranga, & Etxebarria, 1997), clusters (Porter, 1998), and most recently, entrepreneurial ecosystems (Pitelis, 2012).

Empirically, the research interest in regional innovation dynamics has been driven by the growth and strong performance of high-tech start-ups in the US, such as the San Francisco Bay area (Silicon Valley) or the Greater Boston area (Route 128) (Saxenian, 1994; Kenney & von Burg, 1999). Consequently, the growth and performance of high-tech start-ups in agglomerations have been mostly studied in North America and Western Europe (e.g., Audretsch & Keilbach, 2007; Chatterji, Glaeser, & Kerr, 2013; Pe'er & Keil, 2013; Clarysse et al., 2014). In contrast, high-tech start-ups in agglomerations in other parts of the world, including East Asia, have received much less research attention. The Compass Global Start-up Ecosystem Ranking of 2015 even explicitly excludes China, Japan and South Korea (Compass, 2015).

The research focus on Western countries might be justified by the observation that start-up driven innovations have mainly occurred in North American and European agglomerations. However, the global innovation landscape is changing rapidly, with East Asian firms playing a more and more important role. Countries like Japan and South Korea (Korea hereafter) have the highest R&D (research and development) intensities in the world, well above the leading Western economies. Moreover, R&D expenditures of Chinese firms have increased multifold within the

last decade. Similar trends can be observed for the number of patents held by East Asian firms and their performance in high-tech industries (OECD, 2015). As innovations originating from East Asia become ever more numerous and important, it is important to understand to what extent high-tech start-ups in respective countries are benefiting from and contributing to their regional innovation systems. Identifying differences in their role and performance will enhance our knowledge about how start-up ecosystems evolve and what function they play within regional innovation systems.

There is good reason to expect strong differences between East Asia and the West. From an institutional viewpoint, the innovation systems of Western and East Asian countries have been found to differ strongly, as the latter have emerged more recently than the former (Nelson, 1993). From a cultural perspective, the relatively stronger collectivism and long-term orientation as well as the higher power distance in East Asian countries (Hofstede, Hofstede, & Minkov, 2010) which are all rooted in regional cultural traditions of Confucianism result in a stronger distinction between in-groups and out-groups (Yum, 1988) and in a preference for relational over contractual governance in business dealings (Gu, Hung, & Tse, 2008) and collaborations (Bstieler & Hemmert, 2015). These East Asian cultural features can be expected to play out in different ways of interaction between high-tech start-ups and their surrounding organizations from Western countries. However, currently we still have limited knowledge about the differences between Western and East Asian agglomerations, and their implications for start-up firms located in them. Moreover, at the same time little is known about the diversity among agglomerations within East Asia. Given the strong differences in economic and institutional development between East Asian countries, considerable disparity may exist across agglomerations in this region.

This study intends to address these research gaps through an explorative analysis of start-up ecosystems in four representative agglomerations in the three largest East Asian countries: Tokyo (Japan), Seoul (Korea), Suzhou (China) and Chongqing (China). Applying regional entrepreneurial ecosystems, understood as a set of networked institutions in a specific geographic area aiding entrepreneurs in new venture development (Fuerlinger, Fandl, & Funke, 2015) as our analytical framework, we comprehensively analyze data sources on the four agglomerations and the status and development of high-tech start-ups within them, substantially building on materials published in local languages (Japanese, Korean and Chinese). We aim at

contributing to the literature on entrepreneurial ecosystems by (1) studying the development of high-tech start-ups in East Asian agglomerations, (2) examining how they differ from their counterparts in Western countries, and (3) assessing the degree of diversity among the ecosystems located in East Asian agglomerations.

Subsequently, we first conduct a literature review on high-tech start-ups in agglomerations and related theoretical frameworks. Thereafter, we explain our research methodology and analyze the development and status of high-tech start-up ecosystems in the four East Asian agglomerations, resulting in a comprehensive comparison between them. We discuss our findings and develop research propositions which may serve as a basis for future research on entrepreneurial ecosystems. Finally, we briefly elaborate on the contributions and limitations of our study, and on further research directions and managerial implications.

LITERATURE REVIEW

Start-ups

The term 'start-up' has been increasingly used in the business and management literature since the 1990s to distinguish small, newly founded firms which are designed to grow from existing small- and medium-sized and newly created non-growth oriented firms (e.g., Manigart & Struyf, 1993; Castrogiovanni, 1996). The growth orientation of start-ups is also associated with their technology and innovation orientation, as newly founded firms tend to face difficulties in growing without innovating (Price & Chen, 1993). 'New venture firm' is another term used to denominate such companies (Zahra, Ireland, & Hitt, 2000).

As the start-up literature studies individual companies as its focal unit of analysis, it tends to focus on micro-level factors, such as the firms' management (Davila, Foster, & Jia, 2010), and their founders' entrepreneurial orientation (Smart & Conant, 1994). At the same time, the access of start-up firms to critical resources, such as finance and knowledge has also been studied quite extensively (Hellmann & Puri, 2002; de Bettignies & Brander, 2007; Hebllich & Slavtchev, 2014). Recent studies have worked towards integrating these internal and external factors to provide a more comprehensive picture of the antecedents of the growth and success of start-ups (Pe'er & Keil, 2013).

The start-up literature has contributed to a deeper understanding of the factors which enable such companies to grow and survive by focusing on micro-level factors. However, the extant research on start-ups is primarily built on studies from North American and European countries and has given limited consideration to the question of whether its findings are context-specific or universally applicable.

High-tech agglomerations, clusters and entrepreneurial ecosystems

Regional agglomerations have caught the interest of economists at least from the late 19th century (Schumpeter, 1954). During the last forty years and inspired by the rise of high-tech agglomerations in the US, research became increasingly focused on innovation. Silicon Valley became the most prominent example. Saxenian (1994) attributed the growth and strong performance of Silicon Valley to the co-location and strong interaction between established firms, start-ups, public and private research institutions, and venture capitalists. Kenney and von Burg (1999) found similar results and emphasized the path dependency of high-tech agglomerations

when specific organizations and events are shaping regionally specific interaction patterns.

Subsequently, the innovation systems framework was built to analyze the interaction between different types of organizations and actors within a defined geographical area, with a focus on inter-organizational learning processes. It was initially developed at the national level (Lundvall, 1992; Nelson, 1993), but also applied soon thereafter in order to analyze the growth and performance of high-tech agglomerations at the regional level (Cooke, Uranga, & Etxebarria, 1997; Asheim & Isaksen, 2002; Ooms et al., 2015).

Another concept which has been applied to analyze high-tech agglomerations is that of regional or industrial clusters (Porter, 1998; Feldman, Francis, & Bercovitz, 2005; Hassink, 2005). It differs from the regional innovation systems framework in that it refers to the regional concentration of firms and institutions in an array of linked industries, which do not necessarily have to be high-tech (Porter, 1998). However, Porter (1998) also emphasizes that the enhancement of innovation and of new business formation through easy access to a variety of important knowledge sources are important aspects of many industrial clusters. Cluster research has contributed to our understanding of high-tech agglomerations by emphasizing the importance of cross-industrial links and of the co-existence and competition in the formation of high-tech agglomerations. Furthermore, it has identified a wide range of internal and external factors which contribute to the growth and decline of agglomerations, and highlights the role of start-up companies in industrial clusters.

Finally, entrepreneurial (or entrepreneurship) ecosystems have been proposed in recent years as a concept to study high-tech agglomerations, with a particular focus on start-up firms (Cohen, 2006; Pitelis, 2012; Fuerlinger, Fandl, & Funke, 2015). The term 'ecosystem' has been initially introduced in the business literature under the label of business ecosystems, which refer to agglomerations of companies which coevolve capabilities to create innovations through collaboration and competition (Moore, 1993). As the business ecosystem concept has focused on innovation, subsequent studies have developed related frameworks such as 'innovation ecosystems' (Adner & Capoor, 2010) and 'knowledge ecosystems' (Clarysse et al., 2014), emphasizing the growth and decline of agglomerations in analogy to biological systems. The entrepreneurship ecosystem concept epitomizes the extension of the business ecosystems framework to the specific context of high-tech

start-ups by studying how various external organizations within a regional business environment influence the growth and performance of start-ups (Fuerlinger, Fandl, & Funke, 2015). Therefore, entrepreneurial ecosystems provide a useful lens for studying the growth and survival conditions for start-ups within agglomerations.

Start-ups and high-tech agglomerations in East Asia

Research on start-ups, regional innovation systems, industrial clusters and entrepreneurial ecosystems has predominantly focused on North American and European economies. The limited attention given to East Asia is surprising given the economic power and dynamism of the region and the importance of Japan and Korea as countries with a high R&D intensity and an outstanding patenting record (OECD, 2015). The rise of China, driven by successful industrial and technological catch-up and recently supported by genuine innovative efforts (Fu, 2015) also warrants a closer examination of the evolution and role of start-up ecosystems.

English academic publications on Japanese start-up systems are scarce. Studies like the quantitative analyzes by Honjo (2004) looking at the growth of start-up firms or by Masuda (2006) investigating regional differences in latent entrepreneurship do not account for agglomeration effects beyond factors like regional industry concentration. The case studies by Iбата-Arens (2009) of life science clusters in Kyoto and Minneapolis/St Paul explicitly consider local innovative coalitions, entrepreneurial support networks, and cluster culture. The detailed comparison reveals interesting differences between the two locations. However, it remains unclear to what extent the findings can be generalized to other agglomerations.

Similarly to Japan, a limited number of studies on Korean start-ups and high-tech agglomerations has been published in English. Sohn and Kenney (2007) use secondary data to discuss the contribution of universities and government research institutions to the formation of start-up ecosystems and clusters in Korea. Their analysis reveals some interesting features of the Korean innovation system, but stays on a general level and does not provide comparative assessments with other countries. Some other studies focus primarily on managerial features of venture firms and start-ups. In a quantitative analysis, Bae and Yu (2005) identify five different types of human resource management systems applied by Korean venture firms and link the existence of these types to resource availability, institutional forces and strategic choice. Based on case studies of Korean IT start-ups, Cho and McLean (2009) discuss several managerial features of these firms, including

globalization, the importance of founders, workforce development, and organizational culture. These two studies offer good insights into firm-level managerial features of Korean start-ups. However, these features are not explicitly related to start-up ecosystems and agglomerations.

In the Chinese context, the extant research does not explicitly link start-ups or innovation systems to agglomerations. Instead, two strands of international entrepreneurship research in China have uncovered knowledge spillover effects that drive Chinese innovation and firm performance. Bathelt and Li (2014) find that global cluster networks from various industries generate connections to and strengthen similar clusters and industrial parks in China, through foreign direct investment (FDI) linkages that transfer know-how. Different studies focus on how Chinese returnees, with significant commercial and technological expertise, knowledge and international networks, accumulated from overseas experiences, become conduits of creativity and knowledge transfer when they start successful high-tech business at home (e.g. Dai and Liu, 2009). A review of both Chinese and English language literature suggests much room for investigation into cluster and agglomeration differences, and international and regional linkages at the agglomeration level in the context of Chinese start-up ecosystems.

THE EMPIRICAL STUDY

Analytical Framework

To answer the question to what extent high-tech start-up agglomerations in East Asia differ from their Western counterparts, we apply the concept of the start-up ecosystem as a framework of our analysis. The common elements of successful start-up ecosystems elaborated by research on leading Western agglomerations (Pitelis, 2012; Clarysse et al. 2014; Grilli, 2014; Compass, 2015) provide our point of reference.

These common elements include (1) a pool of highly talented people with entrepreneurial spirit and a high risk-taking propensity supported by (2) a culture that nurtures such spirit and tolerates or even values failure; (3) proximity and high density of research institutions where new ideas can be openly discussed and contested and relevant technology is easily accessible; (4) a financial system suited to the needs of high-risk ventures with a high growth potential providing funding for different business development stages including exit channels; (5) mechanisms to quickly and efficiently match investors and promising start-ups ranging from open events to personal networks; (6) a large pool of highly motivated and talented human resources supported by a liquid external labor market; (7) a community of business angels formed by successful former entrepreneurs and other experienced business people and investors willing to advise entrepreneurs; (8) access to local and international markets to quickly deploy and grow successful business ideas; (9) large companies that provide support as investors, as first customers, or as providers of technology, know-how, sales-channels or exit options through M&As (mergers and acquisitions); and (10) a regulatory tax environment and public policies supportive to the risk and cash-flow profile of high-tech start-ups.

In the following, the start-up ecosystems found in the agglomerations of Tokyo, Seoul, Suzhou and Chongqing will be evaluated in a comparative analysis with regard to the existence and strength of the respective elements. Our choice of these four start-up ecosystems was guided by their standing and significance in East Asia: Tokyo and Seoul are not only the capital cities, but also the economic and technological gravity centers of Japan and Korea. Furthermore, Suzhou, which belongs to the Shanghai area, and Chongqing represent leading agglomerations in coastal and inland China, respectively.

Research Method

Information on each of the four high-tech start-up ecosystems being studied has been obtained, combined and triangulated from a wide variety of sources, including government websites, statistical yearbooks, white papers, think-tank technical reports, academic journal articles, and personal interviews with venture capitalists and start-up entrepreneurs. Many of the written sources of information have been published in local languages (Japanese/Korean/Chinese) only. All sources are the most recently available to provide an accurate picture of the current status of each start-up ecosystem. The information sources used for the analysis of each start-up ecosystem are listed in Table 1.

Subsequently, we provide an overview of the findings for each start-up ecosystem we have studied. Summary information for each ecosystem is provided in Table 2.

Table 1 Materials used for analysis of start-up agglomerations in East Asia

Tokyo	Seoul	Suzhou	Chongqing
Cabinet Office (2012); e-Stat (2013); e-Stat (2015); Japan Patent Office (2015); METI (2012); METI (2014); MIC and METI (2014); Statistics Japan (2013); TMG (2014); Venture Enterprise Center (2014); Venture Enterprise Center (2015).	Bi-Net (2016); Hanisch (2015); Lim (2015a); Lim (2015b); Ministry of Science, ICT and Future Planning (2015); KVCA (2015); Seoul Metropolitan Government (2016); SMBA (2013); SMBA and Ministry of Science, ICT and Future Planning (2015).	Fu (2015); Lanza, Kinkel, & Ruhrmann (2015); Pan (2014); SIP China-Singapore Suzhou Industrial Park (2014); SIP China-Singapore Suzhou Industrial Park (2015); SIP China-Singapore Suzhou Industrial Park (2016); Suzhou Statistics Bureau (2015).	Chongqing Science and Technology Commission (2012 – 2015); Chongqing Statistics Bureau (2012 – 2015); Tsinghua University TusPark (2015).

Table 2 Profiles of start-up ecosystems in East Asia

	Tokyo	Seoul	Suzhou	Chongqing
Size of overall agglomeration				
- population	13.2 million	10.3 million	13.1 million	29.9 million
- GDP (US\$)	1,107.2 billion	278.8 billion	376 billion	220.1 billion
- GDP/km ² (US\$)	525.8 million	460.6 million	44.3 million	26.7 million
- number of companies	447,113	129,607	160,980 (40,751 in Suzhou Industrial Park, SIP)	1.7 million
Size and growth of start-up ecosystem	792,600 self-employed and employed business founders: low growth	8,118 new IT start-ups in Korea in 2013, up from 5,798 in 2008; CAGR: 7.0%	1,700 new start-ups in 2005 and 11,000 in 2015 (SIP); start-up rate: 26.0% in 2015	31,600 new start-ups in 2013 and 42,300 in 2014; start-up rate: 2.5% in 2014
Profile of start-up companies in agglomeration	Approximately 60% in software and IT service sector, followed by 10% in biotechnology, media, robotics; mostly small, with some medium to large companies	Mostly very small IT start-ups (83% with less than US\$ 80,000 capital); mostly in IT service sector	Many IT start-ups in a wide range of hardware, software and IT services – 650 start-ups in 2015, compared to 320 in 2014	Most start-ups in IT-industry (35%), followed by smart manufacturing (12.5%) and medical and health care (10%)
External institutions in agglomeration	139 universities with 739,000 students; majority of listed Japanese companies and foreign companies located in Japan	48 universities with 567,000 undergraduate and 114,000 graduate students; majority of leading Korean and foreign companies located in Korea	26 higher education institutions; 51 national R&D agencies; 253 R&D labs by domestic companies and 224 labs by foreign companies; around 50 incubators	68 higher educational institutions with 10 research universities; 51 municipal level or above research institutes; 69 municipal or higher level incubators
Government support of start-up companies	Wide range of support measures offered by central and local government agencies	Strong government support mostly focused on start-up loans; various customized programs sponsored by central government agencies	Angel fund with initial amount of 500 million Yuan set up in 2014 to support tech start-ups; various preferential treatments offered to	Wide range of funding programs offered to high-tech start-ups

companies in SIP

	Tokyo	Seoul	Suzhou	Chongqing
Resource endowments of start-up companies	Availability of capital for start-ups much improved partially due to government's initiatives; recruitment of talent most critical bottleneck as many skilled managers still prefer to work for larger, established companies	Recruitment of talent biggest challenge at initial start-up creation stage; financing biggest challenge for R&D and scaling up	Concentration and diversity of financial services in SIP top ranked in Jiangsu Province – capital availability is notable; talent not in short supply – government policies attract global talent and returnees, local labor supply abundant	Investment capital comes from local government, as well as institutional and private investors; financing not a major challenge; severe shortage of talent
Profile of start-up entrepreneurs	Mostly in their 30s and 40s, with increasing share of younger entrepreneurs	Mostly in their 30s (49%) and 40s (27%); 65% driven by putting business ideas into reality	Many entrepreneurs Chinese returnees from overseas	Mostly in their 30s and 40s; local research staff, former SOE employees, young returnees
Profile of start-up ecosystem networks	Steep increase of venture capital funds; strong, but mostly closed start-up networks	37% of venture firms collaborate with universities, 20% with governmental and public research institutions	Substantial infrastructure and comprehensive business support; <i>potential</i> for strong networks	Close collaboration of start-ups with research institutes; low transformation rate of scientific research into business applications
Globalization of start-up companies	25% of venture firms have already expanded abroad; 54% plan to do so	Strong perceived need and inclination to globalize	Some start-ups have invested into global projects	Most start-ups aiming for domestic market leadership and not investing globally

The Tokyo Start-up Ecosystem

Metropolitan Tokyo is the capital of Japan and the center of its economy. The agglomeration extends over an area of 2,106 square kilometers, corresponding to only 0.6% of Japan's total land surface. However, its share in population accounts for 10% of the total, its gross value added for even 18% of Japan and more than 50% of patents by Japanese nationals registered in Japan originate from Tokyo. The city's economic gravity is exemplified by the fact that 51% of the country's listed companies are headquartered there and 67% of foreign companies choose it as the location for their Japan affiliates. Moreover, the national share in the number of university students is 26%, pointing to a relative abundance of highly educated graduates. The same can be said of the skilled engineers and professionals employed in research institutions or technical service facilities.

The opening and closing rates of enterprises in Japan are known to have been among the lowest in the OECD during the last 20 years. Reasons are the stability and longevity of existing companies combined with a low growth potential since the beginning of the 1990s. In Tokyo, the share of entrepreneurs and the rate of start-ups are in line with the national average. However, a survey of growth-oriented, opportunity-based entrepreneurial firms indicated that more than 70% of such Japanese start-ups are located in the Tokyo Metropolitan area. This indicates that the Tokyo agglomeration attracts many entrepreneurs who are keen to grow their business.

According to the most recent survey of the Venture Enterprise Centre which covered 84 of the largest venture capital (VC) funds, an increase of the VC investment by almost 50% between 2013 and 2014 was found. Tokyo hosts 45% of all start-ups that received VC investment and 42% of the fund invested by VC firms, in line with the general observation that the majority of growth-oriented start-ups in Japan are based in Tokyo. However, the absolute figures are modest compared to leading start-up clusters in the US or Europe.

Start-up companies in Tokyo can benefit from national and local support measures. Some measures are generally directed towards small- and medium-sized enterprises (SMEs) or new business ventures, while others target specifically high-tech ventures.

A central pillar of the Japanese government's growth strategy initiated mid-2013 is the promotion of venture business under the 'Japan Industry Revitalization Plan' with the aim to increase the start-up rate above the closing rate of businesses and up to the 10% rate in the US and the UK. The Plan targets the fostering of entrepreneurial spirit and capabilities, the supply of venture capital, the mobility of resources between existing and new businesses, as well as networking, matching

and information exchange at a national and international level. The central government programs are implemented by various ministries and government bodies with the Ministry of Economy, Trade and Industry (METI) playing a leading role.

Start-ups in Tokyo can also take advantage of various support schemes established by the Metropolitan government. The program focuses more on small direct financing, promotion of existing SMEs, and hands-on support programs for relatively inexperienced entrepreneurs. The coverage of the programs is broad and comprehensive. The Metropolitan government also supports the establishment of venture support facilities and programs such as incubation hubs and commercial exhibitions. It helps venture companies to establish credibility by a trial purchasing program and venture technology award.

A recent survey of 269 venture businesses established during the last five years highlights the business environment of Japanese start-ups. The most prominent source of funding is founders, family and friends (82%), followed by banks (39%), venture capital funds (34%), public institutions (27%), private business angels (26%) and private corporations (25%). Among the 34% of start-ups with investments from venture capital funds, 82% considered a future exit via initial public offering (IPO) or M&A.

According to interviews of venture capitalists conducted in 2015, the availability of capital for start-ups in Tokyo has improved drastically in the past several years, especially due to the success of the 1st generation of startups who establish their own VC firms and the government's initiative (e.g., The Innovation Network Corporation of Japan). Successful start-ups can finance over 10 million US\$ for their early stage funding. It is increasingly difficult for venture capital funds to find good investment opportunities, given the increased size of their funds.

However, securing human resources still appears to be difficult for many start-ups. In the survey, asked about the most pressing needs, the highest ranked topic was human resources (75%), followed by expansion of sales channels (66%), financing (60%) and technology (51%). Entrepreneurs explained in recent interviews that they still have to rely on personal references even in the expansion stage until IPO. Managers who work for well-known established Japanese firms tend not to migrate to start-ups. New graduates also prefer to work for larger, traditional companies. The start-ups in Tokyo typically consider human resources as the largest bottleneck of their growth.

Over half of the listed companies in Japan are headquartered in Tokyo. Similarly, two-thirds of the foreign multinationals have their Japanese affiliates in Tokyo. In theory, such large firms fulfill an important role for high-tech ventures as investors and business partners. In many agglomerations, large corporations in the IT field

whose business is closely linked to or affected by new business ventures connect with start-ups through matching events, by organizing accelerator programs and by offering investments from in-house or fully owned venture capital funds.

However, interviews with venture capitalists and entrepreneurs revealed that the collaboration between large companies and start-up companies is still at a developmental stage in Tokyo. While strong start-up networks exist, these networks are represented by relatively closed communities of entrepreneurs and a limited number of stakeholders such as banks, venture capitalists, accounting firms, law firms, outsourcers, and securities companies. Many of them gather at large closed conference events, exchanging ideas and plans for their business. Typical problems for connecting large companies and start-ups are the establishment of adequate contact points within large organizations, the balance between speedy operational decision-making and governance and the high cost of managing the relationship.

Venture capital funds provided by non-financial Japanese corporations amounted to 7.2 billion Yen (approximately US\$ 65 million) in 2014, which is a threefold increase since 2011. However, capital is mostly provided by relatively young large companies established in the past two decades. Larger, traditional Japanese companies are mostly detached from the start-up ecosystem.

Japanese megabanks, all of them headquartered in Tokyo, have recently been taking a more active role in supporting venture businesses both as a provider of venture capital also at earlier stages of finance, by offering other financial service and as an arranger of business contacts. In fact, there are a number of matching initiatives, acceleration programs and venture awards that aim to close the gap between large and small. Furthermore, universities and research agencies are also active, for example by establishing their own venture funds and organizing start-up matching events for science researchers and students. However, entrepreneurs in Tokyo tend to agree that these start-up networks are still immature and in the early expansion stage, as the small communities are only weakly connected to each other.

Furthermore, the level of internationalization is still low. According to the VEC survey, only 25% of the venture firms have already expanded abroad, although 54% plan to do so. The regional focus is on Asia (47%), followed by North America (17%) and Europe (14%). As the figures indicate, most of the start-ups in Tokyo aim to expand overseas with the initial focus typically in Asia. However, especially due to the existence of a large domestic market, entrepreneurs tend to prioritize domestic expansion, with international expansion following later on. Furthermore, the international linkages are also limited due to language barriers and the relatively weak support of external institutions on internationalization. The start-up

agglomeration in Tokyo is still missing strong international linkages. It has just started to globalize.

The Seoul Start-up Ecosystem

Seoul is the capital of Korea and covers a geographic area of approximately 605 square kilometers, which is less than 1% of Korea's total land area. However, its national economic importance is much higher. Seoul had a population of more than 10.3 million residents in 2015, equivalent to more than 20% of Korea's total population. Its regional GDP amounted to 22.2% of the national GDP in 2013. Together with Gyeonggi-do Province which is surrounding it, approximately half of Korea's population and GDP fall to the Greater Seoul region. There are more than 785,000 businesses in Seoul, among which 130,000 are registered companies.

More than 27,000 new companies, which is equivalent to more than 20% of the total number of registered companies, were founded in 2014, up from 21,000 in 2010. This indicates a high level of entrepreneurial activity in general. However, most of these newly registered companies cannot be regarded as growth-oriented start-ups. According to various surveys and statistics, most high-tech start-ups in Korea are active in the IT industry. In 2013, 8,118 companies were newly founded in the Korean IT sector, up from 5,798 in 2008, indicating strong entrepreneurial dynamism. Most of these IT firms are located in Seoul. Approximately 80% of the firms responding to a recent comprehensive survey of IT start-ups were engaged in IT service business activities, including the development of mobile applications, games, consumer software and technology.

Seoul is the center of business activity in Korea. Most large businesses are registered in the capital, and an overwhelming majority of major domestic and foreign companies have their headquarters located in or close to Seoul. Moreover, 48 universities, including most of Korea's top-ranked universities, are located in the city. Taken together, Seoul's IT start-ups are co-located with a plethora not only of leading domestic and international IT companies, but also of leading universities.

Approximately 80% of IT start-up entrepreneurs recently surveyed are male, and about half among them are in their 30s. A majority of 65% among them is motivated by putting their business ideas into reality, followed by a proportion of 20% who envision to leverage their technological capabilities. Approximately two thirds among them have created a start-up for the first time. Most start-ups have been founded with very limited financial resources – only 17% among them have a capital of more than 100 million Korean Won (equivalent to approximately US\$ 80,000). This equity funding has various sources: 78% of the start-ups rely on entrepreneurs' own capital, 40% on bank loans, 31% on government support programs, and 13% on business angel investors. The Korean government is intensively engaging in direct

financial support for start-up firms since the late 1990s, when such support programs were launched as part of the government's efforts to revive and rebalance the economy after the Asian financial crisis. Currently, several ministries and agencies of the central government run various support programs, such as the 'Global Start-up Vitalization Plan', 'Global Accelerator Fostering' and the 'Promotion Plan for the Support of Re-challenge Ventures'. The overwhelming majority of government financial support is being provided through start-up loans. There also 90 government-supported start-up incubators located in or nearby Seoul. Overall, the amount of government support in relation to the number and capital of start-ups is assessed as the highest in the world. As another potential source of start-up finance, there are around 500 venture capital funds in Korea, and their number and investment is increasing, yet still modest when compared with leading Western countries. The total VC investment by these funds amounted to approximately 1.5 billion US\$ in 2014.

More than 70% among the IT start-ups are small scale with 10 employees or less. The most important challenges identified by the start-up entrepreneurs vary according to the stage of their firms' development: in the stage of initial start-up creation, the most frequent challenge is start-up team building, whereas in the stage of product or service development, it is the procurement of R&D capital and in the external growth stage, it is the procurement of working capital. Overall, while there appears to be abundant early-stage financial resources for start-ups, there is still a lack of venture capital for scaling up these firms. At the same time, securing highly skilled talent constitutes a major hurdle for start-up entrepreneurs in Seoul, as many graduates from leading universities still prefer working for a large company rather than for a start-up.

A large recent survey of Korean venture firms (which include not only start-ups, but also other firms not affiliated with large business groups) revealed that among these firms, external linkages are most frequently established with universities, which 37% of the firms make use of, followed by governmental and public research institutions (20%), other venture firms (8%), large companies (8%), private research institutions (5%) and foreign companies (3%). These data suggest that among the various external institutions which can be found in high density in the Seoul agglomeration, universities and public research institutions appear to be the most frequent collaboration partners for venture firms, including start-ups. In contrast, according to observers of the IT start-up ecosystem in Seoul, many large companies are still not very interested in collaborating with and investing in start-ups. The entrepreneurial networks are strengthening, but currently still appear to be fragile and not very open and integrated.

A majority of the IT start-ups is globally oriented: 14% among them have already globalized their business activities and another 54% is preparing to do so. At the same time, however, many of them perceive multiple hurdles for globalization, including access to overseas distribution or finance, a lack of specialist staff, insufficient market information, and language barriers. Nonetheless, the degree of global orientation appears to be very high, particularly when considering the small size of most IT start-ups.

Taken together, there is vibrant start-up activity in the Seoul agglomeration, particularly in the IT sector. However, most of the IT start-ups are very small and in their early stage of development. There is ample early stage venture finance, partially owing to strong government support for start-ups. The start-ups' external linkages appear to be strongest with universities and public research institutions. There is relatively less external collaboration with other firms. At the same time, many IT start-ups are globally oriented, and a sizeable minority among them is already engaging in global business activities.

The Suzhou Start-up Ecosystem

Suzhou is a prefecture-level city of China that is located in the southeast of China's Jiangsu province, next to China's economic capital, Shanghai and is part of the Yangtze River Delta area. Suzhou is considered one of the richest cities in China in per capita GDP terms (28,700 US\$, in 2014). Suzhou is equally known for its economic success and is the top destination for foreign direct investment (FDI) in China, owing to its proximity to Shanghai and comparatively low operating costs. Suzhou's major industries include iron and steel, IT, electronic equipment manufacturing, services, tourism and textile products. Suzhou is the second largest industrial city in China after Shanghai and much of its industrial success can be attributed to the economic performance of Suzhou Industrial Park (SIP), located within Suzhou itself.

Initially developed as a model industrial township, SIP is the first government-to-government project between China and Singapore. SIP has most recently been designated as a competitive cluster for strategic and 'rising' industries like bio-medical technology; nanotechnology, optoelectronics, and renewable energies (targeted as one industry field); environmental technology and protection; integrated telecommunications; and software, animation and games. More importantly, SIP is the first experimental zone in China for 'Opening-up' and Innovation and is earmarked by China's State Council to become a world-class high-tech international hub integrated by open innovation and economic systems. Transformation is therefore evidently continuous, and SIP remains focused on high-tech and knowledge-intensive industries.

With the number of annually founded start-ups exploding from 1,700 ten years ago to about 11,000 in 2015, the Suzhou agglomeration has grown in accordance with a recent '3 + 5' industry cluster plan (3 fundamental pillar industries + 5 promising future industries), issued by the Chinese central government in cooperation with the Jiangsu provincial government. While these start-ups cover various high-tech industries, the largest number can be found in the IT industry.

At present there about 40,000 companies registered with the tax bureau in SIP. The market spectrum varies from SMEs operating in niche markets to Fortune 500 companies. In 2014, 130 state-owned enterprises were present in SIP and more than 3,800 foreign companies operated there. There are currently about 150 Fortune 500 companies, of which 30 have also set up R&D centers in SIP. Latest statistics reveal that there are 51 national research institutions, 224 R&D institutions that are set up by foreign enterprises, and 253 R&D institutions that are set up by large and medium-sized domestic industrial enterprises in SIP. There are also six national, provincial and municipal technology transfer institutes. There are about 50 government operated and market-based incubators. Furthermore, 26 institutions of higher learning and vocational colleges in the Suzhou agglomeration supply more than 40,000 fresh graduates annually.

In order to support start-up financing, an angel fund with an initial capital of 500 million Yuan (approximately US\$ 83 million) was set up in 2014 to support start-ups and small and medium-sized technology companies. The Suzhou Science and Technology Commission will additionally provide three-year interest-free funds for start-ups that received investment from the angel fund.

Furthermore, there are various other government support policies. Specifically, SIP supports the growth of start-ups and SMEs in all sectors by helping companies to outsource their non-core businesses and offering customized start-up services. A one-stop shop offers a systematic menu with comprehensive services including project application, human resources, legal affairs, media and public relations, finance, procurement, management, information, investment, academic training and exchange, and corporate culture. A Patent Exchange Navigation Centre also exists, where tenants can search for existing patents as well as buy and sell them.

The availability of talent for start-ups in the Suzhou agglomeration is not only supported by graduates from local universities, but also by numerous Chinese returnees from overseas. Returning professionals who were educated abroad or have overseas work experience constitute an important innovation driver. They are especially strong in the biotechnology and IT sectors. SIP is home to the highest number of returnees under the country's Thousand Talent Program, which was designed to attract China's smartest overseas scholars and scientists back to China.

Suzhou also has a dedicated program to attract returned Chinese, who have studied or worked overseas, to start businesses in China. The outcome has been so good that Suzhou has extended the program to foreign expatriates.

The earlier described angel fund together with interest-free financing for angel fund supported start-ups forms an important funding source. A high concentration of banks, financial leasing companies and related financial services companies in the Suzhou agglomeration further support the supply of financial capital. Banks also engage in financial innovation, an example being the development of tax e-financing product that connects start-ups and SMEs' taxpaying credit ratings with financial loans, integrating the taxpaying credit rating into the financing channel via an internet-based financial product.

Due to their long-term working experience in other countries, many start-up entrepreneurs in the Suzhou agglomeration apply a highly Westernized management style. As a result of the early collaboration between Singapore and China, it has been argued that the blend of China operations and Singaporean management styles has given SIP an edge over its competitors. All of the top management of SIP has been trained in Singapore and the park follows international practices. SIP is committed to accommodating different cultures and religions and recently built a church to accommodate the wishes of some of its tenants. Such actions show that SIP has an open mindset, in order to accommodate returnees and foster a climate for successful entrepreneurship. There are also a growing number of companies in SIP that have been founded by professors.

The business networks in the Suzhou agglomeration have high potential, as evidenced by substantial infrastructure and comprehensive business support services that justify SIP's ranking as the second-best industrial park in China. However, the real strength of these networks has yet to be proven. There is a general tendency for strong networks with government agencies but this is less pronounced for the networks between startups and multinational firms.

After twenty years of continuous development, SIP is now widely regarded as a success story and serves a model for urban and industrial development, which appeals to both investors and high-end talents. SIP has shifted its focus from being an investment site for foreign and domestic manufacturing, towards high-tech innovation and entrepreneurship, and has built a service sector that is made up mostly of companies providing shared services centers for multinational firms, R&D in the information and knowledge management industries, and financial-tech services, or FinTech. Entrepreneurship and innovation are increasingly given priority and the barriers to entry are being lowered. The whole ecosystem is constantly improving.

There is a growing trend for companies based in China to make outbound investments. In light of this, SIP unveiled its national level 'Outbound Investment Services Demonstration Platform' in December 2015, which provides integrated, professional services in finance, training, intermediary and risk prevention for companies in SIP making outbound investments. Accordingly, an increasing number of start-ups is pursuing or planning international business activities.

The Chongqing Start-up Ecosystem

Located on the upper reaches of the Yangtze River, Chongqing is Southwest China's biggest industrial and commercial sector, comprehensive transportation hub and a strategically significant part of the "One Belt One Road" national development strategy. Traditionally, due to its geographical remoteness, Chongqing has been an important base in military R&D, and this built the foundation for its current major industry – equipment manufacturing. State assets and state-owned enterprises (SOEs) account for one-third of Chongqing's local economy, which by now has a diversified industrial structure. Factories producing local-oriented consumer goods such as processed food, cars, chemicals, textiles, machinery and electronics are common. Chongqing is China's third largest center for motor vehicle production and the largest for motorcycles.

In 2014, there were about 1.72 million business entities registered in Chongqing's industry and commercial bureau, with approximately 42,300 new start-ups annually. According to a report issued by the Chongqing Science and Technology Commission, 194 high-tech companies were invested in by venture capital funds and private equity funds between 2008 and 2014. These start-ups covered a wide range of 18 industries, with the highest number of investment cases in the internet and IT industries, followed by the manufacturing industry and the medical and health care industry. In terms of the investment size, the highest investments were made in the retailing, energy and mining, and medical and healthcare industries, followed by the automobile industry. Investment in the IT and internet industries has increased, but the investment size is still much smaller than in some other industries.

In general, the local government supports start-ups in various ways, including financial support, improving administrative effectiveness, regulating taxation, strengthening the legal environment, establishing technology transfer channels, and improving the R&D environment. According to a ranking index published by Tsinghua University in 2015, the effectiveness of Chongqing's government support programs ranked 10 among the 157 Chinese cities included in the study.

Financial supply for start-ups appears to be sufficient in Chongqing. In August 2008, the local government invested approximately 0.15 billion US\$ (1 billion RMB)

to establish the Chongqing SCI-tech Venture Capital Guiding Fund, which functions as an umbrella fund in attracting strongly performing and experienced domestic and international venture capitalists to establish sub-funds for investment into high-tech start-ups in Chongqing. These venture capital funds have a relatively high liquidity: until 2015, they have grown to a total size of 1 billion USD. In addition, entrepreneurial investment capital also comes partly from accumulated private household wealth and from institutional investors, large corporations and security companies.

There are 68 higher education institutions in Chongqing, including two national key universities, ten research universities and 58 higher vocational colleges. Chongqing also has 51 research institutes at the municipal or higher level, with 16 national labs and research institutes, and 69 municipal or higher level incubators, with nine state-level technology business incubators.

The higher vocational colleges which are quantitatively predominant in the local higher education system are intended to serve the traditional industrial structure in Chongqing by educating industrial workers for SOEs. Their ability to cultivate entrepreneurs is limited. Instead, the majority of entrepreneurs consist of three groups of people. The first group is formed by university or research institutes' scholars. They either set up their own companies to commercialize their research outcomes or collaborate with local business entities to transfer the results into commercial applications.

Another major group of techno-entrepreneurs is experienced and capable SOE employees. Given its long presence in Chongqing's economy, the SOE sector has nurtured a relatively large pool of corporate entrepreneurs. From 2012, an increasing number of former corporate employees resigned from their companies and began to set up their own business. They usually focus on business opportunities which have a certain level of innovation and potential market space but have not been paid attention to by their former employers. Most of these individuals became entrepreneurs due to their dissatisfaction with the innovation system in their companies, limited space for further career development, and low salaries. They usually have abundant industry experience, but struggle with acquiring investment and organizing operational resources.

The third group of techno-entrepreneurs is returnees from overseas. Their number is relatively small but increasing over the last three years, according to the 2015 White Paper published by the Chongqing Science and Technology Commission. This group of entrepreneurs focuses on introducing foreign technologies and products to the local market, but they are usually handicapped by their weak performance in establishing local business networks.

As academic and techno-entrepreneurs rely on local business entities to transfer their scientific and technological achievements, strong networks of start-ups with local universities and research institutions have evolved. Governmental funds perform a significant role in encouraging such cooperation, indicating a tendency among entrepreneurs to form strong networks with government agencies.

Most start-ups in Chongqing perform rather weakly in terms of internationalization. From a human resource perspective, although the university researchers usually have overseas education experience, their technology commercialization relies on local research facilities and staff. As a result, their business activities are deeply embedded in the local context. The former corporate employees, on the other hand, were mostly educated in Chinese cities and had been working in domestic companies thereafter. Therefore, their exposure to foreign companies and global business is rather limited. From an investment perspective, start-ups in Chongqing usually do not have foreign or international investors. There is also a shortage of proper communication channels between local firms and international investors. Furthermore, most high-tech start-ups aim for a leading position in the domestic market and have no intention of international expansion.

Overall, Chongqing's further development is constrained by its insufficient talent supply and the weakness of its entrepreneurial networks. Its current educational institutions settings cannot satisfy the need for cultivating local techno-entrepreneurs. Although the number of young techno-entrepreneurs is increasing recently, they still face the challenge of developing local business networks which can support them. Former corporate employees and young returnees, in particular are struggling with establishing relationships with local businesses. A well-functioning start-up ecosystem has yet to be established in Chongqing.

Discussion and Research Propositions

The synthesis of empirical findings from our comparative analysis leads to six propositions concerning features of high-tech start-up ecosystems in East Asian agglomerations.

First of all, in contrast to many Western start-up ecosystems, the four ecosystems we have studied are all located within very large urban agglomerations. To illustrate, the core population of all four agglomerations we have studied, even excluding adjacent but economically linked areas, is above 10 million people (Table 2) – larger than even the largest high-tech agglomerations in North America such as the San Francisco Bay area or the Greater Boston area, and any European agglomeration.

The first generation of start-ups in East Asia could rely on these large economic agglomerations to find the necessary supporting resources and institutions. Consequently, the ecosystems which subsequently developed as a result of the success of the first start-up generation, also did not grow independently, but emerged under the strong influence of urban agglomerations. To the best of our knowledge, there are no significant East Asian high-tech start-up ecosystems outside of larger agglomerations. Therefore, we propose:

Proposition 1: High-tech start-up ecosystems in East Asia do not emerge out of regional clusters but established themselves within large urban agglomerations.

As a result of the emergence of high-tech start-up ecosystems in East Asia out of large urban agglomerations, a larger number of relevant external institutions and organizations are a potential part of these ecosystems than in Western start-up ecosystems which are located in smaller agglomerations. Therefore, the formal and informal networks found in and around the East Asian ecosystems are more complex and difficult to capture, involving a large number of universities, government research institutes, incubators, and other participants. However, this does not necessarily mean that these ecosystems are in an advantageous position. Western high-tech start-up ecosystems typically exist around a limited number of world-class research institutions or research-intensive companies that function as strong hubs of knowledge and other resources. In contrast, such knowledge hubs are harder to identify in East Asian start-up ecosystems. Therefore, we propose:

Proposition 2: East Asian high-tech start-up ecosystems do not emerge out of specific knowledge hubs and are subject to a larger number of relevant external institutions and organizations than their Western counterparts.

Furthermore, the larger number of relevant external institutions and organizations, without strong hubs of knowledge and other resources, result in weaker ties between each node in comparison to Western counterparts. Due to the participation of a high number and large variety of research institutions, government organizations, and companies from different industries, East Asian start-up ecosystem networks can potentially facilitate valuable knowledge exchanges. However, this strength may be overshadowed by the ineffectiveness of the weaker network ties. The ecosystems seem to be relatively closed and segregated and appear to be a collection of fragmented, smaller sub-networks that are only weakly connected to each other. East Asian cultural traditions which emphasize the cultivation of relationships with specific counterparts (Bstieler and Hemmert, 2015), as opposed to open networking, form an underlying factor which may contribute to these network features in East Asian start-up ecosystems. The

weaker ties are causing inefficiency and ineffectiveness and appear to inhibit the East Asian start-up ecosystems in high-tech industries to live up to their full potential. Therefore, we propose:

Proposition 3: In East Asian high-tech start-up ecosystems, the networks of start-ups and relevant external institutions and organizations are weaker and more segregated than in their Western counterparts.

Another common observation among the East Asian start-up ecosystems is the relatively ample availability of government funding. This is especially evident in Tokyo, Seoul and Chongqing where comprehensive support programs are provided by multiple government-backed institutions, while the Suzhou government has recently started a series of funding programs that involve both public and private sector participation. These governmental support programs can complement the weak supporting institutions at least to a certain degree. However, most of the programs are designed to support a large number of start-up companies regardless of their potential for growth. The widely and therefore thinly spread support programs, together with a bigger number of ecosystem participants, often appear to be ineffective in accelerating the growth of high-potential start-ups. At the same time, the government support programs, which are available for many companies, may indeed help to grow the size of start-up ecosystems. As a result, East Asian high-tech start-up ecosystems appear to accommodate a larger population of medium-sized, slow-growth start-up companies than their Western counterparts. Therefore, we propose:

Proposition 4: In East Asian high-tech start-up ecosystems, while the level of government support for start-ups is higher than in their Western counterparts, the support programs are less effective in targeting high potential start-ups.

In addition to various similarities of East Asian start-up ecosystems which set them apart from their counterparts in Western countries, we also found some notable differences across the four ecosystems we have studied which can be related to economic and institutional features. Specifically, in contrast to many Western start-up ecosystems where the availability of venture capital appears to be a bottleneck factor (Compass, 2015), the labor market is a very influential factor in predicting the growth of the East Asian high-tech start-up ecosystems, as other important resources such as early stage finance and technology resources appear to be relatively abundant. Human resources are a critical factor in all these ecosystems; therefore, the growth of the talent pool and the degree of labor market flexibility appear to significantly impact the growth of the respective ecosystems. In Tokyo,

the labor population is stagnant, and skilled-labor is generally hesitant to migrate from larger, more established corporations to start-up companies. Seoul has a relatively better supply of young talent, which however also prefers working for larger organizations instead of start-ups. In contrast, the skilled labor population is still expanding in China, and the job market flexibility is high. Managers obtain knowledge and capabilities by working for larger, established companies, and migrate to entrepreneurial start-ups. As a result, the growth of start-up ecosystems appears to be strongest in China, followed by Korea and Japan. Therefore, we propose:

Proposition 5: The growth of East Asian high-tech start-up ecosystems is strongly influenced by the growth and flexibility of the supporting labor market.

Finally, we also find differences in the degree of start-up firms' internationalization across the four ecosystems we have studied. Despite their high aspiration on internationalization, start-ups in East Asian ecosystems tend to be left behind their Western counterparts. A possible reason is the weak institutional support for internationalization. Internationalization efforts of universities and research institutions are still in the developmental stage in most of East Asia. Language barriers are high especially for Japanese entrepreneurs. The entrepreneurs' networks are often domestic and are isolated from global networks. While there are exceptional start-ups and venture capital firms that are an integral part of the global start-up community, the majority of start-ups in the ecosystems focuses primarily on the large domestic market. Start-up ecosystems in China may benefit from the global networks of returnee Chinese entrepreneurs, at least in highly globalized areas such as Suzhou. However, the majority of start-ups appears to focus on the large and growing domestic market. Korean entrepreneurs also face language and institutional barriers, but nonetheless appear to make stronger and more determined internationalization efforts than their Japanese and Chinese counterparts, being aware of the limited size of their domestic market. Therefore, we propose:

Proposition 6: Start-ups in East Asian high-tech start-up ecosystems tend to face strong obstacles to internationalization, and perceive less pressure to internationalize when they are located in large national economies.

Contributions, Limitations, Research Directions and Managerial Implications

This study of high-tech start-up ecosystems in East Asian agglomerations contributes to the start-up ecosystem literature in various ways. Specifically, we have filled an empirical void by studying the growth and performance of the high-tech start-up

ecosystems in four leading agglomerations in Japan, Korea and China, using a large variety of materials that are not available in Western languages, and personal interviews with venture capitalists and start-up entrepreneurs. We identified various features of these start-up ecosystems, including the size and type of agglomerations they are located in, the size and characteristics of their networks, and of government support policies, which set them apart from their Western counterparts. Furthermore, we also found a number of differences between East Asian start-up ecosystems which can be related to labor market conditions and the size of the national economy they are located in. Taken together, we have found that start-up ecosystems in East Asia are different from the West in various important aspects, suggesting that studies of start-up ecosystems need to be extended to non-Western regions to understand the nature, the antecedents and the implications of cross-regional differences.

At the same time, our study has some important limitations. While we have studied the start-up ecosystems in four leading East Asian agglomerations, the small number warrants caution in generalizing our findings to all start-up ecosystems in East Asia. Furthermore, our qualitative methodological approach, while instrumental for gaining strong contextual insights into start-up ecosystems, did not allow us to draw rigorous observations based on quantitative analytical tools. Finally, as our study did not include any Western start-up ecosystems, differences between East Asia and the West could only be identified and discussed indirectly.

Given the contributions and limitations of our study, there are various promising avenues for future research on start-up ecosystems in agglomerations. As we have identified various important differences between East Asian start-up ecosystems and their Western counterparts, start-ups in innovative and dynamic parts of the world such as East Asia should be studied more intensively, resulting in potential extensions of start-up ecosystem models. Studies of larger samples of start-ups across a higher number of East Asian start-up ecosystems may serve to verify and extend our findings. Furthermore, comparative studies of Western and East Asian start-ups and start-up ecosystems can contribute to deepening our knowledge of their similarities and differences.

Start-up entrepreneurs in East Asian agglomerations should focus on factors which appear to be critical for the performance of start-up companies in this region. Specifically, they should make persistent efforts to develop strong ties and networks with external institutions and organizations, including large companies, universities, and research institutions to make use of the strong potential given by the high number and innovative strength of these organizations in large urban agglomerations in East Asia. Furthermore, given the inclination of young talent to

join large companies instead of start-ups in countries such as Japan and Korea, start-up entrepreneurs should leverage their networks and offer strong incentives to acquire the highly skilled human resources they need to grow their companies.

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