Returnee Entrepreneurs, Science Park Location Choice and Performance: An Analysis of High Technology SMEs in China

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Abstract

Building on an asset complementarity perspective, human capital and social capital measures are used to examine the science park location decisions of returnee entrepreneurs and the performance of their ventures. The study uses a unique, hand-collected dataset of 349 SMEs from Zhongguancun Science Park in China, including 53 SMEs from locations administered by universities. The paper considers the antecedents of university and non-university science park location and firm growth with a view to drawing conclusions that go beyond the specific context of Beijing and China. Its findings include the tendency for returning entrepreneurs with academic knowledge in the form of patents transferred from abroad to locate in non-university science parks, and for those with previous firm ownership abroad to choose university science parks. The firms of returnees with patents from abroad enjoyed stronger employment growth in non-university science parks, and those with commercial experience abroad with MNCs performed better in university science parks. This evidence is consistent with the view that returning entrepreneurs seek complementary (academic and commercial) assets in their location decisions, although some inconsistencies with this view are also discussed.
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Introduction
Technology-based firms are important drivers of innovation and growth (Utterbach, Meyer, Roberts & Reitberger, 1988; Acs & Audretsch, 1990). Yet, emerging economies typically lack the entrepreneurial expertise to develop such ventures, and China has become known as the manufacturing workshop of the world, as opposed to a source of innovation and thus intensive growth. However, human capital mobility, specifically returnee entrepreneurs, has recently gained significance as having the potential to fill this gap (Saxenian, 2006; Financial Times, 2007). Returnee entrepreneurs are defined as scientists and engineers trained in the USA or in other OECD countries, returning to their home countries to start up a new venture, and we focus on returnee entrepreneurs in China.

Science parks have been at the forefront of Chinese government’s attempts to exploit returnee entrepreneurs, as part of its policy of stimulating a market economy, but there have been question marks over a lack of real entrepreneurial leadership (Tan, 2001; 2006). Returning entrepreneurs locating in these science parks, with human and social capital accumulated in a market economy, are believed to help to stimulate the development of technology-based firms in China. Since, until quite recently, few managers in China were exposed to international markets, the expertise of returning entrepreneurs may be especially relevant, replacing a ‘brain drain’, i.e. a loss of skilled human capital, with ‘brain circulation’, i.e. the return of entrepreneurs with enhanced expertise (Saxenian, 2006). However, returning entrepreneurs have to make a location
choice within the country to which they return, driven by their need to access resources and assets.

In the West, science parks have been promoted as facilitators of high tech firms since they may create agglomeration economies and networks that support the development of resource-poor, high-risk ventures (Phan, Siegel & Wright, 2005). However, there is debate concerning their effectiveness. For example, key aspects of the ability of science parks to actually promote the development of entrepreneurs in such settings remain unclear (Phan, Siegel & Wright, 2005). More specifically, science parks come from two main sources: those linked to universities, or those administered by municipalities, ministries, etc. (Westhead & Storey, 1995). Therefore, from a resource-based perspective, different types of science parks may be associated with different resource configurations and externalities that, in turn, interact with the characteristics of entrepreneurs looking for a location for their ventures.

In particular, entrepreneurs locating on a science park may seek access to assets that are complementary to their human and social capital (Gans & Stern, 2003; Teece, 1987), which may thus be influential in determining the success of new ventures (Davidsson & Honig, 2003) in these locations. Very little is known about the backgrounds of entrepreneurs, their location decisions in science parks and subsequent firm performance, and these factors may be vital to innovation and long-term economic development in transition economies such as China.

We aim to fill these gaps by examining the science park location choices of returnee entrepreneurs and the performance of their ventures in China where the government has offered
substantial inducements to returning entrepreneurs. We focus on Zhongguancun Science Park (ZSP) in Beijing, where inducements to the establishment of high-tech firms include tax holidays, cheap office space, start-up loans, advice centers and other incentives (Li, Zhang & Zhou, 2005). This park consists of a number of smaller science parks which are located on multiple sites in the Beijing area. Some of the smaller parks of the ZSP are affiliated to universities, while others do not have any formal or informal associations with academia. The provision of subsidies for all firms in all science parks should make returnee entrepreneurs indifferent as between a university or non-university science park location. However, returnee entrepreneurs must make this location choice, but the factors influencing these decisions are not well understood. Using an asset complementarity perspective (Teece, 1987), this paper examines the association between the human and social capital of returning entrepreneurs and science park location choice and the performance of their firms.

This paper makes a number of contributions to understanding the development of entrepreneurship in emerging economies. A large literature has focused on entrepreneurs’ attributes and behavior as key drivers of venture success. However, another stream of entrepreneurship research emphasizes the importance of the location-specific networks in creating agglomeration economies and providing external resources to new ventures. There is very little research that looks at the interaction of these internal and external factors and their effects on venture success. In this paper we provide an integrated framework that links entrepreneurial attributes and behavior with location decisions and thus the performance of a venture. Specifically, we identify how the human and social capital factors of returnee entrepreneurs influence university and non-university science park location and SME growth,
and consider how this study advances our understanding of entrepreneurship in emerging economies beyond China. We develop these themes using novel, large sample survey evidence collected from returning entrepreneurs operating in the ZSP in Beijing, which has the largest cluster of technology-based firms in China (Tan, 2006).

The following section situates our analysis in the literatures on complementary assets, human capital and social capital theory before developing our hypotheses. This is followed by a description of our data and methodology. We then present our findings and conclude with a discussion of the implications of our analysis.

Theory and Hypotheses

Science parks in general may provide entrepreneurs with physical facilities and services as well as links to laboratories, scientists, and access to government subsidies, customers, suppliers and employees that may not otherwise be available to them during the start-up process (Westhead & Storey, 1995; Phan et al., 2005). In addition, in the Chinese context, it has been explained that, once firms in ZSP are qualified as high-tech firms (see the definition below), they receive preferential treatment from the government. Specifically, newly-established firms can get their first three-year of taxes waived, with a 50% reduction for the next three years (ZSP Development Report, 2004). These subsidies apply to all firms in Chinese science parks, whether they are attached to universities or not.

However, from the entrepreneur’s perspective, a university science park location has been found by Western research to offer certain advantages and disadvantages. It may provide the
entrepreneur with access to a vast pool of intellectual resources possessed by academic staff. University departments charged with knowledge transfer may provide entrepreneurs with support and advice in setting up a new venture. However, Western research shows that the university science park has a potential downside in the shape of less commercial credibility, sending a signal to the market that its activities involve academic research rather than a commercial focus (Vohora et al., 2004; Clarysse et al., 2005; Siegel, Westhead & Wright, 2003). The university context may also involve greater bureaucracy in terms of decision-making; difficulties in identifying decision-makers, and a slow process of decision-making by committee can slow the commercialization process. It may also involve advisors who do not have sufficient practical, business commercialization experience (Vohora et al., 2004; Wright et al., 2006) and relatively weaker network ties with financiers and industry partners (Vohora, et al., 2004). Non-university science parks may provide greater access to commercially oriented expertise and contacts, but they may lack access to fundamental research and a diverse academic community. Therefore, a university location may be a strategic choice that has its benefits but also associated costs.

However, the Western literature has so far not been extended to transitional economies such as China. Firms in Chinese university science parks differ from their western counterparts as Chinese parks are typically established and managerially controlled by the universities themselves, rather than as independent entities. Moreover, firms in Chinese university science parks are allowed to utilize the tangible and intangible assets of the university, including physical space, manpower, social links and even the title of the university as a commercial brand (Eun, Lee & Wu, 2006). Nevertheless, in the Chinese context, as in the West, there may be a shortage of commercial skills and contacts in university science parks.
The location decision by returning Chinese entrepreneurs may thus be influenced by the possibility of *asset complementarity* (Gans & Stern, 2003; Teece, 1987) in relation to academic and practical business knowledge. Asset complementarity refers to the possibility that entrepreneurs will seek to acquire or access assets or capabilities that they do not themselves possess or control but which are central to the development of their venture. The commercialization of high tech opportunities may require access to manufacturing and marketing assets as well as distribution channels. Commercialization may also require access to other technological developments to create a product that fits with customer needs. We focus on the human and social capital assets of returnee entrepreneurs and their complementarity vis-à-vis the locational characteristics associated with university and non-university science parks.

In a predominantly Western literature, *human capital* has referred to a spectrum of skills and knowledge with varying degrees of transferability (Castanias & Helfat, 1992). Individuals acquire resources in particular contexts and the resources acquired over time may impact on firm behavior (Gimeno, Folta, Cooper & Woo, 1997; Brüderl, Preisendorfer & Zeigler, 1992; Bosma, van Praag, Thurik & de Wit, 2004). Individuals with broader pools of human capital resources should be associated with superior productivity ‘outputs’ (Becker, 1975; Davidsson & Honig, 2003). The human capital of entrepreneurs that is based on past experiences may be an important factor underpinning SME location and performance (Westhead, Wright & Ucbasaran, 2001).
In a Chinese context, returning entrepreneurs may have acquired academic knowledge in the form of general education and scientific and technical training. They may also have acquired practical business human capital from either working in a commercial environment or through having started a business.

_Social capital_ in the extant Western literature involves the relational and structural resources attained by individuals/ firms through a network of social relationships (Adler & Kwon, 2002; Cooper & Yin, 2005). The actions of individuals can be facilitated by direct and indirect links to other actors. Such social capital is important to many small firms as it provides access to information and resources not available internally (Davidson & Honig, 2003). Social capital is appropriable or convertible (Bourdieu, 1985; Coleman, 1988), that is it can be used for different purposes. An individual that develops social capital through working abroad may be able to use that social capital to access foreign markets when they become a returnee entrepreneur. Social capital can also be complementary to other resources (Adler and Kwon, 2002).

In the context of China and other emerging economies, research suggests that social capital is particularly important to small firms (Peng & Zhou, 2005). Social capital enables these firms with relatively weak internal resources to access complementary assets within the wider network (Bruton, Ahlstrom & Wan, 2003). Indeed, Redding (1996) characterizes these firms as weak organizations linked by strong networks, suggesting that network-related factors should play an important role in their location and performance. The commercial work experience of returning entrepreneurs may also be associated with the development of business networks. Bridging social capital derived through external relations may be especially important for returnee
entrepreneurs creating new ventures. Returnees who have developed social capital with international networks can act as a bridge between the Chinese context and the foreign market.

We argue, therefore, in the Chinese context that the science park location decision, and thus the growth of the new venture, will be driven by the antecedent of returnee entrepreneur’s academic and practical knowledge of business and technology. In particular, the location decision and growth of firms may depend on the founder’s human and social capital (Davidsson & Honig, 2003), such as experiences gained abroad and global networks developed. On this view, an entrepreneur with highly developed practical business skills and knowledge may be expected to benefit most from a university science park location, where more academic scientific and business consultancy skills may complement practical commercial skills. By the same token, an entrepreneur already possessing extensive academic knowledge may benefit most from a non-university science park where the relative emphasis may be on commercialization. Business location decisions that disregard this complementarity may hamper the venture’s growth opportunities.

Location choice is obviously a major strategic decision for SMEs, and the location of Chinese returnee entrepreneurs on a university or non-university science park represents a strategic decision probably as important as subsequent decisions to internationalize or make divestments after firms have grown in their chosen location. We propose that the initial decision to locate in a science park may denote strategic intent, while measures of SME performance may constitute strategic outcomes. While a similar list of determinants may be considered to influence both firm location and performance, the possibility exists that there may be a mismatch, or lack of fit,
between SME characteristics and strategic intent (Hamel & Prahalad, 1989). Any such lack of fit will impact SME performance outcomes. Thus, science park location may mediate the relationship between the knowledge characteristics of returnee entrepreneurs and firm performance. We next develop testable hypotheses using this rationale in the sections that follow.

**Returnees’ Science Park Location and Performance**

Our first key assumption is that academic knowledge and commercial (business or technical) knowledge are complementary. Our second key assumption is that university and non-university science parks offer different assets and capabilities. University science parks are assumed to offer access to scientists, new inventions and laboratories. Non-university science parks are assumed to offer more expertise in commercialization. The choices that these two dimensions of type of knowledge and type of science park offer for returnee entrepreneurs can be portrayed as in Figure 1. With respect to Quadrant 1, we argue that firms established by returnees with educational knowledge obtained abroad will seek complementary, practical, business and scientific skills, which may be relatively abundant in a non-university park location. Regarding Quadrant 2, returnee entrepreneurs with practical but limited business knowledge may seek to establish their venture on a non-university park to access the commercial assets they need. With respect to Quadrant 3, returnee entrepreneurs with prior start-up experience and diverse networks may seek locational advantages associated with university science parks, since they provide access to new innovation opportunities that may be commercialized. Finally, concerning Quadrant 4, returnees with educational knowledge may need to access higher level technical expertise to develop the concept for their venture. However, the quadrants are different in terms
of their levels of asset complementarity, and that may affect organizational outcomes, such as venture growth. More specifically, Quadrants 1 and 3 have high levels of complementarity between internal (entrepreneurial) capital and location-specific assets, whereas the complementarity level in quadrants 2 and 4 is relatively lower. Other things being equal, one may expect that these differences in the levels of complementarity may affect venture growth patterns. Based on this framework we first develop a set of (a) hypotheses relating to the association between academic knowledge and location and performance. We then develop a second set of (b) hypotheses concerning the association between practical business knowledge and location and performance.

**Academic Knowledge**

Education may provide the skills to adapt to environmental changes and to handle complex problems (Hatch & Dyer, 2004) but may inculcate attitudes that are antithetical to entrepreneurship (Casson, 2003). Some early studies show an inverse relationship between educational attainment and firm formation (Storey, 1994), while others suggest that highly educated individuals are more likely to establish new firms (Bates, 1990). Recent studies have tended to be more consistent in identifying a positive relationship between education and entrepreneurship. Entrepreneurs may leverage their knowledge and the social contacts generated through the education system to acquire resources required to identify and exploit business opportunities (Shane, 2003; Arenius & DeClercq, 2005). Arenius and DeClercq (2005) found a positive relationship between education levels and the likelihood of recognizing opportunities. However, Davidsson and Honig (2003) found that nascent entrepreneurs with higher levels of education were more likely to identify opportunities, but they were not more likely to pursue
identified opportunities. Recent evidence indicating that entrepreneurs who are more highly educated obtain a higher return to education than do employees (Van der Sluis, van Praag & Witteloostuijn, 2004), suggests that more highly educated entrepreneurs are either more adept at identifying opportunities and/or are better at realizing the returns from those opportunities. The need for higher education levels may be particularly strong with respect to high tech ventures. In these cases, returnee entrepreneurs may find that location on a university science park offers complementary technical assets that can enable a novel product to be developed.

Education and practical business experience on their own may each imply weaknesses, but we propose from our asset complementarity perspective that a combination of academic experience gained abroad, matched by a non-university park location may offer synergies and high complementarity (Figure 1, Quadrant 1). In contrast, a university park location is less likely to offer the appropriate commercial business skills that these returnee entrepreneurs require to develop their ventures, i.e. low complementarity (Figure 1, Quadrant 4). Therefore:

**Hypothesis 1a:** Returnee entrepreneurs whose main experience abroad was in education are less likely to locate in a university park than in a non-university park.

While business location decisions may represent strategic intentions to match knowledge with the resources offered by different science park locations, strategic outcomes may reflect the extent to which acquired knowledge and science park facilities are matched. For example, a university park environment may be less likely to offer the commercial resources needed by a new venture with extensive academic knowledge, e.g. providing access to customers and
suppliers. Clarysse et al. (2005) and Vohora et al. (2004) find, for the developed markets of Europe, that university incubator environments frequently lack the human capital capabilities to develop the growth potential of the ventures they create. These problems may be exacerbated in the Chinese context and we therefore propose:

**Hypothesis 1b:** The SMEs of returnee entrepreneurs whose main experience abroad was in education perform less strongly in a university park than in a non-university park.

Of course, academic knowledge may take the form of business training, but also the acquisition of scientific information. In this context, the possession of patents may be an important influence on science park location and performance, since patents relate to pre-commercial inventions rather than innovations that can readily be developed into products. It may be hypothesized from our complementary asset perspective, therefore, that returnee entrepreneurs with existing patents may seek to locate on non-university science parks in order to access complementary commercial knowledge relevant to the commercialization of their portfolio of inventions (Gans & Stern, 2003) and thus obtain high complementarity (Figure 1, Quadrant 1). In contrast, returnee entrepreneurs with fewer patents may seek to locate on a university science park in order to gain access to inventions that are being developed in university laboratories. Hence:

**Hypothesis 2a:** Returnee entrepreneurs who hold more patents are more likely to be associated with location in a non-university park than in a university park.
Correspondingly, firms created by returnee entrepreneurs with more patents are likely to perform better if they locate on a non-university park, because they gain the benefits of linking their existing academic expertise with access customers, suppliers, etc. Of course, firms may make decisions based on strategic intent that are mistaken. For example a firm with many patents may nevertheless locate on a university park, achieving a non-complementary mismatch of academic knowledge with university science park facilities that may impact negatively on strategic outcomes and firm performance. Thus we propose:

**Hypothesis 2b:** The SMEs of returnee entrepreneurs possessing more patents perform more strongly in a non-university park than in a university park.

**Practical Business Knowledge**

While the four hypotheses above relate to academic knowledge, education may not guarantee business success (Casson, 2003). Of course, our complementary asset approach emphasizes synergistic combinations of academic and business skills, and work experience can be invaluable. Previous experiences (Reuber & Fischer, 1997), resources (Bloodgood et al., 1996), capabilities, knowledge and learning mobilized by an entrepreneur may lead to the creation, discovery and exploitation of opportunities (Madhok, 1997). Experience can assist in the accumulation of new knowledge and social capital, enabling individuals to adapt to new situations (Davidsson & Honig, 2003) and become more productive (Parker, 2006). The work experience profiles of individuals have been found to be associated with the ability to become self-employed and to start new firms (Bates, 1990; Gimeno, Folta, Cooper & Woo, 1997). Previous experience provides valuable episodic knowledge such as managerial experience,
enhanced reputation, access to finance institutions and broader social and business networks (Wright et al., 1997; Shane & Khurana 2003) which can be leveraged to create new ventures. Past experience of the entrepreneur represents an important organizational resource (Reid, 1981).

In the Chinese context, prior episodic knowledge from developed commercial markets can enable returning entrepreneurs to transfer the relationships and processes of technological entrepreneurship to a new institutional context and build partnerships with distant customers (Saxenian, 2006). This experience may involve working within companies abroad or founding a firm abroad. In what follows, we develop hypotheses relating to these different aspects of practical business knowledge.

First, we consider the role of practical commercial skills acquired by working within companies abroad. The movement of specialist engineers and technologists between firms in the same sector typically involves the transfer of the skills, experience and knowledge acquired in one job to subsequent jobs (Saxenian, 1994; Tan, 2006). Returning entrepreneurs to emerging markets bring expertise relating to commercialization, and also knowledge about products, technology and access to finance. For example, returning entrepreneurs may have been in contact with venture capital firms abroad and thus may have developed transferable expertise in accessing such funding in China (Saxenian, 2006). In addition to financial skills, marketing knowledge may also be obtained from this work experience. More specifically, just as MNCs may be able to transfer technology, management skills and marketing techniques to local firms (Inkpen & Tsang, 2005) and positively affect indigenous firms’ performance, returnee entrepreneurs may also be able to transfer their own experience of working in an MNC to a new venture in China.
These returnee entrepreneurs with knowledge transferred from abroad may seek to obtain complementary technical assets from university parks (Figure 1, Quadrant 3) and are unlikely to need a non-university park location (Figure 1, Quadrant 2). Hence:

**Hypothesis 3a:** Returnee entrepreneurs with practical business knowledge obtained abroad are more likely to be associated with location in a university science park than in a non-university park.

We now apply to practical business knowledge the notion of strategic mismatch already applied to academic knowledge obtained abroad through education and the acquisition of patents. Just as academic knowledge may be mismatched (in this case by a university park location), we extend this complementarity argument to embrace practical business skills obtained abroad.

We argued under H3a that prior episodic knowledge from working in developed commercial markets may enable returning entrepreneurs to transfer technology, management skills and marketing techniques to the local context most appropriately at a university science park location. We now further propose that where this does not happen, synergy will not arise, and thus firm performance will be damaged.

Hence:

**Hypothesis 3b:** The SMEs of returnee entrepreneurs with practical business knowledge obtained abroad perform more strongly in a university science park than in a non-university park.
We now extend our arguments to knowledge derived from the founding of firms abroad by returnees. Such experienced entrepreneurs are likely to have established strong ties with a diversity of overseas and local actors (Hoang & Antoncic, 2003). Prior business ownership experience in general may enhance opportunity recognition skills including more effective search processes (Shane, 2000; Ucbasaran Wright, Westhead & Busenitz, 2003a). Experience may have a strong bearing on the ability to identify innovative opportunities (Amabile, 1990; Sternberg, 1999). Experience contributes to the development of schemas that provide a framework for quicker recognition and evaluation of information relevant to an opportunity; this may be especially relevant to more complex high tech opportunities. There is some evidence that habitual entrepreneurs utilize ties with researchers in universities to recognize a greater number of opportunities than novice or nascent entrepreneurs (Mosey & Wright, 2006).

Ucbasaran, et al. (2003a) also argue that SME business ownership experience, including managerial experience and interaction with financial institutions leads to broader social and business networks, and therefore less dependence on a university science park. However, firms located on university science parks have been found to seek links with universities in order to develop involvement with academics on either a consultancy or a full or part-time employment basis (Westhead & Storey, 1995). In the Chinese context, such technological expertise may be more likely to be located in a university. This suggests a need to locate on a park with links to universities in order to complement practical business skills associated with the creation of a business abroad with access to the human capital that can help develop technology (Figure 1, Quadrant 3):
**Hypothesis 4a:** Returnee entrepreneurs who have previously started a business abroad are more likely to be associated with location in a university science park than on a non-university park.

Since H4a proposed that returnee entrepreneurs with practical business experience in the form of founding a firm abroad may choose to locate on a Chinese university science park, where they can gain access to scientific and consultancy resources that complement their practical knowledge, it follows that, if the proposed synergies do develop, this will have positive implications for firm performance. Hence:

**Hypothesis 4b:** The SMEs of returnee entrepreneurs who have previously started a business abroad perform more strongly in a university park than in a non-university park.

Returnee entrepreneurs’ commercial networks provide social capital that may have an important impact on their location decision and thus performance by reducing information asymmetries and providing the focal firm with important knowledge and resources. Such social capital-related factors may provide the resources for ventures located in university contexts to penetrate international markets (Coviello & Munro, 1997; Zahra et al., 2000). Many university academics may only have loose or weak ties with industrial actors (Adler & Kwon, 2002), and returnees may fill this gap. An academic seeking to address a barrier to venture creation may seek to develop their loose or weak ties (Granovetter, 1973) to gain access to valuable information that would otherwise be difficult or costly for them to obtain. The human capital profiles of academics may thus be enhanced by focusing on weak ties with industry actors (Davidsson & Honig, 2003). Returnee entrepreneurs who have developed international networks may be
especially attractive to university parks as the social capital of academics is typically constrained to a narrow scientific research network. To the extent that there are innovations emanating from universities that have potential overseas markets, returnee entrepreneurs with established international business networks may see benefit from locating on university based science parks. Returnee entrepreneurs can act as a bridge between the Chinese university context and the international market (Adler and Kwon, 2002; Burt, 1992). There is thus a high level of complementarity between the technological skills to be found on the university science park and the social capital of the returnee entrepreneur (Figure 1, Quadrant 3). Hence:

**Hypothesis 5a:** Returnee entrepreneurs who have developed international business networks are more likely to be associated with location in a university park than in a non-university park.

Social capital in the form of business networks may be positively associated with performance. Such networks can provide relevant information in new markets that can help identify more attractive opportunities and potential customers. Davidsson and Honig (2003) find a significant positive association between social capital and performance. As with the previous aspects of practical business knowledge, we propose a hypothesis parallel to H5a that relates to the extent to which access to international business networks is matched by a university location, and *vice versa*:

**Hypothesis 5b:** The SMEs of returnee entrepreneurs who have developed international business networks perform more strongly in a university park than in a non-university park.
Methods

Sample

Our six pairs of related hypotheses were tested using a hand-collected dataset from university and non-university administered science parks in Beijing. The sample firms were selected from within the largest science park in China, Zhongguancun Science Park (ZSP), which has attracted a large number of returning overseas Chinese entrepreneurs. In contrast to western science parks, this park consists of a number of smaller science parks which are located on multiple sites in the Beijing area. As noted earlier, some of the smaller parks of the ZSP are affiliated to universities, while others are administered by municipalities and do not have any formal or informal associations with academia. Firms outside ZSP were not included in the sample. Therefore, the ZSP represents a unique laboratory in which to test our research propositions with regard to location and performance of returnee SMEs. It has attracted a substantial number of returnee entrepreneurs, and its unique combination of university-related and independent segments allows us to explore locational aspects of entrepreneurial acts by returnees.

All firms in our sample are from “high-tech industries”, following the definition of the Ministry of Finance and China National Bureau, comprising electronics and information technology, bioengineering and new medical technology, new materials and applied techniques, advanced manufacturing technology, aviation and space technology, modern agricultural technology, new energy and high power conservation technology, environmental protection technology, marine engineering technology and nuclear-applied technology. Since returnee-owned firms are a recent phenomenon in China, we limited the sample to SMEs, according to the official Chinese definition, where an SME has fewer than 300 employees, and a total value of sales below 5
million RMB. By applying the criterion of high-tech SMEs founded for between 3-5 years, a population of 1,003 returnee-owned were identified in December 2005 from a list obtained from the management committee of ZSP. A willingness to participate in our survey was indicated by 857 returnee-owned firms, representing 85.4% of the population.

The questionnaire was translated from English into Mandarin Chinese. Then it was back-translated by three Chinese Professors in Beijing to ensure its validity. A pilot study was carried out in ZSP where two workshops were organized involving groups of 6 and 8 returning entrepreneurs, not involved in the final sample, who completed an initial version of the questionnaire and were asked to identify any unclear questions. We modified the questionnaire according to feedback received from the workshops. For example, the feedback received from the pilot workshops revealed that returnees felt too many detailed questions about their personal background were asked and were unwilling to complete questions of this kind. This is a familiar problem in the Chinese context. As a result, we replaced the original questions with ‘yes or no’ type answers, leading us to use dichotomous measures for returnees’ background.

We distributed 857 questionnaires by mail to returnee-owned firms, and followed this up with phone calls and visits to 84 sample firms. By the end of 2005, 349 usable questionnaires were returned for a 41% response rate, of which 53 were located on three university parks including Tsinghua University Park, Beijing Aviation University Park, and Beijing Science and Technology University Park and 296 were located elsewhere. The possibility of non-response bias was checked by comparing the characteristics of the respondents with those of the original population sample. The calculated t-statistics for employee growth, ownership and R&D
expenditures of the firm are all statistically insignificant, indicating that there are no significant differences between the respondent and non-respondent firms.

**Variables**

*Dependent variables*

To test the hypotheses relating to location, we used a dummy variable equal to one for returnee entrepreneurs locating in university science parks (*LU*), and zero for non-university parks. To test the hypotheses relating to performance, selection of the dependent variable was more difficult. The problems of measuring firm performance in transition economies are widely recognized, and quantitative and qualitative measures having their own relative merits (Hoskisson, Eden, Lau & Wright, 2000). Financial measures are fraught in a transitional environment where asset values still rely on historic cost and crude depreciation charges, and the quality of local auditors is variable (Liu, 2005). Similarly, measuring the performance of newer, smaller firms even in developed economies can also be problematical due to lack of published information. Empirical studies exploring the outcomes of entrepreneurship have focused on various financial and non-financial yardsticks to measure firm-level growth and performance (Chandler & Hanks, 1993; Cooper, 1993). A number of indicators of venture performance have been found to be relevant, and have good inter-rater reliability, internal consistency and external validity (Chandler & Hanks, 1993). Newer high tech firms in particular may be loss-making or have little revenues since they are in the early stages of developing a market presence. Financial performance measures may therefore not provide a reliable indicator of firm performance. For new technology based ventures employment will likely grow before any sales occur as the firm builds its product base (Brush et al., 2001; Delmar et al., 2003); this
growth in employment indicates an increase in the resources of the firm such that an employment-based measure provides as a suitable indicator of firm growth (Kogut & Zander, 1992). Therefore, as our first performance measure we chose a non-financial performance indicator, employment growth (EG) which is measured as the percentage change in the number of employees since firms were founded.

Satisfaction is a fundamental measure of performance for the individual entrepreneur and may bear on decisions whether to continue or close a business (Cooper & Artz, 1995). Satisfaction-with-performance measures have been shown to possess strong internal consistency and reliability (Chandler & Hanks, 1993; Cooper & Artz, 1995). As combined satisfaction measures may be a more accurate representation of venture performance (Naman & Slevin, 1993; Cooper & Artz, 1995), we constructed a second performance proxy “Managers’ perception of firm performance” (MPP) which measures the extent to which returnees were satisfied with firm performance in terms of sales growth and the pre-tax profitability of their sales in both Chinese and international markets. The items were measured on a 7-point scale. The results show that these four items loaded on a single factor with high loadings and eigen values exceeding 1.0. The cumulative variance explained is 76.94%. The correlation between this subjective performance measure and employment growth is 0.53, indicating that employment growth is in line with managers’ perception of firms’ performance, and constitutes a reasonable ‘hard’ measure of firm performance in the context of high-tech SME start-ups and an emerging economy.

**Independent variables**

Our SMEs were limited to those founded by returning Chinese entrepreneurs with at least two years experience abroad. A dummy variable (ED) was created for those returnees who spent their
time in education, either as students or as professors. As a further index of academic knowledge acquired, the absolute number of patents or licences transferred from abroad by the founding entrepreneur was the basis for \( PAT \).

Practical business experience was represented by work experience abroad using three measures. The first measure was a multidimensional one. Although all the returnee entrepreneurs obtained knowledge abroad, we are particularly interested in testing how the certain knowledge categories transferred from abroad affect location choice and firm growth: (1) new commercial technologies; (2) new business ideas and opportunities; (3) new marketing knowledge, and (4) new financial knowledge. Hence, a composite “business knowledge” transfer \( KN \) variable was constructed on the four questions above (on a 7-point Likert scale). Factor analysis confirms that all these four questions loaded on one factor with eigenvalue exceeding 1.0. The cumulative variance explained was 92.83%. A second work experience measures \( MNC \) was created for entrepreneurs’ international experience in an MNC, taking the value 1 if the returnee previously worked for an MNC abroad, and zero otherwise. Founding entrepreneurs’ previous ownership of SMEs abroad was captured by a dummy based on a question asking if the founder already set up a company abroad before returning to China \( OWN \).

An international business network \( NET \) variable was created using three questions in our questionnaire. These seven point Likert-type questions focused on the degree of importance of three types of network: (1) business networks established in with firms in foreign markets; (2) business contacts maintained with people in foreign markets; (3) membership of business and
professional associations abroad. Factor analysis confirms that these three questions all loaded on one factor with eigenvalue exceeding 1.0. The cumulative variance explained was 84.64%.

Control variables

Our sample firms mainly fall into 6 sub-sectors in high-tech industries, including electronics and information technology with 49.5% of the sample firms, bio-engineering and new medical technology (17.5%), new materials and applied techniques (17.2%), new energy and high-power conservation technology (5.8%), environmental protection technology (8.9%) and modern agricultural technology (1.9%). Therefore, we included industry dummy variables in Equations (1) and (2) to capture the impact of industrial sector on location choice and firm growth. In addition, we controlled for firm age (years since founding) and size (measured by number of employees, see Bonaccorsi, 1992 for a discussion). To avoid potential problems with serial correlation, the employment size variable was dropped from the performance equation (2), below, with the left-hand variable comprising employment growth.

The proposed hypotheses in Section 2 are tested based on the following equations:

\[
LU_i = \alpha_0 + \alpha_1 ED_i + \alpha_2 MNC_i + \alpha_3 OWN_i + \alpha_4 KN_i + \alpha_5 NET_i + \alpha_6 PAT_i + \alpha_7 \text{Size}_i + \alpha_8 \text{Age}_i + \varepsilon_i \quad (1)
\]

\[
PERF_i = \beta_0 + \beta_1 ED_i + \beta_2 MNC_i + \beta_3 OWN_i + \beta_4 KN_i + \beta_5 NET_i + \beta_6 PAT_i + \beta_7 \text{Age}_i + \nu_i \quad (2)
\]

\(LU\) represents university location and \(PERF\) represents performance, measured separately by managers’ perceptions of performance and employment growth. \(ED, MNC, OWN, KN, NET\) and \(PAT\) denote the explanatory variables described above. \(\text{Size}\) and \(\text{age}\) are standard control variables which are used to differentiate the possible impact on location choice and growth.
Equation 1 is estimated using the binary Probit model to detect the factors associated with the location choice of firms between university science parks and non-university science parks, whereas Equation 2 is estimated by applying the OLS. In order to investigate in more detail whether the different characteristics of firms in university and non-university science parks are associated with firm growth, the overall sample is divided into two sub-samples, firms in university science parks and those in non-university science parks. A Chow test is applied to test the equivalence of regression estimates for Equation (2) between sub-samples. If differences between estimations are statistically significant, then the division of the sample firms into two sub-samples is justified.

Results

Table 1 reports the descriptive statistics for the variables used in the analysis and the matrix of correlation coefficients. As this table shows, the number of employees in the sample firms increased by an average of 60% since the firms were founded, and the average age of the firms is almost five years. Almost 86% of returnees had an educational experience abroad, and 34% of returnees worked for an MNC. Some 14.7% of returnees owned a company before coming to the science park. Returnees in our sample also had three patents on average. The correlations between the variables show the predicted signs and most of the coefficients are statistically significant, providing preliminary evidence for the proposed hypotheses.

TABLE 1 NEAR HERE

The Science Park Location Decision
We estimated two specifications for Equations (1) and (2) with and without industry dummy variables. However, the industry dummy variables are not statistically significant in the two equations, indicating that firms’ location choices and growth are independent of sectoral impact, and therefore that internal factors are the main driving force for location choice and growth. Therefore, we present the results without industry dummies. Table 2 presents results for science park location.

The five hypotheses concerning university science park location receive partial support. Two of the hypotheses relating to education aboard (H1a), and international business networks (H5a) exhibit insignificant coefficients. With respect to practical business knowledge transferred, the composite measure is negatively and weakly (10% level) associated with university park location, but the sign is opposite to that proposed by H3a. The coefficient on the second measure of practical business knowledge, experience with MNCs, was insignificant. However, we find strong support (1% level) for the hypothesis (H4a) that university science park location is positively and significantly associated with practical business experiences in the form of previous firm ownership abroad by returning entrepreneurs. Patents transferred by returnees from abroad are also significantly (1% level) and negatively associated with university science park location, as hypothesized (H2a). Smaller firms also tend to locate in university parks, as may be expected for firms needing access to university networks and knowledge. It seems that firms that possess a small number of patents, transfer business founding knowledge from abroad and operate on a small scale, tend to locate in university science parks.

TABLE 2 NEAR HERE
In terms of controls, larger firms seem more likely to locate outside university parks, and age does not have any significant association with location. The dummy variables are not statistically significant in the location equation.

Firm Performance on Science Parks

As with science park location, firm performance is related to the characteristics of returnee entrepreneurs, but this time it is argued that it is the interaction between these characteristics and the type of location that influences performance. In other words, location mediates entrepreneurs’ knowledge and firm performance, and we analyze this by splitting the sample into firms on university and non-university science parks.

The result of the Chow test is statistically significant at the 5% level (F=2.258 with p=0.03), showing that there are distinctive differences between the firms in university science parks and non-university science parks, and the regression estimates using a pooled sample may be biased. Therefore, it is appropriate to divide the overall sample into the two sub-samples. An additional test for the differences in regression coefficients for the two sub-samples was performed. Table 3 summarizes performance results relating to the two dependent variables, employment growth and satisfaction-with-performance, as outline earlier. For each variable, we present the results for the overall sample (columns 1 and 4), the sub-sample of university science parks (columns 2 and 5) and non-university locations (columns 3 and 6). We focus on comparing the results in columns (2) and (3) for employment growth as a performance measure, and in columns (5) and (6) for perceived performance.
Beginning with the results for employment growth, it is evident that the results for non-university firms (col. 3) were the mirror-image of those for university-located firms (col. 2), in the sense that significant coefficients for one were the insignificant coefficients for the other, supporting the decision to divide the overall sample into two sub-samples. The results were also more consistent for non-university firms.

As with the tests on science park location above, the coefficient on patents transferred from abroad for non-university SMEs was positive and highly significant (1% level), in concordance with H2b. A similar result arises for the related variable, practical business knowledge transferred from abroad (H3b). Again, the variable based on the composite measure is positively associated with non-university location and firm performance (at the 5% level), but the sign is opposite to that hypothesized. The experience in MNC measure is weakly significant (at the 10% level) for the overall sample but insignificant for non-university location. The possession of foreign business networks by returning entrepreneurs produces a significant result for non-university firms, which is not consistent with hypothesis H5b.

With respect to the results for the university park SMEs, three variables (H2b and H5b) produce insignificant coefficients. One variable, previous firm ownership abroad, is negatively associated with firm performance for university science park firms and thus opposes the hypothesized relationship (H4b) at a marginally significant level (10%). However, we find that hypothesis H1b relating to education obtained abroad for university science parks is supported.
(at the 1% level). Previous experience with an MNC also has a positive impact on firm growth, hence supporting some H3b but the composite measure is insignificant. The results also show that older firms perform better.

The results for the second dependent variable, satisfaction-with-performance, are generally in line with those for employment growth. The exceptions are in relation to previous ownership and other practical business knowledge from abroad, which become insignificant. In terms of controls, older firms significantly outperform newer ventures in all model specifications. The dummy variables are not statistically significant, indicating that firms’ location choices and performance are independent of sectoral impact, and internal factors are the main driving force for location choice and growth.

We performed a t-test on the differences on the coefficients for H2b-5b in Models 2 and 3. The results (Table 4) further confirm our findings discussed above. More specifically, returnee firms in non-university parks which possess more patents, practical business knowledge and business networks perform more strongly than those locating in university science parks. However, MNC working experience is a more important factor affecting firm performance in university science parks.

**Discussion and Conclusions**

This study is one of the first to examine the science park location choice and growth effects of returnee entrepreneurs in an emerging economy, though our results may have significance outside China, too. Specifically, we examined strategic intentions and outcomes in relation to
firm location and thus performance in Chinese samples of firms in university and non-university science parks that were homogeneous in the sense that both sub-samples comprised SMEs founded by returning Chinese entrepreneurs, a new and important phenomenon.

Education from abroad is not (as hypothesized in H1a) significantly negatively associated with location in a university park, but those firms that did choose a university location after education abroad experienced slower growth, as hypothesized in H1b. This argument may be consistent with returnees with higher education levels seeking to locate on a university science park to access complementary technical assets that can enable a novel product to be developed; the slower growth perhaps suggests that there are major challenges to making this work. Alternatively, some returning entrepreneurs become disillusioned with universities while abroad, avoiding university science parks in China, and their university education abroad may have been incompatible with the university support provided by university science parks. For other returnee entrepreneurs who do locate on a university science park, the lack of resources and capabilities may restrict performance.

The availability of academic technological knowledge is found to be important both in terms of the location of returning entrepreneurs and the growth of their ventures (Hypotheses H2a and H2b). Specifically, the support for these two hypotheses is consistent with the possibility of returning entrepreneurs, well-stocked with patents from abroad, correctly choosing a non-university location with complementary assets, being rewarded with a positive performance outcome.
Practical business knowledge transferred from abroad using a composite measure is negatively, but weakly, associated with a university location (contrary to H3a) and firm performance is positively associated with a non-university location (contrary to H3b). The second measure, previous experience with an MNC is not associated with the type of science park on which a returnee locates (hence overall H3a is not supported). However, this variable has a positive association with employment growth in the sub-sample of university firms (hence overall H3b is partially supported). This finding may suggest that returnees’ previous experience with MNCs has made a valuable contribution to their firm’s growth in university science parks. The possible reason is that these returnees who previously worked for MNCs were more familiar with the Chinese business environment and were more likely to have established commercial links with China, as they were employed as representatives of MNCs in China, or were assigned to China as expatriates. Hence, there may be a complementarity effect between returnees’ experience and location, and their previous experience with MNCs is a crucial factor in firm performance, given that most university firms only possess a few patents, obtain limited knowledge from abroad and have limited international networks. With respect to the lack of support for the location variable, while returnee entrepreneurs have developed human capital related to how enterprises abroad work and the internationalization context, they have not specifically gained experience in the business start-up process. These entrepreneurs for the first time may need to manage the multiple dimensions of uncertainty and organize the resources necessary to establish a market presence (Teece, 1986). As these activities may be especially challenging in the Chinese market context, location on a non-university park may be preferable.
As hypothesized, prior firm ownership abroad is positively associated with location on a university science park (hypothesis H4a) but is negatively associated with firm performance on a university parks (contrary to H4b). These results may suggest that some firms founded by returning entrepreneurs, with previous experience of founding a firm abroad, correctly perceive that opting for a university science park location is likely to give them access to unexploited opportunities from scientific inventions. However, perhaps due to asymmetric information issues, these opportunities are either not present, or the university context with its more bureaucratic procedures and lack of commercial expertise may mean that actual growth is weak.

Although the possession of foreign networks by returning entrepreneurs is not significantly associated with the type of science park on which they locate, it produces a result for non-university firms that is inconsistent with hypothesis H5b.

Figure 1 summarizes our results. We find in the emerging economy context of China that some factors that are relevant for location are not always associated with performance. Quadrant 1 provides strong support for our asset complementarity approach, since returning entrepreneurs with codified academic knowledge in terms of patents are likely to find the complementary assets they need on a non-university park and that this is reflected in the performance of their ventures. In respect of Quadrant 2, the pattern is mixed and dependent on the type of practical business experience for each type of science park. For Quadrant 3, the pattern is again mixed. Prior human capital derived from start-up experience may influence location on a university science park but is not significantly associated with performance. In contrast, social capital as reflected in international business networks is not significantly associated with location on a
university science park but it is associated with performance. This finding is consistent with the evidence of Davidsson and Honig (2003) in another context who find that social capital is much more strongly associated with performance than is human capital. The evidence from both Quadrants 2 and 3 suggest that international aspects of human and social capital may be important for performance but not for location.

Finally, in respect of Quadrant 4, we find no evidence of significant complementarities of assets with the measures adopted in this study. We find a positive but insignificant relationship between returnee entrepreneurs with education obtained abroad and location on a university park, but a significant negative relationship between education obtained abroad and the performance of ventures in university science parks. This suggests that some academically oriented returnee entrepreneurs may not seek complementary assets but rather aim to link with those with a similar world view. Vanaelst et al. (2006) provide support for this argument in their study of the development of entrepreneurial academic teams; they find that academic entrepreneurs tend to attract team members with similar mindsets. The consequence of this approach is that the venture may lack sufficient diversity of human and associated social capital.

We argue that the study makes a contribution to understanding entrepreneurship and science parks in emerging economies in several ways.

First, we develop for the first time in relation to science parks a perspective based on the complementarity of academic and practical business knowledge that may be extended usefully to university incubators and other science parks in the West. In this respect, China offers a unique
laboratory for research in a single city into the effect of university administration on entrepreneurs’ location decisions and firm performance. It is clear that university science parks attract entrepreneurs with few patents but practical skills derived from founding a business abroad. These highly significant results are consistent with an asset complementarity view. While complementary assets have a less consistent role in explaining firm performance, it is also clear that university science parks offer significantly slower firm growth on each performance measure used in the study.

Second, our research study adds to the few studies of science parks in an emerging economy context, providing evidence that emphasizes the need to consider the particular institutional contexts in understanding the drivers of location activity. In particular, the distinction between university and non-university parks may be associated with important heterogeneity of human, and social capital. We find that prior firm ownership experience abroad is associated with the university location decision but that previous work experience abroad has a mixed effect depending on the measure.

Third, some of our findings may be specific to China’s unique process of transition to a market economy. For example, an insignificant role is found for education abroad, suggesting the possible incompatibility of western and Chinese university educations.

Fourth, the study’s findings consistently emphasize the likely role of university science parks as incubators for SMEs that are relatively deficient in knowledge and patents, needing access to
university scientists. It seems likely that this finding is generalizable, and advances our understanding of science parks, relying on a knowledge-based view.

Despite these contributions, our study seems to raise as many new questions and research opportunities as answers associated with returnee entrepreneurs both in China and elsewhere, their backgrounds and their science park location choices. Some of these future research questions are summarized in Table 5.

In relation to returning Chinese entrepreneurs and their backgrounds, it seems clear that we have touched on a subject of enormous importance, with potential for further analysis. For example, a population of 1,003 science park SMEs founded between three and five years ago was quickly identified, yielding a sample of 349 firms with an average of 65.4 employees by end of 2005. In addition to being an important phenomenon for China, we need to ask, is it a feature of the Chinese diaspora in the West, or does it play a role on economic development in other transition and emerging economies such as Russia and India, or indeed in the West? Furthermore, in relation to the attraction of returnees, what is the relative importance of tax credits and subsidies compared to access to local technology, human capital and social capital?

Regarding the backgrounds of returnees and the role of networks. Our measure for social capital captured only one dimension of networks as we simply asked returnees to assess how important international networks are for their businesses instead of the strength or intensity of network ties. In the Chinese context, considerable emphasis is placed on the role of guanxi (e.g. Peng & Luo, 2000). Further research might usefully consider more explicitly the nature and extent of
differences in the *guanxi* of returnee and local entrepreneurs. Returnee entrepreneurs may relocate completely from the foreign country to their home country. Alternatively, they may retain business interests in the foreign country, becoming transnational entrepreneurs. There is a need for further understanding of the asset complementarities involved in the decision to become transnational versus “clean break” returnees.

The science park location decisions of entrepreneurs offers important research opportunities. The focus of this study was on high tech ventures, but returnee entrepreneurs may also be associated with non-high tech ventures. Future research might usefully embrace the latter. Furthermore, our focus here has been on returnee entrepreneurs as individuals, yet it is well-known that many entrepreneurial ventures are started by teams (Ucbasaran, et al., 2003b; Vanaelst et al., 2006). There is scope for significant further research that examines the extent and nature of teams in ventures created by returnee entrepreneurs and their location decisions. To what extent are these teams comprised wholly of returnee entrepreneurs versus a mix of returnees and locals? What roles are played in location decision by local versus returnee entrepreneurs? While our study proposed asset complementarity as a useful lens for the separate analysis of these location decisions and their performance consequences, a more sophisticated methodology could estimate a model where science park location is a mediating factor between entrepreneurial background and the performance of SMEs. This point links to the general notion of graduation from a science park. Do returnee entrepreneurs graduate from science parks or does inertia mean that they remain?
Finally, a number of empirical limitations of the study themselves suggest further research possibilities. The study is cross-sectional and hence is constrained in its analysis of the impact of location choices on venture growth; further research might usefully construct longitudinal datasets. While complementarity of assets may be expected to enhance performance, we found some cases of mismatches. This implies omitted variables. For example, our proxies do not consider the quality of experience abroad or the nature of technology. Also, with respect to performance, we were constrained by the lack of published information and sensitivity on the part of respondents to report details on levels of profitability. It needs to be borne in mind that our somewhat mixed results may be a consequence of the overall superior performance of non-university science parks in China, which may enable practical business knowledge to be positively associated with firm performance in non-university parks, contrary to hypotheses, “swamped” by favorable non-university park growth. The study was also restricted to a single science park in the Chinese context, notwithstanding that this is the largest science park in China and one that has attracted a large number of returning overseas Chinese. We also obtained a high response rate for this kind of survey and, quite unusually for studies in an emerging market context (Hoskisson et al., 2000), were able to establish the representativeness of the sample. However, further research in China might extend to returnee entrepreneurs in science parks elsewhere such as Shanghai and close to Hong Kong where the nature of the technological context and returnee entrepreneurs’ links abroad might be different.

Our findings have implications for entrepreneurs, science park managers and policymakers. Managers of science parks in emerging economies seeking to attract returnee entrepreneurs to develop innovations need to be aware of the heterogeneity of returnees. Correspondingly, this
indicates a need to develop more fine-grained support that recognizes the asset complementarities between their particular type of science park and the type of returnee entrepreneur they need to attract. While returnee entrepreneurs can provide human capital and social capital that link to international markets, there may also be a need for bridging between the returnee entrepreneur and the particular science park in order to ensure an appropriate match. Recognition of this challenge implies the broadening of our perspective on science parks beyond their mere provision of space and facilities.
References


**Figure 1: Returnees, Science Parks and Asset Complementarities**

<table>
<thead>
<tr>
<th>Returnee Knowledge</th>
<th>Science Park Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>University</td>
</tr>
<tr>
<td><strong>Academic</strong></td>
<td><em>Quadrant 4</em></td>
</tr>
<tr>
<td>Returnee with</td>
<td>Returnee with</td>
</tr>
<tr>
<td>background/understanding of high tech needs to access complementary technological assets to develop the concept for their venture or seek partners with similar world view.</td>
<td>more education or patents seeks commercialization assets.</td>
</tr>
<tr>
<td><em>Low level of complementarity</em></td>
<td><em>High level of complementarity</em></td>
</tr>
<tr>
<td><strong>Practical Business</strong></td>
<td><em>Quadrant 3</em></td>
</tr>
<tr>
<td>Returnee with</td>
<td>Returnee with</td>
</tr>
<tr>
<td>business ownership experience seeks more innovative high tech opportunities</td>
<td>practical experience seeks commercialization assets.</td>
</tr>
<tr>
<td>Returnee with</td>
<td>more innovative high tech opportunities</td>
</tr>
<tr>
<td>developed international business networks</td>
<td>seeks to develop innovative opportunities with overseas markets.</td>
</tr>
<tr>
<td><em>High level of complementarity</em></td>
<td><em>Low level of complementarity</em></td>
</tr>
<tr>
<td>Variable</td>
<td>Mean</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>1 University location choice</td>
<td>0.153</td>
</tr>
<tr>
<td>2 Employment growth</td>
<td>0.604</td>
</tr>
<tr>
<td>3 Education abroad</td>
<td>0.866</td>
</tr>
<tr>
<td>4 Experience in MNCs</td>
<td>0.344</td>
</tr>
<tr>
<td>5 Previous ownership</td>
<td>0.147</td>
</tr>
<tr>
<td>6 Knowledge from abroad</td>
<td>0.013</td>
</tr>
<tr>
<td>7 International networks</td>
<td>0.041</td>
</tr>
<tr>
<td>8 No of Patents</td>
<td>3.315</td>
</tr>
<tr>
<td>9 Age</td>
<td>4.941</td>
</tr>
<tr>
<td>10 Size (log)</td>
<td>3.452</td>
</tr>
</tbody>
</table>

Note: All correlation coefficients more than 0.13 or less than −0.13 are significant at 5% level or higher.
Table 2: Location of SMEs in University/Non-University Science Parks
(Dependent variable: SMEs in University parks=1; 0 in other science parks)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Academic Knowledge</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(H1a) Education abroad</td>
<td>0.811</td>
<td>0.623</td>
</tr>
<tr>
<td>(H2a) No. of patents</td>
<td>-0.256</td>
<td>0.103***</td>
</tr>
<tr>
<td><strong>Business Knowledge</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(H3a) Practical business knowledge from abroad</td>
<td>-0.287</td>
<td>0.169*</td>
</tr>
<tr>
<td>(H3a) Experience in MNCs</td>
<td>-0.001</td>
<td>0.334</td>
</tr>
<tr>
<td>(H4a) Previous ownership abroad</td>
<td>0.995</td>
<td>0.404***</td>
</tr>
<tr>
<td>(H5a) Business networks abroad</td>
<td>-0.250</td>
<td>0.306</td>
</tr>
<tr>
<td><strong>Controls</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of firm</td>
<td>-0.011</td>
<td>0.081</td>
</tr>
<tr>
<td>Size</td>
<td>-0.406</td>
<td>0.187**</td>
</tr>
<tr>
<td>Constant</td>
<td>0.033</td>
<td>0.779</td>
</tr>
<tr>
<td><strong>LR Statistic</strong></td>
<td>42.269</td>
<td></td>
</tr>
<tr>
<td><strong>McFadden R²</strong></td>
<td>0.300</td>
<td></td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>349</td>
<td></td>
</tr>
</tbody>
</table>

Note: ***, ** and * denote the 1%, 5% and 10% significance levels, respectively.
Table 3: Post-Location SME Performance in Science Parks

<table>
<thead>
<tr>
<th>Variable</th>
<th>Employment growth</th>
<th>Managers’ perception of firm performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1) Overall Sample</td>
<td>(2) Sub-sample University Science Parks</td>
</tr>
<tr>
<td></td>
<td>Coefficient (Std. Error)</td>
<td>Coefficient (Std. Error)</td>
</tr>
<tr>
<td><strong>Academic Knowledge</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(H1b) Education abroad</td>
<td>-0.286 (0.261)</td>
<td>-2.216 (0.812)**</td>
</tr>
<tr>
<td>(H2b) No. of patents</td>
<td>0.077 (0.019)***</td>
<td>0.007 (0.186)</td>
</tr>
<tr>
<td><strong>Business Knowledge</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(H3b) Practical business knowledge from abroad</td>
<td>0.196 (0.090)**</td>
<td>0.041 (0.227)</td>
</tr>
<tr>
<td>(H3b) Experience in MNCs</td>
<td>0.265 (0.158)*</td>
<td>1.084 (0.470)**</td>
</tr>
<tr>
<td>(H4b) Previous ownership abroad</td>
<td>-0.189 (0.244)</td>
<td>-1.401 (0.648)**</td>
</tr>
<tr>
<td>(H5b) Business networks abroad</td>
<td>0.375 (0.165)**</td>
<td>0.218 (0.555)</td>
</tr>
<tr>
<td><strong>Control: Age of Firm</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.080 (0.027)**</td>
<td>0.409 (0.075)**</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>2.671 (0.311)**</td>
<td>2.894 (0.597)**</td>
</tr>
</tbody>
</table>

Adjusted R²: 0.252, F-statistics: 9.437, Prob(F-statistics): 0.000, Observations: 349

Notes: ***, ** and * denote the 1%, 5% and 10% significance levels, respectively.
Table 4: Result for the t-test of the differences between pair coefficients of explanatory variables (H2b-H5b) in Models 2&3 in Table 3

<table>
<thead>
<tr>
<th>Coefficients of Variables</th>
<th>Dependent variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Employment growth</td>
</tr>
<tr>
<td></td>
<td>t-statistic (p-value)</td>
</tr>
<tr>
<td>(H2b) No. of patents</td>
<td>3.572*** (p&lt;0.01)</td>
</tr>
<tr>
<td>(H3b) Practical business knowledge from abroad</td>
<td>5.810*** (p&lt;0.01)</td>
</tr>
<tr>
<td>(H3b) Experience in MNCs</td>
<td>2.724**(p&lt;0.05)</td>
</tr>
<tr>
<td>(H4b) Previous ownership</td>
<td>3.426*** (p&lt;0.01)</td>
</tr>
<tr>
<td>(H5b) Business networks</td>
<td>2.378**(p&lt;0.05)</td>
</tr>
</tbody>
</table>
Table 5: Returnee Entrepreneurs: Some Future Research Questions

<table>
<thead>
<tr>
<th>Context</th>
<th>Returnee Entrepreneurs</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the relative importance of returnee entrepreneur ventures in</td>
<td>How many ventures founded by returnees are founded by teams or individuals?</td>
<td>What is the relative importance of location of returnee entrepreneur</td>
</tr>
<tr>
<td>high tech and other sectors?</td>
<td></td>
<td>ventures on science parks vs off-science parks?</td>
</tr>
<tr>
<td>What is the relative importance of returnee entrepreneur ventures in</td>
<td>What is the extent of success vs failure of returnee entrepreneur ventures?</td>
<td>To what extent do returnee entrepreneurs retain a business link with the</td>
</tr>
<tr>
<td>emerging economies, former centrally planned economies and developed</td>
<td></td>
<td>foreign country [i.e. are transnational entrepreneurs] vs those that</td>
</tr>
<tr>
<td>economics?</td>
<td></td>
<td>make a clean break?</td>
</tr>
<tr>
<td>How do the ventures created by returnee entrepreneurs vary as between</td>
<td>What are the motives of returnee entrepreneurs in creating ventures in their home</td>
<td>To what extent do returnee entrepreneurs remain in the same location or</td>
</tr>
<tr>
<td>EE, former CPE and DE?</td>
<td>countries?</td>
<td>use it as an initial foothold only?</td>
</tr>
<tr>
<td>What is the influence of the country/institutional source of the</td>
<td>What are the human and social [local vs foreign] capital attributes of the team</td>
<td>To what extent do returnee entrepreneurs exit from their home country and</td>
</tr>
<tr>
<td>returnee entrepreneur’s experience abroad in the nature of their ventures</td>
<td>members used by returnee entrepreneurs?</td>
<td>return abroad?</td>
</tr>
<tr>
<td>and their behaviour?</td>
<td></td>
<td>What factors influence this process?</td>
</tr>
<tr>
<td>What is the relative importance of tax credits and subsidies as</td>
<td>To what extent do returnee entrepreneurs act as business angels?</td>
<td></td>
</tr>
<tr>
<td>drivers of returnee entrepreneurship compared to access to local</td>
<td></td>
<td></td>
</tr>
<tr>
<td>technology, human capital and social capital</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What differences are there between returnee entrepreneurs and their</td>
<td>To what extent do human and social capital act as substitutes or complements?</td>
<td></td>
</tr>
<tr>
<td>ethnic counterparts who remain in the foreign country?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Appendix: Zhongguancun Science Park Survey of Returning Entrepreneurs and Scientists
(extracts used in this paper)

This survey is being carried on behalf of Loughborough University Business School in the UK and the
Greatwall Enterprise Institute, on a project financed by the British Academy. It is the first large-scale
investigation into the role of returning overseas entrepreneurs in technology transfer and
internationalisation. The findings from the project will have important policy implications which will benefit
surveyed firms. Respondents are assured that no reference will be made to their names or to those of their
company without explicit permission.

Section A Establishment Name: ____________________________________
1. Respondent’s Name: a) Position; b) Email address; c) Age
2. What are the main products or service provided by your company?
3. How many employees does the company have currently?
4. How many years has the company been established?
5. Was this establishment founded by a returning entrepreneur or scientist after at least two years’ education
   or business experience abroad? Yes / No
6. Did the founder of the company set up a company abroad before returning to China? Yes NO

Section B (Returning Founders)
1. You stayed outside China for a. education? b. business? c. business and education?
2. Years since return to China?
3. Did you work for a multinational firm before setting up your own company? 4. The locations of your
   main overseas business networks:
   a. China
   b. Abroad: the US, or the EU or Asia
   c. Both in China and abroad

Section C (Knowledge Transferred by Returnees)
1. Have you transferred foreign patents and licences?
   If yes, how many patents or licences have been transferred?
2. To what extent do you think the following types of knowledge have been important in the growth of your
   venture?
   New technological ideas and contacts – International 1 2 3 4 5 6 7
   New technological ideas and contacts – Local 1 2 3 4 5 6 7
   New business ideas, opportunities and contacts – International 1 2 3 4 5 6 7
   New business ideas, opportunities and contacts – Local 1 2 3 4 5 6 7
   Marketing knowledge and contacts - International 1 2 3 4 5 6 7
   Marketing knowledge and contacts - Local 1 2 3 4 5 6 7
   Financial knowledge and contacts – International 1 2 3 4 5 6 7
   Financial knowledge and contacts – Local 1 2 3 4 5 6 7
3. To what extent have you been satisfied over the past few years with the following aspects of your main
   products?
   Market share in international markets 1 2 3 4 5 6 7
   Sales growth in local markets 1 2 3 4 5 6 7
   Sales growth in international markets 1 2 3 4 5 6 7
   Pre-tax profitability in local markets 1 2 3 4 5 6 7
   Pre-tax profitability in international markets is high 1 2 3 4 5 6 7
4. To what extent have the following aspects contributed to the success of your company’s exports?
   Networks established in the major markets 1 2 3 4 5 6 7
   Contacts maintained with people in foreign countries 1 2 3 4 5 6 7
   Membership of different associations abroad 1 2 3 4 5 6 7

Section D (General Firm Performance)
1. Growth of labour force since founding