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Knowledge Spillovers, Search, and Creation in China's Emerging Market

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ABSTRACT Prior research and the articles included in this special issue demonstrate that in emerging markets in general and in China in particular, knowledge spillovers exist between foreign firms and domestic firms. As domestic markets become more sophisticated, and competition between domestic firms and foreign firms becomes stronger, knowledge is flowing to and being sourced in many different directions: from overseas head offices to foreign firms then on to domestic firms; from domestic firms to domestic firms; and from domestic firms to foreign firms, and back to the multinational corporations' head offices in the form of reverse spillovers and reverse innovation. We propose that knowledge spillovers, search, and creation in an emerging market are a dynamic and reciprocal process with knowledge flowing between and among foreign and domestic firms. This represents a fertile field for future research and we have identified a number of areas ripe for study.

KEYWORDS emerging markets, knowledge creation, knowledge search, knowledge spillovers, reverse innovation, reverse spillovers

新兴中国市场中的知识溢出、搜寻和创新

摘要

以往的研究以及收录在本期特刊的研究证明，在新兴市场尤其是在中国，知识在外国公司和国内公司之间存在相互溢出。特别是，随着国内市场变得更为复杂，国内公司和外国公司之间的竞争变得更为激烈，知识正在向不同的方向流动和溢出:从跨国公司海外总部到海外子公司（这里统称为外国公司)再进而至国内公司，从国内公司到国内公司，再从国内公司到外国公司，最后以一种反向的回溢和回溯创新的形式重新回到跨国公司的总部。我们提出在新兴市场中，知识的溢出、搜索和创新是国内外公司之间知识流动的一种动态过程。这是在未来战略和国际商务研究中颇有前景的领域，我们特别指出了一些重要的研究问题。

关键词: 新兴市场，知识创新，知识搜寻，知识溢出，回溯创新，回溢

INTRODUCTION

Strategy scholars have paid increasing attention to knowledge spillovers, search, and creation (e.g., Katila, 2002; Katila & Ahuja, 2002; Laursen & Salter, 2006; Spencer, 2008; Zhang, Li, Li, & Zhou, 2010; Zhang, Li, & Li, forthcoming). *Knowledge spillovers* refer to unintended movements of knowledge among firms without compensation – or a 'free lunch' (Eden, 2009). *Knowledge search* is a problem-solving activity in which firms solve problems by searching for solutions both within and outside their organizational boundaries (Katila, 2002). Firms can further combine externally acquired knowledge with their internal knowledge for *new knowledge creation* (Walsh, Bhatt, & Bartunek, 2009; Zhang et al., 2010).

While knowledge spillovers, search, and creation may occur in many contexts, investigating these processes in the context of emerging markets is critical for strategy scholars. There are at least two reasons for this. First, relative to firms in developed markets, emerging market firms typically lag behind in technology and management skills. Thus, great opportunities exist for emerging market firms to learn and benefit from developed market firms. Indeed, policymakers in many emerging markets have made great efforts to attract foreign firms to help their domestic firms learn from the foreign firms. While a number of economics studies have examined foreign direct investment (FDI) spillovers in emerging markets, we know little about how emerging market firms benefit from foreign firms and under what conditions this benefit is realized (Spencer, 2008; Zhang et al., 2010).

Second, the rapid growth and development of emerging markets, while creating great growth opportunities for developed market firms, also forces these firms to learn and adapt to the new competitive landscape. Emerging markets thus offer learning opportunities for both foreign and domestic firms (Hitt, Li, & Worthington, 2005). In recent decades, many emerging market firms have become important players in global markets. In some respects, these former students have become teachers to their developed country counterparts. Therefore, knowledge spillovers, search, and creation in emerging markets no longer travel one-way from foreign firms to domestic firms, but flow in many directions: from foreign firms to domestic firms, from domestic firms to foreign firms, from foreign firms to foreign firms, and from domestic firms to domestic firms. Hence, there is a strong need to examine how these processes happen in different directions.

This *MOR* special issue provides an opportunity to advance our understanding of how knowledge spillovers, search, and creation occur in emerging markets, more specifically, in China. In this introductory essay, we will first discuss a theoretical model of the evolution of knowledge flow among foreign and domestic firms in an emerging market. Then, we will summarize the main theoretical and empirical contributions of the work included in this special issue.

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A MODEL ON THE EVOLUTION OF KNOWLEDGE FLOW AMONG FOREIGN AND DOMESTIC FIRMS

Figure 1 depicts a model of the evolution of knowledge flow between foreign firms and domestic firms in an emerging market. As shown in the model, the role of *time* needs to be taken into account in understanding an emerging market and what happens in that market. At least three major changes have happened or are happening over time. First, as foreign firms learn about the host country's environment and gradually fit into that environment, some of the initial difficulties (i.e., 'liability of foreignness') resulting from the foreign firms' lack of experience in the host country will diminish over time (Zaheer, 1995; Zaheer & Mosakowski, 1997). Moreover, many foreign firms not only continue to serve high-end customers in emerging markets but also attempt to address demands from mid-range customers and even those at the bottom of the pyramid. Thus, foreign firms have to develop new strategies and new capabilities to compete with other foreign firms as well as local competitors in emerging markets.

Second, as domestic firms learn from foreign firms over time, they can combine these new knowledge components with their local knowledge to develop their own technology and management skills (Zhang et al., forthcoming). In some industries, domestic firms may even 'leapfrog' foreign firms and become their major competitors in these industries. As a result, the competitive landscape in emerging markets changes fast and competition becomes more intense over time.

Third, institutional environments are also evolving over time, which may affect the 'dominant logic' of doing business. For example, *guanxi*, or social ties, have been widely recognized as being important for doing business in China because of China's underdeveloped institutional framework (Chen, Chen, &

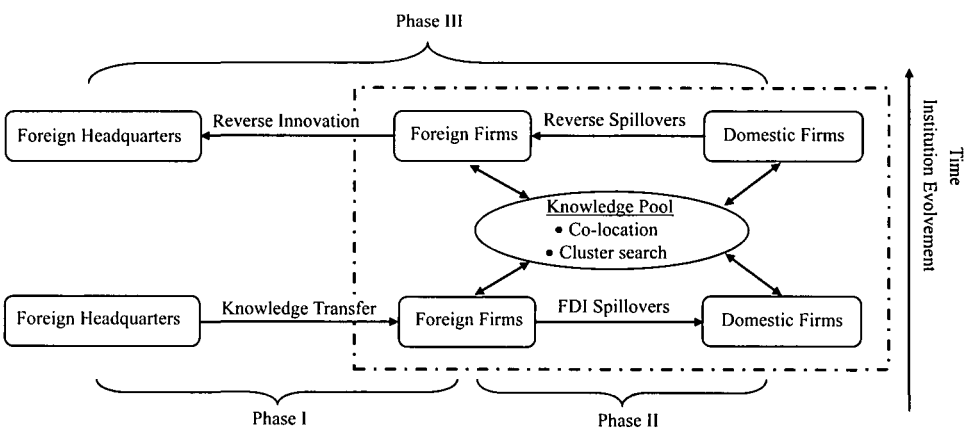

Figure 1. Evolving relationships between foreign and domestic firms in knowledge spillovers, search, and creation in an emerging market

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Huang, 2013; Li & Atuahene-Gima, 2001; Luo, Huang, & Wang, 2012). While *guanxi* will remain important in China, firms' core competencies and unique strategies are increasingly becoming the key to developing and maintaining competitive advantage, particularly in more competitive industries and more marketized regions.

These time-related changes have important implications for knowledge flow between foreign and domestic firms. As domestic firms become stronger over time, the gap between foreign firms and domestic firms in terms of technology and management skills becomes narrower. Domestic firms are no longer just students that receive knowledge from foreign firms. They can become teachers or sources of knowledge for foreign firms. We refer to this process as 'reverse spillovers' from domestic firms to foreign firms. Moreover, as foreign firms adapt to the local environment and develop new competencies in the process of adaptation, they are no longer just recipients of knowledge from their overseas head offices, but instead they may become sources of 'reverse innovation' (Immelt, Govindarajan, & Trimble, 2009).

We divide the evolution process into three phases. The first phase focuses on knowledge transfer from foreign head offices to their overseas subsidiaries located in an emerging market (i.e., 'foreign firms' in an emerging market). The second phase focuses on knowledge spillovers from foreign firms to domestic firms in an emerging market. And the third phase – the emerging one – focuses on reverse spillovers from domestic firms to foreign firms as well as reverse innovation from overseas subsidiaries to foreign head offices. It should be noted that emerging markets continue to evolve and these directions of knowledge flow may co-exist.

Phase I: Knowledge Transfer from Foreign Head Offices to Overseas Subsidiaries[1]

In the early stage of the economic development of an emerging market, both practitioners and academia interested in knowledge flow in this context have focused mainly on knowledge transfer from foreign head offices to their subsidiaries (wholly owned subsidiaries or international joint ventures) in the emerging market. This is because in the early stage of economic development, most emerging market firms have limited technology or management skills. When developed market firms enter emerging markets, they transfer their knowledge and skills from their head offices to the overseas subsidiaries in order to build their operations there. Both the head offices' capacity and willingness to transfer knowledge and the subsidiaries' capacity and willingness to acquire knowledge can affect knowledge transfer from the head offices to the subsidiaries (Lyles & Salk, 1996). Moreover, relationships between foreign head offices and overseas subsidiaries in terms of ties, trust, shared values, and systems can also play an important role in the transfer of knowledge,

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especially tacit knowledge, from the head offices to the subsidiaries (Dhanaraj, Lyles, Steensma, & Tihanyi, 2004).

Phase II: Knowledge Spillovers from Foreign Firms to Domestic Firms

As foreign firms acquire knowledge from their head offices (or develop their new knowledge in emerging markets), they become important sources of knowledge for domestic firms. Indeed, research in the economics literature has long been interested in how foreign direct investment (FDI) may create spillovers for domestic firms (Blomström, 1986; Caves, 1996; Meyer, 2004). It is generally proposed that developed country firms typically enjoy technological superiority and strong management capabilities, and their technology and management practices can be transferred to or imitated by domestic firms in emerging markets (Lyles & Salk, 1996; Zhang et al., 2010). The literature has suggested four major mechanisms through which FDI spillovers to domestic firms may occur: demonstration effect, local business linkages, employee turnover, and competition effect (e.g., Blomström, 1986; Spencer, 2008). However, previous studies have produced mixed findings on spillovers in emerging markets. Some studies have found evidence of positive spillover effects from FDI to emerging market firms (e.g., Blomström, 1986; Buckley, Clegg, & Wang, 2007; Tian, 2007). Others have found that FDI may either have no spillover effects or even have negative effects on domestic firms' productivity in emerging markets (Aitken & Harrison, 1999; Feinberg & Majumdar, 2001).

Zhang et al. (2010) have noted that prior research on FDI spillovers has two major limitations. First, foreign firms have largely been treated as a 'blackbox' and the heterogeneous nature of foreign firms, such as their entry modes, production technology, and country of origins has been ignored. Second, the literature has viewed domestic firms as passive recipients of spillovers and ignored the learning process involved. Recently, however, several studies have addressed these limitations. Regarding the first limitation, Spencer (2008) argued that multinational corporations' (MNCs) strategies, such as local business linkages, local strategic alliances, and recruiting policy, may affect their spillovers to domestic firms by influencing the extent to which their knowledge may be observed by and diffused to domestic firms. Chang and Xu (2008) separated FDI presence at the national level and at the regional level (e.g., provincial level). They found that FDI presence at the national level increased the survival rate of domestic firms (i.e., suggesting a positive FDI spillover effect) while FDI presence at the regional level reduced the survival rate of domestic firms (i.e., suggesting a negative crowding-out effect of FDIs on domestic firms).

Zhang and colleagues (Zhang et al., 2010; Zhang et al., forthcoming) empirically investigated how the attributes of foreign firms may affect their spillovers to

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domestic firms. More specially, Zhang et al. (2010) proposed that the presence of foreign firms from a variety of foreign countries can increase the breadth and depth of the industry knowledge pool, thus facilitating domestic firms' knowledge search and recombination. Empirically they found a significantly positive relationship between foreign firms' country of origin diversity in an industry and the productivity of individual domestic firms in the industry. Zhang et al. (forthcoming) focused on the entry tenure of foreign firms in an industry and they found that as foreign firms' entry tenure increased, individual domestic firms' productivity increased, albeit at a decreasing rate. They also found that when foreign firms have a higher level of export intensity, a higher level of intangible assets intensity, and/or have followed a more irregular (less rhythmic) pattern to enter the industry in the host country, domestic firms face higher imitation barriers, and thus the speed via which they can learn from foreign firms may be lessened.

Regarding the second limitation, Zhang et al. (2010: 982–983) have explicitly argued that 'FDI spillovers in essence involve a process in which domestic firms learn about technology and management practices from foreign firms'. Empirically, they found that domestic firms' absorptive capacity affects the benefits to be gained from FDI spillovers generated by foreign firms' country of origin diversity – domestic firms that are larger, and/or have intermediate levels of technology gaps with the foreign firms can benefit more from the country of origin diversity of foreign firms. Similarly, Spencer (2008) focused on the importance of the relevance of MNCs' knowledge to domestic firms in FDI spillovers and proposed that the relationship between domestic firms' exposure to MNCs' knowledge and spillovers will increase with the similarity between the MNC's home and host country environments.

While these recent studies have advanced our knowledge on how FDI spillovers to domestic firms occur in an emerging market, there are many fruitful directions for future research. Here we discuss three specific issues that are both theoretically and practically important for future research, especially in the Chinese context.

Employee mobility. As many domestic Chinese firms are transforming their businesses to compete with the foreign firms in their local market and on the global stage, their expectations of talent are beginning to match those of foreign firms. As a result they spend considerable time and resources attracting talent from foreign firms. According to the *China New Times* magazine, employee mobility (calculated as the ratio of number of employees left and number of employees newly added to the total number of employees) in MNCs in Beijing has increased from 45 percent in 2008 to 73 percent in 2010. According to a 2010 survey[2] which investigated human resource (HR) managers from 1,143 firms in China, 27 percent of foreign firms' human resources (HR) managers agreed that they faced competitive pressure from domestic non-state-owned firms in talent recruiting and retention, whereas only 17 percent of HR managers of domestic non-state-owned firms

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agreed that they faced competitive pressure from foreign firms. There are several reasons for the rising attraction of domestic firms to talent. For example, owing to their rapid growth, many domestic firms can match or exceed compensation offered by MNCs. The rapid growth and overseas expansion of domestic firms also provides attractive positions and faster promotion for talent. Apparently Chinese domestic firms are attracting talent from their foreign counterparts. Yet we know little about how knowledge spillovers may occur as a result of employee mobility from foreign firms to domestic firms.

The role of returnees in the knowledge spillover process is also interesting. Returnees are those who have studied and/or worked in other countries (i.e., developed countries) and return to their home countries (i.e., emerging markets) for career opportunities (Li, Zhang, Li, Zhou, & Zhang, 2012; Liu, Lu, Filatotchev, Buck, & Wright, 2010). Returnees may facilitate the knowledge spillover, search, and creation processes. For example, returnees have a good understanding of foreign firms' core competencies and cultural backgrounds. They may also better understand the origin and development of certain technologies and know which aspects of those technologies are critical. Thus, they have advantages when helping domestic firms imitate and learn from foreign firms in emerging markets (i.e., their home countries). However, returnees also have disadvantages in terms of lack of local connections and an insufficient understanding of important societal business practices (Li et al., 2012).

Competitive pressure. Competitive pressure is another important mechanism for knowledge spillover. The underlying premise is that the increased competition that accompanies the entry of foreign firms' into domestic markets can force domestic firms to increase their productivity by updating manufacturing technology and adopting advanced management practices to meet the competitive challenge (Spencer, 2008). Competitive pressure may not only be applied from foreign firms to domestic firms but may also exist among foreign firms themselves. Domestic firms can leverage this competition among foreign firms (especially those from different countries, see Zhang et al., 2010) to achieve access to advanced technology and know-how from foreign firms. For example, Japan's Shinkansen, France's TGV, and Inter-City-Express from Germany competed fiercely for the high-speed railway project between Beijing and Shanghai in China (*China Daily*, 2003). The availability and competition of high-speed train technology from multiple countries not only provided an opportunity for Chinese firms to choose between and learn from different technologies, but also helped them leverage the competition among the foreign firms for better terms (Walsh, 2002). Thus, how competition among foreign firms may facilitate knowledge spillovers to domestic firms represents a new venue for research that will extend and enrich traditional international business research, which has generally assumed that foreign firms' competitors are domestic firms in emerging markets. Except for country of origin diversity (Zhang et al.,

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2010), other possible indicators of competition may include technological similarities among foreign firms, overlap of focused markets, and prior competition experience in other countries. Also, how foreign firms would respond to such spillovers is interesting. For example, foreign firms may develop their own local suppliers in an emerging market to avoid knowledge spillovers to domestic firms.

External search and search cost. External search means that firms search for ideas and knowledge from the market, which they then combine with their existing knowledge for innovation and creation. Laursen and Salter (2006) conceptualized external search according to two dimensions: search breadth and search depth. Search breadth refers to the number of external sources that a firm relies upon in their search activities while search depth refers to the extent to which firms draw deeply from the different external sources (Laursen & Salter, 2006). While external search opens up more opportunities for domestic firms, it is not cost-free. Search cost is mainly determined by two factors. First, external search requires firms to invest considerable time, money, and other resources in the search for new information, knowledge, or innovative ideas. Due to the firms' limited absorptive capability, there may be too many ideas for the firms to manage and choose between (Laursen & Salter, 2006). As a result, some important ideas and information may not be given the required level of attention or effort to bring them into implementation because overall management attention is limited (Ocasio, 1997). Second, external search does not occur in a vacuum. Institutional contexts where a firm is embedded will affect the availability of the information as well as how a firm accesses the information or knowledge, and thus will determine the firm's search cost. In emerging markets that are characterized by a volatile environment with a lack of market institutions to support business and innovation, search cost can be very high (Zhang & Li, 2010).

Research on clusters (e.g., technology clusters or science parks) provides a useful solution to the search cost problem. Instead of searching too broadly, firms may limit their external search in a geographically limited region to balance the benefits and costs of external search. Thus it is important to understand the development and growth of clusters and the role of clusters in firms' external search in emerging markets (Zhang, Li, & Schoonhoven, 2009). Cluster memberships may substitute for a lack of institutional infrastructure in an emerging market because the cluster can provide firms in the cluster with technological knowledge, human resources, financial resources, and complementary services. Zhang and Li (2010) examined the role of service intermediaries (e.g., technology service firms, accounting and financial service firms, law firms, and talent search firms) within a technology cluster in China. They found that service intermediaries enable technology ventures to plug into the local networks of a technology cluster, thus contributing to the ventures' product innovation by broadening the scope of their external innovation

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search and reducing their search costs. Clearly, there is more to be done in this area and future research should examine how institutions and search cost interact to jointly affect the value of external search by emerging market firms.

Co-location is another issue. As depicted in Figure 1, domestic and foreign firms may co-locate with each other, particularly those who are in the same or related industries. Co-location of domestic and foreign firms can enhance exposure to each other's technology and knowledge, which can increase spillovers as well as competition. Thus, it would be interesting and important to investigate how domestic or foreign firms choose their locations in relation to other domestic or foreign firms and how these location choices affect their performance. Shaver and Flyer (2000) have argued that agglomeration or co-location is characterized by adverse selection. High-quality firms (e.g., those with the best technology and suppliers) have less to gain from agglomeration but more to lose in spillovers to competitors. Thus these firms may have less motivation to geographically cluster despite the existence of agglomeration economies. In contrast, low-quality firms (e.g., those with the weakest technology and suppliers) have more to gain but less to lose. So they have a stronger incentive to geographically cluster, especially around high-quality firms.

In an emerging market such as China, many domestic firms still lag behind foreign competitors in terms of technology and management skills. Thus domestic firms tend to have a strong incentive to co-locate with foreign firms in order to benefit from such co-location. This argument is supported by Zhang et al.'s (forthcoming) finding that a domestic firm's co-location density (i.e., the number of foreign firms in the same industry located in the same province as the local firm) has a significantly positive relationship with the domestic firm's productivity in China. Foreign firms, however, may have different views about co-location. For example, Du, Lu, and Tao (2008) examined location choices of foreign firms in China. Focusing on U.S. MNCs' investment in China from 1993–2001, they found that the preferred locations are characterized by better intellectual property rights protection, a lower degree of government intervention in business operations, a lower level of government corruption, and better contract enforcement.

Phase III: Reverse Spillovers and Reverse Innovation

The underlying assumption of Phases I and II is that domestic firms in an emerging market lag behind foreign firms in technology and management skills. This assumption is becoming questionable over time, most notably in China. A recent report by the Economist Intelligence Unit (2011: 4) has noted that '[I]t is often taken as fact that multinationals have superior technology and better brand management . . . There are signs that all of these advantages are beginning to erode in China'. Indeed, even among the large foreign companies surveyed (global revenue

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of more than US$5 billion), only a quarter believed that they had superior technology or a stronger brand; these numbers are even lower for the whole sample. Meanwhile, 26 percent of the foreign companies surveyed believed that Chinese competitors are already a serious threat to their business in China, 15 percent believed that Chinese competitors are already a serious threat to their business globally, and only 22 percent of the surveyed companies believed that Chinese competitors are not a threat.

As domestic firms become stronger over time, foreign firms learn from domestic firms about business models, management skills, and even newly developed technologies, representing a 'reverse spillover' process. Moreover, as foreign firms adapt to local environments and develop new competencies in the process of adaptation, they not only receive knowledge from their head offices, but also become sources of innovation for their head offices. This process is known as 'reverse innovation' (Immelt et al., 2009).

Reverse spillovers. While the rapid growth of domestic firms in an emerging market creates the possibility of reverse spillovers, it is important to examine how reverse spillovers occur. In addition to the four major mechanisms of FDI spillovers to domestic firms (i.e., demonstration effect, local business linkages, employee turnover, and competition effect) that may still work for reverse spillovers, we here discuss one mechanism that is unique to reverse spillovers: sense-making of foreign firms' own technologies or knowledge.

Owning a technology does not necessarily mean that the owning firm can realize and capture the full potential of the technology – a classic appropriability problem in the innovation literature (Teece, 1986). This may be an issue for MNCs because many MNCs have very complicated and diversified businesses in different regions. As a result, it is possible that an important technology resides in a unit, but it is not known to and thus cannot be used by other units of the firm. An example is Apple's development of its iconic products with some key technologies developed by Xerox's Palo Alto Lab in California.

However, such spillovers may not necessarily be a loss to foreign firms. Yang, Phelps, and Steensma (2010) argued that when recipient firms combine an originating firm's spillovers with their complementary knowledge, a spillover knowledge pool is formed, creating opportunities for the originating firm to learn vicariously from the recipients. Examining patent citation patterns in the telecommunications industry, they found that a firm's rate of innovation is faster when the spillover knowledge pool is larger and more similar to the firm's knowledge base.

Following this logic, we argue that foreign firms may learn back from their spillovers to domestic firms. Owing to differences between their home and host countries, MNCs may not see the full potential of their technologies and how to use these technologies in the host country in a profitable way. In fact, foreign firms may not realize how much they do not know and how much they need to know until

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many years after they have made the FDI investment (Petersen, Pedersen, & Lyles, 2008). Observing how domestic firms use their technologies may help foreign firms make sense of their own technologies and adapt their technologies to the emerging markets. An interesting example is eBay. eBay entered the Chinese market in 2002. After investing hundreds of millions of U.S. dollars, eBay was forced out of the Chinese market in 2006 by a local Chinese e-commerce player, Taobao (a subsidiary of Alibaba). Taobao has largely copied eBay's business model but has modified and adapted it to the Chinese market by providing numerous conveniences (including 'free services'). eBay was criticized for not understanding the Chinese market and culture and not encouraging direct communications between sellers and buyers. In 2012, eBay decided to re-enter the Chinese market. While it lost the first-mover advantage to Taobao in China, it has learned from Taobao about how to adapt its business model in an emerging market context. This time around, eBay is partnering with Xiu.com, a Chinese online retailer, which knows the Chinese market much better. Indeed, such learning will also be important for eBay to enter other emerging markets. Thus, we believe that reverse spillovers may occur when foreign firms learn from what domestic firms have learnt from them (i.e., by re-inventing or re-utilizing foreign firms' technologies). By absorbing such knowledge, foreign firms could then combine what they have learnt with what they already know and develop something new. This may further trigger learning in domestic firms. This self-reinforcing process is known as the 'Red Queen' effect in evolutionary theory (Barnett & Hansen, 1996). Therefore, understanding how domestic firms' use and extension of foreign firms' technologies or knowledge in an emerging market helps foreign firms make sense of their own technologies or knowledge is worthy of future study.

Reverse innovation[3]. General Electric's (GE) reverse innovation, in which a new product is originally developed for emerging markets and is later sold in the U.S. (e.g., the ECG device for rural India and the ultrasound machine for rural China), represents a different method of innovation for MNCs (Immelt et al., 2009). It is called 'reverse innovation' because it is the opposite of the globalization approach in which MNCs typically develop new technologies, new products, or new business models in developed countries and then sell or modify them for emerging markets (Immelt et al., 2009).

The emergence of reverse innovation is closely related to several important attributes of emerging markets, especially large ones such as China and India. These emerging markets have a large population with demand that may significantly differ from that in developed countries. The unique market demand can pull out innovation indigenous to these markets. Also, these large emerging markets provide a large workforce with a reasonably good level of education, especially in science and technology, and with relatively lower costs that can encourage innovation activities in these markets.

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The emergence of reverse innovation is also the result of the MNCs' own strategies, which are themselves responses to the above push-and-pull forces in an emerging market. For example, in China, MNCs had no more than 30 research and development (R&D) centres in 1999. However, by 2012, there were more than 1,600 R&D centres founded by MNCs in China (*Xinhua News*, 2012). Clearly, many MNCs use their Chinese R&D centres to source knowledge from the local market (including local competitors and other foreign players) to develop innovations not only for the Chinese market but also for the global market. Based on our interviews with the GE R&D centre in Shanghai, this R&D centre is shifting its strategy from 'In China for China' (ICFC) to 'In China for the World' (ICFW).

While there are many benefits associated with reverse innovation (e.g., low cost, fast speed, and a variety of new products), it is important to understand the potential downside of conducting R&D activities in emerging markets characterized with weak intellectual property rights (IPR) protection. Foreign firms may face both local competitor-related and partner-related innovation appropriation hazards, which may limit their ability to appropriate value from their R&D activities in emerging markets (Zhang, Li, Hitt, & Cui, 2007). Recent studies have provided some solutions to MNCs' dilemmas in conducting R&D activities in emerging markets. For example, Zhao (2006) found that technologies developed in countries with weak IPR protection are used more internally and have stronger internal linkages. She argued that MNCs might use internal organizations to substitute for inadequate external institutions to capture the arbitrage opportunities in innovation. Zhang et al. (2007) found that focusing on export markets, coupled with a majority ownership, may allow foreign firms to effectively deal with local competitor-related and partner-related appropriation hazards, thus enabling them to benefit from their R&D investment in China.

Note that both of these studies suggest that MNCs can partially mitigate the problems associated with weak IPR protection in an emerging market by reducing domestic firms' exposure to their R&D activities: focusing on export markets and/or increasing the internal use of technology. However, what can foreign firms do if their R&D activities involve developing new technologies/products to meet the very demand of the emerging market, for example, GE's 'in China for China' strategy? This type of R&D activity probably represents the majority of MNC R&D activities in emerging markets. Therefore, how MNCs manage their R&D activities (including their R&D centres) in emerging markets becomes an interesting issue for exploration in future studies.

OVERVIEW OF THE SPECIAL ISSUE ARTICLES

There are four papers included in this special issue. These papers demonstrate both good theory development and strong empirical rigour. While these four papers do

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not address all the issues we have discussed, in general they fit the theoretical framework as depicted in Figure 1.

Li, Chen, and Shapiro's (2013) paper focuses on how the presence of FDI may influence the product innovations of Chinese firms (i.e., foreign firm → domestic firm spillovers). The authors examine FDI spillovers not only at the national level, a common approach in the economics literature, but also at the subnational level (including both intra-industry and inter-industry spillovers). In a sample of 346,000 Chinese manufacturing firms from 2000 to 2006, they found that Chinese firms improved their product innovations when they were located in cities with concentrated foreign innovation activities in the same industry, but these intra-industry spillovers were inclined to decrease as foreign presence increases. They also found that a greater diversity of industries and a greater presence of foreign firms contributed to product innovations of Chinese firms, providing evidence for inter-industry spillovers. Their findings support our earlier arguments that co-location of foreign and domestic firms increases exposure to each other's technologies, which can enhance both spillover and competition effects.

Liu, Chen, and Kittilaksanawong (2013) and Wu and Wei (2013) focus on the co-location and cluster search of domestic firms. Liu et al. (2013) examine the determinants of external knowledge search. As discussed earlier, external knowledge search, while opening up more opportunities, can be costly and time-consuming. They propose that a firm's choices of external knowledge search strategies will be affected by how its managers interpret external environments. To the extent that the managers perceive the external environment as an opportunity, their firm tends to conduct external search more broadly and more deeply. In contrast, to the extent to which the managers perceive the external environment as a threat, their firm tends to withdraw its external search in terms of both breadth and depth. Based on a survey of 141 technology ventures in China, Liu et al. (2013) found that the relationships between managerial interpretations and search breadth and depth are contingent upon managerial ties. When there are stronger managerial ties, the positive relationship between opportunity interpretation and external search breadth will be stronger whereas the negative relationship between threat interpretation and external search depth will be greater.

Wu and Wei's (2013) paper focuses on the consequences of firms' cluster search. They argue that firms in a cluster need to balance their local search (search within the cluster) and non-local search (search outside the cluster) in order to achieve successful product innovation. They propose that local search should focus more on depth whereas non-local search should focus more on breadth. With a sample of firms from two clusters in China, they find evidence to support this argument. Interestingly, they also find that local search depth and non-local search breadth only matter in stable industries (e.g., textile) but not in fast-changing dynamic industries (e.g., pharmaceutical), suggesting that industries represent an important context for understanding the role of external search in innovations.

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Cantwell and Zhang's (2013) paper examines how MNC subsidiaries source technologies in emerging markets (i.e., reverse spillovers from domestic firms to foreign firms). Using U.S. patents attributed to those subsidiaries between 1996 and 2005, they find that MNC subsidiaries in China have gradually developed their technological capabilities through non-localized search beyond their organizational, technological, and geographical boundaries. In this sense, MNC subsidiaries become potential spillover channels for their parent firms by providing connections with a wider range of knowledge sources in other international locations often beyond the MNCs' organizational boundaries.

FUTURE RESEARCH DIRECTIONS

The four papers included here have addressed several important issues as presented in our theoretical framework in Figure 1. More specifically, Li et al. (2013) focus on how intra- and inter-industry FDI spillovers may affect domestic firms' product innovation. Liu et al. (2013) and Wu and Wei (2013) examine the antecedents and consequences of domestic firms' search strategies (through co-location or clustering). Cantwell and Zhang (2013) focus on foreign firms' innovation search in emerging markets and reverse spillovers from domestic firms to foreign firms. While these studies help advance our understanding of knowledge spillovers, search, and creation in emerging markets, there remain many unanswered questions, offering future research directions.

First, while there is a long tradition of research on FDI spillovers in the literature, previous studies have mainly focused on spillovers at the industry level and have largely treated the firms involved (including both foreign firms and domestic firms) as 'blackbox'. To better understand how spillovers actually occur, it is important to take into account the characteristics of both domestic firms (e.g., their capacity to learn) and foreign firms (e.g., their barriers to imitation, see Zhang et al. forthcoming). Also, prior research on FDI spillovers tends to measure the spillover effect by using firm productivity. Clearly, the effects of FDI spillovers on domestic firms are multi-dimensional. Li et al. (2013) examined the spillover effect with a focus on product innovation. Other outcome variables such as domestic firms' technology upgrading, adoption of management practices, globalization, and even local entrepreneurship (e.g., the creation of new firms) could be investigated in the future.

Second, with increasing competition in emerging markets such as China, the knowledge pool contributed to by foreign firms and domestic firms becomes larger over time. The four papers included in this special issue have mainly focused on spillovers and search. What remains unanswered is how these firms *create* new knowledge from the knowledge pool. As noted earlier, many MNCs have established R&D centres in China. It will be interesting to examine how MNCs can use these R&D centres to develop new knowledge or innovations to meet the demands

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from different levels of Chinese society or from different regions of the world. For domestic firms, new knowledge creation may depend upon how existing knowledge is applied creatively to solve the problems resulting from institutional voids in emerging markets. For example, Alibaba developed an innovative payment approach, 'Alipay', which was based on PayPal. Alipay (i.e., online payment through a third party) solves a fundamental online payment problem faced by many Chinese firms engaging in e-commerce: how do Chinese people conduct online transactions when they do not have credit cards or even credit scores?

Third, as noted earlier, emerging markets such as China are evolving over time. This suggests that there is a strong need for longitudinal studies. In the current special issue, only one article takes a longitudinal approach (see Li et al., 2013). We suggest that future research should examine the processes of knowledge spillovers, search, and creation. With the development of institutional frameworks in emerging markets over time, how does institutional evolution facilitate knowledge spillovers and search among and between foreign firms and domestics firms? How do these firms interact with institutional environments to create new knowledge? These are interesting issues that should be explored in the future.

NOTES

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[1] Since this is a relatively mature literature, we don't aim to provide a comprehensive review. Instead, we briefly discuss the main conclusions.

[2] The survey was conducted by *Manpower*, an international talent search firm. For details, see http://www.manpower.com.cn/surveyreport.html.

[3] We use 'innovation' here in a broad sense, and include new technologies, new products, new services, and new business models or ideas.

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