International Business Review xxx (2015) xxx–xxx

Contents lists available at ScienceDirect

International Business Review

journal homepage: www.elsevier.com/locate/ibusrev

Geographical FDI knowledge spillover and innovation of indigenous firms in China

Cassandra C. Wang [a,*], Aiqi Wu [b]

[a] School of Earth Sciences, Zhejiang University, 38 Zheda Road, Hangzhou 310027, China
[b] School of Management, Zhejiang University, Hangzhou, China

ARTICLE INFO

Article history:
Received 14 November 2014
Received in revised form 6 October 2015
Accepted 2 December 2015
Available online xxx

Keywords:
Geographical FDI knowledge spillover
Product innovation
Horizontal spillover
Vertical spillover
Electronics industry
China

ABSTRACT

In recent decades, theoretical debate on firm innovation has considered particular forms of spatial clustering and foreign direct investment as almost mutually exclusive drivers. While cluster literature pays less attention to firm heterogeneity in ownership structure, FDI literature ignores the importance of geographical dimension in spillover effects. This study combines these two lines of theoretical inquiry to investigate regional FDI knowledge spillover effects on product innovation of China's indigenous electronic firms. It is found that localized innovative-related activities of foreign-invested firms significantly facilitate product innovation of domestic firms. However, FDI horizontal spillover is more important than vertical spillover and cross-sector rather than intra-sector knowledge is significant for indigenous innovation. FDI spillover effects can be reinforced by local innovative activities of domestic firms. This study highlights the significance of geographical proximity and relatively heterogeneous knowledge in FDI spillover effects on domestic innovation but questions the mutual trust relationship between foreign and domestic firms in a cluster.

1. Introduction

Theoretical discussions and debates on indigenous innovation of emerging economies have focused on the effects of foreign direct investment (FDI) and particular forms of spatial clustering of firms. While foreign investment has traditionally been viewed as exogenous sources of technology transfer, firm agglomeration or clustering has been considered as endogenously driving forces to firm innovation. Interesting enough, these two lines of theoretical inquire have seen each other as mutual exclusive driver without giving credits to the other (Menghinello, De Propris, & Driffield, 2010).

On the one hand, foreign direct investment and their effects on host economies have been a hot subject of documentation in the fields of economics and international business (Crespo & Fontoura, 2007; Havranek & Irsova, 2012). Scholars have been obsessive about whether or not and to what extent foreign-invested firms can produce knowledge spillover beneficial to local firms. Empirical analyses have generated competing interpretations, however (Aitken & Harrison, 1999; Javorcik, 2008; Smeets, 2008). These inconclusive findings are attributed to the disregard of the role played by geography in knowledge spillovers and innovation (Barrios, Görg, & Strobl, 2011; Driffield, 2006; László & Balázs, 2007).

On the other hand, the issue of spatial clustering or geographical proximity on firm innovation has never ceased to capture scholarly imagination of economic geographers. Since knowledge may decay with distance, geographical proximity plays a significant role in knowledge diffusion, assimilation, recombination and innovation (Wang, Lin, & Li, 2010). Meanwhile, geographical proximity is identified as an essential condition for firms to enjoy the benefits of externality and therefore brings trust, collaboration and interactions for knowledge flows and transfer (Boschma, 2005). However, this body of literature implies that knowledge spreads evenly among co-located firms without taking account into the heterogeneous characteristics of firms (Wang & Lin, 2013). Foreign-invested firms, for example, tend to be regarded as technological leaders compared to their counterparts in developing countries (Liefner, Wei, & Zeng, 2013). In recognition that the mechanism of knowledge flows and sharing identified in the cluster literature is based on equality and mutual benefits, the progress of knowledge spillover can be easily inhibited by the distinguished differences between local and foreign firms in technological capability, cognitive structure and management philosophy.

* Corresponding author. Tel.: +86 18868103083; fax: +86 57187951336.
E-mail addresses: chencwang@zju.edu.cn (C.C. Wang), wuaiqi@zju.edu.cn (A. Wu).

http://dx.doi.org/10.1016/j.ibusrev.2015.12.004
0969-5931/

Against the theoretical backdrop, this article attempts to combine these two lines of theoretical inquiry to investigate the geographical knowledge spillover effects of foreign-invested firms on product innovation of local firms in a cluster, with a case study on China's electronics industry. Thanks to the reform and open-up policy, China has been the largest recipient of foreign investment among the developing countries and even the world to warrant itself an interesting and significant case for a close investigation. The knowledge-intensive feature of the electronics industry means that there is an important role for FDI knowledge spillovers and flows to play in the process of innovation and hence a case that deserves our special attention. For example, Datang Telecom could not have developed China's own technical standards TD-SCDMA without technology transfer and knowledge spillovers from Siemens and Nokia. The NASDAQ-listed Chinese firm TechFaith was founded by people who used to work in Motorola (Du et al., 2009).

The rest of the article is structured as follows. It starts with a critical review of literature on geography, localized knowledge spillover, FDI spillover effects and innovation. It is then followed by a clarification of data and methodology adopted in this study. The third part introduces the evolution and spatial distribution of foreign-invested electronic firms during the period of 1998–2009. Attention is paid to the mechanism of geographical horizontal and vertical spillover effects of foreign-invested firms as well as the relative importance of intra- and inter-sector knowledge on product innovation of indigenous firms. The last part summarizes the main findings and discusses their implications.

2. Geographical knowledge spillover, FDI effects and innovation of domestic firms

2.1. Geographical proximity, knowledge spillover and innovation

When innovation studies in international business and management science lay much emphasis on micro-level strategies and behavior of firms at the expense of their meso-level geographical environment, the significant role played by geography in knowledge creation, spillover and flows has long been a concern of economic geographers. Since the early 1990s, professional attention has been turned to the study of clusters, industrial districts, innovation milieus, regional systems of innovation to highlight that geography or geographical proximity matters in the following ways (Markusen, 1996; Beugelsdijk, 2007). First of all, knowledge flows more easily and rapidly among co-located firms as spillover effects will decay with geography/distance (Simmie, 2004). In particular, knowledge is often divided into two forms: tacit knowledge and codified knowledge. In contrast to codified knowledge that can be easily understood and widely circulated, tacit knowledge involves know-how and requires a certain background to be put into full use, in which geographical proximity facilitates its process of transmission and absorption (Howells, 2002). Mariotti, Piscitello, and Elia (2010) illustrate that multinational enterprises in Italy tend to agglomerate with other multinational enterprises in order to enjoy localized knowledge inflows.

Second, firms' agglomeration in certain places can nurture a localized labor pool, which induces knowledge flows and circulation through the mobility of qualified labors in the cluster (Fan & Scott, 2003). An empirical research on Canadian manufacturing industries demonstrates that "being there" or "closeness" between users and producers is important for the successful dissemination and implementation of advanced knowledge and technologies (Gertler, 1995). Third, geographical proximity could forge trust relationship and innovative milieu between local agents by stimulating their interactions and linkages to intrigue collective learning and knowledge sharing (Gordon & McCann, 2000; Fu, Revilla, & Schiller, 2013). It is argued that the advantages of firms' co-presence do not really lies in the emergence of reciprocal actions to lowering transaction costs but in knowledge creation and diffusion through the horizontal and vertical dimensions of clusters (Maskell, 2001).

Horizontal dimension of a cluster consists of firms with similar goods and vertical dimension involves a complementary and interlinked network of suppliers and customers (Bathelt, 2005). Horizontal dimension provides opportunities for firms to continuously observe and monitor what local rival firms are doing and to compare to and imitate their competitors, whereas vertical dimension facilitates knowledge flows through input–output production linkages (Wolfe & Gertler, 2004). The sharing of a common set of values and norms in a cluster enhances formal and informal relations and hence strengthens local embeddedness, trust relationship and mutual learning among firms (Saxenian, 1994).

By stressing knowledge spillover within a sector, the existing literature pays much less attention to heterogeneous knowledge from other related sectors. It is argued that the most important knowledge transfers and spillover come from different industries (Glaeser, Kallal, Scheinkman, & Shleifer, 1992). There exists a debate over the importance between sectoral specialization and diversification in knowledge creation and innovation (Boschma & Iammarino, 2009). More recently, a few of scholars started to concern with technological relatedness and related variety in the process of firm innovation because knowledge will spill over from one sector to another only when these sectors shared related knowledge and competence (Frenken, Van Oort, & Verburg, 2007). It therefore requires more empirical studies to explore the relative importance of intra- and inter-sector knowledge sources.

This body of literature has traditionally taken clustering firms as undifferentiated entities with a low variance in business models, technological capability, ownership and size (Munari, Sobrero, & Malipiero, 2012). The heterogeneous and asymmetric distribution of knowledge base among co-located firms actually induces a highly selective and uneven way of knowledge spillover and diffusion in a cluster (Giuliani, 2007). Technological gatekeepers, i.e. those firms with a strong technological capability and intensive connections with firms outside the cluster tend to drive and dominate localized knowledge spillover (Giuliani, 2011). Foreign-invested enterprises (FIEs), with abundant resources and advanced technological knowledge, can be regarded as technological gatekeepers in a cluster, especially in the developing countries.

Nevertheless, the role played by FIEs in knowledge transfer and spillovers to boost localized technological capabilities remains controversial (Breschi & Malerba, 2001). On the one hand, geographical proximity can forge linkages between foreign-invested and domestic firms and encourage spillovers in a way of buyer–supplier interaction and labor mobility (Menghinello et al., 2010). With empirical evidences from Beijing, Zhou and Tong (2003) show that local firms' collaborations with foreign-invested firms in a cluster provide them with a vital technological training to improve their innovative capacity. It is also revealed that geographical proximity helps facilitate technological spillover from MNCs to local suppliers (Ivarsson & Alvstam, 2005).

On the other hand, however, the mechanisms of mutual learning and knowledge spillover do not necessarily work out for a cluster co-presented by foreign and domestic firms, because of their different interests, cognitive structure and cultural background. It is argued that foreign-invested firms are reluctant to share their knowledge unless the host country forces them to do so (Wang & Lin, 2013). Liu and Dicken (2006) have coined a concept of obligated embeddedness to unravel that the foreign-invested firms in China have been forced by the government to make their procurement locally. The relationship based on obligation and

Please cite this article in press as: Wang, C. C., & Wu, A. Geographical FDI knowledge spillover and innovation of indigenous firms in China. *International Business Review* (2015), http://dx.doi.org/10.1016/j.ibusrev.2015.12.004