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知識スピルオーバーと企業の立地選好

○Simon J.H. Liu,七丈 直弘, 馬場 靖憲（東京大学）

概要

先端産業においては、企業は比較優位を獲得するために知識スピルオーバーが及ぼす効果を戦略に取り入れ、他への流出の制御と他から得た知識の活用(exploitation)を行っていく必要がある。スピルオーバーの量は、知識の質や制度的要因のみならず企業の空間的配置、すなわち立地選好によって大きく影響を受ける。本研究では、近年の改革開放政策によって海外企業の誘致と国内産業の成長を推進する中国を対象とし、国外企業の中国における研究開発拠点の設置における立地選好を分析することによって、日米の中国進出における戦略の相違を明らかにする。

キーワード：知識スピルオーバー、産学連携、イノベーション、先端産業

1. Introduction

The critical role of knowledge as a source of competitive advantage has heightened interest in understanding how firms identify, acquire and use externally-generated knowledge (Alcacer & Chung, 2007). In addition to acquisitions and alliances, informal knowledge acquisition (knowledge spillover) is commonly known (Griliches, 1992), such as common buyers and suppliers, chance meetings of diffenrent firms' reseachers, and employee's switching jobs. Moreover, for controling the cost of knowledge outward spillovers, firms may make the horizontal FDI (foreign direct inverstment) (Shatz & Venables, 2000), by establishing the overseas branches, spillovering the knowledge horizontaly cross state boundaries, however, within the company group. Accoridng to the survey data by Shatz & Veneables (2000), firms' FDI increased 17.6% during the period of 1985 and 1997, while the world GDP grew merely 7.2% at the same period. Thus, the research takes the patents data to examine the relation of FDI flows, and location choices.

2. Historical Study Review

Griliches (1992) defines knowledge spillovers as "working on similar things and hence benefiting much from each other's research". In view of knowledge spillover in industries, Chung & Alcacer suggest foreign firms in the pharmaceutical industry value state R&D intensity the most, as a level twice that of firms in the semiconductor industry, and four times that of electronics firms. Further, not only firms from technically lagging nations, but also some firms from technically leading nations are attracted to R&D intensive states.

Jaffe (1986) also found that a significant fraction of the total flow of spillovers that affects a firm's productivity originates from other firms. Firms also benefit from the R&D efforts of other

firms that are in close technological proximity. Alcacer and Chung (2007) find that firms favor locations with academic innovative activity, and consider not only gains from inward knowledge spillovers but also the possible cost of outward spillovers. Further, while less technologically advanced firms favor locations with high levels of industrial innovative activity, technologically advanced firms choose only locations with high levels of academic activity and avoid locations with industrial activity to distance themselves from competitors.

Feldman's (2000) knowledge production model implies that innovative activity should cluster in the regions where knowledge-generating inputs are the greatest and thus where knowledge spillovers are the most prevalent. He also implies that know ledge spillovers may occur as workers move between jobs in an industry, taking their accumulated skills and know-how with them.

3. Methodology and Data

With the high speed economic growth, China has been spotlighted recently. In China, the technologies Market (Annul report of China technologies market survey from 1991~2003) grows with similar speed as high as the R&D growth rate (Motohashi, 2005). Besides, multinationals are prevalent to the more similar countries (in size, and also in other economic dimensions, such as technology and factor endowments) by Markusen & Venables 1998. Thus, our survey selects China as the target market for research. For data collection, our research retrieves the patents data from USPTO (United States Patent and Trademark Office), China Statistics Yearbook (1996-2006) for analysis.

Regarding the methodology, Alcacer & Chung (2002, 2007) quantify the knowledge spillover by checking the flow of FDIs to the startups in various industries (identifying from Standard Industrial Code), mapping to the Economic Areas (EA) in the United States. The R&D intensity of each Economic Area is valued by the number of registered patents. In adopting the concept to quantify knowledge spillover, our survey collects the patent data, from USPTO in the conditions that Chinese inventors with Assignee country to Japan/USA, to evaluate FDIs from Japan/USA to China. For indicating the R&D intensity, our research uses the number of patents in each region (province level in China), instead of "R&D to Sales" rate. Further, our research maps the data to the China territory by province, by using the GIS (Geographical Information System) application, to compare the R&D investments in China between Japan companies and US companies.

4. Results

By utilizing the data from USPTO, and China Statistics Yearbook, our research creates 5 items of data series by China province, such as (A) US-Firms: China inventors of USPTO patents, with assignee country to USA, mapping to Figure 1. (B) JP-Firms: China inventors of USPTO patents with assignee country to Japan, mapping to Figure 2. (C) CN-to-USPTO: All China inventors of patents, registered in USPTO, mapping to Figure 3. (D) FDI-Firms: Number of firms with FDI in China, mapping to Figure 4. (E) Patents-SIPO: All patents registered in SIPO (State Intelligent Property Office of The PRC) in China, mapping to Figure 5.

Figure 1. China inventors to US firms

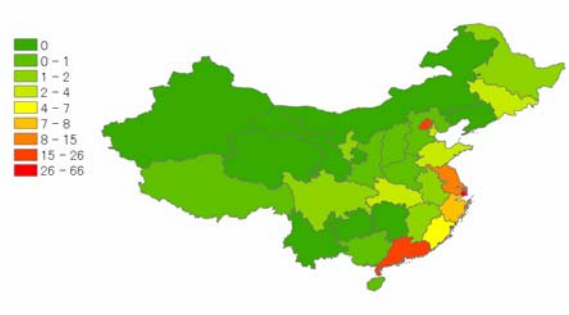


Figure 2. China inventors to Japan firms

Figure 3. China inventors registered in USPTO

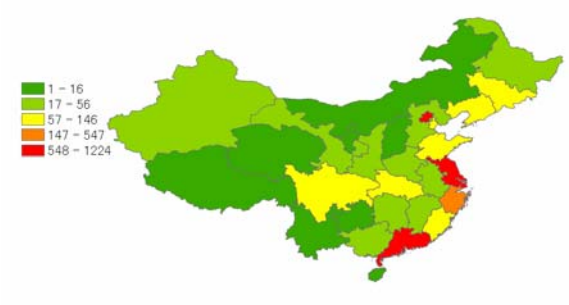


Figure 4. FDI in China

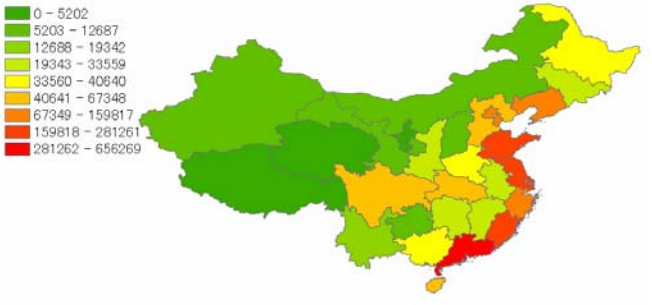
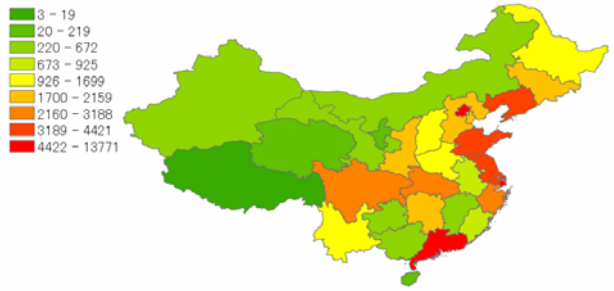


Figure 5. China inventors registered in SIPO



From Figure 3, and 5, we find the R&D locations are concentrated in locations of the east side of China, such as Beijing, Tianjin, Jiangsu, Shanghai, Zhejiang, and Guangdong. Besides, firms with Japan/US FDI (Figure 4) also locate intensively in east side of China, as well as the China R&D distribution (Figure 3, 5).

Table 1. List of Correlation Coefficient

	(C) CN-to- US	(D) FDI-Firms	(E) Patents-SIPO
(A) US-Firms	0.790	0.506	0.555
(B) JP-Firms	0.989	0.947	0.987

Further, from the correlation coefficient analysis, Table 1 indicates Japanese firms with higher correlation coefficient perform R&D investments close to the China R&D intensive regions, more than US firms perform (0.987>0.555). Besides, it also reflects that patents assigned to Japan firms following the distribution of FDI, more than US firms (0.947> 0.506).

Table 2. List of H-H Indices

	(A) US-Firms	(B) JP-Firms	(C) CN-to- US	(D) FDI-Firms	(E) Patents-SIPO
Gini	0.163	0.143	0.128	0.102	0.076

From Table 2, for checking the distribution of R&D, Japan firms (0.143) has lower H-H (Herfindahl-Hirshman) index than US firms (0.163), thus Japan firms perform dispersed investment a little bit more than US firms, which concentrate more on specific areas,

such as Beijing, Shanghai, and Guangdong. However, Japan firms are in proximity to the China R&D areas generally, as the China patents registered to SIPO is with even lower H-H index of 0.076.

5. Conclusion

This work demonstrates both the Japan and US R&D related FDI was made to the China R&D intensive regions, the east coast of China, such as Beijing, Tianjin, Jiangsu, Shanghai, Zhejiang, and Guangdong. Japan firms perform R&D related investment close to the China R&D distribution, more than US firms do. However, US firms concentrates more on specific areas, such as Beijing, Shanghai, and Guangdong. In conclusion, both Japan and US firms invest to the local R&D proximity, indicating the location choices by the foreign firms are closely tied to the knowledge spillover with local firms.

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