Regional Studies, Regional Science

ISSN: (Print) 2168-1376 (Online) Journal homepage: https://www.tandfonline.com/loi/rsrs20

The geography of intercity technology transfer networks in China

Qinchang Gui, Debin Du & Chengliang Liu

To cite this article: Qinchang Gui, Debin Du & Chengliang Liu (2019) The geography of intercity technology transfer networks in China, Regional Studies, Regional Science, 6:1, 395-398, DOI: 10.1080/21681376.2019.1627905

To link to this article: https://doi.org/10.1080/21681376.2019.1627905

Published online: 25 Jun 2019.

REGIONAL STUDIES, REGIONAL SCIENCE
2019, VOL. 6, NO. 1, 395–398
https://doi.org/10.1080/21681376.2019.1627905

Routledge
Taylor & Francis Group

Regional Studies Association

REGIONAL GRAPHIC

The geography of intercity technology transfer networks in China

Qinchang Gui[a], Debin Du[b] and Chengliang Liu [c]

ABSTRACT

In the era of the knowledge economy, the acquisition of exogenous knowledge is understood to be an important strategy for cities in their pursuit of economic growth. The Chinese government has taken measures to foster technology transfer between cities in an effort to promote the flow of knowledge and ideas. Patent transaction data from China's State Intellectual Property Office (SIPO) covering the period 2008–15 are used to visualize the technology transfer map. The maps show that the frequency of intercity patent transfer is intensifying, and the numbers of cities and city-pairs are increasing rapidly over time. Two key features of the network emerge: first, the dominant role played in the network by several cities that results in a 'diamond-shaped' spatial structure that has become more geographically extensive over time; and second, the hub-and-spoke structure of the network with Beijing, Shanghai and Shenzhen forming first-order hubs of technology transfer.

ARTICLE HISTORY

Received 18 February 2019; Accepted 3 June 2019

KEYWORDS

patent transaction; technology transfer; knowledge flows; city network; social network analysis

JEL CLASSIFICATIONS

R11; R12

Accessing external knowledge is one of the key challenges facing cities in their pursuit of economic growth (Bathelt & Henn, 2014; Cooke, 2004). In this context, the role of knowledge networks and knowledge spillovers have been identified as important mechanisms through which knowledge transfer might be engendered (Gui, Liu, & Du, 2018; Ponds, van Oort, & Frenken, 2010). With the increased interconnectedness and interactions between actors in the 'economy of ideas', closed innovation strategies have shifted to ones that are now more open (Chesbrough, 2003). Here knowledge production is not only attributable to the local knowledge base but also rather depends on the

CONTACT

[a] Institute for Global Innovation and Development, East China Normal University, Shanghai, China; and School of Urban and Regional Sciences, East China Normal University, Shanghai, China.

[b] Institute for Global Innovation and Development, East China Normal University, Shanghai, China; and School of Urban and Regional Sciences, East China Normal University, Shanghai, China.

(Corresponding author) clliu@re.ecnu.edu.cn

[c] Institute for Global Innovation and Development, East China Normal University, Shanghai, China; School of Urban and Regional Sciences, East China Normal University, Shanghai, China; and Institute of Eco-Chongming, East China Normal University, Shanghai, China.

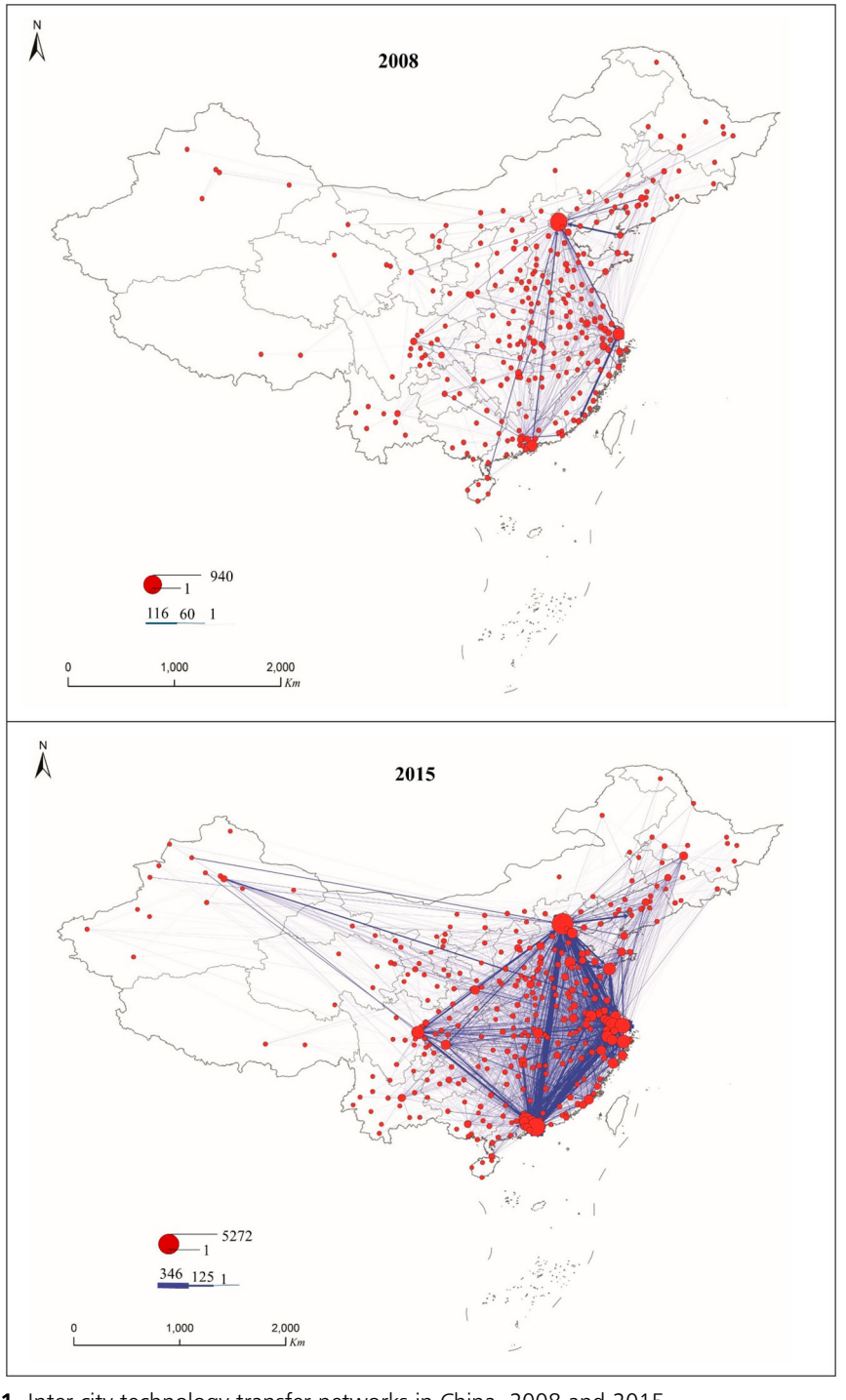

Figure 1. Inter-city technology transfer networks in China, 2008 and 2015.

availability of exogenous knowledge. Since the publication of Outline of the Program for the State Long-Term Science and Technology Development (2006–2020) (http://www.gov.cn/gongbao/content/2006/content_240244.htm), the Chinese government has taken measures to foster

technology transfer between cities in an effort to promote the flow of knowledge and ideas that contribute to innovation-driven development.

Patent transaction data are used here as a measure of technology transfer, which takes into account the economic value of technology and the direction of technology flow in a network (Seo & Sonn, 2019; Zhang, Duan, & Zhou, 2016). Patent transaction data from China's State Intellectual Property Office (SIPO) covering the period 2008–15 are used to construct city-to-city technology transfer networks.

The size of nodes represents the total transfer volume, which is the sum of transfer in and out of the city; the thickness of edges indicates the number of transfer patents between each city-pair, as shown in Figure 1. Compared with 2008, inter-city technology transfer is intensifying with more and more cities engaging in technology transaction processes. The number of nodes are shown to have increased steadily from 257 in 2008 to 332 in 2015, and the number of lines have increased dramatically from 863 in 2008 to 4581 in 2015. In addition, network density is 0.013 in 2008, but increases to 0.042 in 2015, with average degree increasing from 6.716 to 27.596 in the same period. The trend towards intensification implies that patent transfer is more frequent and inter-city technology ties are closer over time.

The inter-city technology transfer network is dominated by several cities, and initially forms a diamond-shaped spatial structure. Beijing, Shanghai and Shenzhen are the dominant hubs in the network, and have occupied a central and advantageous network position. They are the leading technology-transfer centres in China. In addition, the backbone of the transfer network seems to be a diamond-shaped graph with four vertices in four metropolitan areas, namely: in the Beijing–Tianjin–Hebei region, the Pearl River Delta, the Yangtze River Delta and the Chengdu–Chongqing urban agglomerations, which is in line with the patent cooperation network (Ma, Fang, Pang, & Wang, 2015).

Inter-city technology transfer is characterized by a hub-and-spoke structure. Based on nodal size and the level of interaction between nodes, we can identify Beijing, Shanghai and Shenzhen as the national first-order hub of in the network. Second-order hubs include provincial capital cities in the central and western parts of China, or industrial cities in coastal regions, such as Chengdu, Wuhan, Chongqing, Suzhou, Qingdao and Ningbo. The remaining cities are classified as a peripheral set of third-order hubs. In addition, the top 10 bilateral ties are mainly located in the same metropolitan area in 2015 (e.g., Shanghai–Suzhou, Shenzhen–Dongguan, Shanghai–Jiaxing, Beijing–Tianjin and Shaoxing–Hangzhou), which means that the effect of spatial political bias is fading and the degree of regional integration is strengthening over time.

ACKNOWLEDGEMENTS

The authors acknowledge the valuable and constructive suggestions made by the editors.

DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

FUNDING

This work was supported by the National Natural Science Foundation of China [grant number 41571123], the Strategic Priority Research Program of Chinese Academy of Sciences [grant number XDA20100311], the ECNU Academic Innovation Promotion Program for Future Scientists [grant number WLKXJ2019-002], the Shanghai Pujiang Program [grant number 17PJC030], and the Shanghai Philosophy and Social Science Fund Project [grant number 2018EJL003].

ORCID


Chengliang Liu http://orcid.org/0000-0003-4692-2994

REFERENCES

Bathelt, H., & Henn, S. (2014). The geographies of knowledge transfers over distance: Toward a typology. *Environment and Planning A: Economy and Space*, *46*(6), 1403–1424.

Chesbrough, H. W. (2003). *Open innovation: The new imperative for creating and profiting from technology*. Cambridge, MA: Harvard Business School Press.

Cooke, P. (2004). The role of research in regional innovation systems: New models meeting knowledge economy demands. *International Journal of Technology Management*, *28*(3–6), 507–533.

Gui, Q. C., Liu, C. L., & Du, D. B. (2018). Does network position foster knowledge production? Evidence from international scientific collaboration network. *Growth and Change*, *49*(4), 594–611.

Ma, H. T., Fang, C. L., Pang, B., & Wang, S. J. (2015). Structure of Chinese city network as driven by technological knowledge flows. *Chinese Geographical Science*, *25*(4), 498–510.

Ponds, R., van Oort, F., & Frenken, K. (2010). Innovation, spillovers and university–industry collaboration: An extended knowledge production function approach. *Journal of Economic Geography*, *10*(2), 231–255.

Seo, I., & Sonn, J. W. (2019). The persistence of inter-regional hierarchy in technology transfer networks: An analysis of Chinese patent licensing data. *Growth and Change*, *50*(1), 145–163.

Zhang, G. P., Duan, H. B., & Zhou, J. H. (2016). Investigating determinants of inter-regional technology transfer in China: A network analysis with provincial patent data. *Review of Managerial Science*, *10*(2), 345–364.