



The Study on the Contribution of FDI to China's Technology Innovation — Empirical Analysis of 30 Provinces Based on Spatial Panel Model

MACS 30250 Project Proposal

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Introduction

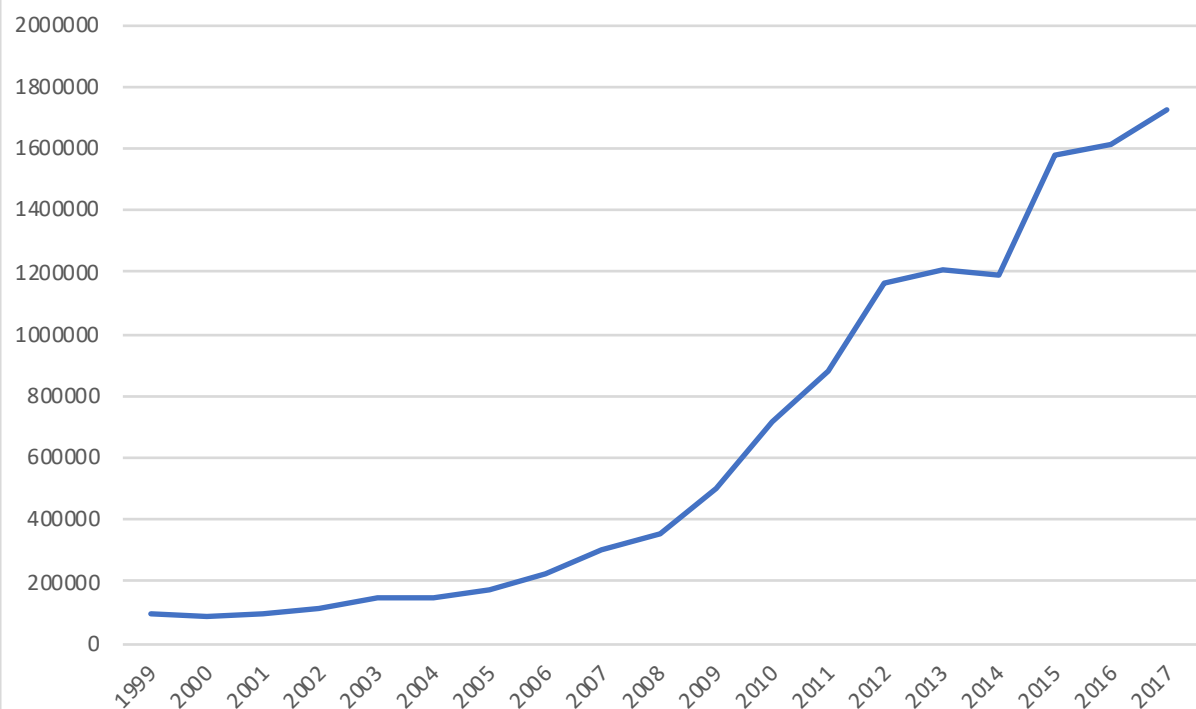


- Foreign Direct Investment (FDI) not only includes transnational flow of tangible capital, but also the international transfer of intangible capital such as technology and management methods.
- It has many effects on host countries such as promoting technological progress, stimulating economic growth and updating the industrial structure.
- With deeper and further utilization of FDI, the technology spillover effects of FDI has increasingly become an important factor affecting regional technological innovation capabilities

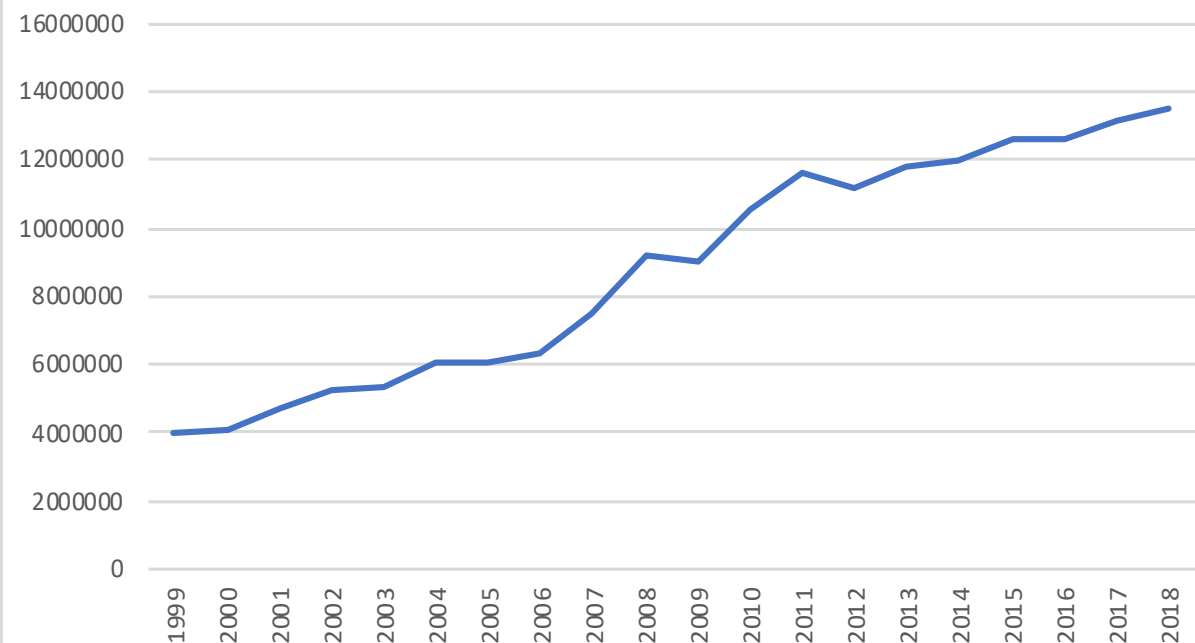
Introduction



Domestic Patent Application Authorization Quantity in China



Actual Utilization of Foreign Direct Investment in China
(US\$10,000)



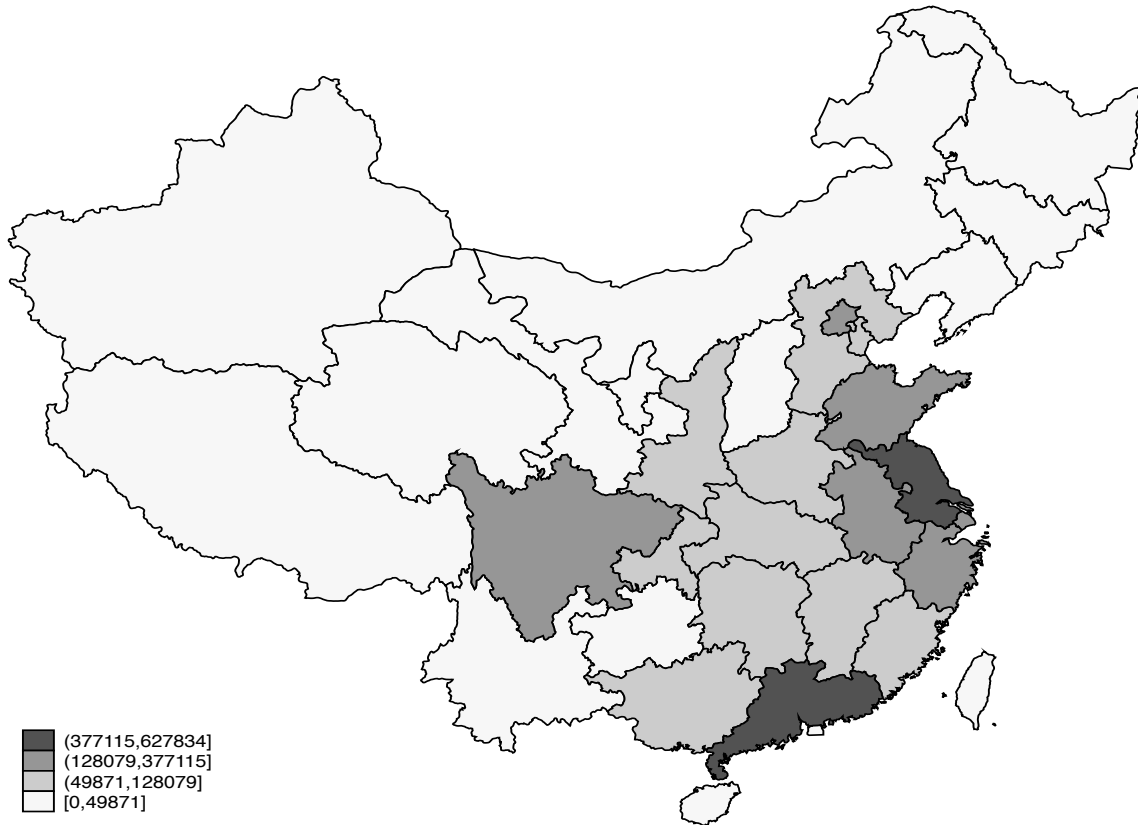
Data source: China National Statistics Bureau

Introduction

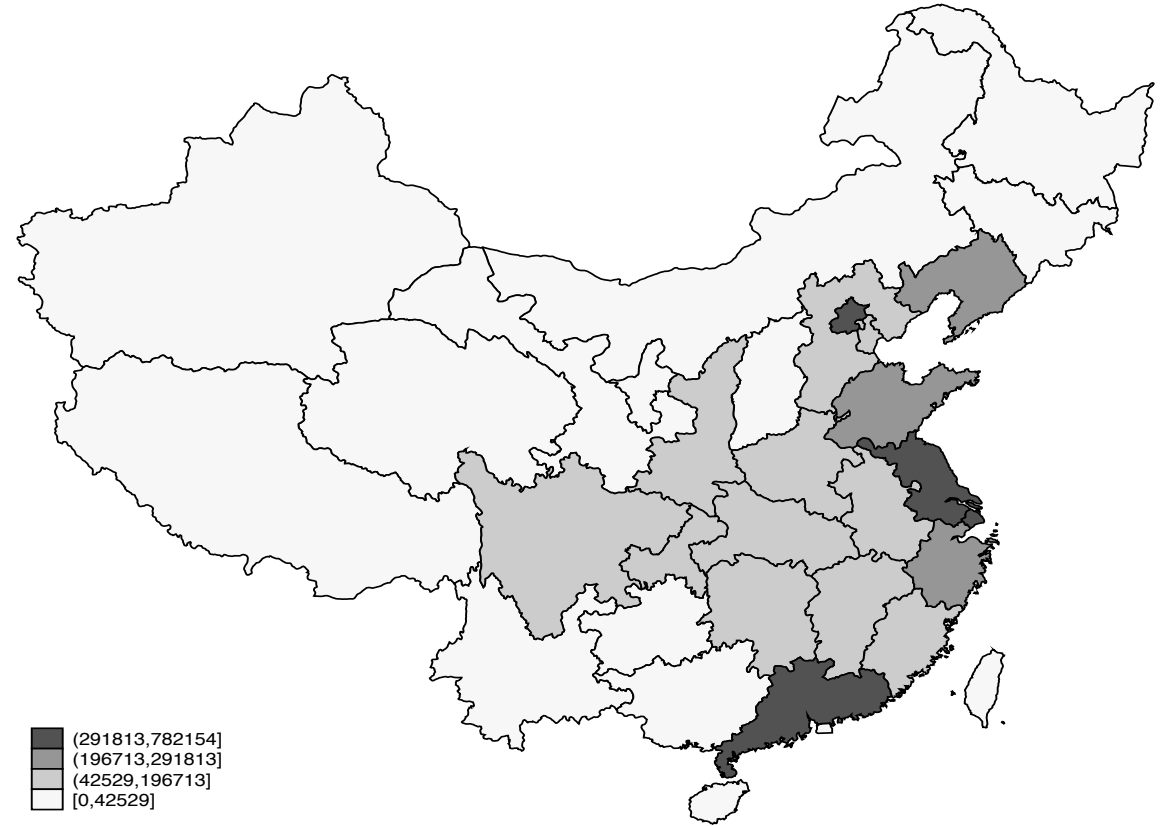
Data source: China National Statistics Bureau



Similar pattern?



2017 Patent Distribution in China



2017 FDI Distribution in China



Research Question

- What's the effect of FDI on regional innovation?

(1) Promotion Theory

- Caves, Richard E. "Multinational firms, competition, and productivity in host-country markets." *Economica* 41.162 (1974): 176-193.
- Borensztein, Eduardo, Jose De Gregorio, and Jong-Wha Lee. "How does foreign direct investment affect economic growth?." *Journal of international Economics* 45.1 (1998): 115-135.

(2) Inhibition Theory

- Bishop, Paul, and Nick Wiseman. "External ownership and innovation in the United Kingdom." *Applied Economics* 31.4 (1999): 443-450.
- Yudaeva, Ksenia, et al. "Does foreign ownership matter? The Russian experience." *Economics of transition* 11.3 (2003): 383-409.

(3) Uncertain Impact Theory

- Harris, Richard, and Catherine Robinson. "Productivity impacts and spillovers from foreign ownership in the United Kingdom." *National Institute economic review* 187.1 (2004): 58-75.



Model Setup

- Generate Spatial Weights Matrix (SWM) -- ArcGIS
 - binary strategy: K nearest neighbors (a feature is either a neighbor (1) or it is not (0))
- Spatial Autocorrelation Test
 - Global Moran's I

$$\text{Moran } I = \frac{n \sum_{i=1}^n \sum_{j=1}^n w_{ij} (X_i - \bar{X})}{\sum_{i=1}^n \sum_{j=1}^n w_{ij} \sum_{i=1}^n (X_i - \bar{X})^2}$$

Model



Year	Moran I	z	p-value*
2008	0.153	1.887	0.030
2009	0.208	2.435	0.007
2010	0.219	2.565	0.005
2011	0.257	3.099	0.001
2012	0.257	3.128	0.001
2013	0.246	2.891	0.002
2014	0.232	2.681	0.004
2015	0.228	2.636	0.004

The spatial distribution of technological innovation output in 30 provinces of China shows significant positive spatial correlation.



Model

- Set and Test the Spatial Panel Model
 - SDM, SEM or SAR

$$\ln Pat_{it} = \rho W \ln Pat_{it} + \beta_1 \ln FDI_{it} + \theta_1 W \ln FDI_{it} + \gamma \ln \vec{X}_{it} + v_i + v_t + \varepsilon_{it}$$

$\ln Pat_{it}$ -- Patent authorization quantity

$\ln FDI_{it}$ -- Foreign Direct Investment

$W \ln Pat_{it}$ -- Spatial lag term

$W \ln FDI_{it}$ -- Spatial lag term

\vec{X}_{it} -- Control Variables:

- 1) Regional Innovation Environment: the degree of regional openness, market competition level and economic development level;
- 2) Regional Absorption Capacity: regional R&D input intensity, human capital



Data Source

- China National Statistics Bureau
- Wind Database

Potential Computational Methods in Analysis

- Spatial Cluster Analysis & Spatial Correlation Analysis
- Spatial Weights Matrix Generation
- Set and Test the Spatial Panel Model
- Spatial Regression Analysis



References

Caves, Richard E. "Multinational firms, competition, and productivity in host-country markets." *Economica* 41.162 (1974): 176-193.

Borensztein, Eduardo, Jose De Gregorio, and Jong-Wha Lee. "How does foreign direct investment affect economic growth?." *Journal of international Economics* 45.1 (1998): 115-135.

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