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Innovation from Spatial Spillovers of FDI and the Threshold Effect of Urbanization: Evidence from Chinese Cities

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Abstract: The trends in the globalization and spatial agglomeration of economic activities offer new perspectives to study the determinants of innovation. To examine the spatial spillovers of foreign direct investment (FDI) in promoting regional innovation and explore the underlying mechanisms, this study employed a spatial autoregressive model and a threshold regression model to analyze a panel dataset of 253 cities in China from 2003 to 2017. It was found that FDI significantly promotes regional innovation and that there are positive and significant spatial spillovers among cities. The results indicate that innovation is characterized by spatial agglomeration and that the diffusion of technology and knowledge from FDI contributes to the formation of coordinated innovation and development among neighboring cities. Furthermore, the threshold regression analysis indicates that the relationship between FDI and regional innovation depends on the urbanization level. FDI has a positive effect on regional innovation in China once above a certain threshold of urbanization, which demonstrates the heterogeneous effect of FDI spillovers on innovation in China. This study deepens the understanding of how FDI spurs innovation that leads to an increase in the sustainable competitive advantages across regions in emerging markets.

Keywords: innovation; foreign direct investment; urbanization; spatial spillovers; threshold regression

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1. Introduction

Innovation is regarded as the key driving force of sustainable economic growth [1]. Through international technology spillovers associated with globalization, more countries have acquired advanced technologies that enhance their innovation capabilities [2–4]. Foreign direct investment (FDI) is considered to be one of the main channels for accessing technology, especially through spillovers in emerging countries [5–7]. Therefore, to take advantage of the FDI spillovers in innovation, productivity, and management capabilities, numerous countries have implemented policies to attract FDI. Explaining how FDI affects regional innovation has become an important research topic in recent years.

With China's reform, opening-up policy and its "market for technology" initiative, it has become the largest recipient of FDI among emerging countries since 2000. How does FDI promote regional innovation in China? Are there spatial spillovers from FDI on regional innovation? Previous studies have addressed these questions from various perspectives. At the macro level, FDI creates a competitive macroeconomic environment by introducing high-quality technology and management experience, which promotes investment in innovation and research and development (R&D) by Chinese firms [8–10]. Meanwhile, it also promotes intellectual property protection [11], which is a mechanism for improving overall innovation. At the micro-level, when foreign investment enterprises (FIEs) establish operations in a host country, they tend to promote innovation by domestic firms through various channels, which include the staff turnover effect, demonstration effect, and spillovers within the supply chain [5,12–15].

However, the existing literature seems to ignore regional differences and the notable spatial agglomeration in innovation performance and the distribution of FDI in China, which indicate the need for a research framework that takes spatial spillovers into account [16–18]. Currently, a few scholars have started to utilize spatial models to study the influence of FDI on urbanization, environmental pollution, etc., as well as the geographical scope and spatial spillovers of FDI [6,16,17]. However, the spatial spillovers of FDI on regional innovation have not yet been examined systematically. In addition, existing studies specify a monotonic impact of FDI on innovation, ignoring potential threshold effects in the relationship. Within different intervals, the direction or intensity of FDI spillovers may vary. Hence, the omission of threshold effects from these models may lead to inconsistent results.

In order to address this critical gap in the literature, this paper employed a variety of econometric models to identify the impact of FDI on regional innovation, using a panel dataset of 253 cities in China from 2003 to 2017. First, a spatial autoregressive (SAR) model was utilized to study the direct effect and spatial spillover effect of FDI on regional innovation. Second, given that there are significant differences in urbanization levels across China, this paper investigated the influence of FDI on regional innovation by taking regional urbanization level as a threshold and examined the channel through which urbanization affects the spatial spillovers of FDI on regional innovation. The primary findings demonstrate that FDI promotes regional innovation with significant spatial spillovers and that there is a significant threshold effect in terms of the urbanization level.

This paper makes three main contributions. First, this paper systematically examines the impact of FDI on regional innovation. Previous studies primarily focused on the direct effect of FDI on regional innovation, ignoring its agglomeration characteristics. Therefore, this paper contributes to the literature by using spatial models to identify and quantify the spatial spillovers of FDI on regional innovation. Second, this paper extends research on the threshold effect of regional innovation by taking urbanization as a threshold to explore the underlying mechanism through which FDI impacts regional innovation. Finally, the key findings of this paper provide meaningful implications for policymakers, which not only deepen the understanding of the relationship between FDI and regional innovation but also can inform a more coordinated development that leads to an increase in sustainable competitive advantages across regions in emerging markets.

The rest of the paper is organized as follows. Section 2 provides a literature review and the developed research hypotheses. Section 3 describes the data and methodology. Section 4 presents results and robustness tests. Section 5 discusses the findings and implications. Finally, Section 6 concludes the paper.

2. Literature Review and Hypothesis Development

FIEs, which are characterized by their financial strength, advanced technology, and knowledge, are likely to introduce intense competition to host countries [10,19]. Meanwhile, they may promote productivity and innovation in local firms [9,20–22]. In this section, we first analyze the mechanism through which FDI affects regional innovation and then discuss the spatial spillover effect and the threshold effect.

2.1. FDI and Regional Innovation

FIEs are generally considered to have more advanced technology and management expertise than local firms, which could give rise to technology spillovers for local firms in host countries in a variety of ways. The first mechanism is horizontal spillover, which can be divided into the labor turnover effect and the demonstration effect. The employee turnover effect of FDI can increase the absorptive capacity and promote innovation among local firms [23]. Generally, FIEs tend to invest more in technology and often have more human capital than local firms. When workers move from FIEs to local firms, they may bring extensive knowledge of cutting-edge technology, which is a positive spillover for local firms' innovation [13,24]. The demonstration effect of FDI on the innovation of local firms refers to the fact that local firms carry out technological innovation by imitating the products and technologies of FIEs. Specifically, Hamida and Gugler [14] find that FDI has a positive demonstration effect on the innovation of manufacturing enterprises.

Second, the vertical spillovers of FDI on local innovation can be divided into forward and backward inter-industry spillovers [7,9]. On the one hand, when FIEs enter a host country as downstream purchasers, they cooperate with local suppliers and provide technical and management support for local firms to obtain high-quality products from upstream suppliers; this generates significant backward spillovers for local firms and improves their innovation capacity [5,12]. On the other hand, due to the entry of FIEs as upstream suppliers, downstream local firms not only have access to high-quality intermediate inputs but also receive support and after-sales service. Thus, local firms have more opportunities to obtain advanced technologies from FIEs. Through the spillovers from their suppliers, downstream local firms may improve their innovation capabilities [25,26]. For instance, Havranek and Irsova [27] show that the spillovers of foreign subsidiaries on upstream and downstream local suppliers and customers have been significant in the last decade. Therefore, FDI can promote regional innovation through vertical spillovers within supply chain networks.

Third, as FIEs increase their market share in the host country, competition between FIEs and local firms intensifies [10,21], which causes local firms to increase their R&D investment and innovation capabilities to cope with the competition [28]. Therefore, the entry of FDI will cause local firms to enhance innovation through positive competition effects and consequently improve regional innovation. To sum up, this paper proposes the following baseline hypothesis:

Baseline Hypothesis (BH). *FDI promotes regional innovation in the host country.*

2.2. Spatial Spillovers of FDI on Regional Innovation

An important feature of FDI in China is its uneven spatial distribution, which is due to the heterogeneous development of cities in the country [6,17]. In addition, FDI exhibits spatial agglomeration characteristics. For example, cities with high degrees of FDI utilization are often located adjacent to cities with similar levels of FDI utilization, which indicates that one city's level of FDI utilization could be associated with that of neighboring cities [29]. More specifically, the spatial spillovers of FDI on regional innovation can be reflected in the following dimensions.

First, due to the existence of spatial agglomeration, the spillovers of FDI may cross geographical or economic boundaries, affecting not only the innovation of the initial investment region but also the innovation of adjacent areas. At the same time, enterprises in a region make use not only of the FDI obtained locally but also of the FDI from neighboring regions [6,17]. Second, as was discussed earlier, FIEs have spatial spillovers on upstream and downstream partners through supply chain participation. For the consideration of benefits and costs, FIEs are more likely to cooperate with local firms in neighboring regions, resulting in vertical spillovers across geographical boundaries. Third, preferential foreign investment policies and tax policies in a given city may also have spatial spillovers on foreign investment in neighboring areas, especially cities located in the same province [24]. Therefore, FDI not only affects the innovation of the specific region in which it is located but also affects the innovation of neighboring regions. Based on the above analysis, this paper proposes Hypothesis 1, as follows:

Hypothesis 1 (H1). *FDI increases the innovation of neighboring regions through the spatial spillover effect.*

2.3. Threshold Effect of Urbanization on FDI Spillovers to Regional Innovation

There are large differences in the level of economic development between cities. The impact of FDI on regional innovation varies across cities, and different degrees of development may lead to heterogeneous impacts of FDI. Therefore, the influence of FDI on regional innovation could have a threshold effect [12,30].

As an important aspect of modernization and development, urbanization refers to the gradual increase in the non-agricultural population and the transformation from an agricultural society to urban industrial society in the process of industrialization of a country [31], including population urbanization, economic urbanization, and other dimensions. Greater urbanization is accompanied by a higher level of economic development and technological progress [32]. Therefore, urbanization is a crucial factor that influences FDI in a region, by determining its attractiveness to FDI firms [33].

The seminal work by King and Levine [34] is foundational to the largely shared view that financial intermediation provides important services to the economy and thus promotes economic growth in the long run. In the theoretical framework of Borensztein et al. [35], FDI contributes to economic growth only after a sufficient absorptive capability of the advanced technologies is achieved. To the extent that the ability to adopt foreign technology hinges on the level of human capital, a minimum threshold stock of human capital is required for the host economy to experience the positive effects of FDI. Specifically, Glaeser formalizes Marshall's theory in a model and demonstrates that urbanization increases human capital accumulation and knowledge spillovers [36]. Hence, when the level of urbanization meets a minimum threshold, FDI in the region begins to have positive spillovers and foster regional innovative activities. Based on the above theoretical models, it can be conjectured that the positive effects stemming from FDI become substantial only when the urbanization level is above a certain threshold.

To be more specific, in regions with high levels of urbanization, firms tend to have stronger absorptive capabilities and accumulate more human capital than firms in other regions; thus, FDI spillovers improve their ability to carry out technological innovation. In regions with low levels of urbanization, out-of-date information and backward technology prevent firms from taking advantage of FDI spillovers. Because FIEs possess relatively more sophisticated technology and more advanced knowledge, they are more competitive than local firms in the market, which inhibits the technological innovation of local firms in regions with low urbanization levels [37]. Therefore, FDI has a positive spillover effect on the innovation of local firms only when a city crosses the threshold level of urbanization. On the contrary, when a city does not meet the threshold urbanization level, FDI does not necessarily promote or inhibit the innovation of local firms. Accordingly, this paper proposes Hypothesis 2:

Hypothesis 2 (H2). *FDI has a positive effect on regional innovation in China only above a certain threshold of urbanization.*

3. Methodology and Data

3.1. Data Sources

The regional innovation data were sourced from the China Regional Innovation and Entrepreneurship Index, which is produced by the Enterprise Big Data Research Center at Peking University [38]. Following previous studies [39,40], the relevant data about city-level characteristics were derived from the China Urban Statistical Yearbook and China Statistical Yearbook. The sample provides a balanced panel dataset that consists of 253 cities in China from 2003 to 2017 for a total of 3795 city-year observations.

3.2. Variables

3.2.1. Dependent Variable: Regional Innovation

Since patent data are strictly regulated and accurate, following the previous literature [41], this study measured the regional innovation (*Innovation*) by the overall index of patents granted in the city for each year.

3.2.2. Main Independent Variables: FDI

The FDI level in each city was proxied by the logarithm of foreign direct investment flows in the city (*FDI*).

3.2.3. Distance Matrix

In the SAR spatial econometric model, the geographical distance matrix and economic distance matrix were used to construct the spatial weight matrix. The geographic distance matrix measures the geographical distance between cities. It is generally believed that smaller geographical distances are associated with higher correlations between the economic activity levels of cities. Therefore, this study employed the longitude and latitude coordinates of the cities provided by the website of the National Geographic Information System. STATA was used to calculate the spatial weight matrix of each city and conduct standardized processing for constructing the SAR model.

The economic distance matrix is similar to the geographical distance matrix, but the criterion for measuring distance in each of these matrices is different. In this paper, the difference between the average annual GDP of each city from 2003 to 2017 was used as the measurement index of the economic distance between pairs of cities. The economic distance matrix was also calculated using STATA.

3.2.4. Threshold Variable: Regional Urbanization

Following McDonald [42], this study employed the logarithm of urban population density (*Urbanization*) to measure the urbanization of the city for each year.

3.2.5. Control Variables

This study also controlled for the following variables that could affect regional innovation:

(1) *Economic development*: The logarithm of GDP per capita was used to proxy the economic development level of a city.

(2) *Financial development*: The ratio of the balance of loans of financial institutions to the city GDP at the end of the year was used to represent the level of financial development of the city. This measure is similar to that proposed by King and Levine [43] which uses the ratio of the overall liquid liabilities of formal institutions to GDP to measure financial development. The logic behind this measure is that the size of the financial sector can be measured by the provision of financial services.

(3) *Human capital*: The number of college and university students per 10,000 people in the city was used to characterize the level of human capital in the city [44]. The reason why this study adopted this measure is that it can reflect the quantity of skilled workers with college degrees who are capable of learning and implementing advanced technologies [45]. It should be acknowledged that students may come to a place with good educational institutions but migrate to a different place with better job opportunities as indicated in [46]. However, due to data limitations, this study adopted the method of a previous study [44] to measure human capital using the share of the population enrolled in colleges and universities.

(4) *High-Speed railway*: A dummy variable indicating whether the city had a high-speed rail station in that year.

Table 1 displays the descriptive statistics of the main variables. The mean value of the dependent variable innovation is 162.584; and the standard deviation is 76.586, indicating that there are large variations in innovation across cities. Meanwhile, the independent variable FDI exhibits a similar pattern. This allowed us to exploit spatial variations and apply the spatial econometric model.

Table 1. Summary statistics of variables.

	Variables	Observations	Mean	Standard Deviation
Dependent variable	innovation	3795	162.584	76.586
Independent variable	FDI	3795	5.031	1.884
Threshold variable	Urbanization	3795	5.830	0.795
Control variables	Economic development	3795	10.066	0.876
	Financial development	3795	1.231	1.082
	Human capital	3795	−4.823	1.184
	Free trade zone	3795	0.007	0.086
	High-speed railway	3795	0.256	0.436

3.3. Model Specification

To test the research hypotheses, the following baseline model was constructed to identify the direct spillover effect of FDI on regional innovation:

$$Innovation_{it} = \alpha + \beta FDI_{it} + \boldsymbol{X}_{\boldsymbol{it}}^{\prime}\boldsymbol{\Gamma} + D_i + D_t + \varepsilon_{it} \tag{1}$$

In Equation (1), $innovaton_{it}$ is the regional innovation of city i in year t, and FDI_{it} is the FDI utilization level of city i in year t. Note that $\boldsymbol{X_{it}}$ is a vector of various control variables; D_i denotes the city fixed effect; and D_t indicates the time fixed effect. Following convention, α is the intercept, and ε_{it} is the idiosyncratic disturbance term.

To capture the spatial spillover effect of FDI on regional innovation, a spatial interaction term was added to the model in Equation (1) and SAR was used for the estimate [47,48]. The SAR model allowed us to analyze the spatial dependence of regional innovation and estimate the direct effect, spillover effect, and total effect of FDI. Specifically, the spillover effect characterizes the spatial spillovers of inter-regional FDI on regional innovation. Thus, the SAR model is specified as follows:

$$Innovation_{it} = \alpha + \rho \cdot W \cdot Innovation_{jt} + \beta FDI_{it} + \boldsymbol{X}_{\boldsymbol{it}}^{\prime}\boldsymbol{\Gamma} + D_i + D_t + \varepsilon_{it} \tag{2}$$

In Equation (2), $innovaion_{jt}$ represents regional innovation of city j in year t, and ρ represents the correlation coefficient of spatial lag factor. If ρ is greater (less) than 0, it indicates a positive (negative) spatial correlation. W represents the spatial weight matrix of each city, which captures the spatial dependence of regional innovation. The SAR model was estimated using STATA [49].

Finally, following the literature [2,50,51], to assess whether the impact of FDI on regional innovation is affected by regional urbanization, a dynamic threshold regression model was constructed using regional urbanization as the threshold variable. The threshold model is specified as follows:

$$Innovation_{it} = \alpha + \beta_1 FDI_{it} I(urbanization_{i,t} \leq \gamma) + \beta_2 FDI_{it} I(urbanization_{i,t} > \gamma) + \boldsymbol{X}_{\boldsymbol{it}}^{\prime}\boldsymbol{\Gamma} + D_i + D_t + \varepsilon_{it} \tag{3}$$

In Equation (3), regional urbanization, $urbanization_{it}$ is the threshold variable, and γ is the threshold value to be estimated. $I(\cdot)$ denotes the indicator function. β_1 and β_2 represent the coefficients of the influence of FDI on regional innovation in regions that are larger than the threshold value and smaller than the threshold value, respectively.

4. Results

Table 2 reports the pairwise correlation coefficients between variables. The correlation coefficients for economic development, human capital, and foreign investment utilization level were relatively high, indicating that the degree of economic development was associated with the level of foreign investment and the stock of human capital. Table 3 summarizes the Variance Inflation Factors (VIF) for the explanatory variables. The VIF of each variable was below the conventional threshold of 10, indicating that multicollinearity was unlikely to be a major concern in this research. The discussions of the results are presented in the following sections.

Table 2. Pairwise correlation matrix.

	Variables	1	2	3	4	5	6	7
1	Innovation	1						
2	FDI	0.598	1					
3	Urbanization	0.538	0.408	1				
4	Economic development	0.475	0.592	0.168	1			
5	Financial development	0.090	0.146	0.021	0.070	1		
6	Human capital	0.574	0.510	0.243	0.612	0.247	1	
7	High-speed railway	0.254	0.358	0.243	0.401	0.315	0.305	1

Table 3. Variance inflation factors.

	VIF	Tolerance
Economic development	2.16	0.460
FDI	1.90	0.528
Human capital	1.82	0.550
High-speed railway	1.39	0.721
Urbanization	1.27	0.790
Financial development	1.21	0.830
Mean VIF	1.62	

4.1. Baseline Results

To test the baseline hypothesis, this paper first used OLS to estimate the model. Table 4 reports the results of the OLS estimation of the effect stemming from FDI on regional innovation. In Columns (1) and (2) of Table 4, the estimated coefficients of the variable of interest, *FDI*, were significantly positive, indicating that FDI promotes regional innovation. The results are consistent with the Baseline Hypothesis.

Table 4. Baseline regression results of FDI's influence on regional innovation.

Variables	Innovation	
	(1)	**(2)**
FDI	1.559 *** 0.363	0.859 ** 0.430
Urbanization		28.711 *** (2.433)
Economic development		0.632 (1.144)
Financial development		−0.451 (0.505)
Human capital		5.420 *** (1.262)
High-speed railway		0.172 (1.388)
Constant	154.740 *** (3.441)	23.892 *** (21.370)

Table 4. *Cont.*

Variables	Innovation (1)	(2)
R-square	0.358	0.415
Observations	3795	3795
Number of years	15	15
Number of cities	253	253

Note: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The control variables are outlined in Column (2) of Table 4. The estimated coefficients of *urbanization* and *human capital* were positive and statistically significant at the 1% level. The estimated coefficient for *urbanization* implies that the expansion of city scale and the improvement of urbanization tend to facilitate regional innovation. The estimated coefficient for *human capital* indicates that improvements in the quality of the regional labor force lead to increases in the absorption and utilization level of technology in the region, which boosts regional innovation. These results highlight the importance of promoting regional urbanization and improving the education system in enhancing regional innovation [52].

4.2. Spatial Spillover Effect Analysis

4.2.1. Spatial Dependence Test

Following the existing literature [6,18], this study adopted Moran's I statistics to test the spatial dependence of innovation among the 253 cities in the sample using the geographical distance matrix. The value of Moran's I ranges from -1 to 1. Note that a positive (negative) Moran's I indicates a positive (negative) spatial dependence of economic activities in each region. If Moran's I is close to 0, it indicates that there is no spatial correlation, that is, the spatial distribution of economic activities is random. Larger absolute values of Moran's I indicate a stronger spatial dependence of economic activity. Table 5 shows the values of Moran's I for the regional innovation of Chinese cities for each year from 2003 to 2017. For these years, the standardized value $Z(I)$ of Moran's I fluctuated between 0.183 to 0.529; all the values were significant at the 1% level. These findings indicate that there was a positive spatial correlation in regional innovation between Chinese cities, that is, regional innovation imparts agglomeration effects that lead to clustering in terms of spatial distribution. Therefore, it is important to account for spatial dependence when studying regional innovation and its determinants.

Table 5. Moran's I statistics for regional innovation from 2003 to 2017.

Year	Z(I) (Moran's I Row Standardization)	p Values
2003	0.219	0.000
2004	0.183	0.000
2005	0.237	0.000
2006	0.183	0.000
2007	0.237	0.000
2008	0.256	0.000
2009	0.402	0.000
2010	0.475	0.000
2011	0.420	0.000
2012	0.438	0.000
2013	0.475	0.000
2014	0.456	0.000
2015	0.475	0.000
2016	0.511	0.000
2017	0.529	0.000

4.2.2. SAR Model Regression

This study employed the SAR model to estimate Equation (2), and the results are reported in Table 6. Each column displays the estimated coefficients of major variables and spatial correlation coefficients, along with the estimated values of the direct effect, spillover effect, and total effect.

Table 6. SAR model of FDI's influence on regional innovation.

Spatial Matrix Type	**Geographic Distance Matrix**		**Economic Distance Matrix**	
Variables	**Innovation**			
ρ (Space factor)	0.750 *** (0.044)	0.673 *** (0.046)	0.718 *** (0.018)	0.580 *** (0.018)
FDI	0.186 *** (0.004)	0.078 *** (0.005)	0.123 *** (0.004)	0.055 *** (0.005)
Urbanization		0.226 *** (0.010)		0.197 *** (0.009)
Economic development		0.106 *** (0.014)		0.074 *** (0.012)
Financial development		0.018 * (0.009)		0.021 ** (0.009)
Human capital		0.128 *** (0.008)		0.091 *** (0.008)
High-speed railway		0.052 ** (0.021)		0.040 ** (0.019)
Direct effect	0.188 *** (0.005)	0.078 *** (0.005)	0.134 *** (0.004)	0.058 *** (0.005)
Indirect effect	0.568 *** (0.136)	0.163 *** 0.039)	0.303 *** (0.023)	0.073 *** (0.008)
Total effect	0.756 *** 0.136)	0.242 *** (0.041)	0.437 *** (0.024)	0.130 *** (0.012)
R-square	0.098	0.179	0.254	0.401
Observations	3795	3795	3795	3795
Number of years	15	15	15	15
Number of cities	253	253	253	253

Note: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

As shown in Table 6, when controlling for the relevant variables, the spatial autoregressive coefficient of regional innovation in the SAR model was positive and statistically significant at the 1% level. This shows that there was a significantly positive correlation between the innovation levels of neighboring cities. There is an interaction effect of innovation level among cities, that is, the effect of FDI on local innovation in a city depends on the innovation capacities of its neighboring cities. Cities that are closer together experience stronger demonstration effects, employee turnover effects, forward and backward correlation effects, and competition effects. The diffusion of technology and knowledge promotes collaborative innovation among neighboring cities, thus promoting the spatial agglomeration of innovative activities.

The SAR model in Table 6 not only explores the spatial dependence of innovation levels among cities but also examines the direct effect of FDI in each city, the spillover effect of FDI across cities, and the total effect of FDI on innovation. In Column (2) of Table 6, the direct effect coefficient of FDI on innovation was 0.078; the spillover effect coefficient of FDI on innovation was 0.163; the total effect coefficient of FDI on the innovation level was 0.242. All these coefficients were significant at the 1% level. Therefore, FDI had a positive and significant spatial spillover effect on regional innovation, which supports Hypothesis 1. Moreover, it was found that the absolute value of the coefficient of the spillover effect was greater than that of the indirect effect, that is, the influence of inter-city FDI spillovers on innovation was more pronounced than that of intra-city FDI spillovers, which is closely in line with the phenomenon of delocalization [53].

It should be noted that different spatial weight matrices could affect the spatial econometric regression results. Therefore, to ensure the robustness of the findings, this study also used the economic distance matrix as the spatial weight matrix for spatial regression, and the results are shown in Columns (3) and (4) of Table 6. The results indicate that the spatial coefficient of regional innovation remained significantly positive, and FDI still had a significant spatial spillover effect on regional innovation capacity. The spatial regression results using the two spatial weight matrices were consistent, which supports Hypothesis 1.

4.3. Threshold Analysis with Urbanization as the Threshold

Considering the possible non-monotonic impact of urbanization, which has been discussed previously, this study further explored the spillover effects using urbanization as the threshold. Before estimating the threshold model, an existence test for panel thresholds was conducted following the method of Hansen [50]. It was found that the regional urbanization level variable contained a single threshold and estimated its value. It is noteworthy that F = 46.03 and P = 0.000 for Column (1), while F = 42.34 and P = 0.003 for Column (2). Therefore, this study estimated a single threshold regression model, and the results are shown in Table 7. The impact of FDI on regional innovation had a significant threshold effect in terms of urbanization, indicating that the impact of FDI on regional innovation varied with the urbanization level of each city.

Table 7. Threshold regression analysis.

Variables	Innovation (1)	Innovation (2)
Threshold value γ	5.424	5.471
FDI*I (Urbanization $\leq \gamma$)	−1.752 *	−1.979 **
	(0.954)	(0.883)
FDI*I (Urbanization $> \gamma$)	1.638 **	1.202 *
	(0.786)	(0.699)
Economic development		2.814
		(2.017)
Financial development		0.695
		(0.814)
Human capital		−3.340
		(2.392)
High-speed railway		0.829
		(2.263)
Constant	158.310 ***	115.114 ***
	(3.577)	(29.013)
Observations	3795	3795
Number of years	15	15
Number of cities	253	253

Note: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

In Column (2) of Table 7, the single threshold value of the urbanization level was 5.471. When *urbanization* was less than the threshold value of 5.471, the coefficient for the impact of FDI on regional innovation was −1.979, which was highly significant at the 5% level. When *urbanization* was greater than the threshold value of 5.471, the estimated coefficient was 1.202, which was significant at the 10% level. This means that when urbanization is low and the threshold has not been reached, FDI inhibits regional innovation. When the urbanization level of a region exceeds a certain threshold value, FDI significantly promotes regional innovation. One possible explanation is that increases in urbanization promote the absorption capacity of FDI spillovers by local firms. However, in regions with low urbanization levels, local firms have a weaker absorption capacity and are consequently less able to absorb FDI spillovers, which inhibits their innovation when competing against FIEs.

To sum up, FDI flows have a dynamic effect on regional innovation that is moderated by the urbanization level. The influence of FDI on regional innovation is subject to a threshold effect based on the degree of urbanization, which supports Hypothesis 2.

4.4. Robustness Tests

4.4.1. Different Categories of Innovation

Patents can be divided into the following three categories: invention patents, utility patents, and appearance patents. As a robustness check, this study constructed variables for the index of invention patents (*Invention*), utility patents (*Utility*), and appearance patents (*Appearance*). Since different types of patents are associated with different technologies and different types of innovation are affected heterogeneously by FDI spillovers, robustness tests were conducted by estimating the model using three alternative measures of the dependent variable. Table 8 shows that FDI had significant impacts and spatial spillover effects for each of the three categories of innovation. Therefore, our findings were robust in the division of different innovation categories.

Table 8. Robustness test: different categories of innovation.

Spatial Matrix Type	**Geographic Distance Matrix**			**Economic Distance Matrix**		
Variables	**Invention (1)**	**Utility (2)**	**Appearance (3)**	**Invention (4)**	**Utility (5)**	**Appearance (6)**
ρ (Space factor)	0.445 ***	0.623 ***	0.492 ***	0.394 ***	0.499 ***	0.395 ***
	(0.074)	(0.053)	(0.060)	(0.024)	(0.020)	(0.025)
FDI	0.084 ***	0.097 ***	0.094 ***	0.066 ***	0.076 ***	0.076 ***
	(0.008)	(0.007)	(0.008)	(0.008)	(0.006)	(0.008)
Urbanization	0.227 ***	0.257 ***	0.271 ***	0.199 ***	0.220 ***	0.269 ***
	(0.016)	(0.013)	(0.016)	(0.015)	(0.013)	(0.015)
Economic development	0.137 ***	0.123 ***	0.066 ***	0.111 ***	0.099 ***	0.039*
	(0.022)	(0.019)	(0.022)	(0.021)	(0.017)	(0.021)
Financial development	0.004	−0.002	0.042 ***	0.006	−0.00018	0.047 ***
	(0.015)	(0.013)	(0.015)	(0.014)	(0.012)	(0.014)
Human capital	0.178 ***	0.161 ***	0.107 ***	0.151 ***	0.129 ***	0.081 ***
	(0.013)	(0.011)	(0.013)	(0.013)	(0.010)	(0.013)
High-speed railway	0.096 ***	0.015	0.053	0.081**	0.007	0.057*
	(0.033)	(0.028)	(0.033)	(0.032)	(0.026)	(0.032)
Direct effect	0.084 ***	0.098 ***	0.095 ***	0.067 ***	0.079 ***	0.077 ***
	(0.008)	(0.007)	(0.008)	(0.008)	(0.007)	(0.008)
Indirect effect	0.069 ***	0.164 ***	0.093 ***	0.041 ***	0.073 ***	0.048 ***
	(0.023)	(0.041)	(0.025)	(0.006)	(0.008)	(0.007)
Total effect	0.153 ***	0.262 ***	0.188 ***	0.109 ***	0.152 ***	0.125 ***
	(0.027)	(0.044)	(0.029)	(0.013)	(0.014)	(0.014)
R-square	0.250	0.231	0.213	0.313	0.398	0.294
Observations	3795	3795	3795	3795	3795	3795
Number of years	15	15	15	15	15	15
Number of cities	253	253	253	253	253	253

Note: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.4.2. Regional Heterogeneity

Since there are large differences in resource endowments and economic development across different regions in China, the spatial distribution of regional innovation and the foreign investment utilization of each city could be heterogeneous. Therefore, the impact of FDI on regional innovation may also be heterogeneous with regard to regional distribution. China's National Bureau of Statistics divides cities into eastern, central, and western cities. The descriptive statistics of variables for cities in the eastern, central, and western regions are summarized in Table 9. The means of regional innovation and foreign investment were substantially different between regions. Meanwhile, the proportion of cities above the threshold of the urbanization level in the eastern region was higher than in the central and western regions.

Table 9. Descriptive statistics of innovation, FDI and urbanization in each region.

Innovation				
Classification of cities	Observations		Mean	Standard deviation
Eastern region	1650		193.496	74.904
Central region	1560		139.575	67.054
Western region	585		136.752	74.009
FDI				
Eastern region	1650		5.651	1.658
Central region	1560		4.997	1.684
Western region	585		3.370	1.965
Urbanization				
Classification of cities	Observations	Observations above the threshold	Mean	Standard deviation
Eastern region	1650	1285	6.069	0.651
Central region	1560	939	5.633	0.897
Western region	585	369	5.680	0.690

Table 10 reports the regression results for the regional heterogeneity of the impact of FDI spillovers on regional innovation. Table 10 shows that FDI in eastern China significantly promoted regional innovation. In contrast, FDI had no significant impact on regional innovation in central and western China. Table 9 shows that the FDI utilization level and regional innovation level in the eastern region were higher than those in the central region and the western region; meanwhile, the impact of FDI on regional innovation was significant for the eastern region only. The reason for this pattern could be that, compared with the central and western regions, the eastern region of China has a higher level of economic development and urbanization. Foreign investment entered the eastern region earlier than other regions, which allowed the spillovers of FDI to be fully realized. As shown in Table 9, more cities in the eastern region have passed the threshold level of urbanization. Specifically, 77.9% of cities in the eastern region exceeded the threshold level of urbanization, while the proportions of cities in the central and western regions above the threshold were less than 65%. Therefore, the spillover effect of FDI in eastern China was more pronounced.

Table 10. Robustness test: regional heterogeneity.

Variables	**Eastern Region (1)**	**Central Region (2)**	**Western Region (3)**
FDI	2.498 ***	−0.642	−0.196
	(0.830)	(1.186)	(0.888)
Urbanization	19.553 ***	28.293 ***	28.601 **
	(5.055)	(5.166)	(13.477)
Economic development	0.709	−1.149	−2.392
	(3.357)	(3.321)	(3.474)
Financial development	−1.517	0.136	−0.129
	(1.393)	(1.170)	(1.998)
Human capital	2.846	9.011 ***	8.610 **
	(4.440)	(3.478)	(4.242)
High-speed railway	−1.108	3.336	0.897
	(3.086)	(4.409)	(4.515)
constant	68.963(56.128)	37.485(57.006)	42.205(91.451)

Table 10. *Cont.*

Variables	Eastern Region (1)	Central Region (2)	Western Region (3)
R-square	0.532	0.345	0.406
Observations	1650	1560	585
Number of years	15	15	15
Number of cities	110	104	39

Note: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5. Discussion

5.1. Theoretical Implications

The theoretical implications of this study are threefold. On one hand, this study systematically investigated the spatial spillovers of FDI in promoting regional innovation in China and scrutinized the underlying mechanisms of such an effect. This study demonstrated the importance of identifying and quantifying spillovers of FDI using spatial models in the setting of China, as regional heterogeneity and spatial agglomeration were accounted for. The diffusion of technology and knowledge through FDI facilitates collaborative innovation among neighboring cities, thus promoting the spatial agglomeration of innovative activities. Our identification strategy provided a comprehensive estimation of the spatial spillovers of FDI on regional innovation, which have not been discussed thoroughly in previous studies. On the other hand, the threshold regression analysis indicates that the spatial spillovers of FDI are not unconditional but depend on the level of urbanization. The positive effects of FDI on regional innovation become significant only when the urbanization level of a region exceeds a certain threshold. To the extent that the ability to adopt foreign technology hinges on the level of human capital, a threshold level of urbanization is required for the host region to experience the positive effects of FDI [36]. This analysis reveals some new findings on FDI spillovers in China, the world's largest recipient of FDI among emerging countries. The findings of this study deepen the understanding of how FDI spurs innovation that leads to an increase in sustainable competitive advantages across regions in emerging markets [54,55]. Furthermore, the study corroborates the important role of FDI in inducing entrepreneurial activities and promoting the growth of productivity in Asia-Pacific Economic Cooperation economies, especially in East Asia [56].

5.2. Policy Implications

In China, the innovation environment is complex and the economic institutions are heterogeneous [57,58]. This study has important implications for policymakers. First, given the significant spillovers of FDI on China's regional innovation, corresponding preferential policies should be arranged to encourage the development of FIEs, with the aim of promoting regional innovation and building a better regional innovation environment. Second, due to the spatial spillovers of FDI, the government can strengthen cross-regional cooperation to enhance the coordinated development of all regions. Specifically, the government should take into account the influence of location factors, strengthen information flows between neighboring cities, and foster the sharing of human capital, finance, technology, and other resources. Third, after FIEs enter the host country, cooperation with local upstream and downstream enterprises promotes innovation by relevant enterprises through industrial linkages. Therefore, the government should encourage cooperation between domestic and foreign enterprises in the region and build a platform for upstream and downstream cooperation between these enterprises. Finally, different regions should formulate FDI-introduction policies according to their degrees of urbanization. Only cities that are above the threshold level of urbanization benefit from significant FDI spillover effects. This is attributed to the fact that the urbanization level is an important driving force for FDI in promoting regional innovation.

6. Conclusions

The trends in globalization and spatial agglomeration of economic activities offer new opportunities to study the determinants of innovation. Using China's city-level data from 2003 to 2017, this paper employed a SAR spatial econometric model and a threshold model to examine the impact of FDI on China's regional innovation and its underlying mechanisms. The main findings are as follows. First, FDI has significantly improved regional innovation. FIEs, relying on their advanced technology and innovation advantages, have become an important factor in promoting innovative activities in Chinese cities. Secondly, the spatial spillovers of FDI on China's regional innovation have been systematically identified. FDI contributes to the formation of coordinated development among neighboring cities, and regional innovation is characterized by spatial agglomeration. Third, the impact of FDI on regional innovation is subject to a significant threshold effect associated with the level of urbanization. FDI promotes regional innovation only when the urbanization level of a city crosses the threshold value; otherwise, it inhibits regional innovation. These results confirm that regional urbanization and FDI jointly improve regional innovation and facilitate FDI spillovers. Finally, it was found that cities in eastern China were better able to absorb the spillover effects of FDI than cities in central and western China.

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References

1. Hasan, I.; Tucci, C.L. The innovation–economic growth nexus: Global evidence. *Res. Policy* **2010**, *39*, 1264–1276. [CrossRef]
2. Girma, S.; Gong, Y.; Görg, H.; Lancheros, S. Estimating direct and indirect effects of foreign direct investment on firm productivity in the presence of interactions between firms. *J. Int. Econ.* **2015**, *95*, 157–169. [CrossRef]
3. Newman, C.; Rand, J.; Talbot, T.; Tarp, F. Technology transfers, foreign investment and productivity spillovers. *Eur. Econ. Rev.* **2015**, *76*, 168–187. [CrossRef]
4. Zhang, Y.A.; Li, Y.; Li, H. FDI Spillovers Over time in an emerging market: The roles of entry tenure and barriers to imitation. *Acad. Manag. J.* **2014**, *57*, 698–722. [CrossRef]
5. Liang, F.H. Does foreign direct investment improve the productivity of domestic firms? Technology spillovers, industry linkages, and firm capabilities. *Res. Policy* **2017**, *46*, 138–159. [CrossRef]
6. Lin, M.; Kwan, Y.K. FDI technology spillovers, geography, and spatial diffusion. *Int. Rev. Econ. Financ.* **2016**, *43*, 257–274. [CrossRef]
7. Orlic, E.; Hashi, I.; Hisarciklilar, M. Cross sectoral FDI spillovers and their impact on manufacturing productivity. *Int. Bus. Rev.* **2018**, *27*, 777–796. [CrossRef]
8. Cohen, W.M.; Levinthal, D.A. Innovation and learning: The two faces of R&D. *Econ. J.* **1989**, *99*, 569–596. [CrossRef]
9. Lu, Y.; Tao, Z.; Zhu, L. Identifying FDI spillovers. *J. Int. Econ.* **2017**, *107*, 75–90. [CrossRef]
10. Meng, S.; Sima, Y. Foreign competition and corporate social responsibility: The role of the firm–government relationships. *Chin. Manag. Stud.* **2022**. [CrossRef]
11. Cohen, W.M. Fifty years of empirical studies of innovative activity and performance. In *Handbook of the Economics of Innovation*; Elsevier: Amsterdam, The Netherlands, 2010; Volume 1, pp. 129–213. [CrossRef]
12. Alfaro, L.; Chanda, A.; Kalemli-Ozcan, S.; Sayek, S. FDI and economic growth: The role of local financial markets. *J. Int. Econ.* **2004**, *64*, 89–112. [CrossRef]

13. Fosfuri, A.; Motta, M.; Rønde, T. Foreign direct investment and spillovers through workers' mobility. *J. Int. Econ.* **2001**, *53*, 205–222. [CrossRef]
14. Hamida, L.B.; Gugler, P. Are there demonstration-related spillovers from FDI?: Evidence from Switzerland. *Int. Bus. Rev.* **2009**, *18*, 494–508. [CrossRef]
15. Javorcik, B.S. Does foreign direct investment increase the productivity of domestic firms? In search of spillovers through backward linkages. *Am. Econ. Rev.* **2004**, *94*, 605–627. [CrossRef]
16. Lin, M.; Kwan, Y.K. FDI spatial spillovers in China. *World Econ.* **2015**, *40*, 1514–1530. [CrossRef]
17. Madariaga, N.; Poncet, S. FDI in Chinese cities: Spillovers and impact on growth. *World Econ.* **2007**, *30*, 837–862. [CrossRef]
18. Shang, Q.; Poon, J.P.; Yue, Q. The role of regional knowledge spillovers on China's innovation. *China Econ. Rev.* **2012**, *23*, 1164–1175. [CrossRef]
19. Blomström, M.; Kokko, A. Multinational corporations and spillovers. *J. Econ. Surv.* **1998**, *12*, 247–277. [CrossRef]
20. Adikari, A.M.; Liu, H.; Marasinghe, M.M.S.A. Inward foreign direct investment-induced technological innovation in Sri Lanka? Empirical evidence using ARDL approach. *Sustainability* **2021**, *13*, 7334. [CrossRef]
21. Fons-Rosen, C.; Kalemli-Ozcan, S.; Sorensen, B.E.; Villegas-Sanchez, C.; Volosovych, V. Foreign investment and domestic productivity: Identifying knowledge spillovers and competition effects. *Natl. Bur. Econ. Res.* 2017. Available online: https://www.nber.org/papers/w23643 (accessed on 30 December 2021).
22. Negash, E.S.; Zhu, W.; Lu, Y.; Wang, Z. Does Chinese inward foreign direct investment improve the productivity of domestic firms? Horizontal linkages and absorptive capacities: Firm-Level evidence from Ethiopia. *Sustainability* **2020**, *12*, 3023. [CrossRef]
23. Zhang, Y.; Li, H.; Li, Y.; Zhou, L.A. FDI spillovers in an emerging market: The role of foreign firms' country origin diversity and domestic firms' absorptive capacity. *Strateg. Manag. J.* **2010**, *31*, 969–989. [CrossRef]
24. Cheung, K.Y.; Lin, P. Spillover effects of FDI on innovation in China: Evidence from the provincial data. *China Econ. Rev.* **2004**, *15*, 25–44. [CrossRef]
25. Isaksson, O.H.; Simeth, M.; Seifert, R.W. Knowledge Spillovers in the supply chain: Evidence from the High Tech sectors. *Res. Policy* **2016**, *45*, 699–706. [CrossRef]
26. Wang, C.C.; Wu, A. Geographical FDI knowledge spillover and innovation of indigenous firms in China. *Int. Bus. Rev.* **2016**, *25*, 895–906. [CrossRef]
27. Havranek, T.; Irsova, Z. Estimating vertical spillovers from FDI: Why results vary and what the true effect is. *J. Int. Econ.* **2011**, *85*, 234–244. [CrossRef]
28. Fu, X. Foreign direct investment, absorptive capacity and regional innovation capabilities: Evidence from China. *Oxford Dev. Stud.* **2008**, *36*, 89–110. [CrossRef]
29. Cheng, S.; Lin, K.; Simmons, R. A city-level analysis of the distribution of FDI within China. *J. Chin. Econ. Foreign Trade Stud.* **2017**, *10*, 2–18. [CrossRef]
30. Huang, L.; Liu, X.; Xu, L. Regional innovation and spillover effects of foreign direct investment in China: A threshold approach. *Reg. Stud.* **2012**, *46*, 583–596. [CrossRef]
31. Chen, Q.; Song, Z. Accounting for China's urbanization. *China Econ. Rev.* **2014**, *30*, 485–494. [CrossRef]
32. Bertinelli, L.; Black, D. Urbanization and growth. *J. Urban Econ.* **2004**, *56*, 80–96. [CrossRef]
33. Hsiao, C.; Shen, Y. Foreign direct investment and economic growth: The importance of institutions and urbanization. *Econ. Dev. Cult. Change* **2003**, *51*, 883–896. [CrossRef]
34. King, R.G.; Levine, R. Finance and growth: Schumpeter might be right. *Q. J. Econ.* **1993**, *108*, 717–737. [CrossRef]
35. Borensztein, E.; De Gregorio, J.; Lee, J.W. How does foreign direct investment affect economic growth? *J. Int. Econ.* **1998**, *45*, 115–135. [CrossRef]
36. Glaeser, E.L. Learning in cities. *J. Urban Econ.* **1999**, *46*, 254–277. [CrossRef]
37. Chen, J.; Wang, L.; Li, Y. Natural resources, urbanization and regional innovation capabilities. *Resour. Policy* **2020**, *66*, 101643. [CrossRef]
38. Zhang, X. China Regional innovation and Entrepreneurship Index. In *Peking University Open Research Data Platform*; Peking University: Beijing, China, 2019. [CrossRef]
39. Li, J.; Chen, L.; Chen, Y.; He, J. Digital economy, technological innovation, and green economic efficiency—Empirical evidence from 277 cities in China. *Manag. Decis. Econ.* **2021**, *43*, 616–629. [CrossRef]
40. Zhao, C.; Wang, B. Does China's low-carbon pilot policy promote foreign direct investment? An empirical study based on city-level panel data of China. *Sustainability* **2021**, *13*, 10848. [CrossRef]
41. Chen, L.; Li, W. Language acquisition and regional innovation: Evidence from English proficiency in China. *Manag. Decis. Econ.* **2022**, *43*, 178–191. [CrossRef]
42. McDonald, J.F. Econometric studies of urban population density: A survey. *J. Urban Econ.* **1989**, *26*, 361–385. [CrossRef]
43. King, R.G.; Levine, R. Finance, entrepreneurship and growth. *J. Monet. Econ.* **1993**, *32*, 513–542. [CrossRef]
44. Su, Y.; Liu, Z. The impact of foreign direct investment and human capital on economic growth: Evidence from Chinese cities. *China Econ. Rev.* **2021**, *37*, 97–109. [CrossRef]
45. Abel, J.R.; Deitz, R. Do colleges and universities increase their region's human capital? *J. Econ. Geogr.* **2012**, *12*, 667–691. [CrossRef]
46. Barro, R.J.; Lee, J.W. A new data set of educational attainment in the world, 1950–2010. *J. Dev. Econ.* **2013**, *104*, 184–198. [CrossRef]

47. Blanc-Brude, F.; Cookson, G.; Piesse, J.; Strange, R. The FDI location decision: Distance and the effects of spatial dependence. *Int. Bus. Rev.* **2014**, *23*, 797–810. [CrossRef]
48. Blonigen, B.A.; Davies, R.B.; Waddell, G.R.; Naughton, H.T. FDI in space: Spatial autoregressive relationships in foreign direct investment. *Eur. Econ. Rev.* **2007**, *51*, 1303–1325. [CrossRef]
49. Belotti, F.; Hughes, G.; Mortari, A.P. Spatial panel-data models using Stata. *Stata J.* **2017**, *17*, 139–180. [CrossRef]
50. Hansen, B.E. Threshold effects in non-dynamic panels: Estimation, testing, and inference. *J. Econom.* **1999**, *93*, 345–368. [CrossRef]
51. Wang, H.; Liu, H. An empirical research of FDI spillovers and financial development threshold effects in different regions of China. *Sustainability* **2017**, *9*, 933. [CrossRef]
52. Andersson, R.; Quigley, J.M.; Wilhelmsson, M. Urbanization, productivity, and innovation: Evidence from investment in higher education. *J. Urban Econ.* **2009**, *66*, 2–15. [CrossRef]
53. Siotis, G. Foreign direct investment strategies and firms' capabilities. *J. Econ. Manag. Strategy* **1999**, *8*, 251–270. [CrossRef]
54. De Mello, L.R., Jr. Foreign direct investment in developing countries and growth: A selective survey. *J. Dev. Stud.* **1997**, *34*, 1–34. [CrossRef]
55. Vujanović, N.; Radošević, S.; Stojčić, N.; Hisarciklilar, M.; Hashi, I. FDI spillover effects on innovation activities of knowledge using and knowledge creating firms: Evidence from an emerging economy. *Technovation* **2022**, *118*, 102512. [CrossRef]
56. Bandyopadhyay, D. How financial development caused economic growth in APEC countries: Financial integration with FDI or privatization without FDI. *Asia Pac. Dev. J.* **2006**, *13*, 75–100. Available online: https://repository.unescap.org/bitstream/handle/20.500.12870/2346/ESCAP-2006-JN-APDJ-V13N1.pdf?sequence=1#page=84 (accessed on 10 May 2022). [CrossRef]
57. Han, G.; Zhang, Z. Regional innovation paths selection in complex environments of China: A configurational perspective. *Manag. Decis. Econ.* **2021**. [CrossRef]
58. Su, H.; Cai, F.; Huang, Y. Institutional constraints and exporting of emerging-market firms: The moderating role of innovation capabilities and digital transformation. *Manag. Decis. Econ.* **2022**. [CrossRef]