Spatial Determinants of Inward FDI in China: Evidence from Provinces (Preliminary)

Kangning Xu,   Xiuyan Liu,   Bin Qiu[*]

Abstract

This paper investigates the spatial determinants of foreign direct investment (FDI) which is a driving force for China's fast economic growth from the perspective of new economic geography theory. It highlights the importance of agglomeration economies in attracting FDI into China. Using panel data sets of the areas at provincial level in China during the period of 1998-2007, this study finds that agglomeration economies is one important factor that influences the location choices of FDI in China, and the cumulative FDI in an area may have crucial demonstration effect on the decision-making of new FDI entrants. Our estimation results also show that labor costs are still one crucial element for the location choices of FDI; however, labor quality is playing a more and more important part in attracting FDI from the U.S. and European countries. The estimation results also suggest that generated by the analysis of core-periphery framework, the two mega-cities of Hong Kong and Shanghai as the cores of agglomeration have significant influence on the location choices of FDI in China. For FDI from different sources, there exist country-specific features, which mean previous cumulative foreign investments have led to the concentration of new investments from same source country.

Key words: China, FDI, spatial determinants, agglomeration economies

JEL : F2, R3

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1. Introduction

Since China implemented reform and opening-up to the outside world policies at the end of 1970s, large amount of inflow of foreign direct investment (hereafter FDI) has become phenomenal feature of Chinese economy, which is also one of the most important reasons of China's fast economic growth. The accession into the WTO made China a "hot land" in attracting FDI inflow in the world, which led to the fact that China replaced the U.S. and became the largest country in the world of foreign capital inflow in 2003.

By the end of 2006, the accumulated FDI China had absorbed amounted to 524 billion U.S. dollars, most of which were agglomerated in coastal regions in the eastern part of China. Respectively, the percentages of actually utilized FDI in eastern, central and western part of China are 86.85%, 8.79% and 4.37%. Some previous research proved that FDI is one of the important factors that resulted in China's regional imbalance in economic development (Wei et al, 2002). In that case, what are the most crucial elements that decided the location distribution of FDI in China? Why most of FDI concentrated in the eastern part of China and very less in the western part? Are there any other determinants for the above-mentioned result apart from the common economic geographic factors? In addition, what part did FDI play in driving the performance of economic growth in different regions of China? The aim of this paper is to explore the determinants of location distribution of FDI in China and the role of FDI in regional economic growth from the perspectives of market conditions, increasing return on scales, core-periphery mode, and technology spillovers based on new economic geography and endogenous economic growth theories.

This paper empirically studies the above issues, using the panel data sets of provinces of China from 1998 to 2007. Our study found that there exist apparent agglomeration effects in the location choices for FDI in China, i.e. the accumulation of FDI in a certain region exerts a strong effect on FDI especially on the decision-making of newly incoming FDI. Simultaneously, there exist relatively obvious home market effects in FDI location distribution in China, i.e. FDI had a tendency of entering into regions with large market scales and high level of consumptions, which reflected a fact that FDI that China had attracted was home market-oriented. Moreover, labor cost had double significances on the FDI distribution in China, on one side, FDI tended to flow into those areas with cheap labor cost; on another side, FDI also tended to concentrate in areas with high talents which indicate that the labor costs are not so cheap, this is even evident in the latter time period of China's reform and opening-up.

Profound analysis has also been made from some new perspectives employed in new economic geography theory that are quite different from the commonly used economic variables and some interesting conclusions have been made. For example,

within the core-periphery framework, we found that of all the large cities in China, as the largest business centers, Hong Kong and Shanghai have the most crucial impact on the location distribution of FDI in China. However, Beijing, the capital city of China, exerts less important impact on the location distribution of FDI in China. In terms of the impact of traffic infrastructure on the location choice of FDI in China, completeness of aviation conditions is more attractive to FDI compared to that of roadway infrastructure. For different sources of FDI inflow, country/region factor has corresponding features for different determinants of FDI in China. For example, for FDI from such countries as Korea, Australia, Germany, Japan and Singapore, there are obvious source country agglomeration effects, whereas the agglomeration effects are not so obvious for capital from France, the U.S., UK and Taiwan. FDI from Korea, Australia, Singapore and Taiwan is sensitive to labor quality, while FDI from other countries and regions tended to flow into areas with high quality of labor.

This paper is organized as follows. Section 2 is literature review and establishment of theoretical hypotheses for the determinants of FDI location choice in China. Section 3 discusses the research model and gives an introduction to variables and source of data sets. Section 4 deploys the empirical analysis and its results. Section 5 concludes.

2. Literature review and theoretical hypotheses

The location determinants of FDI have been one of the hottest topics in international economics and regional economics. By reviewing the previous studies we can find that the traditional international investment theories such as Vernon's product life cycle hypothesis (Vernon, 1966), Kojima's comparative cost theory (Kojima, 1973) and the internalization theory developed by Buckley and Casson (1976) have investigated the motivation and location determinants of FDI from different perspectives. Later on, Dunning (1980; 1988a; 1988b) synthesized the existing theories of foreign direct investment and developed a new theoretical framework. His theoretical framework has been called the eclectic theory of international production which analyzes the pattern and determinants of FDI in terms of ownership-specific advantages, internalization advantages and location advantages (OIL). Location advantages are those advantages specific to a country arising from assets or resource endowments, labor costs, market and relative factors, infrastructure and government policies etc., which dictate the choice of production site. Based on Dunning's eclectic theory, a number of empirical literatures used cross-country/region data in one country to examine the determinants of FDI inflows, many of which find that, compared with the home country or other potential recipient country, the host country's advantages on factor costs(Culem，1988；Hatizius，2000), market size (Tallman, 1988; Grosse and Trevino,1996; Kimino *et al.*, 2007), infrastructures(Coughlin *et al* ,1991; Wheeler and Mody , 1992; Globerman and Shapiro, 2003), government polices (Blejer and Khan, 1984; Brewer,1993; Mudambi,1995 ; Taylor，2000) and geographic or culture distance between the home

and host country (Waldkirch, 2003; Lipsey, 2004) have significant impacts on the location determinants of FDI.

By observing the map of China, it can be easily found that FDI in China concentrated in coastal provinces/cities with developed economy and relatively complete traffic infrastructure and large transportation capacity. This implies that variables like geographic location (including how far away from a certain economic center), economies of scale and completeness of traffic infrastructure have internal causality with the spatial distribution of FDI. However, the audio-visual observation can not replace meticulous logical deduction because it is not precise, for the role of such elements as labor, human capital and agglomeration economies can not be obtained only through the surface work of geographic observation. For the above considerations, this paper first advances the corresponding theoretical hypotheses as the basis of the empirical study. For the convenience of our study, this paper attributes the determinants of FDI in China to two kinds of elements, i.e. traditional influencing elements and new economic geographic elements. In the meantime, we pose the corresponding theoretical hypotheses combined with the related literature in the scope of our research.

2.1 Traditional Influencing Elements

2.1.1 Size of Local Market
The location choice of FDI is a sort of corporate decision-making behavior which pursues the principle of maximum benefits. Since the size of local market is an important element that helps actualize economy of scales, thus the spatial distribution of FDI is greatly impacted by the size of local market. This is why size of local market has been the focus of traditional location theory and empirical studies. For instance, Chyan and Linda(1995)、Head & Ries(1996)、Broadman and Sun(1997)、Wei et al (1999)和 Lee et al.(2004) proved that provinces with large amount of GDP, high level of GDP per capita and high growth rate of GDP would attract more FDI, using cross-sectional or panel data sets of provincial level in China.

Hypothesis 1: Regions with relatively larger size of local market, i.e. regions with high level of GDP have the tendency of attracting more FDI inflows.

2.1.2 Labor Market Conditions
To lower the costs of production and other operations, the price level of labor costs is a very important factor that FDI would take into account while deciding its location in the space. Some previous studies found that lower labor costs were an important factor for China to attract FDI inflows (Minghong Lu, 1997; Canfei He, Ying Chen, 1997; Parker and Wei, 1999). Some other studies showed that there was no significant causality between the location distribution of FDI in China and labor costs (Chen 1996; Head and Ries 1996; Broadman and Sun 1997；Kangning Xu and Jian Wang，

2002), or there existed a positive relationship between them (Wei et al,1999; Fu, 2000; Cheng and Yum,2000; Houkai Wei，2000；Xinli Li and Rungui Jin，2002). In addition to labor costs, FDI might attach great or even greater importance to local labor quality, and the higher the production technology level and technological content in the product, the more strict requirements will be for labor quality. Therefore, we decompose labor into two indexes, labor costs and labor quality and then put forward the following hypotheses:

Hypothesis 2a: Due to the substitution effect between labor costs and labor quality, with the increasingly strengthened role that labor quality plays, the role of labor costs was decreased, and labor quality plays a more important role than labor costs in location distribution of FDI.

Hypothesis 2b: Labor quality exerts an important impact on the location distribution of FDI in China; even it raises labor costs to a certain degree.

2.2 New economic geographic elements.

2.2.1 Market Access
New economic geography theory revealed that under the mutual impacts of increased return on scales and transportation costs, firms tend to be located in a position that facilitates entering into markets of large size to lower transportation costs. This indicates that apart from the size of local market, a region's access to external markets has an important impact on the location choice of FDI as well. Hence, FDI tended to concentrate more likely in areas close to China's economic centers which represent greater market potentials. The previous studies mainly made investigations on local market effects in the location choice of FDI; few scholars concerned the market access factor, which led to the fact that research into the access effects to China's central markets was quite insufficient.

Hypothesis 3: FDI inflows will enter into provinces which are close to China's central domestic markets which mean large market potentials.

2.2.2 Traffic Infrastructure
Superior infrastructure development may have positive influence on the location choice of FDI through reducing costs in transportation and information collection. Many previous studies proved that the development of various kinds of infrastructure has a positive effect on the location of FDI (Piscitello,1995; Gong, 1995; Brodman,1997; Fung et al.,2002;Sun et al.,2002; Lee, 2004). In most of the previous studies, railways or high ways were paid more attention to (Broadman and Sun，1997) but only very few scholars cared about the impact of airfreight network on the location distribution of FDI. In fact, as far as FDI is concerned, airfreight plays a more important part in reducing information collection, increasing international visits and human capital flows.

Hypothesis 4: A sound foundation in traffic infrastructure, especially areas with easy access to a hub of communications will attract more FDI.

2.2.3 Agglomeration Effect

The agglomeration of economic activities may bring in external benefits through channels like labor market development, intermediary goods sharing and technology spillover. Therefore, agglomeration factor is one important aspect that affects FDI. For example, some previous studies made by Li and Park (2006), Kangning Xu and Jian Wang (2002) and Hong (2007) showed that agglomeration effect is an important factor that influences location selection of multinational corporations. Agglomeration factor affects the location choice of FDI in two ways: FDI agglomeration effect and country-specific agglomeration effect of FDI. The agglomeration effect of FDI showed that the increment of FDI will be influenced by FDI stock of specific location, i.e. new foreign investors tend to enter into areas with high level of existing FDI. For example, Canfei He's study (1999) indicated that the so-called "regional self-reinforcing" mechanism in FDI will lead to a certain degree of rigidity in location choice mode of a region. Country-specific agglomeration effect refers to the phenomenon that FDI coming from the same source location tend to concentrate in a certain area, i.e. the more FDI from a source country in an area, the more attractive the area will be in attracting FDI form that source country. This is beneficial to lower costs in collecting information and promoting externalities in knowledge and information. For example, Kangning Xu and Jian Wang's study (2006) proved the existence of source country effect by using data sets of Jiangsu Province of China.

Hypothesis 5a: The more the FDI stock in an area, the more attractive the area will be and more FDI will concentrate in that area.

Hypothesis 5b: The agglomeration of FDI coming from the same country/region will attract more FDI from that country/region.

3. Research model, data source and explanatory variables

3.1 Research Model

According to the types and structure of the data sets, we build up two models respectively. The first equation is a distribution determinants model of total FDI in an area, ignoring the factor of source country/region.

$$
\begin{aligned}
FDI_{it} = \alpha_0 + \alpha_1 LFDI_{it-1} + \alpha_2 GDP_{it-1} + \alpha_3 WAGE_{it-1} + \alpha_4 EDU_{it} \\
+ \alpha_5 ROAD_{it} + \alpha_6 \ln AVIATION_{it} + \beta_c \ln DISCENT_{ic} + u_{it}
\end{aligned} \tag{1}
$$

The second equation is a distribution determinants model of total FDI in an area at the provincial level, taking into account the factor of the source country/region.

$$FDI_{ijt} = \alpha_0 + \alpha_1 LFDI_{ijt-1} + \alpha_2 GDP_{it-1} + \alpha_3 WAGE_{it-1} + \alpha_4 EDU_{it} +$$
$$\alpha_5 ROAD_{it} + \alpha_6 \ln AVIATION_{it} + \beta_c \ln DISCENT_{ic} + u_{ijt}$$

(2)

Where, i、j and t denote sample provinces, source country/region and time (year) respectively. C represents the four large central cities including Beijing, Shanghai, Hong Kong and Chongqing; μ denotes residuals and ln denotes the natural logarithms of variables.

3.2 Data Source and Explanatory Variables

3.2.1 Data Source
The data sets in this paper are mainly drawn from *China Statistical Yearbook* and statistical yearbooks of each province. In which, the sum total data of each area at the provincial level come from *China Statistical Yearbook* of that very year under observation, such as GDP of each area, FDI in each area, wage level of employees, educational level of population, roadway kilometers, handling capacity of passengers in the largest airport. FDI data according to each source country/region came from statistical yearbooks of each province. Besides, in analyzing the location determinants of the sum total FDI in each province, our samples include all inland provinces except for Tibet. In the analysis of location determinants of each province considering source country effect, due to lack of some data sets, we only select sample data of FDI of 23 areas of the provincial level coming form 10 source countries/regions, as shown in the footnote[†].

3.2.2 Introduction to Explanatory Variables
In order to explore the substantial determinants that affect location distribution of FDI and test the hypotheses we put forward, this paper aims at identifying possible variables that affect FDI location choices according to principles of internal connections, data authenticity and availability. The explanatory variables are described as follows.

(1) Market size (*GDP*)
The overall scale and growth of a certain country or area are one of the most important factors that influence the entry of FDI. Since a relatively large local market size increases the potentials for FDI to obtain economies of scale and lower the marginal cost of production (Sabi, 1988). The larger the local market size and consumption capacity are, the higher the return will be to investments of the same scale. This paper introduces domestic/regional gross production (*GDP*) as the measurement for local market size, deducting the element of inflation. To avoid the endogenous problem of this variable, we introduce the variable with one year lag length into the regression model.

[†] Due to the incompleteness of FDI data of each province according to source country/region, considering the availability of data and convenience for analysis, we select 10 countries/regions including U.S., Germany, U.K., France, Japan, Korea, Australia, Singapore, Hong Kong and Taiwan.

(2) Wage level (*WAGE*)

From the previous empirical studies on the relationship between wage level and FDI, there were no identical conclusions about it. For example, some research literature suggested that labor costs were not a sensitive factor in the determinants of U.S. capital in China (Kangning Xu and Jian Wang, 2002). However, labor costs are a element that deserve being tested in most situations, therefore we still take into account this variable. This paper takes the average wage level of employees (*WAGE)* as the variable, also deducting the element of inflation and with one year lag length in the regression equation.

(3) Labor quality (*EDU*)

Most of the previous studies have shown that labor quality is an important consideration that impacts the location distribution of FDI. This paper thinks that for FDI with high level of technology, labor quality will exert greater influence than labor costs in determining the location choices of FDI. The greater the average educational level is in an area, the greater the labor productivity will be. Considering the availability of data, we use the share of people with assistant college degrees or above in the working population as labor quality index in a province.

(4) Accessibility to central market (*lnDIS*)

This paper thinks that the agglomeration of FDI in a certain area in China is not only influenced by local market size but also influenced by market size of neighboring areas especially that of central markets in China. To test the radiation effect of central markets and its impact on location distribution of FDI, we construct the index of central market accessibility. In this paper, we use the distance between the administration center of each province and Beijing, Shanghai, Hong Kong and Chongqing as the measurement for market accessibility to its central markets. The distance from each provincial capital city to Beijing, Shanghai, Hong Kong and Chongqing are drawn from longitude and latitude distance computation software packages, and the data of longitudes and latitudes are from the inquiry system of China surveying and mapping website. The market accessibility of Beijing, Shanghai and Chongqing is represented by the internal distance, the computation formula is $\frac{2}{3}\sqrt{area_i / \pi}$, where *area* stands for the land area of each municipal city.

(5) Traffic infrastructure (*ROAD, AVITATION*)

Since traffic infrastructure plays a big part in FDI location choices and good traffic infrastructure conditions influence the return of investments through reducing costs in transportation and information collection. Hence, this paper pays much attention to the role of traffic infrastructure. We take into account roadway and airway infrastructures in the meantime. For roadway infrastructure, we use road kilometers (*ROAD*) for every 10 thousand square kilometers to measure the transportation capacity. For airway infrastructure (*AVITATION*), we take the handling capacity of

passengers in the largest airport as the measurement of each province.

(6) Agglomeration economies (*LFDI*)
This paper investigates the agglomeration economies of FDI from both overall agglomeration economies of FDI and country-specific agglomeration economies of FDI. Overall agglomeration economies of FDI indicates that the location choices of the increment of FDI will be influenced by the FDI in stock at a certain location, i.e. new entrants tend to invest in areas with large existing stock of FDI. In this paper, the sum total of FDI in a certain area without caring about its source locations is used as the index representing the overall agglomeration economies of FDI. The country-specific agglomeration feature refers to the fact that FDI coming from the same source country tends to concentrate in the same area, i.e. the more the FDI from a certain country is, the more attractive the area will be for FDI from that country. For country-specific agglomeration economies, we select the cumulative FDI in areas of provincial level as measurement for agglomeration economies of FDI from a certain country.

4. Results

The empirical analysis in this paper proceeds with China's provincial level panel data sets over a ten-year period from 1998 to 2007. Compared with cross-section data sets analysis, panel data sets can enlarge sample capacity and therefore overcome the disadvantage of cross-section data set with lower capacity of samples. The most advantageous aspect of panel data sets is that it can control the individual heterogeneity which is invariant as time goes by, which is impossible in time series and cross-section analyses. In panel data sets analysis, different estimation approaches will be adopted depending on different assumptions toward unobserved effects. The commonly used approaches are the fixed effect model (FE) and the random effect model (RE). Due to the specific research objectives and data structures in this paper, our models include distance variable which in invariant over time, thus the random effect model is applied to run our regressions, ignoring the comparisons between the fixed effect model and the random effect model. Estimation results are reported in Table 1, Table 2 and Table 3. The estimation result of the location determinants of total FDI in an area at provincial level is shown in Table 1. The estimation result of "affecting factors" of location distribution of FDI for each source country/region is reported in Table 2. The sum total estimation result of location determinants of each source country/region is assorted in Table 3, the detailed estimation results are shown in Appendix 2.

Table 1
Regression results of location determinants of Total FDI in areas at

provincial level in China

	1	2	3	4	5
Estimation method	RE	RE	RE	RE	RE
$LFDI_{t-1}$	0.0598***	0.0657***	0.0751***	0.0571***	0.0695***
	(0.0114)	(0.0109)	(0.0103)	(0.0111)	(0.0105)
GDP_{t-1}	0.0335***	0.0357***	0.0308***	0.0380***	0.0321***
	(0.0051)	(0.0050)	(0.0046)	(0.0047)	(0.0048)
$WAGE_{t-1}$	-0.0036	-0.0066***	-0.0047**	-0.0053**	-0.0053**
	(0.0023)	(0.0023)	(0.0020)	(0.0021)	(0.0022)
EDU	7.4437*	9.6723**	5.4341*	12.129***	4.5724
	(4.2835)	（4.0101）	(3.0497)	(3.2655)	(3.4089)
ROAD	0.0015	0.0048	0.0017	0.0022	0.0049
	（0.0034）	(0.0034)	(0.0033)	(0.0033)	(0.0033)
AVIATION	5.9410	11.894**	16.023*	-0.8371	20.744**
	(10.885)	(10.472)	(9.261)	(10.185)	(9.987)
LnDIS BeiJing	-0.3559	14.657			
	(15.489)	(16.011)			
LnDIS ShangHai	-24.183**		-35.077***		
	(15.489)		(12.042)		
LnDIS HongKong	-68.755***			-68.102***	
	(20.107)			(19.259)	
LnDIS ChongQing	39.341**				33.098*
	(16.886)				(17.528)
cons	280.381	-299.839**	6.7654	-451.39**	-533.90***
	(279.97)	(143.059)	(150.375)	(230.04)	(200.77)
obs	300	300	300	300	300
R^2	0.6137	0.6145	0.6033	0.6158	0.6080

Notes: the numbers under each coefficient are standard errors. ***, ** and * denote

significance at the 1%, 5% and 10% level respectively.

Table 2
Determinants of FDI localities of areas of provincial level by country/region

	RE	RE	RE	RE	RE
LFDI $_{t-1}$	0.1444***	0.1442***	0.1443***	0.1440***	0.1443***
	(0.0031)	(0.0023)	(0.0023)	(0.0023)	(0.0023)
GDP$_{t-1}$	-0.0002	0.0005	0.0004	0.0006*	0.0002
	(0.0004)	(0.0004)	(0.0004)	(0.0003)	(0.0004)
WAGE$_{t-1}$	-0.0012***	-0.0016***	-0.0015***	-0.0016***	-0.0015***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
EDU	-24.2301	51.9230	46.5033	68.4913*	14.6403
	（0.6826）	(46.8563)	(35.4776)	(32.6727)	(39.8122)
ROAD	0.0007	0.0009**	0.0006	0.0009**	0.0012***
	（0.0005）	（0.0004）	（0.0004）	(0.0004)	(0.0004)
AVIATION	4.2412***	3.2137**	3.1851**	2.7285**	3.8269***
	(2.0661)	(1.3482)	(1.2417)	(1.9435)	(1.2787)
LnDIS BeiJing	-2.1325	-0.5012			
	(1.1859)	(1.7334)			
LnDIS ShangHai	-3.6705***		-3.7861***		
	(1.3900)		(1.1637)		
LnDIS HongKong	-1.9067			-0.8400	
	(2.2436)			(1.9435)	
LnDIS Chongqing	5.1012**				5.2182**
	(2.2955)				(1.9530)
cons	-50.073	-29.4383*	-5.6078	-20.5345	-76.3216***
	(46.577)	(17.8097)	(19.1141)	(26.1587)	(25.1109)
obs	2030	2030	2030	2030	2030
R^2	0.6671	0.6636	0.6642	0.6632	0.6645

Notes: the numbers under each coefficient are standard errors. ***, ** and * denote significance at the 1%, 5% and 10% level respectively.

From the estimation results of location distribution model of total FDI in areas at provincial level, the signs of coefficient estimate of most variables are in accordance with our expectations. The signs of coefficients for cumulative FDI are significantly positive in 5 regressions and therefore prove Hypothesis 5a, indicating that there exist apparent agglomeration effects in the location choices of FDI, i.e. the cumulative FDI in an area has important demonstration effect on FDI especially on the decision-making of new FDI entrants. The signs of coefficients for actual GDP for each area are also significantly positive, and theses results verify the local market

effect of the location distribution of FDI, which means FDI prefers to enter into areas with large market size and high level of consumption capacity, and a possible interpretation for this is that the FDI China has attracted is local market oriented. The signs of coefficients for actual wage level and human capital are also in accordance with our hypotheses, and the coefficient estimate for actual wage level in an area is only insignificant in regression 1, while the coefficient estimate for human capital is only insignificant in regression 5. The coefficient estimate for traffic infrastructure measured by road density and handling capacity of airways of the largest airport in an area has a positive relationship with FDI, but the coefficients for road density are insignificant in all 5 regressions, however the coefficients for airway infrastructure are significant in regression 2, regression 3 and regression 5.

For *lnDIS* , the proxy for accessibility to central market, we find that the coefficient estimates for distance to Shanghai and distance to Hong Kong are both significant and negative either in the regressions for all 4 distance variables or in regressions only for these two distance variables. This result conforms to our expectations and suggests the importance of Shanghai and Hong Kong as China's centers of economic activities, which have tremendously large impact on the location distribution of FDI in China. The coefficient estimate for distance to Beijing is insignificant, indicating that the city of Beijing does not exert strong impact on the location distribution of FDI. In addition, the coefficient estimates for distance to Chongqing are significant and positive in the two regressions, implying that the city of Chongqing has not become the concentration site in the location distribution of FDI.

Estimation results for determinants of FDI localities by different FDI sources (country or region) are reported in Table 3. Because of limited space of this paper, we only discuss the coefficient estimates and significance of accessibility to central markets, detailed estimation results are laid out in Appendix 2. From Table 3 we can see that the proxy for distance to Beijing is ONLY significant and positive in the regression for the distribution model of Korean investments. This means that the localities of Korean investments are more affected by Beijing. Besides, this result also verifies the fact that Beijing has not become the market center of regional distribution of FDI in China in the total FDI distribution model. The coefficient estimates for distance to Shanghai are significant and negative for FDI sources from Australia, Germany, France, U.S., Japan, U.K., Singapore and Taiwan, demonstrating that as the largest city in mainland China, Shanghai has perfectly fulfilled the obligation as the economic center in mainland China. The coefficient estimates for distance to Hong Kong are significant and negative for FDI sources from France, U.K., Hong Kong and

Taiwan, indicating that Hong Kong also plays a big part in FDI localities as China's economic center. The coefficient estimates for distance to Chongqing are either insignificant or positive, suggesting that the city of Chongqing does not act as the center site of FDI locality decision making of those investment sources.

Furthermore, the above empirical analyses have reflected the distribution of different FDI sources in mainland China, i.e. the Korean investments are Beijing-centered, and FDI from U.S., Japan, Australia, Germany and Singapore are Shanghai-centered, while FDI of Hong Kong source is distributed in Pearl River Delta region which is close to Hong Kong. FDI from France, Taiwan and U.K. are distributed both Shanghai and Hong Kong-centered.

Table 3
Determinants of FDI localities by different FDI sources (country or region)

	lnDISBeijing	lnDISShanghai	lnDISHongKong	lnDISChongqing
Australia	-0.2021	-0.3565*	0.3961	-0.1654
German	2.7096***	-3.2034***	0.1408	1.6465
French	0.6695	-1.0821*	-2.1890**	-0.1361
Hong Kong	20.7442	-33.1529	-134.256***	20.9556
Korea	-4.6444*	-0.9654	7.3129**	-3.2353
US	0.4117	-8.1067***	1.9731	7.0330**
Japanese	3.4239	-8.7871***	-8.7871***	2.8528
Taiwan	3.4239	-6.0034***	-7.4026**	1.6810
Singapore	1.5113	-2.4780*	-1.1968	1.4497
UK	1.0410	-1.6222***	-2.5754***	0.8430

Note: ∗∗∗, ∗∗ and ∗ denote significance at the 1%, 5% and 10% level respectively.

5. Conclusion

The huge influx of FDI into China is one of the most phenomenal changes in China's economic development in the past 30 years. Simultaneously, there exist obvious regional differentials in the spatial distribution of FDI across China. Most of the FDI concentrated in very few provinces, while for most of the provinces there are very little FDI inflows. This paper empirically tests the spatial distribution of FDI in China and examines the reasons for it, using the panel data sets from 1998 to 2007 at the provincial level.

Based on our research some fundamental conclusions are made as follows:

1. Agglomeration economies is one important factor that influences the locality choices of FDI in China, i.e. the cumulative FDI in an area may have crucial demonstration effect on FDI especially on the decision-making of new FDI entrants. There exist clear agglomeration economies in the FDI locality choices for FDI in China. For example, for Guangdong Province and Jiangsu Province, the large amount of cumulative FDI is a critical factor to attract continuous FDI inflows into these two provinces.

2. Labor costs are still one crucial element for the locality choices of FDI. However, in the whole process of influencing spatial distribution of FDI, human capital or labor quality is playing a more and more important part, especially for some specific FDI sources. For example, FDI coming from the U.S. and main European countries will be more influenced by labor quality.

3. The completeness and development level of infrastructures greatly influence the spatial distribution of FDI in China. Generally speaking, multinationals tend to invest in provinces with superior infrastructure development. The locality choices of FDI in China will be influenced by the development level of different types of infrastructure. The completeness of either of railway, roadway or airway will be beneficial for the agglomeration of FDI. As far as locality choices are concerned, the completeness of aviation infrastructure will significantly facilitate FDI inflows.

4. From the perspective of new geographic analysis, the spatial distribution of FDI in China matches the geographic feature of core-periphery relation, i.e. FDI will concentrate around a mega-city functioning as the core of agglomeration. The closer a place is to the "core", the more FDI will concentrate in that place. The further a place is to the "core", the less FDI concentration in that place. If observing the map of whole China, Hong Kong and Shanghai are the largest two "cores", where most of FDI in China concentrate there. As the capital city and the second largest city in China, Beijing has no significant influence on the location distribution of FDI. Chongqing has not yet become the "core" of FDI agglomeration though it is the center of the southwestern region of China.

5. For FDI from different sources (country or region), some common features are embodied in the location choices of FDI in China, for example, the market size, infrastructure completeness and agglomeration economies, etc will influence the location determinants of FDI greatly. However, some country-specific features exist too. For example, agglomeration economies do exist for FDI by some countries or regions but fail for FDI by some other countries or regions.

References

Andreas Waldkirch. The 'new regionalism' and foreign direct investment: the case of Mexico. The *Journal of International Trade,* Volume 12, Issue 2, 2003, Pages 151 – 184

Broadman, Harry G., Xiaolun Sun. The Distribution of Foreign Direct Investment in China. *Policy Research Working Paper Series* 1720, the World Bank, 1997

Canfei He, Ying Chen. Locational Distribution and Spatial Diffusion of Hong Kong-Macao's FDI in China. *Geographic Study*, Vol.17, Number 3, 1997, pp.193-200（in Chinese）

Cheng, L. K. , Y. K.wan. What are the Determinants of the Location of Foreign Direct Investment？ the Chinese Experience. *Journal of International Economics*, Volume 51, 2000, pp.397 - 400

Chien-Hsun Chen. Regional Determinants of Foreign Direct Investment in Mainland China. *Journal of Economic Studies*, Volume: 23, 1996, pp.18-30

Chyan Tuan, Linda F. Y. FDI Facilitated by Agglomeration Economies: Evidence from Manu facturing and Services Joint Ventures in China. *Journal of Asian Economics* , Number 13 , 2003 , pp.749 - 765

Cletus C. Coughlin, Joseph V. Terza, Vachira Arromdee. State Characteristics and the Location of Foreign Direct Investment within the United States. *The Review of Economics and Statistics*, Vol. 73, No. 4, 1991, pp.675-683

Culem, Claudy G. The Locational Determinants of Direct Investmentsamong Industrialized Countries. *European Economic Review*, Vol. 32, 1988, pp.885-904

Hongmian G.. Spatial Patterns of Foreign Investment in China's Cities, 1980- 1989. *Urban Geography*, Number 3, 1995, pp.189-209

Houkai Wei. Locality Determinants of FDI from EU, U.S., Japan and Korea in Manufacturing Sectors. C*hina Industrial Economics*, Number 11, 2000, pp.65-73（in Chinese）

Jan Hatzius. Foreign Direct Investment and Factor Demand Elasticities. *European Economic Review,* Volume 44, Issue 1, 2000, pp.117-143

John H. Dunning. Toward an Eclectic Theory of International Production: Some Empirical Tests. *Journal of International Business Studies*, Vol. 11, No. 1, 1980, pp.9-31

John H. Dunning. The Eclectic Paradigm of International Production: A Restatement and Some Possible Extensions. *Journal of International Business Studies*, Vol. 19, No. 1, 1988, pp.1-31

John H. Dunning. Location and the Multinational Enterprise: A Neglected Factor? *Journal of International Business Studies*, Vol. 29, No. 1, 1998, pp.45-66

Jun Fu. Institutions and Investments: Foreign Direct Investment in China During an Era of Reforms. University of Michigan Press, 2000

Junjie Hong, Anthony T.H. Chen. Modeling the Location Choices of Foreign Investments in Chinese Logistics Industry. *China Economic Review*, Volume 18, Issue 4, 2007, pp425-437

Kangning Xu, Jian Wang. An Analysis of Determinant Factors of American Direct Investment in China (1983 - 2000). *Social Sciences in China*, Number 5, 2002, pp.66-77（in Chinese）

Kangning Xu, Jian Wang. The Home-Country (Region) Effect of FDI Agglomeration: Evidence from Jiangsu Province. *China Economic Quarterly*, Vol.5, Number 3, 2006, pp.761-776（in Chinese）

Keith Head, John Ries. Inter-City Competition for Foreign Investment: Static and Dynamic Effects of China's Incentive Areas. *Journal of Urban Economics*, Volume 40, Issue 1, 1996, pp 38-60

K.C. Fung, H Iizaka, S Parker. Determinants of US and Japanese Foreign Direct Investment in China. *Journal of Comparative Economics*, 2002

Kojima, Kiyoshi. A Macroeconomic Approach to Foreign Direct Investment. *Hitotsubashi Journal of Economics*, volume 14, number 1, 1973

Lixin Li, Rungui Jin. An Comparative Analysis on Location Factors of Different Groups of FDI in China. *China Soft Science*, Number 7, 2002, pp.89-94（in Chinese）

Manijeh Sabi. An Application of the Theory of Foreign Direct Investment to Multinational Banking in LDCS. *Journal of International Business Studies*, Volume 19, Number 3, 1988, pp.433-447

Mario I. Blejer and Mohsin S. Khan. Government Policy and Private Investment in Developing Countries. Staff　Papers - *International Monetary Fund*, Vol. 31, No. 2 , 1984, pp. 379-403

Mariotti S, Piscitello L. Information Costs and Location of FDIs with in the Host Country: Empirical Evidence from Italy. *Journal of International Business Studies*, Number 4, 1995, pp.815-838

Minghong Lu. An Empirical Study on Institutional Elements and FDI Locality Distribution. *Economic Research Journal*, Number 7, 1999, pp.57-66（in Chinese）

Minsoo Lee, MoonJoong Tcha. The Color of Money: The Effects of Foreign Direct Investment on Economic Growth in Transition Economies. *Review of World Economics*, Volume 140, Number 2, 2004, pp.211-229

N Driffield, K Taylor. FDI and the Labour Market: a Review of the Evidence and Policy Implications. *Oxford Review of Economic Policy*, Volume 16, Number 3, pp. 90-103

P.J. Buckley, M Casson. The Future of the Multinational Enterprise. Macmillan London, 1976

Qian Sun, Wilson Tong, Qiao Yu. Determinants of Foreign Direct Investment across China. *Journal of International Money and Finance*, Volume 21, Issue 1, 2002, pp.79-113

Ram Mudambi. The MNE Investment Location Decision: Some Empirical Evidence. *Managerial and Decision Economics*, Vol. 16, No. 3, 1995, pp. 249-257

Raymond Vernon. International Investment and International Trade in the Product Cycle. *The Quarterly Journal of Economics,* Vol. 80, No. 2, 1966, pp.190-207

Robert E. Lipsey, Fredrik Sjöholm. Foreign Direct Investment, Education and Wages in Indonesian Manufacturing. *Journal of Development Economics*, Volume 73, Issue 1, 2004, pp.415-422

Robert Grosse, Len J. Trevino. Foreign Direct Investment in the United States: An Analysis by Country of Origin. *Journal of International Business Studies*, Vol. 27, 1996, pp.139-155

Satomi Kimino , David S. Saal , Nigel L. Driffield . Macro Determinants of FDI Inflows to Japan: An Analysis of Source Country Characteristics. *The World Economy*, Vol. 30, No. 3, 2007, pp. 446-469

Shaomin Li, Seung Ho Park. Determinants of Locations of Foreign Direct Investment in China. *Management and Organization Review*, Volume 2, Number 1, 2006, pp.95-119

Stephen B. Tallman. Home Country Political Risk and Foreign Direct Investment in the United States. *Journal of International Business Studies*, Vol. 19, No. 2 ,1988, pp.219-234

Steven Globerman, Daniel Shapiro. Governance Infrastructure and US Foreign Direct Investment . *Journal of International Business Studies*, Vol. 34, 2003, pp.19-39

T.L. Brewer. Government Policies, Market Imperfections and Foreign Direct Investment. *Journal of International Business Studies,* Vol. 24, 1993

Wheeler, Mody. International Investment Location Decisions : The Case of U.S. Firms. *Journal of International Economics*, Volume 33 ,Issue 1, 1992, pp.57-76