Financial Crisis and FDI's Interest in China's Hinterland: A Quest for Social Infrastructure Factors

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Abstract

Foreign direct investment (FDI) into China rose by 23.6 percent in 2008 over the previous year, in spite of the worldwide **economic downturn**. China received a total of US$92.4 billion FDI flows in 2008. And the foreign companies are investing more money into the **central** and **western provinces**, away from the traditional manufacturing areas along China's south-eastern coastal belt. In this paper, we try to identify factors that affect FDI's location determinants in China's hinterland. What is new for this paper is that we introduced some '**social infrastructure factors**' into the analysis, including expenditure on local education, environmental protection and culture and recreational facilities. This study provide us a chance to ascertain what factors effectively attracting FDI flows to the hinterland cities, especially under the current world economic recession era.

Key Words: Financial crisis, China's hinterland, foreign direct investment, social infrastructure

1. Introduction:

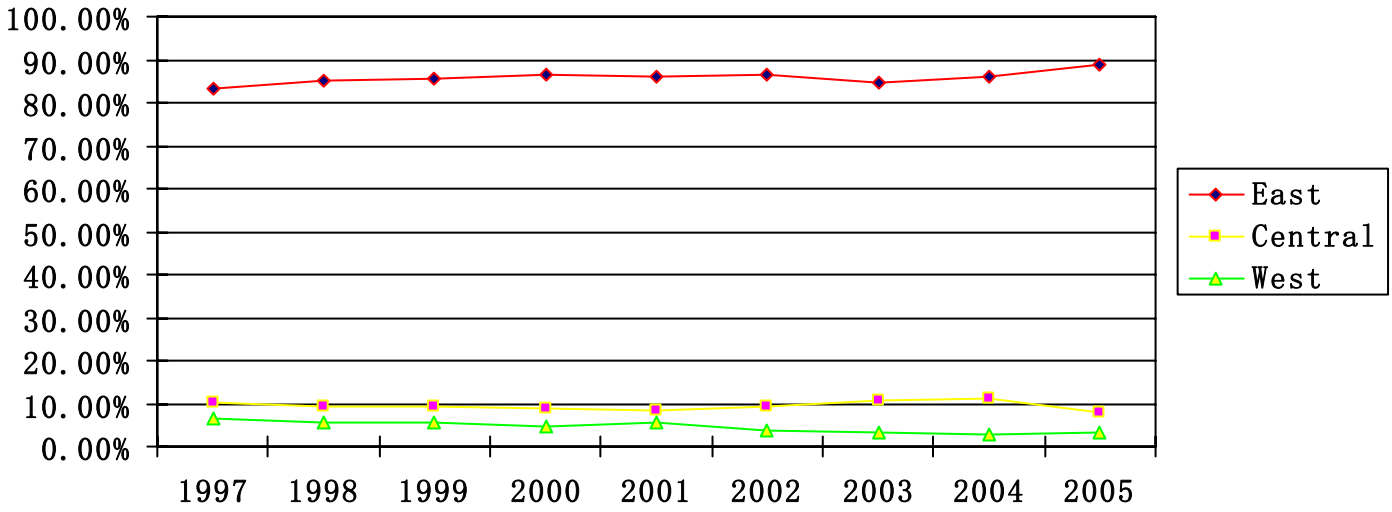
FDI's positive effect to host country's economic development has been well documented (e.g.,Chenery & Strout 1966; Firebaugh 1992; Jansen 1995; Borenztein, Gregorio & Lee 1998; Amirahmadi & Wu 1994). In the case of China, the government's export oriented industralization policy since 1980 had attracted huge amount of FDI flow to China, and the majority of FDI to China was received by the eastern coastal belt rather than the central and western regions (figure 1). It is argued that the over concentration of FDI in the eastern region had produced negative effects for future FDI flows, e.g., the increasing land and labour cost in the coastal belt had deterred foreign investors' interest in the region. Meanwhile, the steadily increasing purchasing power in the hinterland region also attracted foreign investors' attention. In 2008, we had seen a surge of FDI flows to the central and western regions of China: in the first half of 2008, the FDI flows to the central and western China increased by 102.8% and 139.3 respectively, while the increasing rate of eastern China is only 37.2%. This somewhat surprising figure had put the Chinese hinterland onto the stage after 30 years behind the eastern region's aureole in terms of attracting FDI flows. Though the Chinese government introduced the GWDS and the CCRS in 2000 and 2004 with substantial financial support to develop the infrastructure in the hinterland, the focus is on the economic infrastructure investment rather than the social infrastructure[1]. Previous research on FDI in China also tend to focus on factors relating to the economic infrastructure, while discussion around the interplay between the social infrastructure and FDI flows was not adequate, especially the data based empirical studies.

The objective of this paper is thus to examine what infrastructure factors can effectively contribute to more FDI flows to the Chinese hinterland: will the economic infrastructure dominate the game or the social infrastructure factors can also contribute to the FDI flows.

[1] The economic infrastructure includes physical facilities such as all kinds of transportation, reservoirs, sewerage, irrigation, telecommunications and power generation etc; the social infrastructure includes housing, education, medical care, culture, recreation， law and other facilities that support the community's need for social interaction.

The remaining of this paper was organized as below: in section 2, we briefly introduce the GWDS and CCRS, followed by the FDI literature review and hypotheses development; section 3 is data analysis and results discussion; section 4 is the conclusion.

Figure1: FDI's spatial distribution in China



Source: compiled from '2006 China Foreign Investment Report', September, 2006, Ministry of Commerce, People's Republic of China.

2. Literature Review and Hypothesis Development

2.1 A review of China's strategies to develop the hinterland region

China's GWDS was initially introduced in the Ninth Five-Year Plan (1996-2000). According to Wang (2001), the main content of this strategy including: first, to narrow regional disparities in economic development and income distribution; second, to maintain social and political stability in the western area by accelerating western

development; and third, in response to the slowing economic growth in China, to create new economic growth by expanding domestic demand. On the Ninth National People's Congress in 2000, Zhu rongji[2] stressed the following five focal points for developing the western:

1. Accelerating infrastructure construction, especially in water conservancy, communications, transportation, travel, and broadcasting
2. Strengthening ecological construction and environmental protection
3. Adjusting the industrial structure, giving priority to the industries with comparative advantages and market prospects, while fostering and forming new economic growth points
4. Developing technology and education, and accelerating personnel training
5. Deepening reforms and openness by adopting major policies and measures to attract domestic and international funds, technology, and management experience

In 2004, Wenjiabao[3] formally introduced the CCRS in the government working report, with similar developing plans as mentioned above.

From 1999 to 2008, the central government invested 1700 billion RMB on 102 key projects around transportation, water conservancy, energy and telecommunication in western China, the outcomes including: the mileage of rail transportation increased by 8000 km; the number of airport reached to 79, which account for 49.4% of China's total airports[4]. In terms of central China, from 2004 to the end of 2007, the urban fixed asset investment was 2493.67 billion RMB, account for 21.1% of China's total[5]. According to the latest data published by the central statistical bureau of China, during the first half of 2009, the increasing rate of the above-scale industrial added value in China's eastern regions was 5.9%, while this figure was 6.8 % in the central China and 13.2 % in the western China[6].

[2] Former Chinese premier from 1998 to 2003.
[3] Chinese premier from 2004to present.
[4] 'Open new development space: sixty years of western China economic development', Xinhua News Agency, 17th September, 2009. http://www.gov.cn/jrzg/2009-09/17/content_1419678.htm
[5] 'Central China rising now', reporters' notes, July 2009. http://www.jzgczz.com/news/news.asp?id=1502
[6] 'Open new development space: sixty years of western China economic development', Xinhua News Agency, 17th September, 2009. http://www.gov.cn/jrzg/2009-09/17/content_1419678.htm

2.2 Hypothesis Development & FDI literature review

In this paper, based on data availability, we selected three variables to measure the government's investments in economic infrastructure in the hinterland, we focus on the local expenditure on transportation, information communication technology and investment in environmental protection. In terms of social infrastructure, we also selected three variables, focus on investment in local medical facilities, local culture and recreational facilities and investment in local higher education[7]. We also adopt three traditional FDI attractiveness factors as the control variables: per capita GDP at the city level, policy incentive and location advantage.

2.2.1 Economic Infrastructure Investment vs. FDI flows

Transportation infrastructure

Empirical studies have confirmed the positive correlation between better transportation and FDI flows in both developed countries such as the United States (Head et al 1995; Shaver 1998) and developing countries like China. In the case of China, both at the city level (Gong 1995; Qu and Green 1997; Zhao and Zhu 2000) and the provincial level (Broadman and Sun 1997; Wei et al 1999; Fu 2000; Fung et al 2002; Sun et al 2002), better transportation infrastructure is proven to be positively correlated with FDI flows. But some authors such as Coughlin and Segev (2000a) have found an insignificant correlation between transportation infrastructure and FDI flows.

In terms of FDI flows to China's hinterland, an empirical study by He and Liang (1999) suggests that poor transport infrastructure in western China seriously deters FDI flows into that region. In this study, we use the area of paved road per capita in the city level to test the correlation between investment in transportation infrastructure and FDI's location choice in hinterland cities. Thus we have:

Hypothesis 1: The improving of transportation infrastructure tends to be positively correlated with FDI's location choice in hinterland cities.

[7] Detailed description listed in Table 1.

Communication infrastructure

In the case of China, empirical findings provide evidence those improvements in information and communication technology (ICT) infrastructure lead to an increase in FDI flows. For example, scholars using different measurements of ICT infrastructure, such as the proportion of output of telecommunication in total local output (Gong 1995) and landline phone users in total population (Wei et al 1999; He, 2002; Hsiao and Shen 2003) have found that improvements in ICT infrastructure lead to an increase in FDI flows. In this study, we use land phone users per ten thousand people to test the relationship between investment in ICT and FDI's location choice in China's hinterland. We suggest that this relationship is positive. Thus we have:

Hypothesis 2: Improvement in ICT infrastructure tend to attract more FDI flows.

Environmental protection infrastructure

Since China launched the strategy to develop its western and central regions in 2000, the Chinese hinterland has opened to an increasing number of industrial plants, some of which are threatening the fragile ecological environment. For example, in February 2006, a newly built chemical plant in Shaanxi province, discharged more than 2,000 tons of waste water into a nearby river seriously contaminated the local drinking water. The plant was a project introduced by the local government to promote development. Other high risk industrial plants are common in other western regions such as the Ningxia province[8]. The central government had realized that the ecological protection had to be considered first in pursuing economic growth, as the ecology was rather weak in the less developed hinterland regions than the developed south-eastern coastal belt. The government is paying more attention to environmental protection, seeking ways to achieve a balance with economic development. In this paper, we use the percentage of approved industrial waste water treatment as the indicator to measure government's investment in environmental protection infrastructure in the less developed hinterland regions. Based on data availability, we use the approved industrial waste water recycle rate at the city

[8] 'Western China Tries to Balance Environment and Development', Xinhua News Agency April 10, 2006.

level as the proxy to measure government's investments in local environmental protection, and we suggest hinterland cities with more investment in environmental protection tend to attract more FDI flows.

Hypothesis 3: Improvement in environmental protection infrastructure can make a hinterland city more attractive to FDI flows.

2.2.2 Social Infrastructure Investment vs. FDI flows

Education infrastructure investment:

Empirical studies have found a positive relationship between the level of qualification of workers and the volume of foreign investment (e.g., Glickman and Woodward, 1988; Coughlin and Segev, 2000a; Sun et al 2002; Mody and Srinivasan 1998, Fan and Dickie 2000; Akinlo 2004). Broadman and Sun (1997) used Chinese provincial data and found provincial illiteracy to be a statistically significant negative determinant of FDI. In this study, we use the number of students enrolled in third level education per 10 thousand people (THIRD) to measure government's investment in improving local education infrastructure. Thus we have:

Hypothesis 4: Improving in education infrastructure can make a hinterland city more attractive to FDI flows than other cities.

Medical & recreational infrastructure investment:

Now many hinterland cities provide low land prices, tax breaks and other means to attract foreign investments, but as discussed above, the effect is poor. The investment environment is a system rather than a few factors, foreign business people making the investment decisions will consider not only the production environment, but also the social environment and institutional environment. With FDI's continuous flowing to China, more and more foreign employees had moved home to China together with their

families. This requires the host city to provide superior medical care, child care and flexible recreation facilities to the foreign staff and their families. It is argued that many foreign staff prefers to work in Beijing, Shanghai rather than those second tier cities, due to the better medical care and culture infrastructure facilities provided in the first tier big cities, apart from their traditional advantage in economic infrastructure as compared to the less developed hinterland regions . On the contrary, cities of the western and central regions of China lacking competitive advantage in both economic and social infrastructure facilities as compared to the coastal cities. Therefore, to attract more FDI flows to the less developed hinterland cities, government need to invest not only the economic infrastructure, but also the social infrastructure in the hinterland cities. According to a survey on the competitiveness of 120 Chinese cities that conducted by World Bank on November 2006, Beijing and Shanghai were excluded from the top six 'Gold Medal' cities. And the reasons behind this result is that this rank adopted some variables that look at the social infrastructure or soft environment factors, while not purely focus on economic infrastructure, for example, it look at the days required by the surveyed firms to negotiate with the local government, it also look at the effectiveness of the environmental protection and the medical care, education facilities etc. as suggested by David Dollar, the World Bank Country Director for China "Foreign and domestic investors are seriously considering urban quality of life in making investment decisions so sustained government spending on education, health, and the environment would encourage business investment and economic growth." Taking these factors, Beijing and Shanghai only ranked among those 13 cities that received the 'silver medal' after the top six cities that received the 'Gold Medal', these six cities are Hangzhou, Suzhou, Saoxing, Qingdao, Xiamen and Yantai). Though these cities are all in the south-eastern developed region rather than the hinterland regions, but their size and their international reputation can not compete with Beijing and Shanghai, but in terms of social infrastructure like environmental protection, suitable for living etc, they done a better job than big name cities like Beijing and Shanghai.This reminds us that the potential hinterland cities can also attract more foreign investors if they done a good job in improving social infrastructure, apart from continuous investment in economic infrastructure.

Therefore, we suggest for the purpose to attract more foreign investment to the less developed hinterland regions, the government should not only look at the economic infrastructure, but also need to improve the social infrastructure like medical care, and recreational facilities. In this study, we use the number of beds per 10 thousand people at the city level as the proxy to measure government's investment on local medical facilities; we use the library books per 100 people at the city level as the proxy to measure government's investment on recreational facilities in the less developed regions.

Hypothesis 5: hinterland cities spent more on medical care infrastructure tend to receive more FDI flows than other hinterland cities.

Hypothesis 6: Hinterland cities spent more on recreational infrastructure tend to receive more FDI flows than other hinterland cities.

2.2.3 Control Variables

Control variable 1: per capital GDP

One major motivation for FDI is to look for new markets (Dunning 1993). Studies have demonstrated that Chinese provinces with larger GDP, GDP per capita, and GDP growth rate receive more FDI (e.g., Head & Ries 1996, Broadman & Sun 1997, Wei et al 1999). In this paper, we use GDP per capita as the control variable, thus we have:

Control variable 2: Policy Incentives

For FDI in China, Gong (1995) uses a dummy variable to capture the spatially uneven distribution of special economic zones (SEZs). Head and Ries (1996), Wei et al (1999) also use dummy variables to measure the effect of economic and technology development zones (ETDZs[9]). These studies all demonstrated that policy preferences have a positive effect in attracting FDI. However, before 2000, most of the ETDZs were located in the

[9] From 1984 to 2002, the Chinese government set up 49 national level ETDZs, plus 5 industrial parks with the same policy preferences. Of these, 37 were set up before 2000, primarily in the south-eastern coastal belt and 17 were set up after 2000, mainly distributed across the central and western regions of China. Overall, 32 are located in the south-eastern coastal belt, and 22 are located in central and western China ('2006 Report of Development Zones', the central people's government of the people's republic of China, January 2007)

coastal belt rather than the hinterlands. The level of economic development and stages of reform in China's hinterland are not the same in different regions across China (Luo and O'Connor 1998). MNEs typically consider the central and western regions more complex and uncertain than the eastern region, due to higher levels of governmental interference and cultural distance. After 2000, the central government established 17 national ETDZs, primarily distributed in central and western China. The goal was to instantly produce an FDI friendly environment within a region that was generally not seen as attractive to FDI. We suggest this policy initiative will be effective in attracting FDI flow. A dummy variable with value 1 is given to those hinterland cities that host at least one national level ETDZ after the year 2000 (16 out of 98 hinterland cities in our sample match this requirement) and 0 elsewhere. Thus we have:

Control variable 3: Location proximity to industrial core-regions.

Coughlin and Segev (2000b) found geographical proximity to metropolitan locations to be an advantage in attracting foreign owned manufacturing plants in the United States. Applying this work to China, Coughlin and Segev (2000a) estimated that FDI into neighbouring provinces increases FDI into a Chinese province. They assign this as evidence of agglomeration externalities. Head and Mayer (2004) focus exclusively on the impact of neighbouring regions' GDP on Japanese FDI into Europe and find it has a significant positive correlation with FDI.

In this study, we further explore this location proximity advantage by adopting theories of the core-periphery assumption from development economics. We suggest that hinterland regions that are geographically close to industrialized coastal provinces[10] tend to receive more FDI than more remote regions. In this study, we introduce a dummy variable REGION: value 1 given to those cities[11] located in the four provinces that bordered with the five industrial core provinces and 0 elsewhere. A positive correlation is expected between REGION and FDI flows. Thus we have:

[10] From Golley (2002), the industrial core regions are the five coastal provinces: Guangdong, Fujiang, Zhejiang, Shandong, Jiangsu. The four hinterland provinces that border the above core regions are: Guangxi, Hunan, Jiangxi and Anhui.

[11] These cities are those located in the following provinces:Guangxi, Hunan, Jiangxi, Anhui, which are geographically border the industrialized south-eastern coastal provinces.

3 Analysis and Findings

3.1 Data and Method

All data was obtained from China City Statistical Yearbooks (2000-2008), which provides data from 1999 – 2007[12]. The data covers 98 cities in 16 hinterland provinces[13]. Thus we have a pooled time series and cross sectional data set for this study. The dependent variable is the realized per capita FDI at the city level[14]. A description of the explanatory variables and their expected signs are shown in Table 1.

Table 1 goes about here

Our empirical analysis is thus based on a panel data set, with the model specified as:

$$LnPFDI = \alpha + \beta_1 LnPROAD + \beta_2 LnICT + \beta_3 LnENVIRPRO + \beta_4 LnEDU + \beta_5 LnCULTURE + \beta_6 LnMED + \beta_7 LnPCGDP + \beta_8 POLICY + \beta_9 REGION + \varepsilon_{it}$$

(Equation 1)[15]

In Equation 1, a log-linear functional form is adopted with the purpose of transforming a likely non-linear relationship between the realized per capita FDI flows and the explanatory variables into a linear relationship. In addition, the logarithm transformation enables us to directly obtain FDI elasticities with respect to various explanatory variables. The results of one POLS and five RE GLS analyses are presented in Table 4.

[12] The 2007 data is the latest data available as of September 2009.

[13] There are 20 regions (provinces or autonomous zones) in China's hinterland. Among these 20 regions, the data for Tibet, Gansu and Yunnan provinces was incomplete. These three regions were excluded from this study. Furthermore, Chongqing as the only autonomous city in the hinterland has received addiitional financial support from the central govermment compared to other hinterland cities. As a result, it was also excluded from our data analysis. For the remaining 16 regions, there are 164 cities registered for the year 2005 compared to 132 for the year 1999. Since we use a panel data set covering the time periods from 1999 to 2005, the maxium number of cross sectional observations we can target is 132. Taking account of missing data for some of the variables led to the exclusion of 34 cities, leaving a final data set covering 98 cities. These
are from the following 16 regions: Shanxi, Neimenggu, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan, Guangxi, Sichuan, Guizhou, Shaanxi, Qinghai, Ningxia and Xinjiang.

[14] The term 'city' in this paper represents urban area and suburbs, not including sub-counties.

[15] Detailed descriptions of the variables are given in Table 1.

Model 1 in Table 4 gives the results of POLS with all the independent variables from Equation 1. The correlation matrix among variables and the result of variance inflation factors test was shown in Table 2 & 3.

Table 2 & 3 go about here.

Model 2 shows the results of an RE GLS regression with the same variables as contained in Model 1. Model 3 to Model 6 represent the results of RE GLS regressions by using different control variable sets.

Table 4 goes about here

3.2 Results Discussion

First of all, Model1, the basic POLS model indicates that two variables are negatively correlated with per capita FDI flows: LNENVIRPRO and LNMED. After introducing random effect GLS regressions in Model 2, LNENVIRPRO remain negative with statistical significance at the 0.01 level; LNMED became positive, however, without statistical significance. From Model 3 to 6, we test the consistency and robustness of the six explaining variables by introducing different control variables and the finding is satisfied: from Model 3 to 6, apart from LNENVIRPRO is negatively signed with statistical significance, all other five explaining variables are all positive[16]. Among them, LNPROAD, LNICT and LNEDU are positively signed with statistical significance, while LNCULTURE and LNMED without statistical significance. In detail, in terms of economic infrastructure investment, investment in improving local road transportation (LNRPOAD) and information communication (LNICT) proved to be highly contributed to attract FDI flows. This is consistent with our hypotheses and previous research. However, LNENVIRPRO, the variable that we introduced to measure government's investment in local environmental protection is negatively correlated with FDI flows with

[16] Except LNCULTURE in Model 5.

statistical significance at the 0.01 level. For this somewhat surprising result, we suggest it is due to the relatively low level of environmental protection facilities that is available in China's hinterland cities as compared to the developed south-eastern coastal belt. For example, when hinterland cities possessing an opportunity to attract foreign investment projects, even they know relevant environmental protection facilities are not in place, they are not likely to say no to the foreign investors. Especially that most Chinese municipal leaders having the pressure to attract FDI to the city as a job evaluation indicator. Another explanation may lie in the variable itself, it is measured by the approved recycle rate of industrial waste water. Therefore, some cities that attract more foreign investment projects may not guarantee that each project has satisfied industrial waste water recycle facilities, while other cities may have only a few foreign invested projects but thus they can guarantee each of them has satisfied waste water recycle rate, therefore, it is not a guarantee that the city invest more in environmental protection can yield more FDI flows.

In terms of social infrastructure investment, investment in improving local education level proved to be highly correlated with FDI flows, this is consistent with our hypothesis and previous research. While investment in improving municipal medical care (LNMED) and culture & recreational facilities (LNCULTURE) did not prove to have statistical significance, though they were positively signed. Instead to declare that these social infrastructure factors could not effectively attract FDI flows, we suggest this is due to the relatively overall poor investment environment in hinterland cities. For example, according to Luo et al 2008, a key factor that can make a hinterland city more attractive to FDI is the agglomeration economies effect in that city. As China's coastal regions have overall advantages compared to the hinterland cities, thus foreign investors firstly consider hinterland cities that having better industrial agglomeration base. Social infrastructure factors like local medical and culture facilities are somewhat less concerned factors when compared to agglomeration economies effect.

4 Conclusion: Contribution and Implication

Based on a panel data set containing information of 882 Chinese hinterland cities, this paper intends to find out which infrastructure factors can contribute to more FDI flows to

China's less developed hinterland region. We suggest the following points that contribute to the current literature.

Firstly, our finding suggest that apart from the traditional economic infrastructure investment like road transportation and information and communication facilities that can attract FDI flows, social infrastructure investment in local education also proved to be highly correlated with FDI flows. As showed in Table 4, the coefficient of LNEDU is at par with LNICT, and is higher than LNPROAD. Since China launched the western China development strategy and central China rising strategy in 2000 and 2004, huge amount of capital had been spent in improving infrastructure in western and central China. Among them, the transportation sector received the majority of the investment, while the education sector in hinterland region, received much less investment as compared to transportation sector. The finding of this study indicates investment in improving local education can attract more FDI flows compared to investment in improving transportation. Therefore our first suggestion to policy maker is: apart from improving economic infrastructure like transportation and ICT facilities, investment in education is equalled important in terms of attracting FDI flows.

Secondly, the government had invested heavily in environmental protection in western and central China. But our empirical study found it is negatively correlated with FDI flows. Our argument is that between the choice of attract more FDI projects and guarantee the project's environmental protection, the latter one is unfortunately in a less concerned place. We suggest to enlarge investment in environmental protection is the key to deal with this dilemma; also, the government should re-consider using amount of FDI attracted as a criteria to evaluate municipal leaders' occupation performance. In anther word, the environmental protection concern should be emphasized apart from simply look at the amount of FDI attracted.

Thirdly, though our finding lacking statistical support in terms of the role of social infrastructure investment in medical care and culture & recreational facilities, we believe for the long run, these social infrastructure facilities will effectively contribute to attract FDI flows to the less developed hinterland cities. Therefore, the government

should continue to invest in these social infrastructures rather than purely focus on the economic infrastructure.

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Table 1. The Determinants of FDI in China's Hinterland

Variables	Proxy	Expected sign	
LNPFDI	Per capita Realized FDI at the city level		
LNPROAD	Area of paved road per person at the city level	+	Economic infrastructure investment on local transportation facilities
LNICT	Share of land phone users every 10 thousand population at the city level	+	Economic infrastructure investment on local information and telecommunication facilities
LNENVIRPRO	Approved rated of recycled industrial waste water at the city level	+	Economic infrastructure investment on local environmental protection facilities
LNEDU	Share of registered third level students every 10 thousand population at the city level	+	Social infrastructure investment on local education facilities
LNCULTURE	Number of public library books every 100 people at the city level	+	Social infrastructure investment on local culture and recreational facilities
LNMED	Number of hospital beds every 10 thousand population at the city level	+	Social infrastructure investment on local medical facilities
LNPCGDP	Per capital GDP at the city level	+	Control variable on local market size and purchasing power
POLICY	Hinterland cities that hosting at least one national level ETDZ having the value of 1 and others of 0.	+	Control variable on government's FDI incentive policies
REGION	Hinterland cities that are located in the provinces that are bordered with the industrialized coastal provinces having the value of 1 and other of 0.	+	Control variable on location proximity to industrialized core regions

Source: The authors.

Table 2. Correlation Matrix

	lnpfdi	lnproad	lnphon~r	lnwwater	lnthir~r	lnbooks	lnbeds	lnpcgdp	policy	region
lnpfdi	1.0000									
lnproad	0.5408	1.0000								
lnphonshar	0.4939	0.6462	1.0000							
lnwwater	0.1922	0.3360	0.3343	1.0000						
lnthirdshar	0.5198	0.5413	0.6602	0.2604	1.0000					
lnbooks	0.3816	0.4218	0.5573	0.0305	0.5051	1.0000				
lnbeds	0.3210	0.4560	0.6263	0.0980	0.4492	0.6515	1.0000			
lnpcgdp	0.5660	0.6993	0.7633	0.3230	0.5957	0.5359	0.5397	1.0000		
policy	0.3176	0.1750	0.3493	0.0869	0.5060	0.5314	0.2738	0.3244	1.0000	
region	0.2370	0.0572	-0.0489	0.0689	-0.0032	-0.1718	-0.0999	-0.0133	-0.0691	1.0000

Table 3: Variance Inflation Factor Test

Variable	VIF	1/VIF
lnphonshar	3.42	0.292413
lnpcgdp	3.05	0.327632
lnbooks	2.54	0.394284
lnproad	2.28	0.438772
lnthirdshar	2.25	0.444590
lnbeds	2.17	0.460272
policy	1.69	0.591383
lnwwater	1.24	0.804574
region	1.06	0.944946
Mean VIF	2.19	

Table 4. Panel Data Results.

	Model 1 (POLS)	Model 2 (RE GLS)	Model 3 (RE GLS)	Model 4 (RE GLS)	Model 5 (RE GLS)	Model 6 (RE GLS)
LNPROAD	0.6364	0.2944	0.2651	0.4112	0.3041	0.2783
	(0.1059)***	(0.1322)**	(0.1309)**	(0.1284)***	(0.1353) **	(0.1340) **
LNICT	0.0325	0.3619	0.3557	0.5098	0.3595	0.3534
	(0.1263)	(0.1297) ***	(0.1297)***	(0.1245) ***	(0.1314) ***	(0.1315) ***
LNENVIRPRO	-0.2054	-0.3965	-0.3968	-0.3620	-0.3972	-0.3978
	(0.1311)	(0.1254)***	(0.1255)***	(0.1256)***	(0.1265)***	(0.1266)***
LNEDU	0.2745	0.3285	0.3581	0.4138	0.3430	0.3697
	(0.0551) ***	(0.0753) ***	(0.0729) ***	(0.0729) ***	(0.0780)**	(0.0757) ***
LNCULTURE	0.1475	0.0262	0.0925	0.0509	-0.0490	0.0138
	(0.0712)**	(0.1068)	(0.0982)	(0.1087)	(0.1110)	(0.1022)
LNMED	-0.2381	0.0496	0.0429	0.0720	0.0718	0.0675
	(0.1304)*	(0.1751)	(0.1751)	(0.1781)	(0.1816)	(0.1816)
LNPCGDP	0.6457	0.4498	0.4467		0.4319	0.4291
	(0.1036)	(0.1258) ***	(0.1258) ***		(0.1291) ***	(0.1291) ***
POLICY	0.3622	0.3854		0.3704	0.3857	
	(0.1325) ***	(0.2458)		(0.2550)	(0.2673)	
REGION	0.7648	0.8014	0.8023	0.8023		
	(0.0795) ***	(0.1610)***	(0.1610) ***	(0.1678) ***		
Observation Number	882	882	882	882	882	882
LM test		Chi2(1)=454.24 ***	Chi2(1)=462.64***	Chi2(1) = 516.73***	Chi2(1)=601.96***	Chi2(1)=609.54***
Adj. R^2	0.4589	0.4440	0.4393	0.4174	0.3784	0.3737

Source: Output of Stata 9.0.
Standard errors are in parentheses.
***, ** and * indicate that the coefficient is significant at the 1, 5 and 10% levels, respectively.