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Location Determinants of Foreign Direct Investment in China

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Abstract

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The research reported in this paper uses a panel dataset to empirically investigate the location determinants of foreign direct investment in China. In particular, the novelty of this paper is adopting recent data of 35 provinces in China from 2000 to 2010 and using three different econometrics techniques to explore the relationships between foreign direct investment level and thirteen different explanatory factors. Research outcomes suggest that previous year's FDI level, market size (RGDP), openness of a province (EGDP), labor quality (UNI) and geographical location (COASTAL) have a positive effect on level of FDI in a province. It is also found that per capita GDP (PGDP) and trade-to-GDP (TGDP) will negatively impact realized FDI level, while illiteracy rates and realized FDI correlate positively. Although the last three findings are not intuitively clear at first sight, additional thorough analysis based on previous studies demonstrates that the interesting results to be plausible and indicates that China may be at the third stage of investment development path.

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1. Introduction

As an important economy power, China has been successful in attracting foreign direct investment (FDI) inflows. However, due to the unique economy reforming process under the communist regime and enormous differences among each regions and provinces, China's economy growth has shown extremely uneven provincial pattern. FDI in china is overwhelmingly concentrated in the eastern region, which amounting to 77% of the total accumulative FDI inflows, while the central region and western region accounted for only 3% and 9% of the total respectively. Although the initial biased regional open policies and SEZs are critical factors of the uneven distribution of FDI inflows, Chinese government has moved the implementation of open policies for FDI towards a more level playing field throughout China nowadays. The large amount of emphasizes on fixed asset investment in the construction of infrastructure facilities such as railroad, highways and waterways have also enhanced the transportation condition significantly compared to that ten years ago. Moreover, with more expenditure on education and popularization of Internet, information now can be shared freely cross-regions. Since most previous studies utilized data before 2005, it would be interesting to use an updated dataset to investigate if the provincial differences in FDI inflows are caused by different location factors nowadays. Or if the same set of location factors have possessed stronger or weaker relationships compared to the results of previous research. More importantly, my choice of dataset from the period of 2000-2010 covers the 2008 world financial crisis. It would be valuable to understand if there is any change in the relationships between location determinants and FDI inflows.

This paper studies use a recent dataset and three different econometrics techniques to explore the topic of location determinants of FDI in China. Section 2 begins by providing a

definition of FDI and a big picture of current trend in global FDI. Discussions on previous literatures of FDI theory and location determinants of FDI will also be presented in section 2. In section 3, I will clearly describe my dataset, and some observations on the recent FDI data in China. Section 4 details my hypotheses regarding the possible relationships between different location factors and the realized FDI level in a province. Then my methodology will be presented following by a thorough discussion on which econometrics model to choose from. Section 5 demonstrates the empirical results and the findings and interpretations will be listed in Section 6. Finally, Section 7 concludes my study and gives some suggestions for further improvement of the research.

2. Literature Review

2.1Definition of Foreign Direct Investment and Recent Trend in FDI

According to the organization for Economic Co-operation and Development (OECD):

> Direct investment is a category of cross-border investment made by a resident in one economy (the direct investor) with the objective of establishing a lasting interest in an enterprise (the direct investment enterprise) that is resident in an economy other than that of the direct investor. The motivation of the direct investor is a strategic long-term relationship with the direct investment enterprise to ensure a significant degree of influence by the direct investor in the management of the direct investment enterprise. The "lasting interest" is evidenced when the direct investor owns at least 10% of the voting power of the direct investment enterprise. Direct investment may also allow the direct investor to gain access to the economy of the direct investment enterprise which it might otherwise be unable to do. The objectives of direct investment are different from

> those of portfolio investment whereby investors do not generally expect to influence the management of the enterprise. (p. 17)

Sodersten and Reed articulate that (FDI) "…is in essence a bundle of capital, technology and management skills transmitted by multinational enterprises or transnational corporations (MNEs or TNCs respectively)" (as cited in Cassidy, 2002, p.11). China's gradual liberalization of its FDI regime has been one of the most crucial steps of China's move from a planned economy towards a market economy. China's gradual liberalization of its FDI regime has been one of the most crucial steps of China's move from a planned economy towards a market economy. As shown in Figure 1, the growth of FDI inflows into China from 1979 to 2011 can be broadly divided into four phases. Chen (2011) categorized the first three phases as the experimental phase from 1979 to 1991, the boom phase from 1992 to 200 1, and the post-WTO phase from 2002 to 2009. The fourth phase, which is from 2009 to present, is the focus of my paper. We called it post-financial phase. In the first phase, FDI inflows into China were highly concentrated in Guangdong and Fujian provinces because of the establishment of the four Special Economic Zones (SEZs). After that, FDI inflows into China increased rapidly until 1989, when the Tiananmen event undermined foreign investors' confidence and led to a sharp decrease of FDI inflows. However, the level of FDI recovered in 1991 as the Chinese government established the Yangzi River Delta, the Pearl River Delta, the Min Nan Delta, and the Shanghai Pudong New Development Zone and introduced more opening policies to the entire coastal areas. After Deng Xiaoping's tour to China's southern coastal economically opened areas, the inflows of FDI into China reached US$11.01 billion, twice as much as those in 1991 (Chen 2011). Chen (2011) also articulates that the slow-down of FDI from 1997 to 2000 could be explained by a slow-down in transfers of labor-intensive activities from neighboring Asian economies, the substantially

weakened outward investment abilities of East and South-East Asian economies caused by East Asian financial crisis, informal relationships and corruption that hinder foreign transactions, and remaining restrictions on FDI. The third phase started in 2002 after China joined the WTO in 2001. The greater liberalization in trade and investment attracted more foreign investors' interests and pushed the FDI to a new high level. FDI inflows decreased sharply after 2008 due to the world financial crisis, followed by a recovery in 2010 and 2011. However, the FDI inflows declined again in 2012 to US$119.7 billion from US$124.0 billion in 2011 (United Nations Conference on Trade and Development [UNCTAD], 2013).

Based on UNCTAD (2013)'s report, global FDI flows fell by 18% to an estimated US$1.3 trillion, down from a revised US$1.6 trillion in 2011, as significant investor uncertainty continues to hamper the FDI recovery. This uncertainly is mainly driven by a slagging macroeconomic environment with lower GDP growth rates, trade, capital formation and employment, and by some risk factors related to the Eurozone crisis, the United States fiscal cliff, and broad-based policy changes with implications for FDI (Table 1). Especially for China, the changes of government leadership may also cast some influence on new regulations for Chinese FDI. FDI flows to China declined slightly but the country continues to be a major FDI recipient --- the second largest in the world because the 7.8% GDP growth rate of Chinese economy helped maintain investors' confidence, stated by UNCTAD (2013). Although the rising production costs and weakening export markets posed strong downward pressure on FDI in Chinese manufacturing, overall FDI inflows to China decreased by only 3.4% to US$120 billion in 2012 (UNCTAD 2013).

2.2 FDI Theory

The eclectic paradigm theory published by Dunning, which is also known as the OLI-Model, is a further development of the theory of internalization based on the transaction cost theory. The process of internalization describes that if the transaction costs on the free market are higher than the internal costs, then the transactions will be made within an organization. According to Dunning, companies choose to invest abroad because of three factors (O-L-I): ownership advantages, location factors and internalization factors (as cited in Cassidy, 2002, p.12). These three factors are defined below:

- Ownership (O) advantages: economies of scale, other technological advantages, or management skills. These ensure or enable the firm to recover the costs of investing abroad.
- Location (L) factors: these contribute to the decision to employ ownership advantages to produce abroad (risks or barriers in export markets or availability of low cost labor or natural resources, for example).
- Internalization (I) factors: foreign production occurs within the firm --- an internal market is created between parent and affiliates to control key sources of competitiveness or to reduce the risk that the firm might lose control of knowledge or technology (which would happen through licensing). (Cassidy, 2002)

The location decision is the key of FDI theory. Dunning also articulates that OLI theory is applicable both to "home country" and "host country" FDI (as cited in Cassidy, 2002, p.13). The firm's possession of unique competitive advantage that overcomes the disadvantages of competing with the local firms on their home turfs, the ability to undertake business activities more profitable in a foreign location than undertaking it in a domestic location, and the capability

to benefit more from controlling the foreign business activities than from hiring an independent local company to provide the services explain why FDI originates in one country and locates in another country (Cassidy, 2002). There are indeed other accesses to invest or conduct business in a foreign country. However, the FDI enjoys all the three advantages (OLS) mentioned above (Table 2).

Dunning (1979) pointed out "the outward and inward direct investment position of a country is systematically related to its economic development, relative to the rest of the world". The concept of the investment development path (IDP) discussed by Dunning (1979) suggests that countries tend to go through five stages of development and at each stage countries have different propensity and characteristics of inward and/or outward direct investment. In turn, this propensity will rest on the countries' three categories (OLS) of advantages. A brief summary of the 5 phases suggested by Dunning (1979) is summarized below:

Stage 1: Low inward FDI, but foreign companies are beginning to discover the advantages of the country. No outward FDI--- no specific advantages owned by the domestic firms.

Stage 2: Growing inward FDI due to the advantages of the country, especially the lower costs. The standards of living are rising which draws more foreign companies to the host country. Outward FDI remains low.

Stage 3: Strong inward FDI, but the host country's nature is changing due to the rising wages. The outward FDI is taking off as host country's domestic companies are getting stronger and have their own competitive advantages.

Stage 5: Both inward and outward FDI are likely to continue to increase. The net outward investment (NOI) position of a country first falls and later fluctuates

> around the zero level, which means the flows of outgoing and incoming FDI come into equilibrium. (p. 138)

Based on OCED's data (Figure 2), we observed that over the past decade Chinese inward FDI continues to increase at a rapid pace while outward FDI starts to pick up. I identified that China is currently at its third stage of the investment development path (IDP). The technological capabilities of China are still geared towards the production of standardized goods. Fuelled by growing competitiveness among domestic firms and the rising level of incomes, Chinese consumers start to demand higher-quality goods. The comparative advantage of labor-intensive activities begin to deteriorate as more labor-oriented low cost mass-manufacturing factories are moved inland from coastal areas or relocated to Southeast Asian countries such as Philippines, Indonesia or Malaysia, etc. As more domestic firms in the host country are competing directly with foreign firms in the same sectors, the initial landscape of OLS advantages of foreign firms change, stated by Dunning (1979). Foreign firms will introduce new technological, managerial or marketing innovations to compete while host country is increasing its expenditure on education, vocational training and innovatory activities, therefore, the O advantages will likely be based on the possession of intangible knowledge (Dunning 1979). The improved domestic capacity, enlarged market and rising wages will attract more technology-intensive manufacturing than labor-intensive manufacturing. Dunning (1979) also pointed out that at this stage, the role of government-induced actions will likely to be less significant, as more market-oriented activities are encouraged owing to the increase in the domestic firms' multi-nationality. Dunning (2002) reasoned that host country's government at this stage will try to attract inward FDI in those sectors in which the O advantages are weakest but L advantages are strong, and encourage host country's firms to invest abroad in those sectors in which the O advantages are strong and L

advantage are weak. The trend of outward FDI in labor-intensive sectors will increase as the economy moves forward to stage four of IDP.

2.3 Location Determinants of FDI

As the second largest economy in the world with a unique political environment, the import and impact of FDI for China has long been an interesting topic for many scholars. The previous papers have gave us many valuable insights into the investment environment of China and the process of utilizing and exploiting FDI for China's economy development on national, regional and local levels respectively. Wei and Liu (2001) examined the characteristics and patterns of FDI in China from both national and regional levels. Then further discussed the productivity spillovers effect on Chinese electronics industry, regional income convergence issue and FDI's impact on trade interactions in China. In the regional distribution of FDI section, Wei and Liu (2001) analyzed the determinants of the regional distribution of FDI within China using a panel data set covering 28 provinces and municipalities over the period 1983-98 for contracted FDI and 1986-98 for realized FDI. They combined the ideas from both traditional industrial location theory, which explains geographical distribution of FDI in terms of transport costs, wages and infrastructure and new location theory that focuses on pecuniary externalities or agglomeration effects from knowledge spillovers. Then they examined the relationships between FDI inflows and regional characteristics such as the level of international trade, wages, R&D manpower, GDP growth, infrastructure, agglomeration externalities, investment incentives and links with foreign investors. Their research found positive relationship between contracted FDI and the level of international trade, R&D manpower, GDP growth, infrastructure, and the availability of information and investment incentives while high effective wage rates act as deterrents to FDI. Among all the independent variables, GDP growth is the most powerful

determinants in terms of the magnitude of effect on FDI. Moreover, the research result showed that being a coastal city has significant effect on attracting FDI.

Considering the dataset that Wei and Liu (2001) used are all around late 90s, I deem investigating another research that uses more recent data may give us a fresh perspective. Chen (2011) examined the relationships between the inflows of FDI and the location variables in China's provinces using a panel dataset including 30 provinces from 1986-2005. He focused on five groups of location factors as important in determining the magnitude of FI inflows into each of China's host provinces. They are economic factors (market size, level of economic development of the host province, economic growth rate of the host province, labor cost, openness of provinces and level of accumulated FDI), infrastructure and energy supply (intensity of transport infrastructure, provision of telecommunications and energy supply), human resource (labor quality), geographical location, and policy factors. Chen (2011) implemented random-effects panel regression and concludes that provincial market size (GDP), the level of economic development (PGDP), the real growth rate of provincial economy (GR), the trade and export to GDP ratios (TGDP, and EGDP), the level of accumulated FDI stock (FDIS), the intensity of transport infrastructure (TI), the provision of telecommunications (TELECOM), the energy supply (EL), the university students enrollment rate (UNI), and the provincial literacy rates are positive and statistically significant location determinants of FDI. Efficiency wage is negative to FDI and geographical location variables such as dummy variables of coastal cities; special economic zone cities and regional open policies have strong impact on the provincial distribution of FDI. The results were very similar to the results concluded by Wei and Liu (2001), despite using different periods of data.

Different from looking into the relationships between aggregate FDI inflows from all countries to China, Cassidy (2002)'s research paper focused merely on the spatial determinants of Japanese FDI in China. Due to the difficulties of data collection and translations of data from Toyo Keizai, Cassidy (2002) decided to use the simplest model based on Broadman and Sun (1997), using Japanese FDI stock for the year of 1996 at current prices, to use explanatory variables for 23 provinces for the same year to run a simple OLS regression in order to test the relationship. Cassidy (2002)'s choices of independent variables were cost of labor, transportation, labor force quality, wage and coastal location. Cassidy suggested that tertiary education and exports are both highly significant and positively related to Japanese direct investment stock. Coastal location is also highly significant and positively related. PGDP and wage are positive but not significant. Air-staff is negative and not significant.

Given that most previous literatures focus on testing the relationships between FDI and local determinants around the periods when China firstly established special economic zone or entered the WTO, I decide to take this topic a little step further to investigate if the relationships still hold at present. I will further discuss about my research methodology and data in the following section.

3. Data Analysis

FDI Inflows and the Openness of China Domestic Market

China has been the ranked second in the FDI inflows for the third consecutive year by 2011 (Figure 3). It is reasonable for people to believe that China's openness to the world has largely improved, and the domestic market has been able to bring confidence to many foreign investors. Many previous literatures has discussed the historical background of China's development and articulated the economic reforms after 1984 including region open policies and

establishment of special economic zones (SZEs) in details. However, the question of to what extent has China liberalized its domestic market and created a friendly environment for overseas investors is rarely discussed in a quantitative approach in previous papers. Here I would like to borrow the concept of FDI regulatory restrictiveness index created by OECD to evaluate the openness of current Chinese domestic market.

OECD structured the OECD FDI regulatory restrictiveness index (FDI RR Index) (Figure 4) is a tool for benchmarking countries, measuring reform and assessing its impact. It measures all discriminatory statutory restrictions affecting foreign investors, including market access restrictions and departures from national treatment. The statutory restrictions are categorized into four types: sectoral equity limits, screening, restrictions on key personnel and other restrictions related to land, capital repatriation, etc. Each restriction is given a score based on an assessment of its importance. Aggregate score is weighted average of sectoral scores. The index covers almost all major economies and 13 important sectors including agriculture, forestry, fishing; mining & quarrying; manufacturing; electricity; construction; distribution; transport; hotels & restaurants; information & communication; financial services; professional services and real estate (OECD, 2012). This index gives us a more intuitive grasp of the relative FDI restrictiveness of each country and changes in restrictiveness over time. Furthermore, it measures a country's performance in attracting FDI for a given level of restrictiveness and the effect of FDI liberalization on FDI inflows. From the 2012 FDI RR Index graph, we can tell that China is still considered a fairly closed economy compared to other countries. China's 0.407 is 171% higher than Non-OECD countries' average (OECD database, 2012). Figure 5 also refers that the higher the FDI RR index is correlated with a lower level of FDI. I think the current low level of openness represented by the large FDI RR Index is not necessarily a disadvantage of China but

rather a positive implication. It shows that China still has great potential to attract more FDI to stimulate economy development if Chinese government is willing to implement more appropriate open polices to inland regions.

3.2 Major investors of Chinese FDI

Until 2009, more than 170 countries and economies have invested in China. It is important to know who are the major investors and what is their investment behavioral. By the end of 2009, FDI in China was overwhelmingly dominated by Asian investors, which accounted for 67% of the total realized FDI in China, followed by Latin America (16%) Europe (6%) and North America (4%) shown in Figure 6. Within Asia, Hong Kong has held the dominant position, accounting for 76% of the total Asian realized FDI, followed by Japan (6.8%), Singapore (5.9%), Korea (4.5%) and Taiwan (3.1%) (Table 3). Among developed economies, Europe and United States are two major investors of FDI in China. UK, France, Grmany and the Netherlands contributed significantly. One notable fact is the large shares held by tax-haven economies. The Virgin Islands took the dominant position, followed by Cayman Islands and Samoan Islands. FDI inflows into China from the tax-haven economies increased dramatically in 2000s.

3.3 Distribution of FDI in China by regions

Combining data of 31 provinces over 11 years from 1999 to 2010 from the ACMR database into three region categories clearly shows us the uneven distribution of FDI inflows into China by regions. Inward FDI in China was overwhelmingly concentrated in the eastern region, which accounted for 63.72% of total accumulative FDI inflows, while the central region and western region accounted for only 14.35% and 3.79% of the total respectively (Table 4). Table 5 depicts the distribution of FDI by province/municipality of three periods before joining WTO,

post-WTO, and post-financial crisis. In the first period, the most attractive location for FDI was Guangdong, attracting 25.20%, amounting to US$23 billions. The other major recipient locations of FDI were Jiangsu and Fujian. The lowest performing coastal province was Guangxi (1.27%). In the second period after joining WTO, we observe that the inequality of distributions of FDI among three regions decreases significantly. FDI in central regions increases from 8.09% to 19.65%, mainly lead by increasing FDI in Jiangxi province. Both Jiangsu and Jiangxi provinces surpass Guangdong in FDI inflows for the first time in history. Over the third period, eastern regions returned to the dominant recipient of FDI again at 76.52%. Jiangsu (17.21%), Guangdong (12.85%) and Liaoning (10.51%) were the lead in the eastern regions. It is remarkable that FDI in Liaoning increased dramatically after financial crisis. Also during the post-financial crisis period, the major inflows of FDI flow into eastern regions again. The location of the SEZs, coastal development areas with regional open policies and development triangles may be one factor in terms of the attraction of FDI to cities located in eastern regions. Table 6 is a summary of cities, province and areas that are benefit from open policies and are appealing to FDI inflows.

3.3 Distribution of FDI in China by Sectoral

By the end of 2009, the sectoral distribution of FDI in China was highly concentrated in the manufacturing sector (52.95%). Real estate (18.7%) is another sector that received significant amount of FDI inflows. The FDI inflow into manufacturing (52%) was higher than that into service sectors (36%). According to Chen (2011), among three industry groups of manufacturing, FDI firms in the technology-intensive sector gained more share than FDI firms in the labor-intensive sector and the capital-intensive sector in manufacturing. This observation again confirmed my view that China is now in the third stage of IDP because China's

comparative advantage has improved largely due to rapid growth of economy. Although China is still enjoying the benefits of relative low labor cost thanks to its huge population, China has greatly increased its comparative advantages in technology-intensive activities and capital-intensive activities. Moreover, the rising wages is pressuring China to make a structural change to move away from labor-intensive production. Chen (2011)'s data in 2008 proves technology-intensive activities and capital-intensive activities have surpassed labor-intensive activities receiving FDI (Table 7). FDI investment patterns in Chinese manufacturing sector have changed dramatically (Table 8).

4. Research Methodologies and Hypothesis Formation

4.1 Hypothesis Formation

Dunning classified MNC's international production location decision factors into six types: market seeking, natural resource seeking, efficiency seeking of products and processes, strategic asset seeking, trade and distribution (import and export) and support services (as cited in L.Luo, Brennan, C. Liu & Y. Luo, 2008, p. 94). Most research focuses only on the first three types. Also referring to Chen (2011), Wei and Liu (2001) and L. Luo, Brennan, C. Liu & Y. Luo (2008)'s approach in their research, I selected 12 factors that consider important to examine in my paper.

a. Market-seeking FDI

(1) Market size of the host province

Numerous studies have shown that the larger the market the greater the market demand, thus lead to more economy activities. Market size is a very important indicator of the overall economy capacity of a host province. Moreover, provinces with larger market size may have greater capabilities to take on technology-intensive and capital-intensive economic activities

thanks to external economies of scale and spillover effects, thus attract inward FDI. We use real gross domestic product (GDP) calculated from nominal GDP adjusted by GDP index in this study.

Hypothesis 1: Provinces with higher real GDP will receive more FDI than other provinces.

(2) The level of economic development of the host province

The population number varies a lot among different provinces in China. Therefore, using per capita GDP calculated by real GDP divided each province's population as a proxy for the provincial economic development level would not only shed some lights on the overall good economic performance of a province but also implies the purchasing power and living standard of the people in the province. This is a comprehensive indicator of overall level of economic development.

Hypothesis 2: Provinces show higher level of per capita GDP are likely to receive more FDI.

(3) Economic growth rate of the host province

GDP growth rate measures how fast the economy is growing. We calculated real growth rate using real GDP year by year in this study. The GDP growth rate is the most important indicator of economic health and the potential for one economy to grow. If it is growing, so will business, jobs, and personal income. If it is slowing down, then businesses will hold off investing in new purchases and hiring new employees. This, in turn, can easily further depress the economy. Therefore, higher growth rate will bring confidence to investors.

Hypothesis 3: Higher growth rate will be positively related to higher inward FDI.

(4.5) Policy Incentives

China adopted the open door policy three decades ago, increasing number of cities and areas have been benefit from open polices to attract FDI. However, the biased policies have

already created unequal development among provinces. We observe the uneven distributions of inward FDI among different regions, and would like to test the impact of SEZ policies and the regional open polices (ROP) implemented since the 1990s. SEZ and ROP will be two dummy variables that are used to test their impact on the inflows of FDI into each province. For the dummy variable SEZ, I give a value of one for Guangdong, Fujian, Hainan, Xinjiang and a zero value for other provinces. For ROP dummy variable, a value of one is assigned to Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Guangxi. In order to test the real affect of SEZa, we will create a SEZb that excludes Xinjiang to test again.

Hypothesis 4: Provinces benefit from SEZs or ROP policy tend to receive more FDI than other provinces.

(6.7) Openness of provinces to the outside world

International business through trade generally sets the foundations for inward FDI and the international production that serves to substitute for or complement trade (UNCTAD 2002). We use trade to GDP ratio (TGDP) and export to GDP (EGDP) as two indicators for the openness of an economy. Trade to GDP ratio is calculated by using the total amount of export and import to divide GDP of that province. Discussed previously using FDI RR Index, the greater the openness of an economy to the world is positively correlated with attracting more inward FDI. We are curious to test if this relationship holds at a provincial level

Hypothesis 5: The higher level of international exposure of a province will enable it to attract more FDI.

b. Natural resource-seeking FDI

(8) Transportation condition of the host province

The quality of public infrastructure is likely to affect the location decisions of foreign firms. First, Castro, Regis & Saslavsky (2007) states that "the presence of a good infrastructure can significantly reduce firms' output costs, providing a positive incentive for vertical FDI or investment where transnational firms base their location decisions purely on a cost basis" (as cited in L.Luo, Brennan, C. Liu & Y. Luo, 2008, p. 96). Secondly, past studies have confirmed the positive correlation between better transportation and inward FDI both in developed countries and in developing countries. However, Coughlin and Segc (2000a) find an insignificant correlation between transportation infrastructure and inward FDI (as cited in L.Luo, Brennan, C. Liu & Y. Luo, 2008, p. 96). I am using the length of transport routes (km) at the end of each year in each province as a proxy for transportation condition for a province. The length of transport routes is the sum of the length of railroad, inland waterway, highways and substandard highway in kilometers.

Hypothesis 6: Better transportation infrastructure tends to be positively correlated with location decision of FDI.

(9) Geographical location

Dunning suggests that natural resource-seeking FDI seeks for locations that possess natural resources and equipped with related communication and transport infrastructure, tax and policy incentives (as cited in L.Luo, Brennan, C. Liu & Y. Luo, 2008, p. 95). Similar to Chen (2011)'s approach, I also divided China's 31 provinces into three regions. The eastern or coastal region is the dominant recipient of inward FDI. Since the implementation of open door policy, FDI investments are highly biased towards the coastal region where better waterway and transportation existed. The coastal areas functioned as the windows to the outside world are benefiting from many tax and policy incentives, thus are very well economically developed.

According to the *China Ocean Yearbook*'s classification, we denote 12 coastal provinces[1] and make them a geographical location dummy variable with a value of one.

Hypothesis 8: Being a coastal province will increase the like-hood to receive FDI than a non-coastal province.

c. Efficiency-seeking FDI

(10) Efficiency wage

Many past empirical studies show that wage is an important factor of location choice of inward FDI. Based on data availability L.Luo, Brennan, C. Liu & Y. Luo (2008) used the average nominal wage rate per employee to measure the wage cost of a province. Their research also argued that regions with lower labor cost plus higher productivity will attract FDI, whereas regions with lower labor costs and lower productivity will not. On the other hand, Chen (2011) used the "efficiency wage" as a measure of labor costs, and examines the negative correlations between high efficiency wage and FDI inflows. Chen (2011) measured efficiency wage using the following formula: $EW_j = \frac{W_j}{\Pi_j}$, where EW_j is the average efficiency wage in host province j, W_j is the average wage rate of all employees in province j, and Π_j is the labor productivity in province j measured by provincial GDP over total employees in each province. Since we aim to use wages to give us useful implication on the labor productivity in the host province, I decide to use efficiency wage in my model rather than simple nominal wage rate per employee.

Katz (1986) stated that " …firms may find it profitable to pay workers' wages above the market clearing level since such wage premiums can help reduce turnover, prevent worker malfeasance and collective action, attract higher-quality employees, and facilitate the elicitation

[1] 12 coastal provinces: Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Guangxi and Hainan.

of effort by creating feelings of equitable treatment among employees". Thus, I believe efficiency wage will be a better proxy for labor productivity.

Hypothesis 9: The impact of high efficiency wage on FDI inflows into each of the host provinces will be negative.

(11.12)Labor Quality

Chinese government started the nine-year compulsory education system since 1986, and continues to improve the education system over years. In the past decade, the illiteracy rate in major cities has reduced significantly. For example, in 2000 the illiteracy rate in Beijing is 4.23% while in 2010 the number reduced to 1.70%. Since labor quality directly affects labor productivity, and the growing technology-intensive manufacturing sector and services sector have created need for higher-quality labor we include two variables illiteracy rates and university students enrollment rates in our study as a proxy for labor quality.

Hypothesis 10: Higher illiteracy rates will lower FDI inflow.

Hypothesis 11: Higher university students enrollment rate will likely increase inward FDI.

4.2 Methodology

The relationship between the FDI inflows in China and the location variables in China's provinces is examined over time and across provinces. Thirty-one provinces (including Tibet) from 2000 to 2010 are included in the dataset. The dependent variable is the deflated aggregate realized FDI from all source countries into China's host province j in year t, denoted as $FDI_{i,t}$. The unit of FDI is at 10 thousands USD. There are 13 independent variables, which are summarized in table 9. The following equation is formed to test the location determinants of provincial distribution of FDI inflows into China:

$$\begin{aligned} lnFDI_{i,t} \quad & \beta_0 + \beta_1 lnRGDP_{i,t} + \beta_2 lnTGDP_{i,t} + \beta_3 lnEGDP_{i,t} + \beta_4 lnUNI_{i,t} + \beta_5 lnILL_{i,t} \\ & + \beta_6 lnTRAN_{i,t} + \beta_7 lnEW_{i,t} + \beta_8 lnPGDP_{i,t} + \beta_9 GR_{i,t} + \beta_{10} LFDI_{i,t} + \beta_{11} SEZb_i \\ & + \beta_{12} ROP_{i,t} + \beta_{13} COAST_i + v_i + \varepsilon_{i,t} \end{aligned}$$

(1)

All independent variables are lagged k years, which k is set to be one, except for the dummy variables. A list of independent variables with expected sign in listed in Table 9.

In order to select the best model to test the relationships between realized inward FDI and the important determinants, I reviewed some common models that were used in previous studies to gain an overall idea.

Three statistical models are commonly used in panel dataset estimation: pooled ordinary least squares (POLS), fixed effects (FE) and random effects (RE). A summary of selected studies on the determinants of FDI and their methodologies are included in Table 10. They both have some pros and cons, and we will briefly discuss my approach to select the best-fit model for this study. For an OLS model, the presence of unobserved effect, even if it is not correlated with any of the explanatory variables, will in general cause OLS to yield inefficient estimates and invalid standard errors. However, if the Xj are so comprehensive that they capture all the relevant characteristics of the individual, and then we can assume there is no unobserved effect and use a pooled OLS regression fit the model, treating all the observations for all of the time periods as a single sample (Dougherty 1992). For FE model, although it is widely used for panel data estimation and it does not have unobserved effect problem, there are some prices to pay. First, the intercept and any X variable that is constant for each individual will drop out of the model. The loss of the dummy variables can be frustrating because we are not able to obtain an estimate of the coefficient of the dummy variables, therefore can not explain the effects caused by dummy variables. No matter we choose between “Within-groups fixed effects” model or “First difference fixed effects” mode, they both suffer from the missing dummy variables problem. Therefore, we consider an alternative approach, a random effect regression. “In principle, random effects estimation is more attractive because observed characteristics that

remain constant for each individual are retained in the regression model. In fixed effects estimation, they have to be dropped. Also, with random effects estimation, we do not lose *n* degrees of freedom, as is the case with fixed effects." However, if either of the two preconditions for using random effects is violated, we should use fixed effects instead. Therefore, a Hausman test is conducted to assist the model choosing process. As shown in the result (Figure 7), the null hypothesis that the preferred model is the random effect model is rejected, thus a fixed effect model is suggested in this case. At the same time, I also run the Breusch-Oagan Lagrange Multiplier (LM) test to further help me decide the fitness between a random effect regression and a simple OLS regression. Here (Figure 8) we successfully reject the null hypothesis that the variances across entities are zero, and conclude that random effect model is appropriate. By analyzing the advantages and disadvantages of all three models, I decide to include all of them and compare the differences among the results.

5. Empirical Analysis

5.1 Correlation Test

Before running any regression, we first do a correlation test. The correlation matrix (Table 11) points out that there are high correlations between EGDP and TGDP, LFDI and RGDP, PGDP and UNI, and LFDI and PGDP, therefore potential multicollinearity problem should be monitored.

5.2 Model 1.2.3

Model 1,2 and 3 (Table 12) share the same dependent variable (LFDI) and include 12 independent variables (Lag FDI is excluded). Comparing the results given by three different empirical techniques, POLS has the highest R-square (0.7133), which indicate that the explanatory variables in the model explain most of the variation in the dependent variables. RE

gives the second best R-square (0.4876), and FE delivers the worst R-square (0.0228). The residuals histogram is drew for the three different empirical techniques, and they are all normally distributed around the mean zero. FE method has the smallest standard deviations for residuals (Figure 9,10,11 & Table 13).

5.3 Model 4.5.6

Omitted-variable bias exist when there is an omitted variable that is a determinant of the dependent variable, and it is correlated with one or more of the included independent variables. The three models above might have suffered from the omitted-variable bias because the previous year's FDI level is not taken considered by the models. We try to reduce the bias by adding a new variable "Lag FDI" into the models, and the empirical results of model 4,5 and 6 are listed in Table 14. The overall R-square is improved significantly for RE model from 0.49 to 0.76. POLS's R-square also improves after adding this new variable. However, FE model's R-square is reduced significantly from 0.02 to 0.005, which makes it a even worse model than before. As before, FE model still has the smallest standard deviations for residuals (Figure 12,13,14 & Table 15).

5.4 Model 7.8.9

Considering that the potential multicollinearity problem may misleadingly inflates the standard errors, thus makes some variables statistically insignificant while they should be otherwise significant. Based on the correlation matrix, I eliminate EGDP, PGDP, and ROP from model4, 5 and 6, and run the model using three different econometrics techniques again. The coefficient significances do not have obvious improvement, and some of the coefficients even become insignificant. Model 7, 8 and 9's results are listed in Table 16. Residuals' results are summarized in Figure 15,16,17 and Table 17.

We conclude that the original model 4, 5 and 6 do not suffer from serious multicollinearity problem, and they would be a better fit for the dataset. We will, therefore, discuss out findings based on model 4, 5 and 6 in the next section.

6. Results

Based on the fact that the models that contains all 13 independent variables give us the best R-square, and within model 4, 5 and 6, POLS and RE methods' high values of R-square indicate that they are better fits than FE method which generates a R-square of 0.0049. I decide to use POLS and RE's results as main support for our findings.

As seen from both model 4 and 6, the variables for FDI in the pervious year (LFDI), market size (RGDP), trade-to-GDP ratio (TGDP), export-to-GDP ratio (EGDP), Labor quality (UNI, ILL), Per capita GDP (PGDP) and geographical location (COASTAL) are statistically significant at 5% level. Efficiency wage (EW) is significant at 10% level under POLS while special economic zones (SEZb) is not significant under any regression. We test both SEZa (including Xinjiang) and SEZb (excluding Xinjiang) in all models, and they both are not significant under any regression.

Lagged FDI appears to have a positive influence on realized inward FDI in china, suggesting a self-reinforcing effect of FDI. This result is consistent with that of Zheng (2011) using a different estimation methodology. It can be explained by more previous FDI received by the region will reinforce foreign investors' confidence therefore attract more inward FDI in the following year.

The positive relationship between RGDP and FDI indicates that market size in an important location determinant for inward FDI. As previous studies (Head and Ries 1996; Broadman and Sun 1997) suggest that Chinese provinces with larger GDP, and relatively higher

GDP growth rates receive more FDI, we can conclude that market seeking is a crucial motive for investing in China. This could also possibly explain why being a coastal city has positive effect on inward FDI. According to data from *China Statistical Yearbook*, most coastal cities have relatively higher GDP than inland cities. The GR is small and not significant in any case as well as the infrastructure proxy, transportation condition. Identical to our prediction, efficiency wage, the proxy for labor costs adjusted for productivity, is negative and statistically significant as a location determinant affecting realized FDI. As more regions are benefited from open policies, labor intensive FDI has gradually moved towards inland regions, the insignificant coefficients suggest that ROP and SEZb are not major determinants for inward in the past decade.

Three interesting results are observed from our regression. First, Different from our expectation and the Chen (2011)'s result, we observe a significant negative Per capita GDP from our regression. According to Goodspeed, Martinez-Vazquez and Zhang (2006), per capita GDP can have two interpretations, with opposite implications for its sign. First, as I assumed in the hypothesis part, per capita GDP is a proxy for market size. In this case, "to the extent that FDI is for consumption in the host country rather than for export, a positive sign would be predicted"(Goodspeed, Martinez-Vazquez & Zhang 2006). However, if I already have a separate variable for export, per capita GDP will be better justified as a proxy for capital abundance (Goodspeed, Martinez-Vazquez & Zhang 2006). Here the negative per capita GDP will suggest that a higher marginal product of capital can be achieved at poorer provinces.

Another unexpected result is given by the highly significant positive relationship between university enrollment rate, illiteracy rates and FDI. Although it is easy to understand that higher university enrollment rate demonstrate better quality of human capital thus attract more inward FDI, the positive correlation between illiteracy rates and FDI is not intuitively. However, the

Zhang-Markusen (ZM)'s inverse U-shaped relationship between human capital and FDI give us a reasonable explanation. The ZM theory suggests, " rich countries with high human capital and poor countries with low human capital demonstrate an inverse correlation between FDI and human capital proxies"(as cited in Akin and Vlad 2011). However, "for middle-income and upper middle-income countries, human capital (especially tertiary education) has a positive relationship with FDI" articulated in ZM theory (as cited in Akin and Vlad 2011). Therefore, higher university enrollment rate is related to higher FDI. And as significant illiteracy rates improvement are mostly seen in wealthy Chinese cities, while poor provinces remain high illiteracy rates. In the poor regions, the inverse correlation between FDI and human capital may be seen because more low-paid labor-intensive jobs are outsourced from wealthy areas to poor regions.

The last notable result is the negative relationships between trade-to-GDP ratio and realized FDI level. Export-to-GDP ratio is a straightforward proxy of the openness of provinces to the outside world. Align with the initial expectation; the higher the export-to-GDP ratio contributes to a higher inward FDI. However, we observe that there is a significant negative relationship between the trade-to-GDP ratio and inward FDI. Many previous studies have found opposing views on the relationship between FDI and trade. Pontes (2007) articulated that there are two kinds of FDI:

> On the one hand, horizontal FDI displaces trade: instead of exporting, the firm sets up a subsidiary in the foreign country, trading off lower trade costs against higher fixed costs (see, among others, HORSTMANN and MARKUSEN, 1992). FDI is "tariff-jumping" and is positively related with trade costs. On the other hand, vertical FDI splits the production process into segments that are relatively

> intensive in different factors of production. Each segment is located in the country that is abundant in the required factor (see HELPMAN, 1984). Since each plant must export its output as an intermediate good to other plants, vertical FDI complements trade and is eased by low trade costs". (p. 2)

Guerin and Manzocchi (2009) investigated the empirical relation between democracy and the nature of FDI inflows (vertical versus horizontal) to emerging countries and found that " emerging countries are likely to receive relatively more FDI of the vertical type. In the past 10 years, there is a clear increasing trend of vertical FDI in China. Furthermore, Chinese Yuan has also appreciated a lot relative to USD as Chinese economy strengthened (Figure 18). Accompany with the appreciation of Chinese Yuan, the vertical FDI trade is discouraged by the increasing trade costs. Therefore, it would not be a surprise to observe a negative relationship between trade-to-GDP ratio and inward FDI.

7. Conclusions

This study improves our understandings of recent trend of global FDI and current condition of Chinese FDI inflow level. By using the updated database from 2000-2010, we are able to observe some changes in the importance of different location determinants. The empirical results show that market size (GDP), previous year's FDI level (LFDI) and openness of a market (EGDP) are still crucial factors that influence the inward FDI in China. However, in the past decade, as more regional open policies have been implemented in various areas in China, the impact of policy incentives measures such as special economy zones (SEZs) and regional open policy (ROP) on FDI inflows has reduced to an insignificant level. The three interesting results generated from the empirical analysis indicate that the Chinese economy may be experiencing a structural change that moves from labor-intensive production style to a more advanced

technology-intensive production period. Chinese local firms have benefited from the past spillover effects of knowledge and technology and are starting to have their own competitive advantages. Therefore, more technology-focused or market-seeking firms may come to invest in China rather than natural resource-seeking firms.

However, there are still limitations on this study, which may affect our previous findings and interpretations. The panel dataset only covers 10 years' data for 36 provinces. A dataset with longer period may be more desirable. However, considering the difficulties of collecting and sorting Chinese provincial and national data, this update dataset is a fair contribution for the research topic. Also, as the Hausman test suggested, FE model will be a better fit for the dataset. However, this study ignores the results regressed from FE model because of the extremely low R-square. More rigorous methods or tests may be available for us to build a better model to fit this dataset and give us a more reliable understanding of location determinants. Therefore, while gladly analyzing and studying the interesting results, we should bare in mind that further improvements on this study are needed.

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9. Appendix

Figure 1: The Trend of FDI inflows into China from 1979 to 2011

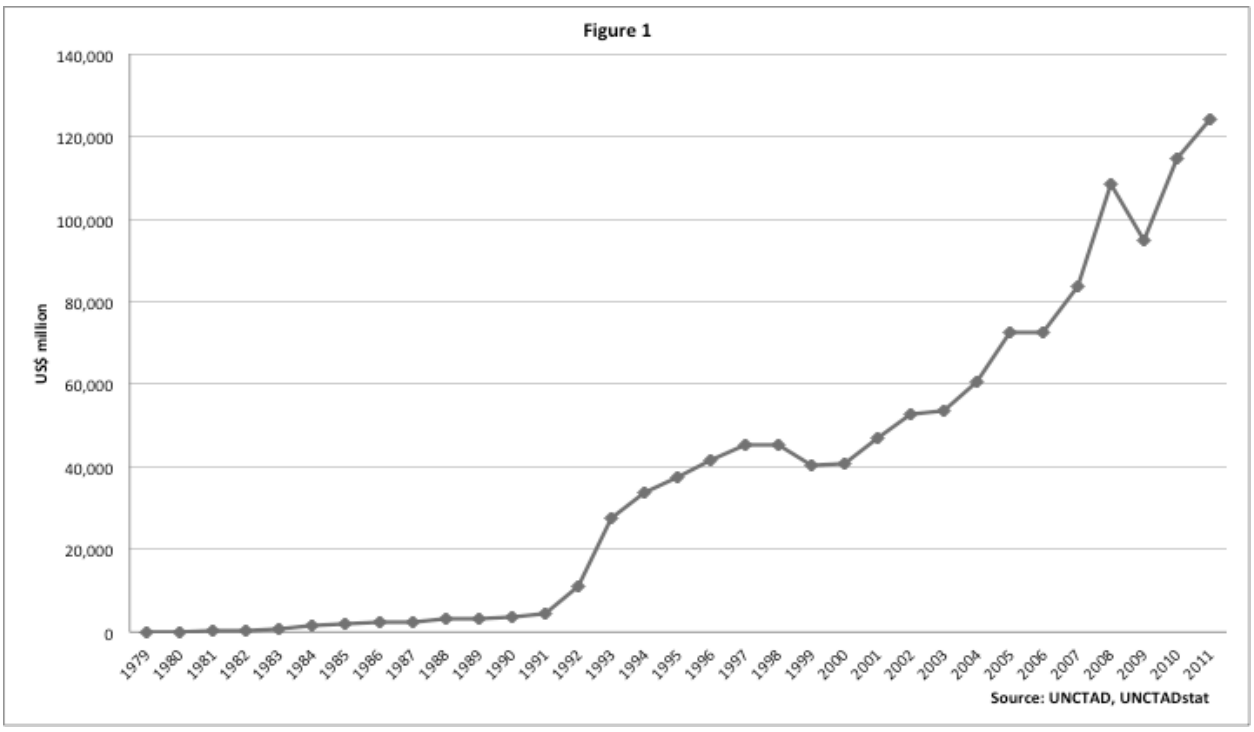


Figure 2: Chinese Inflow and Outflow FDI Summary (1990-2011)

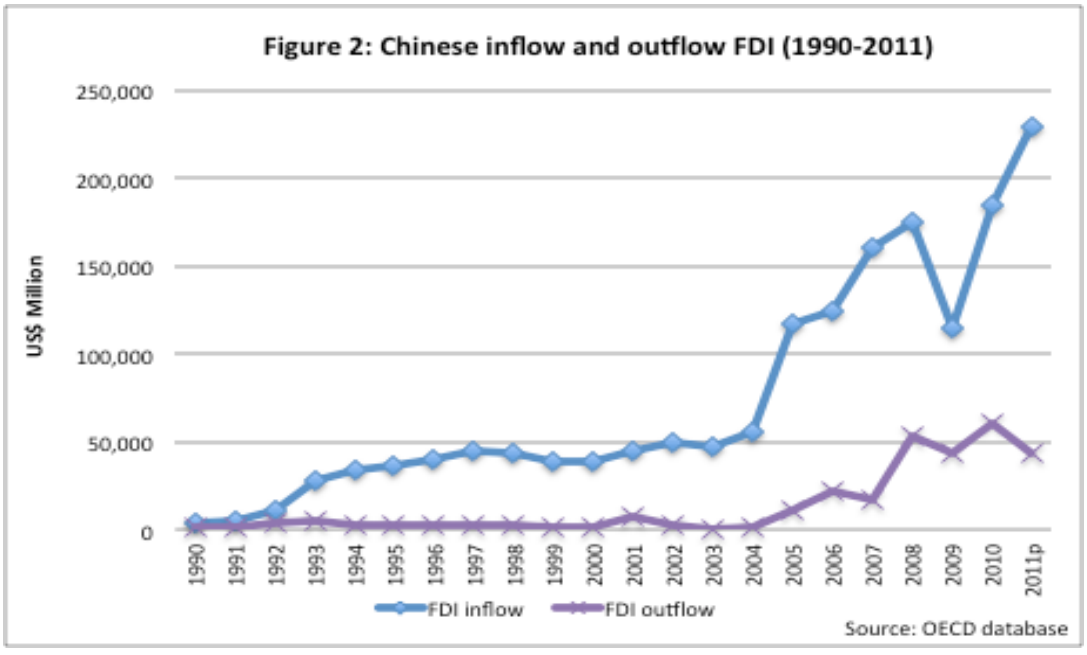


Figure 3: Top 10 Countries with Most FDI Inflows

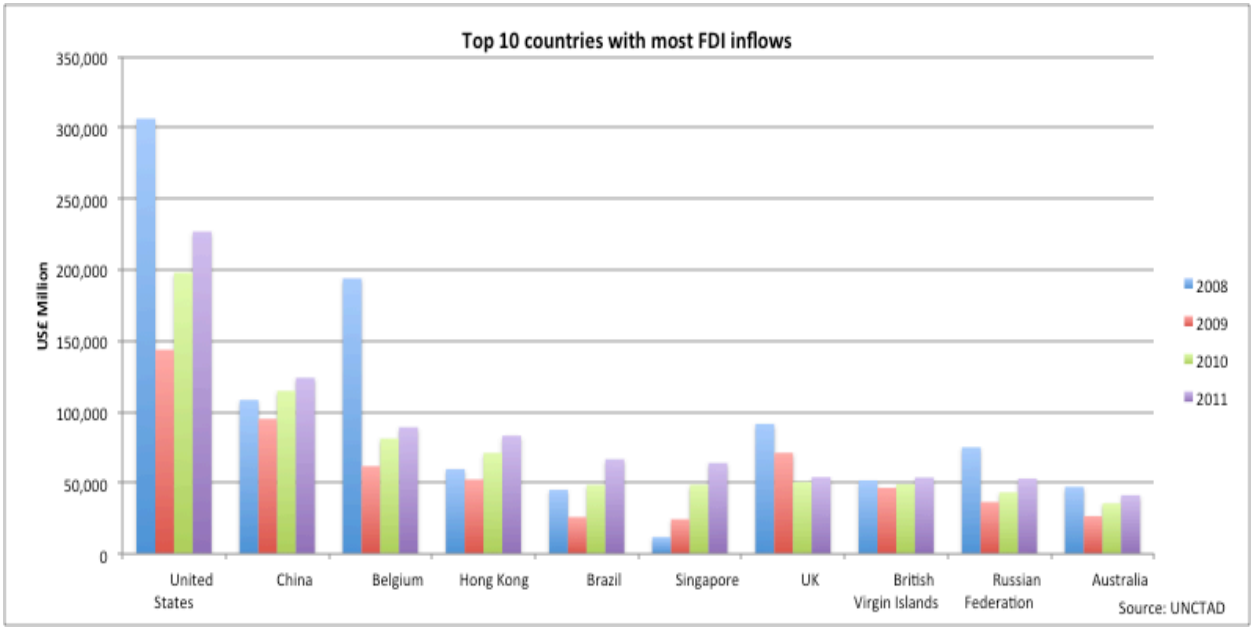
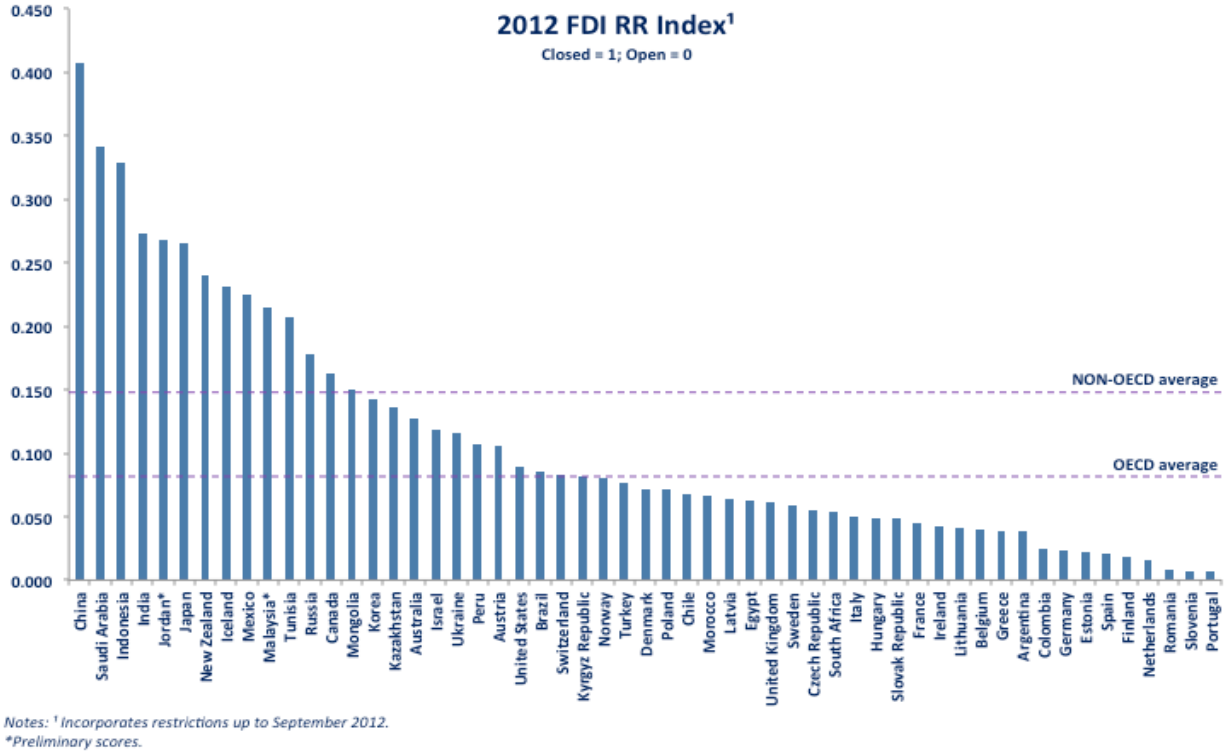


Figure 4: 2012 OECD FDI Regulatory Restrictiveness Index



Notes: ¹ Incorporates restrictions up to September 2012.
**Preliminary scores.*

Figure 5: The relationship between FDI Regulatory Restrictiveness Index and Market Openness

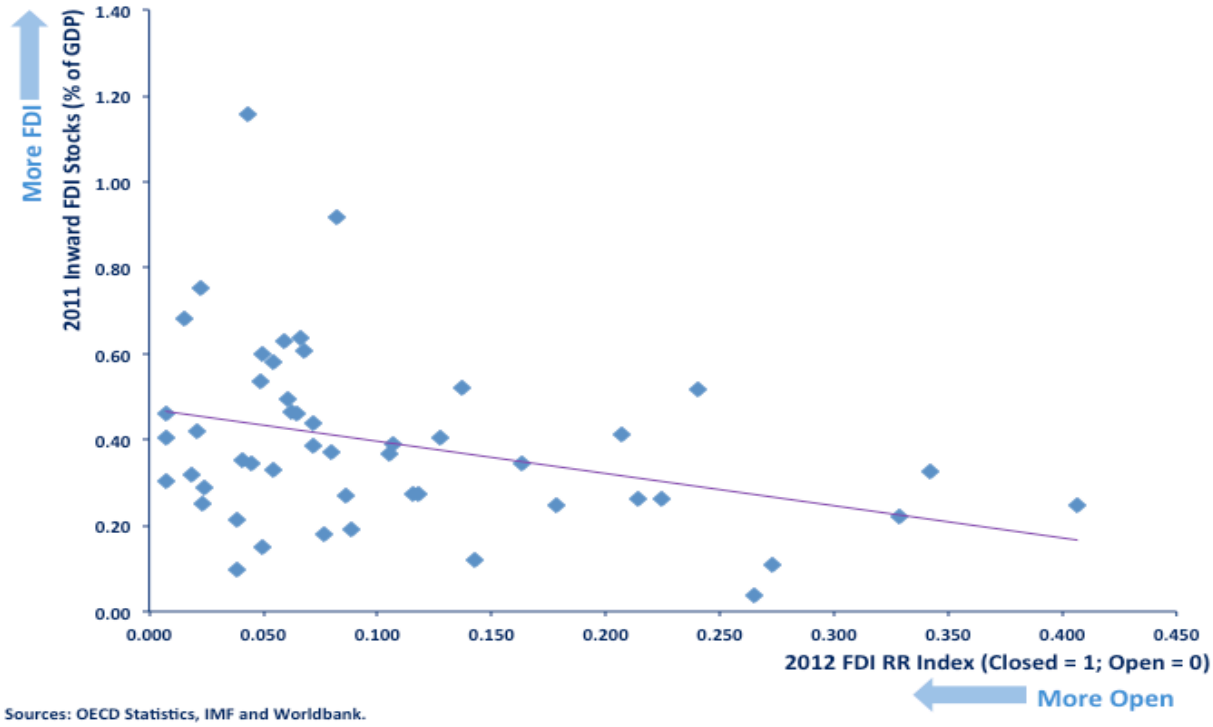


Figure 6:Shares of Realized FDI in China by Sources (2009)

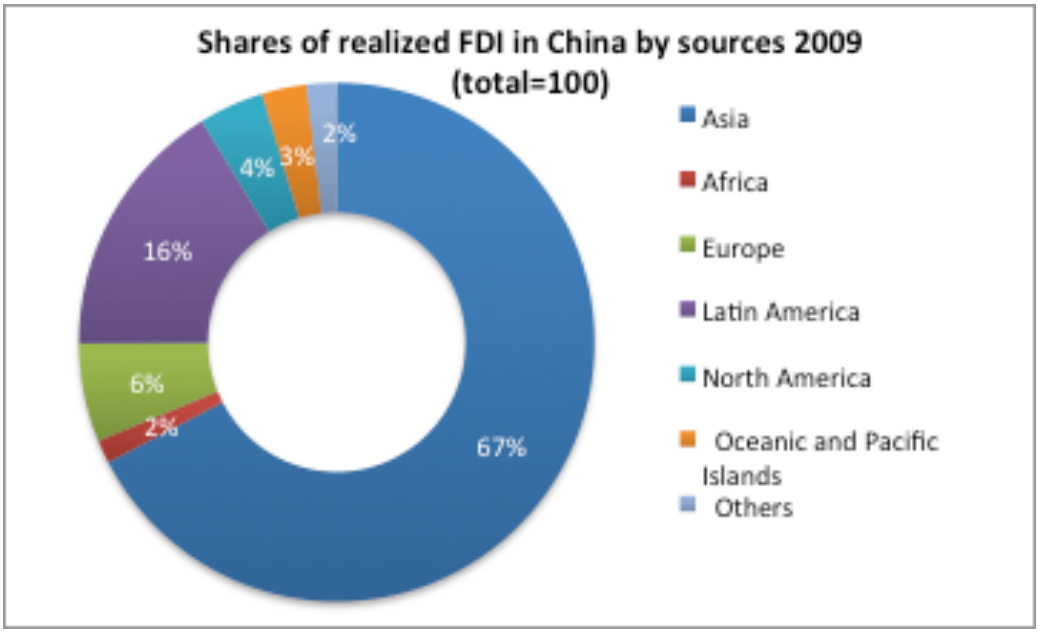


Figure 7: Hausman Test

```
. hausman fixed random
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	Coefficients (b) fixed	(B) random	(b−B) Difference	sqrt(diag(V_b−V_B)) S.E.
logRGDP	−.3774206	.7120873	−1.089508	.0892053
logTGDP	−.70315	−.7091266	.0059766	.
logEGDP	.6992484	.6843683	.0148802	.
logUNI	.5771615	.9918862	−.4147246	.
logILL	1.072128	.53579	.5363377	.0588435
logTRANSPORT	.4480496	−.1578178	.6058674	.
logEW	.3784765	−.3929068	.7713833	.
logPGDP	.6922407	−.7332404	1.425481	.0622925
logGR	−.1166984	−.0966224	−.0200761	.
loglFDI	.0707006	.4246578	−.3539572	.

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(10) = (b−B)'[(V_b−V_B)^(−1)](b−B)
= 781.40
Prob>chi2 = 0.0000
(V_b−V_B is not positive definite)

Figure 8: LM Test

Breusch and Pagan Lagrangian multiplier test for random effects

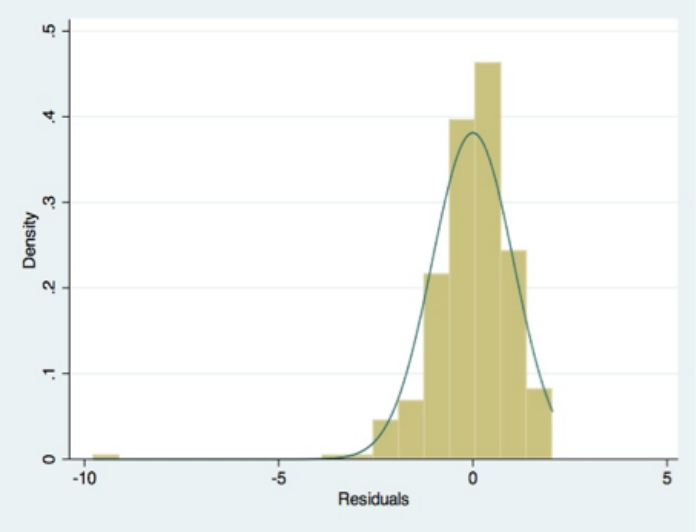
logFDI[Province,t] = Xb + u[Province] + e[Province,t]

Estimated results:

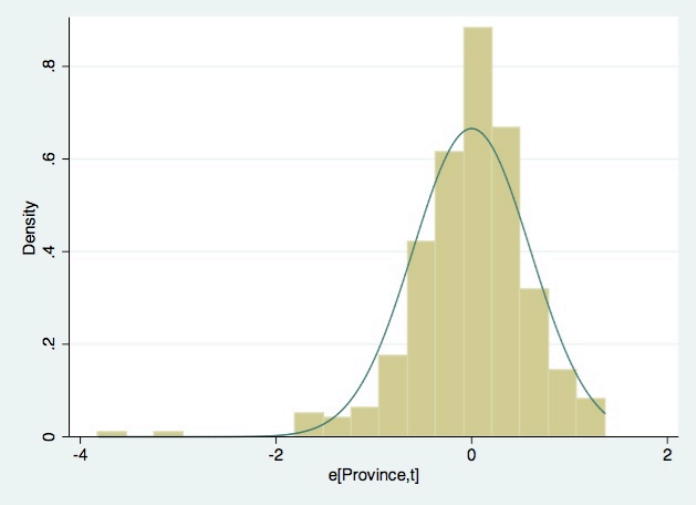
	Var	sd = sqrt(Var)
logFDI	3.831351	1.957384
e	.3989448	.6316207
u	.0052565	.0725014

Test: Var(u) = 0
chibar2(01) = 34.95
Prob > chibar2 = 0.0000

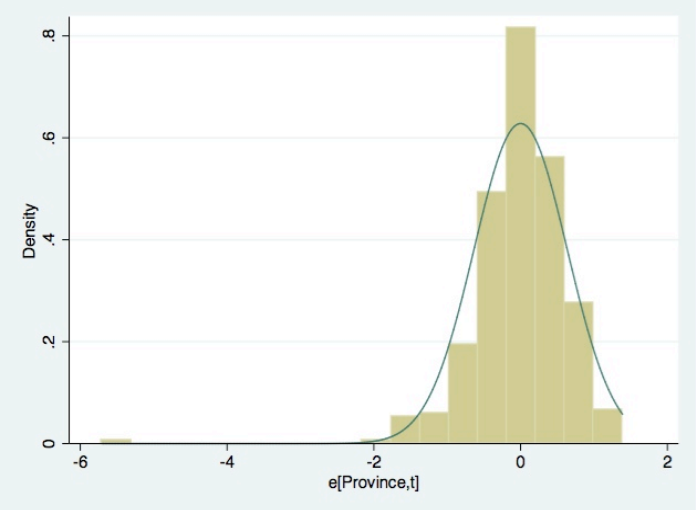
Figure 9, 10, 11: Residuals Histogram of Model 1,2,3



(1) POLS Model 1

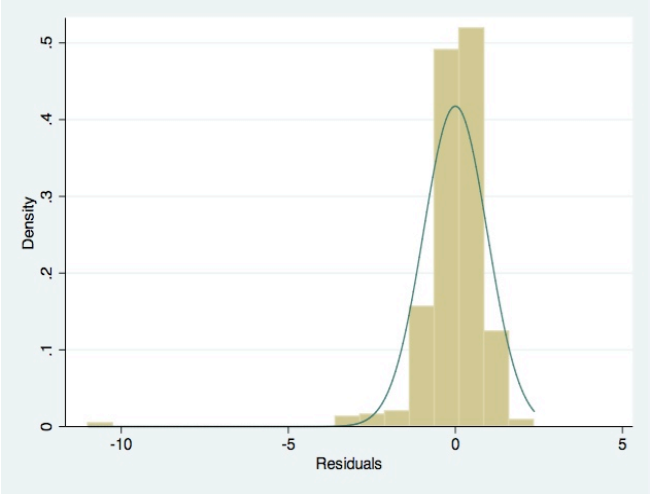


(2) FE Model 2

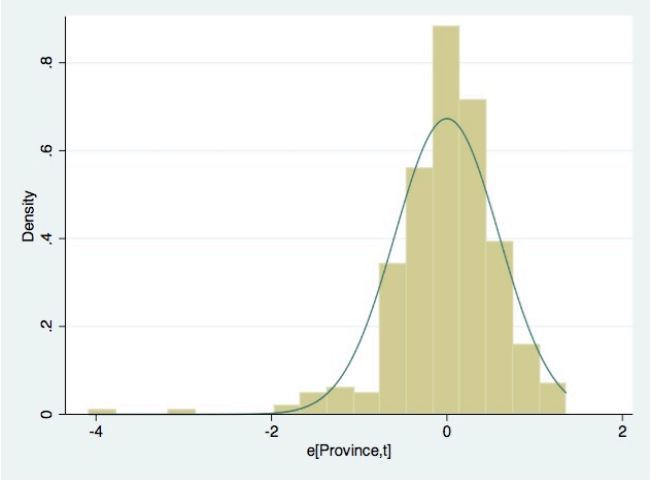


(3) RE Model 3

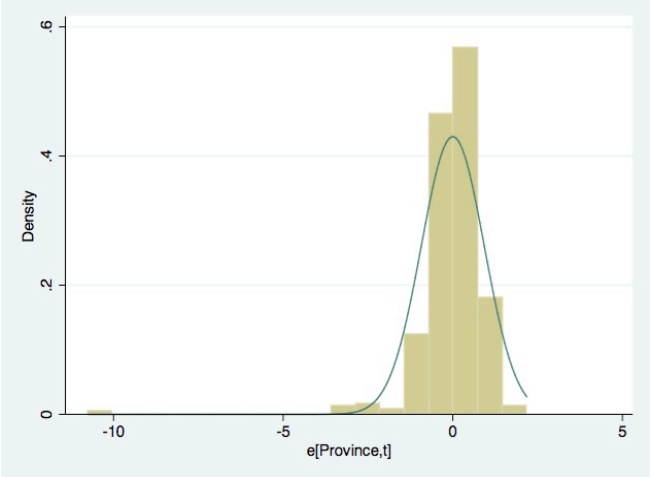
Figure 12,13,14: Residuals of Model 4,5,6



(1) POLS Model 4

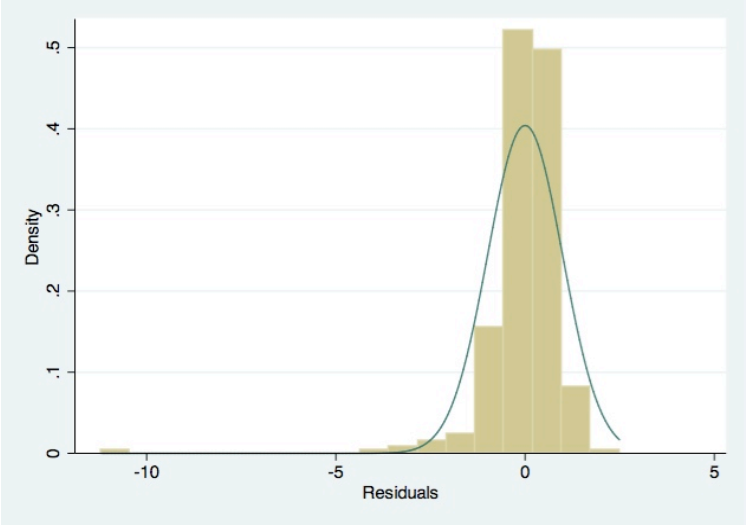


(2) FE Model 5

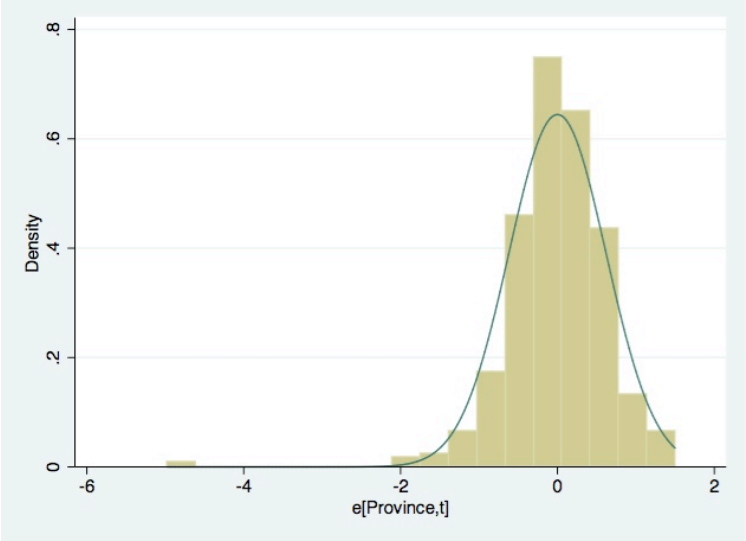


(3) RE Model 6

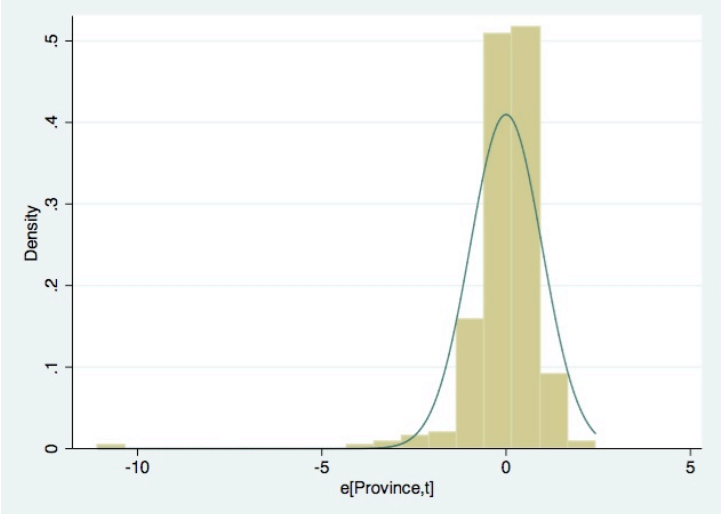
Figure 15,16,17: Residuals of Model 7,8,9



(1) POLS Model 7



(2) FE Model 8



(3) Model 9

Table 1: Growth Rates of Global GDP, GFCF, Trade, Employment and FDI (2008-2014)

Table 1

Growth rates of global GDP, GFCF, trade, employment and FDI, 2008-2014 (Per cent)

Variable	2008	2009	2010	2011	2012	2013	2014
GDP	1.40	(2.10)	4.00	2.70	2.30	2.40	3.10
Trade	3.00	(10.40)	12.60	5.80	3.20	4.50	5.80
GFCF	2.30	(5.60)	5.30	4.80	4.60	5.30	6.00
Employment	1.10	0.40	1.40	1.50	13.00	1.30	1.30
FDI	(9.50)	(33.00)	14.10	16.20	(18.30)	7.70	17.10
Memorandum:							
FDI value (in trillions)	1.81	1.21	1.38	1.60	1.31	1.40	1.60

Source: UNCTAD based on World Bank for GDP, IMF for GFCF and Trade and ILO for employment.
Note: Data for 2012 is estimation, for 2013 and 2014 are projections
GFCF= gross fixed capital formation

Table 2: Summary of Form of Market Entry by author

Table 2		Categories of advantages		
		Ownership advantages	Location advantages	Internalization advantages
Form of Market Entry	Licensing	Yes	No	No
	Export	Yes	Yes	No
	FDI	**Yes**	**Yes**	**Yes**

Table 3: Accumulated realized FDI in China by Sources of Countries and Economies

Table 3

Accumulated realized FDI in China by sources of countries and economies, 2006-2009 (US$ 10,000)

	2009	2008	2007	2006
Hong Kong, China	4,607,547	4,103,640	2,770,342	2,023,292
Virgin Islands	1,129,858	1,595,384	1,655,244	1,124,758
Europe	551,771	545,937	436,511	571,156
Japan	410,497	365,235	358,922	459,806
Singapore	360,484	443,529	318,457	226,046
Republic of Korea	270,007	313,532	367,831	389,487
Cayman Islands	258,189	314,497	257,078	209,546
United States	255,499	294,434	261,623	286,509
Samoan	202,003	254,975	216,988	153,754
Taiwan, China	188,055	189,868	177,437	213,583

Sources: Complied from National Bureau of Statistics of China (various issues), China Statistical Yearbook

Table 4: Accumulated FDI Inflows in China by Region and Provinces

Table 4

Accumulated FDI inflows in China by region and provinces, 1999-2010 (US$ 10,000)		
Regions	Acuumulative FDI inflows 1999-2010 (US$ 10,000)	Share 1999-2010
Eastern Regions	**85,097,713**	**63.89%**
Beijing	4,413,680	3.31%
Tianjing	5,067,832	3.80%
Hebei	2,294,878	1.72%
Liaoning	8,415,030	6.32%
Shanghai	8,019,016	6.02%
Jiangsu	18,375,674	13.80%
Zhejiang	7,778,437	5.84%
Fujian	4,966,041	3.73%
Shandong	8,356,489	6.27%
Guangdong	16,700,227	12.54%
Guangxi	710,409	0.53%
Central Regions	**17,487,914**	**13.13%**
Shanxi	701,298	0.53%
Inner Mongolia	1,526,539	1.15%
Jilin	758,347	0.57%
Heilongjiang	1,568,609	1.18%
Anhui	1,968,510	1.48%
Jiangxi	2,674,837	2.01%
Henan	2,457,481	1.84%
Hubei	3,112,130	2.34%
Hunan	2,720,163	2.04%
Western Regions	**6,562,602**	**4.93%**
Hainan	924,506	0.69%
Chongqing	1,698,827	1.28%
Sichuan	1,941,874	1.46%
Guizhou	114,866	0.09%
Yunnan	457,044	0.34%
Tibet	19,408	0.01%
Shaanxi	954,890	0.72%
Gansu	86,261	0.06%
Qinghai	195,376	0.15%
Ningxia	63,377	0.05%
Xinjiang	106,173	0.08%
Provincial total	**133,198,746**	**100.00%**

Source: ACMR

Table 5: FDI Inflows 1999-2010 by Province /Municipality

Table 4

Accumulated FDI inflows in China by region and provinces, 1999-2010 (US$ 10,000)

Regions	Acuumulative FDI inflows 1999-2010 (US$ 10,000)	Share 1999-2010
Eastern Regions	**85,097,713**	**63.89%**
Beijing	4,413,680	3.31%
Tianjing	5,067,832	3.80%
Hebei	2,294,878	1.72%
Liaoning	8,415,030	6.32%
Shanghai	8,019,016	6.02%
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Zhejiang	7,778,437	5.84%
Fujian	4,966,041	3.73%
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Guangdong	16,700,227	12.54%
Guangxi	710,409	0.53%
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Anhui	1,968,510	1.48%
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Henan	2,457,481	1.84%
Hubei	3,112,130	2.34%
Hunan	2,720,163	2.04%
Western Regions	**6,562,602**	**4.93%**
Hainan	924,506	0.69%
Chongqing	1,698,827	1.28%
Sichuan	1,941,874	1.46%
Guizhou	114,866	0.09%
Yunnan	457,044	0.34%
Tibet	19,408	0.01%
Shaanxi	954,890	0.72%
Gansu	86,261	0.06%
Qinghai	195,376	0.15%
Ningxia	63,377	0.05%
Xinjiang	106,173	0.08%
Provincial total	**133,198,746**	**100.00%**

Source: ACMR

Table 6: Lists of Special Economic Zones and Open Economic Zones

Table 6
Lists of special economic zones and open economic zones

Type	City	Province
Special Economic Zone, City	Shenzhen	Guangdong
	Zhuhai	Guangdong
	Shantou	Guangdong
	Xiamen	Fujian
	Kashgar	Xinjiang
Special Economic Zone, Province	N/A	Hainan
Coastal Development Areas with Regional Open Policy	Dalian	Liaoning
	Qinhuangdao	Hebei
	Tianjin	Tianjin
	Yantai	Shandong
	Qingdao	Shandong
	Lianyungang	Jiangsu
	Nantong	Jiangsu
	Shanghai	Shanghai
	Ningbo	Zhejiang
	Wenzhou	Zhejiang
	Fuzhou	Fujian
	Guangzhou	Guangdong
	Zhanjiang	Guangdong
	Beihai	Guangxi
Development triangles	Yangzi River Delta region (around Shanghai)	
	Pearl River Delta region (around Guangzhou)	
	Min Nan Delta region (around Xiamen)	

Sources: Chen Chunlai, Foreign Direct Investment in China

Table 7: Industrial Structure of FDI Firms in Manufacturing by Total Assets

Table 7

Industiral structure of FDI firms in manufacturing by total assets		
Sector	1995	2008
Labor intensive	50.91%	31.11%
Capital intensive	21.71%	31.28%
Technology intensive	27.38%	37.61%
Total	100%	100%

Source: Chen (2011), Foreign direct investment in China

Table 8

Sectoral distribution of realized FDI in China
(US$ 10 thousands)

	2009	Share	2008	2007	2006	2005
Total	**9,003,272**	**100%**	**9,239,544**	**7,476,789**	**6,302,061**	**6,032,469**
Agriculture, forestry, animal, husbandry & fishing Industry	142,873	1.6%	119,102	92,407	59,945	71,826
Mining & Quarrying	50,059	0.6%	57,283	48,944	46,052	35,495
Manufacturing	4,677,146	51.9%	4,989,483	4,086,482	4,007,671	4,245,291
Electric Power, Gas & Water Prod. & Supply	211,206	2.3%	169,602	107,255	128,136	139,437
Construction	69,171	0.8%	109,256	43,424	68,801	49,020
Transport, warehousing, post & telecommunications	252,728	2.8%	285,131	200,676	198,485	181,230
Information transmission, computer services and software industry	224,694	2.5%	277,479	148,524	107,049	101,454
Wholesale & retailing	538,980	6.0%	443,297	267,652	178,941	103,854
Accomodation & catering	84,412	0.9%	93,851	104,165	82,764	56,017
Financial services	45,617	0.5%	57,255	25,729	29,369	21,969
Real estate	1,679,619	18.7%	1,858,995	1,708,873	822,950	541,807
Renting & business services	607,806	6.8%	505,884	401,881	422,266	374,507
Scientific research, technical services	167,363	1.9%	150,555	91,668	50,413	34,041
Water conservancy, environment and public facilities management industry	55,613	0.6%	34,027	27,283	19,517	13,906
Resident Services and Other Services	158,596	1.8%	56,992	72,270	50,402	26,001
Education	1,349	0.0%	3,641	3,246	2,940	1,775
Health, social security and social welfare	4,283	0.0%	1,887	1,157	1,517	3,926
Culture, Sports and Entertainment	31,756	0.4%	25,818	45,109	24,136	30,543
Public administration and social organizations	1	0.0%	6	44	707	370

Source: Complied from National Bureau of Statistics of China (various issues), China Statistical Yearbook

Table 9: The Determinants of Location Decision of Inward FDI in China

Table 9

The determinants of location decisions of inward FDI in China			
Dependent Variable	Specification	Expected sign	Data source
FDI	Aggregate realized FDI from all source countries		ACMR, Chinese Provincial Statistical Yearbook (Various issues)
Independent Variables			
RGDP	Market size: Real GDP	+	China Statistical Yearbook
TGDP	Total trade to GDP ratio	+	China Statistical Yearbook
EGDP	Export to GDP ratio	+	China Statistical Yearbook
UNI	University students enrolment rate of population	+	China Statistical Yearbook
ILL	Illteracy rates of population	-	China Statistical Yearbook
TRANSPORT	Total lengeth of highways, railways and waterways	+	China Statistical Yearbook
EW	Efficiency Wage	?	China Statistical Yearbook
PGDP	Per capita GDP	?	China Statistical Yearbook
GR	Real growth rate of GDP	+	China Statistical Yearbook
SEZa.b	Special Economic Zone dummy variable	+	China Statistical Yearbook
ROP	Region open policy dummy variable	+	China Statistical Yearbook
COASTAL	Geographical location dummy variable	+	China Statistical Yearbook
LFDI	One year-lagged FDI	+	China Statistical Yearbook

Table 10: Summary of Selected Studies on the Determinants of FDI

Table 10
Summary of selected studies on the determinants of FDI

Author	Countries	Data	Econometirc Method	Significant determinatns	Effects
Wei ei et al.(2001)	China	Panel data (1983-1998)	RE model	International trade	+
				Wage rate	–
				GDP	+
				Infrastructure variable	+
				Investment incentives	+
Cassidy (2002)	China/Japa	Annual data (1996)	OLS	Tertiary education	+
				Exports	+
				Coastal location	+
Luo ei et al. (2008)	China	Panel data (1990-2005)	POLS/RE GLS	Infrastructure variable	+
				GDP	+
				Per capita GDP	–
				Policy incentives	+
				City industrial output	+
				Education	+
				Region location	+
				Interaction effect of industrial agglomeration and resource	+
Zheng (2011)	China	Panel data (1984-2007)	POLS	Lag FDI	+
				GDP	+
				Wage	–
				Education	+
				Agglomeration	+
				Infrastructure variable	+
				Tiananmen Square incident	–
				Location policy	+
Chen (2001)	China	Panel data (1986-2005)	RE model	GDP	+
				Per capita GDP	+
				Real growth rate	+
				Wage rate	–
				Transportation	+
				Export to GDP ratio	+
				Trade to GDP ratio	+
				Telecome infrastructure	+
				University enrollment rate	+
				Provision of electricity supply	+
				Geographical location	+
				Literacy rate	+
				SEZ	+
				Regional open policy	+
				Trade and investment liberalization	+

Table 11
Correlation Matrix

	logRGDP	logTGDP	logEGDP	logUNI	logILL	logTRA~T	logEW	logPGDP	logGR	loglFDI
logRGDP	1									
logTGDP	0.4227	1								
logEGDP	0.4035	0.9645	1							
logUNI	0.5472	0.4662	0.3872	1						
logILL	-0.5734	-0.3973	-0.3191	-0.5102	1					
logTRANSPO	0.531	-0.3094	-0.2649	-0.0044	-0.0356	1				
logEW	-0.2822	-0.5365	-0.4799	-0.2744	0.4953	0.2719	1			
logPGDP	0.6243	0.633	0.5766	0.8482	-0.5556	-0.0001	-0.3413	1		
logGR	0.167	0.1416	0.1373	0.4111	-0.0612	0.0737	0.1229	0.3801	1	
loglFDI	0.8203	0.569	0.5318	0.5906	-0.557	0.225	-0.4246	0.6743	0.149	1
SEZb	0.0558	0.3476	0.3173	-0.0808	-0.0558	-0.0194	-0.08	0.0929	-0.0188	0.193
ROP	0.4837	0.671	0.7019	0.2151	-0.2813	-0.074	-0.3969	0.4529	0.0342	0.5392
COASTAL	0.3956	0.747	0.7142	0.2859	-0.3475	-0.2538	-0.4368	0.4994	0.0391	0.5466

	SEZb	ROP	COASTAL
SEZb	1		
ROP	0.2396	1	
COASTAL	0.4135	0.8731	1

Table 12 & 13: Model 1,2,3 Summary; Residuals Summary

Independent Variable	POLS	FE	RE
LRGDP	1.2635	-0.3257	0.2431
	(5.90)***	(-0.67)	(1.13).
LTGDP	-0.7935	-0.6769	-0.8052
	(-1.91)*	(-2.49)***	(-3.04)***
LEGDP	0.7254	0.6629	0.7808
	(2.10)**	(2.46)**	(3.30)***
LUNI	1.2195	0.6181	0.9399
	(3.37)***	(2.00)**	(3.39)***
LILL	0.5729	1.0836	0.9048
	(2.73)***	(4.21)***	(4.31)***
LTRANSPORT	-0.2563	0.4827	0.2377
	(-1.3).	(2.08)**	(1.56).
LEW	-0.6109	0.3788	0.1159
	(-2.47)**	(2.30)**	(0.90).
LPGDP	-0.7339	0.6660	0.0357
	(-1.79)*	(1.10).	(0.11).
LGR	-0.1265	-0.1210	-0.1538
	(-0.9).	(-1.32)	(-1.58).
SEZb	0.9137	0.0000	0.2442
	(2.34)**		(0.43).
ROP	-0.2774	0.0000	0.1895
	(-0.84).		(0.34).
COASTAL	1.3021	0.0000	2.2255
	(3.57)***		(3.88)***
CONSTANT	19.7094	7.4557	12.6787
	(3.54)***	(1.29).	(3.41)***
Observations	339	339	339
Groups	/	31	31
R-sqaure: overall	0.7133	0.0228	0.4876
F-test	33.89	15.45	/
Wald Chi2	/	/	213.67

Note: *Statistically significant at 0.1 level (two-tail test)
**Statistically significant at 0.05 level (two-tail test)
***Statistically significant at 0.01 level (two-tail test)

Variable	Obs	Mean	Std. Dev.	Min	Max
(1) POLS uhat	339	-1.64e-09	1.046871	-9.773988	2.051638
(2) FE uhatf	339	-3.85e-11	.5993243	-3.814475	1.362384
(3) RE uhatr	339	1.11e-10	.6352094	-5.706789	1.388943

TABLE 14 & 15: Model 4,5,6 Summary; Residuals Summary

Independent Variable	POLS	FE	RE
LLFDI	0.4493	0.0707	0.4247
	(2.88)***	(0.74).	(2.72)***
LRGDP	0.7063	-0.3774	0.7121
	(2.54)**	(-0.79).	(2.58)***
LTGDP	-0.6758	-0.7032	-0.7091
	(-2.40)**	(-2.53)**	(-2.56)**
LEGDP	0.6557	0.6992	0.6844
	(2.49)**	(2.43)**	(2.66)***
LUNI	0.9534	0.5772	0.9919
	(3.10)***	(1.90)*	(3.20)***
LILL	0.5192	1.0721	0.5358
	(3.02)***	(4.10)***	(3.07)***
LTRANSPORT	-0.1582	0.4480	-0.1578
	(-1.07).	(1.90)*	(-1.06).
LEW	-0.4128	0.3785	-0.3929
	(-1.72)*	(2.35)**	(-1.64).
LPGDP	-0.7295	0.6922	-0.7332
	(-2.40)**	(1.07).	(-2.40)**
LGR	-0.0869	-0.1167	-0.0966
	(-0.69).	(-1.27).	(-0.78).
SEZb	0.5706	0.0000	0.5825
	(1.38).		(1.38).
ROP	-0.2158	0.0000	-0.2003
	(-0.77).		(-0.71).
COASTAL	0.9818	0.0000	1.0301
	(3.66)***		(3.76)***
CONSTANT	15.9629	6.9621	16.4254
	(3.23)***	(1.17)*	(3.32)***
Observations	338	338	338
Groups	/	31	31
R-sqaure: overall	0.7617	0.0049	0.7614
F-test	148.33	16.03	/
Wald Chi2	/	/	1795.82

Note: *Statistically significant at 0.1 level (two-tail test)
**Statistically significant at 0.05 level (two-tail test)
***Statistically significant at 0.01 level (two-tail test)

Variable	Obs	Mean	Std. Dev.	Min	Max
(1) POLS uhat	338	-7.38e-10	.9554216	-10.99069	2.359458
(2) FE uhatf	338	-1.87e-10	.5929522	-4.07983	1.356856
(3) RE uhatr	338	1.06e-09	.9277892	-10.75401	2.182321

Table 16 & 17: Model 7,8,9 Summary; Residuals

Independent Variable	POLS	FE	RE
LLFDI	0.4500	0.1061	0.4380
	(2.77)***	(1.01).	(2.69)***
LRGDP	0.6530	-0.2600	0.6546
	(2.34)**	(-0.73).	(2.35)**
LTGDP	-0.0938	0.0101	-0.0926
	(-0.78).	(0.06).	(-0.76).
LUNI	0.3803	0.9696	0.3918
	(3.17)***	(2.78)***	(3.25)***
LILL	0.6224	0.9478	0.6354
	(3.80)***	(4.61)***	(3.86)***
LTRANSPORT	-0.1471	0.4200	-0.1446
	(-0.99).	(1.97)**	(-0.97).
LEW	-0.4125	0.4264	-0.4063
	(-1.86)*	(2.93)***	(-1.83)*
LGR	-0.1420	-0.0780	-0.1428
	(-1.40).	(-0.84).	(-1.41).
SEZb	0.4800	0.0000	0.4782
	(1.38).		(1.36).
COASTAL	0.6710	0.0000	0.7003
	(4.54)***		(4.67)***
CONSTANT	6.0453	13.9697	6.2245
	(3.37)***	(3.63)***	(3.44)***
Observations	338	338	338
Groups	/	31	31
R-sqaure: overall	0.7456	0.0002	0.7455
F-test	223.76	18.82	/
Wald Chi2	/	/	2134.38

Note: *Statistically significant at 0.1 level (two-tail test)
**Statistically significant at 0.05 level (two-tail test)
***Statistically significant at 0.01 level (two-tail test)

Variable	Obs	Mean	Std. Dev.	Min	Max
(1) POLS uhat	338	3.84e-10	.9873152	-11.19999	2.490384
(2) FE uhatf	338	7.23e-10	.6190891	-4.975103	1.498341
(3) RE uhatr	338	-2.79e-09	.9737818	-11.07834	2.423561