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## Agglomeration and location of foreign direct investment: The case of China Yanjing CHEN

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#### ABSTRACT

This paper investigates the effect of agglomeration on foreign direct investment (FDI) location in China. We use different measures of agglomeration, and test both within and across region agglomeration effect. The results suggest that urbanization, foreign-specific agglomeration and industry diversity have positive impact on FDI location. Urbanization, foreign-specific agglomeration and industry specialization, also significantly promote industrial FDI. The results also suggest there exist both within and across region agglomeration effects. Other factors including market size, wage, education, road density, government policy and trade cost also have significant impacts on FDI location.

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#### **1. Introduction**

Agglomeration has been recognized as one of important determinants of firm location choices. Agglomeration may generate positive externality in local area and increase the productivity and profit of enterprises. There are lots of empirical studies investigating the effect of agglomeration on FDI location choice. Most studies focus on the effect of within region agglomeration on FDI location choice, based on an assumption of spatial independence that activity outside region has no effect on activity within the region (e.g., Broadman & Sun, 1997; Chen, 1997; Cheng & Kwan, 2000; Guimarães, Figueiredo, & Woodward, 2000; Sun, Tong, & Yu, 2002). However, the geographic scope of agglomeration effect is less clear. If across region spillover effect exists, then the measure of agglomeration only within region is problematic. Therefore, the study on the different geographic scopes of agglomeration is important to understand FDI location choice. A few studies focus on this topic. For example, Head, Ries and Swenson (1995) found that the agglomeration externalities cross state boundaries significantly affect the location choice within the state. They suggested that "the geographic extent of manufacturing agglomeration does not end at state borders; the attractiveness of a state increases with the level of industrial activity in neighboring provinces on a province's FDI. In case of the United States, Bobonis and Shatz (2007) also found FDI in adjacent states also boosts the level of same-source-country investment. Bruce, Ronald, Glen, and Helen (2004) suggest FDI into a host country may depend on the FDI in proximate countries. And Hall and Petroulas (2008) further confirm the existence and importance of such international interdependence.

This paper examines both within and across region agglomeration effect on FDI location in China. The measures of agglomerations include urbanization, foreign-specific agglomeration, and regional industry concentration. The case of China is interesting for following reasons. First, since the "Law of the People's Republic of China on Joint Ventures Using Chinese and Foreign Investment" was enacted in 1979, China has received a large amount of FDI flows and become the largest FDI recipient in developing countries.<sup>1</sup> Second, FDI is



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<sup>&</sup>lt;sup>1</sup> In 2002, China used 52.7 billion US dollars of foreign direct investment, ranking the first place in the world in stead of USA. And the amount mounts to 82.658 billion US dollars in 2007.

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unevenly distributed across provinces and industries within China.<sup>2</sup> Most FDI in China locates on the eastern coastal area and concentrates on the "foot-loose" manufacturing industries.<sup>3</sup> This provides a good setup for the study of agglomeration effect on FDI location.

Our results show that foreign-specific agglomeration, urbanization and industry diversity are important determinants of FDI location. The results also suggest that there exist both within and across region agglomeration effect. Using disaggregate industrial data, we examine industry-specific agglomeration effect and find that industry specialization significantly promotes industrial FDI. This effect is significant both within and across region. Other factors including market size, wage, education, road density, government policy and trade cost have significant impact on local FDI location choice.

This paper is organized as follows. Section 2 describes the data and specification. The empirical results are discussed in Section 3. Section 4 examines the effect of industry-specific agglomeration on FDI location and refers robustness test at the same time. Section 5 concludes the paper.

#### 2. Data and specification

#### 2.1. Data

The first dataset, include regional information on 23 provinces, 3 municipalities and 4 autonomous regions that makes up Mainland China.<sup>4</sup> It is compiled from series public publications of National Bureau of Statistics of China: China's Statistical Yearbook; Urban Statistical Yearbook of China, China Population Statistic Yearbook. The information includes nominal FDI inflow 1985–2004 in 10 thousand US dollars, total number of employed persons, number of employed persons for foreign enterprise, number of total population, number of city population 1993–2006, number of population educated at least for 12 years, number of population aged 15 and over, nominal GPP in 10 thousand RMB Yuan, average nominal wage in RMB Yuan, the total length of paved grade highway, provincial consumer price index (CPI) 1993–2006 and fixed assets investment price index (FAIPI) 1985–2006. More details are reported by data in the Appendix. FDI stock from1993 to 2004 in 10 thousands RMB Yuan is dependent variable. Prior to summation of FDI flow, the nominal FDI from beginning to 2004 in US dollars is converted into RMB using yearly average dollar/RMB exchange rate, the yearly levels have been adjusted to reflect 1990 constant prices using FAIPI, and they are summed by social discount rate 12%. Other monetary data, including nominal GPP and average nominal wage are adjusted to reflect 1990 constant price using provincial CPI.

The numbers of National Economic and Technologic Development Zones; National High and New Technology Industry Development Zones; National Foreign Trade Zones 1993–2006 are obtained from China Association of Development Zones (CAD). The distances between provincial capitals are measured according to map with a scale of 1:9,000,000, published by China Map Press in 2005. And the dummy variable of trade cost is equal to 1 if the province is alongside the ocean and 0 for others. The area of province is arising from The Brief Hand book of the Administrative Division of the People's Republic of China of 2004, published by Ministry of Civil Affairs of the People's Republic of China.

The second dataset includes provincial employment 1993–2006 and FIEs assets and employment 1998–2006 for 29 2-digit manufacturing industries. The employment of disaggregated manufacturing is used to construct Hoover coefficient. And the FIEs assets and employment data of disaggregated manufacturing is used in study of extension. Similarly, FIEs assets are adjusted to reflect 1990 constant price in 10 thousands RMB Yuan. All of information of the second dataset is derived from National Bureau of Statistics of China. More details are reported by the data in the Appendix.

#### 2.2. Empirical model

Most previous studies treat FDI location choice as the balanced comparatively choice outcome according to agglomeration, natural endowment and other determinants, (e.g., Guimarães, Octávio, & Woodward, 2000; Sun et al., 2002). According to Cheng and Kwan (2000), FDI is a special capital flow and has a positive self-reinforcing effect on itself.<sup>5</sup> We estimate the following equation:

$$FS_{i,t} = (1 - \mu)FS_{i,t-1} + \alpha_1^K \sum_{K} A_{i,t}^K + \alpha_2^K \sum_{K} A_{n,t}^K + \beta^L \sum_{L} X_{i,t}^L + \varepsilon_{i,t}$$
(1)

where subscript *i* refers to local province and *n* refers to defined neighboring regions of province *i*. *t* refers to our sample year 1993–2004. *FS* is dependent variable, denoting FDI stock.  $A^{K}$  is the specific agglomeration *K*, including regional industry concentration, urbanization economics and foreign-specific agglomeration, respectively.

<sup>&</sup>lt;sup>2</sup> The Bohai Rim, Yangtze River Delta and Southern coast, which contained the original open zones, received a lion's share of the total FDI stock, 81.45% from 1985 to 2004.

<sup>&</sup>lt;sup>3</sup> Between 1993 and 2004, contracted investment stock of foreign enterprises in secondary industry takes up 65% of the total. From 1996 to 2004, manufacturing accounts for about 67.5% accumulated contracted FDI in China.

<sup>&</sup>lt;sup>4</sup> Tibet is excluded because it has no FDI at all in sample years. Besides, its political, social and geographical situation makes it poor candidate for the testing of conventional location determinants. Chongqing is added into Sichuan after 1997 since any data of Sichuan before 1997 include Chongqing. <sup>5</sup> According to Cheng and Kwan (2000) investment flow takes the adjust takes in the second size of the testing of the second size of the second

<sup>&</sup>lt;sup>5</sup> According to Cheng and Kwan (2000), investment flow takes time to adjust towards the target stock of FDI, investment flow depends on the actual stock, and the target stock itself changes with the environment. The effect is consistent with the agglomeration effect.

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