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Foreign- Specific Agglomerations and the Location of Taiwanese Direct Investment in China

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ABSTRACT

This study investigates the interactions between provincial characteristics and foreign-specific agglomerations on Taiwanese investors' location choice in China. Using firm-level data, we find that nationality agglomeration and Asian agglomeration have non-negligible impacts on these investors. Furthermore, we find that their location choice follows a sequential selection process. These findings suggest that a region-wide development strategy is a more effective means of attracting these investors than province-specific fiscal concessions and preferential treatment.

Keywords Foreign-specific agglomeration; China; Taiwanese investment; location choice

Subject classification codes F23, R12, R30

1. INTRODUCTION

Following the normalization of the Taiwan-China (or cross-Strait) relation in 1989, Taiwanese direct investment (TDI) in China has skyrocketed. Despite this rapid development, bilateral governance frameworks for this investment did not come into existence until 2000. As a result, several studies have suggested that the extent of this investment is likely to exceed that officially reported due to non-reporting or under-reporting behaviors by investors (Tung 2000; Yang and Tu 2004)[1].

From the outset, the rise to prominence of TDI in China is to be expected; both sides of the Taiwan Strait share cultural ties and geographical proximity (Yang 1997; Li and Hu 2002; Gao 2005). However, such reasoning fails to take into account the geo-political tension that often places Taiwanese investors in precarious positions (Tung 2003; Zhu 2005)[2]. The fact that TDI continues to deepen and widen in the Chinese economy suggests that there must exist compensating factors for the risk associated with such an undertaking. In this study, we set out to explore the nature of these factors.

The search for determinants of FDI in China is not new. Since it opened its door to the rest of the world in 1978 China has continued to be one of the world's leading host countries for FDI. This has attracted the attention of researchers and policymakers seeking to understand the causes and effects of this development. The consensus in the current state of research is that agglomeration economies play a catalytic role. For example, many province-level studies find that agglomeration economies are responsible for the concentration of FDI in coastal provinces (Chen 1996; Wei et al. 1999; Wei and Liu 2001; Zhang 2001; Sun et al. 2002). This finding is echoed by city-level studies which explain how agglomeration economies transform many

[1] Prior to 2000, Taiwanese investors were only allowed to indirectly invest in China; that is, all transactions between Taiwanese parent companies and their Chinese subsidiaries had to be conducted via a third destination. Consequently, vital information, such as source countries, were often lost or deliberately concealed in the disclosure process.

[2] Tung (2000, 2003) provides examples in which prominent Taiwanese investors were pressured by the Chinese government to denounce pro-Taiwan independence candidates during the 1996 and 2000 Presidential Election.

coastal cities into major FDI hubs within a relatively short period of time (Head and Ries 1996; Qu and Green 1997; He 2002; Tuan and Ng 2004).

Notwithstanding useful information provided by these studies, one major question remains much underexplored; that is, how agglomeration economies affect location choice at the firm level. As industrial location theory suggests, the effects of agglomeration economies can vary extensively from one firm to another and from one industry to the next (Fujita and Thisse 2002). As such, firm-level studies are necessary for disentangling the impacts of agglomeration economies at smaller units of analysis. In general, studies in this genre use refined agglomeration economies measures, such as localization economies and urbanization economies, to study individual foreign investor's location choice.[3] In the case of China, they find that while manufacturing-based foreign investors are attracted to localization economies, their service-based counterparts respond more to urbanization economies (Head and Ries 1996; Chen 1997; Belderbos and Carree 2002; Blonigen et al. 2005; Chang and Park 2005; Wakasugi 2005).

From the preceding discussion, undoubtedly, the extent of agglomeration economies enters foreign investors' location choice. However, most studies have focused on traditional agglomeration economies measures and have overlooked the effect of foreign-specific agglomerations, or agglomeration economies arising from the co-location of foreign investors in the host location. He (2002) and Sun et al. (2002) show that foreign-specific agglomerations are important contributors to the uneven distribution of FDI across Chinese provinces. At the firm level, Head and Ries (1996), Belderbos and Carree (2002), Zhou et al. (2002), Wakasugi (2005), Cheng and Stough (2006) and Cheng (2006; 2007; 2008a; 2008b) find that greenfield Japanese investors prefer to locate in well-established Japanese clusters in China. A similar result is also reported for Korean, Hong Kong and Taiwanese investors in China (He 2003; Chang and Park 2005).

The focus of this paper is on how foreign-specific agglomerations affect Taiwanese investors' location choices in China. To date, with the exception of

[3] See Rosenthal and Strange (2004) for a comprehensive literature review on the nature and measures of agglomeration economies.

He (2003), there has yet to be a comprehensive analysis in this line of inquiry. As such, this paper is designed to fill this gap in the literature. Furthermore, we set out to test whether these investors follow a sequential location selection process; that is, do they select a region that is more familiar to them before deciding on the best province to invest within that region?[4] This question carries important policy implications. This is because such a process implies that these investors respond more to a balanced, region-wide development policy than province, or city-specific FDI initiatives. Finally, we assess the impact of different types of foreign-specific agglomeration at industry level.

The paper is organized as follows. Hypotheses for exogenous variables are specified in Section 2. Section 3 presents econometric methods. The database and sample selections are described in Section 4. Results are provided in Section 5, while the final section concludes.

Table 1 summarizes variables that define characteristics of the investment location and their expected signs.

[4] It is important to note that even though the hierarchical decision structure suggests a sequential decision-making process it does not imply that firms actually make location choices sequentially. It is simply a way to analyze the decision-making process by grouping potential location choices together and take into account possible dependence among alternative locations (Cheng 2007).

2. Hypotheses for Exogenous Variables

Table 1 Variables, by definition

	Variable	Symbol	Definition	Expected sign
Foreign-specific agglomeration	Nationality agglomeration	N_p	Logarithm of the year-end number of Taiwanese firms in province *p*	+
	Asian agglomeration	A_p	Logarithm of the year-end number of Asian firms in province *p* in the previous year	+
	Foreign agglomeration	F_p	Logarithm of year-end number of foreign firms in province *p* in the previous year	+
Location-specific variables	Market potential	M_p	Logarithm of the year-end distance-weighted sum of income per capita in all other provinces in the previous year	+
	Industrial linkages	I_p	Logarithm of the year-end number of Chinese manufacturing firms in province *p*	+
	Labour costs	W_p	Logarithm of the year-end real wage rate adjusted for labour productivity in province *p*	-
	Transportation density	T_p	Logarithm of the year-end combined length of railways and highways per square kilometer	+

Source: Compiled from various issues of *China Statistical Yearbook* and *Almanac of China's Foreign Economic Relations and Trade*

Foreign- specific agglomerations

The notion of foreign-specific agglomerations has its antecedents in the network effect literature in which the co-location of foreign investors can arise from these investors' extending their networks established at home to the host location (Dunning 1992; Caves 1996). In the case of China, this effect is often measured by provincial cumulative stock of FDI (Wei et al. 1999; Sun et al. 2002). However, many studies suggest that the provincial number of foreign firms should be used to control for the dominance of large coastal provinces (Head and Ries 1996; Chang and Park 2005; Wakasugi 2005; Cheng 2008a). This idea is subsequently broadened to FDI-based location quotients, which simultaneously controls for the size of the province and the number of foreign firms in that province (Cheng and Stough 2006; Cheng 2007, 2008a, b).

In this study we use distance-weighted count of firms to test the effect of foreign-specific agglomerations. Head et al. (1995) and Crozet et al. (2004) suggest that, unlike pure counts of firms, the distance-weighted approach is able to take into account the impact of neighbouring provinces. We construct three distance-weighted counts of firms to capture different types of foreign-specific agglomeration.

The first distance-weighted count of firms is for nationality agglomeration, on the basis that a large presence of Taiwanese investors in a province indicates that province possesses attributes pertinent to these investors (Yang 1997; Zhu 2005). Formally, it is given by:[5]

$$N_p = \text{Taiwanese firms count}_p + \sum_{p \neq q} \left(\frac{\text{Taiwanese firms count}_q}{d_{pq}} \right) + 1 \qquad (1)$$

where d_{pq} is the distance from provincial capital city in province p to provincial capital city in province q. We expect a positive sign on this variable.

The second distance-weighted count of firms is for Asian agglomeration, which stems from the fact that many Taiwanese investors may replicate matured network linkages with other Asian firms in the host province (Chen and Chen 1998). Formally, it is given by:

$$A_p = \text{Asian firms count}_p + \sum_{p \neq q} \left(\frac{\text{Asian firms count}_q}{d_{pq}} \right) + 1 \qquad (2)$$

We expect a positive sign on this variable.

According to He (2002), provincial number of foreign firms, or foreign agglomeration, is a good indicator on the level of information cost in a province. The congregation of foreign firms helps to disseminate information about the host province back to the home country. This reduces information cost for future investors. Alternatively, the clustering of foreign firms can a indicate better investment environment in the host province (Qu and Green 1997). Formally, it is given by:

$$F_p = \text{Foreign firms count}_p + \sum_{p \neq q} \left(\frac{\text{Foreign firms count}_q}{d_{pq}} \right) + 1 \qquad (3)$$

We expect a positive sign on this variable.

[5] In order to overcome cases in which TDI fails to emerge in a particular province, one is being added to foreign-specific agglomeration variables. This approach follows from Crozet et al. (2004).

Additional provincial characteristics

One provincial characteristic often considered by Taiwanese investors in China is provincial market size. This is because establishing production facilities in large provinces not only helps to realize economies of scale and scope in production and distribution, but also increases the likelihood of reaching new customers. In the case of China, the level of gross provincial product and its growth rate (Wei et al. 1999; Belderbos and Carree 2002; Zhou et al. 2002; Cheng and Stough 2006; Kang and Lee 2007), provincial income per capita (Chen 1996; Sun et al. 2002) and provincial population density (Chang and Park 2005) are often used as indicators for provincial market size. However, Cheng (2007) suggests that these measures implicitly assumes that foreign investors' sales are confined to the host province and ignore the fact that these investors are also likely to sell their goods in neighbouring provinces. We control for this by constructing a provincial market accessibility index:[6]

$$M_p = \sum_{p=1}^{24} \frac{Y_q}{d_{pq}^2}, p \neq q \tag{4}$$

whereY_q is the income per capita in province q and d_{pq} is the distance from provincial capital city in province p to provincial city in province q. We expect a positive sign on this variable.

The extent of industrial linkages is another potential characteristic affecting Taiwanese investors in China. This is because locating in a province with a strong industrial base allows better accesses to local supply networks and specialized service providers. These considerations are consistent with the findings on localization economies and urbanization economies in the literature (Fujita and Thisse 2002). In the case of China, number of provincial manufacturing firms and the number of provincial manufacturing workers are

[6] Kim et al. (2003) suggest that equation (4) not only has the advantage of controlling for the proximity to end-users that may be sought by firms manufacturing products with high transportation costs, but also links FDI attraction by one province to conditions in other provinces.

often used as indicators for industry linkages (Head and Ries 1996; Zhou et al. 2002; Chang and Park 2005; Wakasugi 2005; Cheng 2007). We choose the former as the proxy for the industrial linkage effect and expect a positive sign on this variable.[7]

Undoubtedly, like many other foreign investors, the large pool of low-cost workers in China has attracted many Taiwanese investors (Tung 2000; Zhu 2005). This labour-market pooling effect is often examined through the lens of provincial average real wage rate (Zhou et al. 2002; Wakasugi 2005; Cheng and Stough 2006; Kang and Lee 2007). However, Cheng (2007) suggests that such an approach may suffer from the endogeneity problem arising from high correlation between average real wage rate and labour quality. As a result, some studies choose provincial efficiency wage rate, or provincial average real wage rate adjusted for productivity (Head and Ries 1996; Chen 1997; Belderbos and Carree 2002). We select provincial efficiency wage to control for potential endogeneity problem and expect a negative sign.

The level of transportation density is expected to influence Taiwanese investors in China. This is because the state of transportation infrastructure directly affects the level of transportation costs. This is particularly relevant to those engaged in local and global distribution networks (Chen 2008). Given the importance of China in the global economy, the total number of seaports and airports in a province has been used as the measure for transportation costs (Head and Ries 1996; Belderbos and Carree 2002; He 2002). We select another commonly used measure in the literature; namely, provincial transportation density, or the combined length of highways and railways per square kilometre(Zhou et al. 2002; Chang and Park 2005; Wakasugi 2005; Cheng and Stough 2006; Cheng 2007; Kang and Lee 2007). We expect a positive sign on this variable.

3. Econometric Method

Conditional logit model (CLM) is the most widely used approach for studying

[7] This is an arbitrary choice, on the basis that the Pearson correlation coefficient between provincial number of manufacturing firms and provincial number of manufacturing workers is $r = 0.93$.

firm location choice. It was first developed by McFadden (1974) based on Marschak's (1960) random utility maximization specification. Essentially, it assumes that a decision-maker would choose an alternative if, and only if, it yields the highest utility. Carlton (1983) shows that firm location choice problem can be seen as a variant of random utility maximization problem. Specifically, if the firm is assumed to maximize profit, it will only establish plants in locations with the highest level of expected profit. Formally, firm *i* will establish a plant in location *j* if, and only if,

$$\pi_{ij} > \pi_{is} \forall j \neq s \tag{5}$$

The actual profit delivered by each location alternative to the firm is, however, not directly observable. This is because there are two components to this unknown profit function; namely, a deterministic component and a stochastic component. Specifically, we can express this function for firm *i* in location *j* as:

$$\pi_{ij} = V_{ij} + \varepsilon_{ij} = \beta_i X_{ij} + \varepsilon_{ij} \tag{6}$$

where X_{ij} are observable characteristics of a location alternative and ε_{ij} is a stochastic factor capturing any profit differences resulting from all unobservable factors.

The presence of the stochastic component in equation (6) means that one cannot be absolutely certain about exact location choices made by firms. However, McFadden (1974) suggests that, if ε_{ij} are independently and identically distributed (IID) according to an extreme-type-value 1 distribution, one can infer location choices from the probability of location *j* being selected by firm *i*. Mathematically, the probability of firm *i* choosing location *j* can be expressed as:

$$\Pr(Y_i = j) = \frac{\exp\,(X_{ij}\beta_i)}{\sum_{s=1}^{j} \exp\,(X_{is}\beta_i)} \tag{7}$$

The increasing popularity of CLM in the study of discrete choices can be attributed to its computational convenience.[8] However, for equation (7) to hold, it requires ε_{ij} to satisfy the independence from irrelevant alternatives (IIA) property, or that the probability ratio of any two location alternatives depends only on their own attributes and independent of other available location alternatives. This is because, in any good specification of CLM, the independent variables should capture all observable characteristics in which the stochastic component ε_{ij} are not correlated (Ben-Akiva and Lerman 1985). Simply put, firms consider all location alternatives as equally substitutable and that omitting any location alternative from the choice set should not produce any material impact on the location choice (Train 2003).

Given the importance of the IIA property, Hausman and McFadden (1984) propose a diagnostic test by comparing an unrestricted CLM derived from the whole choice set and a restricted CLM in which some alternative choices are excluded. In principle, if a subset of the choice set were truly irrelevant, omitting it from the restricted model should not generate any statistically significant different results than those provided by the unrestricted model. As Carlton (1983) suggests, violations of the IIA property may not be problematic if possible location alternatives are geographically distant. Clearly, this does not apply to the case of China, where possible location alternatives are not equally substitutable due to geographic features and past policy (Bao et al. 2002). For instance, Beijing and Tianjin, or Jiangsu and Zhejiang, might be a closer substitute than Fujian and Xizang.

Nested logit model

The conventional approach for controlling potential IIA violations is to include regional dummy variables as a means of controlling unobservable characteristics. However, such an approach cannot shed light on whether Taiwanese investors follow a sequential location selection process in China. To achieve that end, we divide the choice set into mutually exclusive subsets and assume that the IIA property continues to hold within, but not across, these subsets (Train 2003). This modification means that each subset now

[8] Specifically, the IID stochastic component allows for a closed-form probability solution as shown in equation (7).

contains only location choices with similar attributes and allows us to run nested logit model (NLM) estimations. Specifically, in this setting, Taiwanese investor *i* is assumed to first consider a choice between regional subsets (the upper nest) before making a choice for a province within the chosen regional subset (the lower nest).

In order to test the sequential location choice hypothesis we divide China into regions $r = 1,2,\cdots,R$ and provinces $p = 1,2,\cdots,P$. Furthermore, we assume that each investor will choose the location alternative that maximizes profit according to equation (6). Finally, the function of observed location characteristics V_{rp} depends simultaneously on regional characteristics Y_r and provincial characteristics X_{rp}. Therefore, the observable characteristics of a location alternative are comprised of:

$$V_{rp} = \alpha Y_r + \beta X_{rp} \tag{8}$$

where α and β are vectors of the parameters to be estimated.

The probability of Taiwanese investor *i* choosing region *r* in China depends simultaneously on the investor's own attributes and characteristics of location alternatives that composed the lower nest. For ease of exposition, let's define the inclusive value (IV), or the expected maximum profit associated with the lower nest as:

$$IV_r = \log \sum_{i=1}^{P_r} \exp(\beta X_{ir}) \tag{9}$$

Consequently, the probability of Taiwanese investor *i*chooses region *r*is:

$$\Pr(Y_i = r) = \frac{\exp(\sigma IV_r + \alpha Y_r)}{\sum_{j=1}^{R} \exp\left(\sigma IV_j + \alpha Y_j\right)} \tag{10}$$

The probability that Taiwanese investor *i* chooses province *p* within region *r* can be expressed as $\Pr(p|Y_i = r) = \Pr(r|Y_i = p) \times \Pr(Y_i = r)$, where

$$\Pr(p|Y_i = r) = \frac{\exp(\beta X_{rp})}{\sum_{i=1}^{C_p} \beta X_{ri}} \tag{11}$$

Equivalently, equation (11) can be restated as follow:

$$\Pr(p|Y_i = r) = \frac{\exp(\beta X_{ir}) \times \exp(\sigma IV_r + \alpha Y_r)}{\sum_{j=1}^{R} \exp(\sigma IV_j + \alpha Y_j) \times \exp(IV_r)} \tag{12}$$

where the coefficient attached to IV_r, or σ, is a measure of the degree of independence between province alternatives within the same regional nest. In general, σ has a range between zero and one, with a smaller σ indicating that province alternatives within the same regional nest are close substitutes (Maddala 1983)[9].

In this study, we interpret σ as an indicator for a nested structure of Taiwanese investors' location choice in China. According to Hensher and Johnson(1981) and Cheng (2007), if σ is defined as the extent of province alternatives within the same regional nest that are close substitutes, $1-\sigma$ would then be a measure of the degree of similarity between regions. Therefore, if σ were statistically significant and fell within the range between zero and one, it may be concluded that Taiwanese investors in China do, indeed, follow a sequential location selection process; that is, the desired region was chosen ahead of identifying the province within that region for investment.

Estimation procedure

We begin testing Taiwanese investors' location choice in China by estimating three separate CLM specifications, with each specification including a particular foreign-specific agglomeration variable. Since we use the maximum likelihood method for all estimations, we pay close attention to the likelihood ratio χ^2 for the joint significance of independent variables in the

[9] Conceptually, as Mucchielli and Puech (2004) point out, if σ is equal to zero, the NLM specification simply collapses into a standard CLM specification. Intuitively, this is because all province alternatives within the same regional nest are completely dependent. In contrast, if σ is equal to one, all province alternatives in the same regional nest are completely independent, making the NLM specification superfluous.

model. We also examine the model's overall goodness-of-fit by observing the likelihood ratio index ρ^2. According to Greene (2000), the model is said to have a reasonable level of goodness-of-fit if ρ^2 falls within the range between 0.2 and 0.4. We will use these criteria to identify the baseline model for the industry-level analysis later on.

Next, we perform six NLM specifications to check for potential IIA violations. Logically, if Taiwanese investors in China follow a sequential location selection process, the IV coefficients for each specification should be statistically significant and fall within the range of zero and one. We estimate these coefficients by dividing China into Open Door policy regions and Census regions. Specifically, in the first three specifications, we divide China into the Eastern region, which was the first to open to FDI, followed by the Central region and later the Western region[10]. This gradualist approach to FDI is expected to have a non-negligible impact on Taiwanese investors. Clearly, the objective in these specifications is to test the hypothesis that these investors would first choose the desired Open Door policy region before selecting a province within that region for investment.

In the remaining three specifications we divide China into six Census regions; namely, Huabei, Huadong, Huazhong, Xinan, Xibei and Dongbei[11]. The objective here is to test the hypothesis that Taiwanese investors first select the preferred Census region before choosing a province within that region for investment. It is worth noting that, unlike Open Door policy regions, provinces within the same Census region tend to share similar historical, cultural and ethnical ties.

Finally, it is well-documented in the industrial location literature that the impact of location attributes is highly industry-specific. Accordingly, we

[10] The Eastern region includes Beijing, Tianjin, Hebei, Liaoning, Shanghai, Zhejiang, Fujian, Shandong, Guangdong, Guangxi and Hainan. The Central region includes Shanxi, Neimenggu, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei and Hunan. The Western region includes Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang and Xizang.

[11] The Huabei region includes Beijing, Tianjin, Hebei, Shanxi, and Neimenggu. The Huadong region includes Shandong, Jiangxi, Fujian, Anhui, Zhejiang, Jiangsu and Shanghai. The Huazhong region includes Hainan, Guangxi, Guangdong, Hunan, Hubei and Henan. The Xinan region includes Guizhou Sichuan, Yunnan, and Xizang. The Xibei region includes Shannxi, Gansu, Qinghai, Ningxia and Xinjiang.

divide Taiwanese investors into different industries and perform the baseline model on each industry. Since the dependent variable is the probability of a Chinese province being selected by a Taiwanese investor, the resulting estimated coefficients do not directly measure the marginal effect of location attributes on the location choice. Instead, those coefficients should be referred to as average probability elasticity; that is, the sum of probability elasticity across all Taiwanese investors and location alternatives in China (Head et al. 1995; Wakasugi 2005; Cheng 2008a).

4. The Database and Sample Selection

We examine Taiwanese greenfield investors' location choice in China from 1996 to 2005. We select greenfield investors as our unit of analysis because, unlike merger and acquisition, they are free to establish plants at any location in China. Furthermore, they are more responsive to fiscal incentives and preferential treatment, all of which reduce establishment costs of foreign presences. Finally, and perhaps more importantly, this selection allows us to answer whether a sequential location selection process exists. As discussed earlier, NLM specifications assume a two-level location choice structure; namely, whether to invest in a region at all, and if a region is selected, which province in that region to invest. Most studies on FDI in China, to date, have only considered provinces in which investment actually took place. However, this means that the first decision has been largely ignored. Since these two decisions are interrelated, this systematic sample selection bias can render parameter estimates biased and inconsistent (Braunerhjelm and Svensson 1996).

The sample used in this study has been compiled from various issues of *Statistics on Approved Indirect Mainland Investment* published by the Ministry of Economic Affairs (MOEA) in Taiwan. We restrict our sample to include only projects undertaken by publicly listed companies, on the basis that they tend to be genuine and active in cross-Strait economic exchanges (Yang and Tu 2004). Consequently, we omit those projects not formally registered with MOEA and those investors who re-invest in, or withdraw their investment from, China. In other words, we focus exclusively on the initial location choice, not on the operational success or failure in subsequent periods. According to MOEA, during the period 1996-2005, there were a total of 2,131 projects satisfying these requirements.

For any discrete choice model, it is important for each individual alternative in the choice set to be chosen at least once (Head and Ries 1996; Belderbos and Carree 2002). Table 2 shows that, during the period 1996-2005, there were a total of six provinces with no Taiwanese greenfield investment[12]. Therefore, we exclude them from the study. In order to maintain consistency, and constrained by data availability, investment in Chongqing is considered as part of investment in Sichuan. Since some provinces are excluded from the study, we need to interpret the dependent variable as the average probability of a province being chosen from the remaining 24 provinces. Formally, the average probability elasticity of Taiwanese investor *i* choosing province *p* with location attribute X_k is given by:

$$E_{ip}^{k} = \frac{\partial \mathrm{Pr}\,(Y_i = p)}{\partial X_k} \frac{X_k}{\mathrm{Pr}\,(Y_i = p)} = \beta_k(1 - \mathrm{Pr}(Y_i) = p) \qquad (13)$$

We can obtain the average probability elasticity of location attribute X_k by summing across all investors and provinces:

$$E^{k} = \sum_{i=1}^{N} \sum_{p=1}^{24} E_{ip}^{k} = \beta_k \frac{P-1}{P} = \beta_k \frac{24-1}{24} = 0.96\beta_k \qquad (14)$$

where$P$ is the total number of provinces received at least one investment project during the sample period and β_k is the estimated coefficient of location attribute X_k, with an estimated marginal effect of 96 per cent of β_k.

[12] These six provinces were Xinjiang, Xizang, Gansu, Yunnan, Qinghai and Ningxia.

Table 2 Location of Taiwanese greenfield investment in China, 1996- 2005, by province and industry

	Chemical	Electrics and electronics	Food processing	Machinery	Metal	Transportation	Textiles	Retails and services	**Total**
Huabei	**19**	**60**	**17**	**7**	**13**	**6**	**11**	**19**	**152**
Beijing	5	34	8	6	6	4	8	13	**84**
Tianjin	12	21	9	1	2	2	2	6	**55**
Hebei	1	1	0	0	4	0	1	0	**7**
Shanxi	1	3	0	0	1	0	0	0	**5**
Neimenggu	0	1	0	0	0	0	0	0	**1**
Dongbei	**3**	**9**	**4**	**1**	**0**	**6**	**1**	**2**	**26**
Liaoning	2	7	4	0	0	1	1	2	**17**
Jilin	1	1	0	1	0	2	0	0	**5**
Heilongjiang	0	1	0	0	0	3	0	0	**4**
Huadong	**173**	**621**	**35**	**45**	**114**	**76**	**77**	**94**	**1,235**
Shanghai	50	212	17	26	37	18	26	62	**448**
Jiangsu	7	14	0	2	5	2	1	2	**33**
Zhejiang	96	351	11	15	68	26	38	21	**626**
Anhui	2	3	0	0	0	1	0	0	**6**
Fujian	11	21	5	1	4	26	7	7	**82**
Jiangxi	0	4	1	0	0	1	2	0	**8**
Shandong	7	16	1	1	0	2	3	2	**32**
Huazong	**88**	**368**	**10**	**20**	**51**	**24**	**50**	**40**	**671**
Henan	1	1	1	0	0	0	1	1	**5**
Hubei	3	12	1	0	0	3	1	2	**22**
Hunan	3	2	0	0	1	1	1	4	**12**
Guangdong	81	348	7	20	48	19	47	32	**622**
Guangxi	0	4	1	0	0	0	0	1	**6**
Hainan	0	1	0	0	2	1	0	0	**4**
Xinan	**3**	**10**	**0**	**3**	**2**	**6**	**1**	**12**	**37**
Sichuan	3	9	0	3	2	6	1	12	**36**
Guizhou	0	1	0	0	0	0	0	0	**1**
Yunnan	0	0	0	0	0	0	0	0	**0**
Xizang	0	0	0	0	0	0	0	0	**0**
Xibei	**2**	**3**	**0**	**0**	**2**	**0**	**0**	**3**	**10**
Gansu	0	0	0	0	0	0	0	0	**0**
Shannxi	2	3	0	0	2	0	0	3	**10**
Qinghai	0	0	0	0	0	0	0	0	**0**
Ningxia	0	0	0	0	0	0	0	0	**0**
Xinjiang	0	0	0	0	0	0	0	0	**0**
Total	**289**	**1,071**	**66**	**76**	**182**	**118**	**140**	**170**	**2,131**

Descriptive statistics for proposed variables are shown in Table 3, which are compiled from various issues of *China Statistical Yearbook* and *Almanac of China's Foreign Economic Relations and Trade*, both published by the National Bureau of Statistics of China. In constructing Table 3, provincial real income per capita are converted in 1990 prices using gross provincial product deflator. Similarly, provincial consumer price index is used to convert provincial efficiency wage into 1990 prices. The distance between capital cities in different provinces and the landmass for each province are obtained from Google Earth.

Table 3 Descriptive statistics, by variable

Variable	Symbol	Mean	S.D.	Min.	Max.
Nationality agglomeration	N_p	0.990	0.043	0.237	1.454
Asian agglomeration	A_p	2.445	2.349	0.391	3.431
Foreign agglomeration	F_p	1.045	0.495	0.998	2.535
Market potential	M_p	1.454	1.324	0.873	4.564
Industrial linkages	I_p	4.323	2.453	1.293	6.434
Labour cost	W_p	2.465	2.284	0.453	4.138
Transportation density	T_p	-0.459	0.268	0.159	0.278

Note: These descriptive statistics are based on the logged value and since log 0 is undefined, 10^{-4} is used to replace the zero whenever it occurs in the dataset. Then panel data comprises observation of 24 provinces for the period 1996-2005.

The main problem with our proposed variables is that they can overlap with one another, giving rise to potential multicollinearity. Therefore, we check for Pearson pair-wise correlation coefficients by transforming these variables into their natural logarithm and stacking them across provinces. Table 4 shows that, with the exception of foreign-specific agglomeration variables (as highlighted in bold), there are no significant correlations among the remaining variables[13]. Given that only one foreign-specific agglomeration variable will be included in the specification at a time, the correlation among foreign-specific agglomeration variables should not be of a concern.

[13] Gujarati (1995) suggests that potential multicollinearity can arise if Pearson pair-wise correlation coefficient exceeds 0.6.

Table 4 Pearson pair- wise correlation coefficient matrix, by variable

	N_p	A_p	F_p	M_p	I_p	W_p	T_p
N_p	1.00						
A_p	**0.78**	1.00					
F_p	**0.89**	**0.78**	1.00				
M_p	0.46	0.34	0.43	1.00			
I_p	0.34	**0.64**	0.39	0.18	1.00		
W_p	0.31	0.21	0.30	0.25	0.48	1.00	
T_p	-0.20	-0.41	-0.32	-0.38	-0.29	-0.32	1.00

Note: Author’s own calculation.

5. Results

Conditional logit estimates

We begin by examining the effects of foreign-specific agglomerations on Taiwanese investors in China. After controlling for provincial characteristics, each CLM specification is designed to test the effect of a particular type of foreign-specific agglomeration. The estimation results are presented in Table 5. In general, a province with greater market potential (M_p) and better industrial linkages (I_p) is more likely to attract Taiwanese investors. In contrast, a province with higher labour costs (W_p) discourages these investors. These findings are consistent with the extant literature. However, the finding on transportation density (T_p) is mixed. This could be attributed to the fact that the importance of transportation networks varies significantly between industries.

Table 5 Conditional logit estimates, by foreign- specific agglomeration effect

	Dependent variable: Location choice		
	(1)	(2)	(3)
Foreign-specific agglomeration			
N_p	2.981***		
	(4.3462)		
A_p		1.471***	
		(3.191)	
F_p			0.899
			(0.989)
Provincial characteristics			
M_p	1.938***	2.361***	2.354***
	(2.999)	(4.540)	(3.430)
I_p	3.874*	0.984*	0.998***
	(1.690)	(1.780)	(3.403)
W_p	-2.324***	-1.989***	-3.438***
	(6.893)	(5.437)	(3.231)
T_p	0.984***	-2.456	1.009
	(2.847)	(0.087)	(0.987)
Log-likelihood	-3246.04	-2000.94	-1987.09
χ^2	3445.98	1809.63	1774.27
ρ^2	0.334	0.249	0.227
No. of choosers	2,132	2,132	2,132
No. of choices	24	24	24

Note: Conditional logit regressions are estimated by maximum likelihood. Absolute values of t-statistics are in parentheses. ***, ** and * indicates 1, 5 and 10 per cent level of significance, respectively. The log-likelihood ratio (χ^2) is computed as $2(L_{UR} - L_R)$, where L_{UR} is the log-likelihood value for the unrestricted model and L_R is the log-likelihood value for the restricted model. The log-likelihood ratio index (ρ^2) is computed as $1 - L_{UR}/L_0$, where L_0 is the log-likelihood value of the model with only an intercept.

In terms of foreign-specific agglomerations, column (1) shows that the extent of nationality agglomeration (N_p) has a non-negligible impact on Taiwanese investors. According to He (2002) and Mariotti and Piscitello (1995), this may be explained by these investors wanting to locate in proven locations in order to save time and resources in searching for alternative locations. Simply put, nationality agglomeration sends a signal to potential Taiwanese investors that the host location possesses unique factors pertinent to Taiwanese firms.

Importantly, while column (2) finds that Asian agglomeration (A_p) attracts Taiwanese investors, column (3) shows that foreign agglomeration (F_p) has no impact on these investors' location choice. This mixed result can arise from the fact that many of these investors are also suppliers of intermediate inputs to Asian conglomerates in China rather than Western multinationals (Wade 1992; Chen and Chen 1998; Chen 1998; Zhu 2005).

In passing note, although both the likelihood ratio (χ^2) and the likelihood ratio index (ρ^2) are satisfactory in all CLM specifications in Table 5, we need to make sure that they do not violate the IIA property.

Nested logit estimates

The most common criticism for CLM specifications is that their estimated coefficients and robustness are sensitive to violations of the IIA property[14]. We check this by applying NLM specifications to the sample. Intuitively, if a CLM specification is free of any IIA violation, its IV coefficient should be statistically insignificant and fall outside the range of zero and one. Table 6 presents six NLM specifications in which China is divided into Open Door policy regions and Census regions. Within each division, three separate NLM specifications are reported.

[14] In fact, the Hausman-McFadden test was conducted on the sample and a visual inspection of the results suggests that all three CLM specifications violate the IIA property; that is, the *p*-values of omitted alternatives in these specifications are extremely low.

Table 6 Nested logit estimates, by regions

	Dependent variable: Location choice					
	Open Door policy			Census region		
	(1)	(2)	(3)	(4)	(5)	(6)
Foreign-specific agglomeration						
N_p	4.985***			2.344***		
	(4.583)			(3.321)		
A_p		2.971***			1.298***	
		(2.836)			(5.483)	
F_p			0.864			0.653*
			(1.232)			(1.648)
Provincial characteristics						
M_p	3.445***	2.354***	1.532***	1.222***	3.459***	2.344**
	(2.989)	(2.974)	(2.653)	(3.423)	(2.932)	(2.006)
I_p	0.763***	1.233***	0.998*	0.634***	0.734**	1.234***
	(2.648)	(2.999)	(1.653)	(2.922)	(1.973)	(3.322)
W_p	-4.333***	-2.344**	-4.984***	-2.344***	-2.019***	-2.787***
	(2.998)	(2.350)	(3.472)	(2.974)	(3.332)	(3.485)
T_p	0.847	0.665	1.754**	0.987	-0.863	1.221*
	(1.234)	(0.874)	(1.976)	(0.998)	(0.673)	(1.658)
IV	0.653***	0.765***	0.675***	1.454	1.997	1.864
	(2.854)	(2.653)	(2.381)	(1.087)	(1.245)	(1.103)
Log-likelihood	-4076.10	-3996.09	-4043.48	-1896.93	-1998.32	-1643.98
χ^2	3993.94	3900.22	3999.03	1987.84	1999.00	1543.91
ρ^2	0.356	0.343	0.353	0.143	0.210	0.111
No. of choosers	2,132	2,132	2,132	2,132	2,132	2,132
No. of choices	24	24	24	24	24	24

Note: Nested logit regressions are estimated by maximum likelihood. Absolute values of t-statistics are in parentheses. ***, ** and * indicates 1, 5 and 10 per cent level of significance, respectively. The Open Door policy divides China into the coastal, middle and western regions. The census region divides China into Huabei, Huadong, Huazhong, Dongbei, Huazhong, Xinan, and Xibei regions.

Table 6 shows that IV coefficients in all three NLM specifications for Open Door policy regions (columns (1)–(3)) are statistically significant, suggesting that Taiwanese investors in China does, indeed, follow a sequential location selection process; that is, they choose an Open Door policy region before selecting a province within that region for investment. Furthermore, these coefficients fall within the range of 0.65 and 0.77, indicating that any pair of provinces in the same region is quite different. In contrast, IV coefficients in all three NLM specifications for Census regions (column (4)-(6)) are statistically insignificant and fall outside the range between zero and one. This suggests that Census regions have no impact on Taiwanese investors in China.

Finally, Table 6 shows that the likelihood ratio (χ^2) and likelihood ratio index (ρ^2) for nesting provinces within Open Door policy regions appears to be a good specification for Taiwanese investors in China. Furthermore, we find that all statistically significant variables are consistent with our a priori expectations. That is to say, these investors prefer provinces with extensive nationality agglomeration (N_p), Asian agglomeration (A_p), market potential (M_p) and industrial linkages (I_p), while they stay away from provinces with high labour cost (W_p). Importantly, foreign agglomeration (F_p) once again does not affect these investors' location choice.

In short, the significance of IV coefficients demonstrates that independently modeling Taiwanese investors' location choice in China using CLM specifications may not be appropriate. Instead, the correct approach should be NLM specifications, with Open Door policy regions composing the upper nest. Specifically, based on the likelihood ratio (χ^2) and the likelihood ratio index (ρ^2), we select column (1) in Table 6 as the baseline model for the industry-level analysis.

Location choice at the industry level

The extant literature on FDI in China has found that location determinants are highly industry-specific (Belderbos and Carree 2002; Wakasugi 2005). We test this hypothesis by dividing our sample into different industry groups; namely, Chemicals, Electrics and Electronics, Food Processing, Machinery, Metals, Transportation, Textiles and Retails and Services. We then apply the baseline model (column (1) in Table 6) to each group.

Table 7 shows that estimated results vary extensively across industries. Importantly, with the exception of Machinery and Metals, nationality agglomeration (N_p) remains a significant determinant. Furthermore, the statistically significant industrial linkage variable (I_p) suggests that the role of indigenous Chinese firms in local production and distribution networks has grown in importance in recent years.

Table 7 Nested logit estimates by selected industry

	Dependent variable: Location choice								
	Total	Chemical	Electrics and electronics	Food processing	Machinery	Metals	Transportation	Textile	Retails and services
N_p	2.100***	2.184***	3.355***	1.342**	0.837	1.343	2.345***	2.212***	3.442***
	(4.553)	(3.443)	(2.584)	(2.003)	(1.221)	(1.334)	(2.894)	(4.887)	(3.434)
M_p	1.214	1.345	1.455	3.985***	1.974	1.998	1.864	1.983	2.487
	(1.232)	(1.333)	(1.153)	(2.873)	(1.336)	(0.773)	(1.867)	(1.225)	(0.863)
I_p	1.098**	2.334***	3.492***	2.212	1.863*	1.753*	2.339	2.325**	3.432**
	(2.002)	(4.554)	(3.443)	(0.844)	(1.666)	(1.653)	(1.198)	(1.880)	(2.007)
W_p	-2.309***	-0.846	-2.345***	-1.323***	-0.874***	-0.776***	-1.223	-4.543***	-0.873**
	(5.339)	(1.354)	(3.440)	(2.986)	(2.856)	(3.332)	(0.874)	(5.433)	(1.969)
T_p	0.874	1.007	1.683*	1.309*	1.942**	-0.344	0.934**	1.753*	-1.831
	(0.734)	(0.844)	(1.651)	(1.767)	(1.890)	(0.863)	(1.963)	(1.653)	(1.004)
IV coefficient									
Coastal	0.667***	0.447**	0.456***	0.389***	0.189	0.278	0.240	0.483***	0.247***
	(5.674)	(2.149)	(3.341)	(2.914)	(0.885)	(0.801)	(0.928)	(4.104)	(2.910)
Central	0.224	0.205	0.202	0.211	0.201	0.205	0.203	0.212	0.241
	(0.974)	(0.724)	(0.719)	(0.721)	(0.694)	(0.511)	(0.322)	(0.129)	(0.528)
Western	0.131	0.181	0.159	0.134	0.113	0.108	0.111	0.130	0.141
	(1.344)	(0.917)	(0.811)	(0.919)	(0.703)	(0.823)	(1.032)	(0.921)	(0.421)
Log-likelihood	-4541.04	-3844.12	-4115.60	-4003.88	-2204.34	-2390.09	-2198.19	-4044.33	-3898.48
χ^2	4058.35	3685.12	3841.46	3756.34	2099.51	2123.51	2000.63	3751.34	3697.60
ρ^2	0.300	0.121	0.383	0.388	0.165	0.127	0.134	0.336	0.333
No. of choosers		289	1,071	66	76	182	118	140	170
No. of choices		24	24	24	24	24	24	24	24

Note: Nested logit regressions are based on Column (1) in Table 6 and estimated by maximum likelihood. Absolute values of t-statistics are in parentheses. ***, ** and * indicates 1, 5 and 10 per cent level of significance, respectively.

Contrary to popular belief, Table 7 shows that, except for Food Processing, market potential (M_p) is not an important determinant. This can be attributed to the fact that the majority of Taiwanese investors are export-orientated (Chen and Ku 2000; Hsu and Liu 2004). As a result, they rank labour cost (W_p) ahead of other determinants. This is because the access to low-cost workers constitutes an important competitive advantage in the world market (Kao 2002). In relation to this, they prefer coastal provinces because of their proximity to the world market (Qu and Green 1997; Wei et al. 1999; He 2002).

It is worth noting that while Table 7 shows that Taiwanese investors in China follows a sequential location selection process, many estimated coefficients are statistically insignificant for Chemical, Machinery, Metals and Transportation. This is also reflected in log-likelihood ratios (ρ^2) for these industries falling outside of the range of 0.2 and 0.4. We may conclude that they face markedly different industry-specific factors, perhaps, related to capital requirement, production technology or market condition.

Table 8 presents the average elasticity of probability at the industry level. It shows that the network-driven Electrics and Electronics and Retails and Services rank nationality agglomeration (N_p) and industrial linkages (I_p) highly. Unsurprisingly, labour-intensive Textile is most sensitive to labour costs (W_p). Finally, export-orientated Electrics and Electronics and Textile prefer to locate in coastal provinces.

Table 8 Average probability elasticity, by selected industry

	Total	Chemical	Electrics and electronics	Food processing	Machinery	Metals	Transportation	Textiles	Retails and services
N_p	2.016	2.097	3.221	1.288			2.251	2.212	3.304
M_p			1.400	3.826				2.863	3.348
I_p	1.054	2.241	3.352					2.232	3.208
W_p	-2.216		-2.251	-1.270	-0.813	-0.745		-4.361	-0.838
T_p			1.616				0.905	1.683	
Coastal	0.640	0.429	0.438	0.373				0.464	0.237

Note: The average probability elasticity is based on the estimates in Table 7. Only variables with a statistical significance of over 5 per cent are presented.

6. Concluding Remarks

The aim of this study is to explore the effect of foreign-specific agglomerations on Taiwanese investors' location choice in China during the period 1996-2005. We examine three types of foreign-specific agglomeration; namely, nationality agglomeration, Asian agglomeration and foreign agglomeration. We find that national agglomeration and Asian agglomeration have non-negligible impacts on these investors. While most studies in this field have concluded foreign agglomeration to be an important determinant, it is not the case for these investors. One plausible explanation could be that they may have entered into strategic alliances with other Taiwanese and/or Asian conglomerates rather than Western multinationals. We also find supports that not only these investors follow a sequential location choice process, the set of compensation factors are highly industry-specific.

So what can policymakers take away from this study? Firstly, if the objective is to attract more Taiwanese investors to a host location, it is imperative to initially encourage leading Taiwanese firms to establish production facilities in that location. Over time, these firms will become the catalyst for kicking start the cumulative causation process of agglomeration economies. Secondly, it is vital for all provinces belonging to the same region to co-operate on improving the entire region's investment environment. This is because these investors first select a region before deciding on the province to invest within that region.

References

Bao, S., G. H. Chang, J. D. Sachs and W. T. Woo (2002). Geographic factors and China's regional development under market reforms, 1978-1998. *China Economic Review* 13, no. 1: 89-111.

Belderbos, R. and M. Carree (2002). The location of Japanese investment in China: Agglomeration effects, keiretsu, and firm heterogeneity. *Journal of Japanese and International Economies* 16, no. 2: 194-211.

Ben-Akiva, M. and S. R. Lerman (1985). *Discrete Choice Analysis: Theory and Application*. Cambridge, MA, MIT Press.

Blonigen, B. A., C. J. Ellis and D. Fausten (2005). Industrial groupings and foreign direct investment. *Journal of International Economics* 65, no. 1: 75-91.

Braunerhjelm, P. and R. Svensson (1996). Host country characteristics and agglomeration in foreign direct investment. *Applied Economics* 28, no. 7: 833-840.

Carlton, D. W. (1983). The location and employment choices of new firms: An econometric model with discrete and continuous endogenous variables. *Review of Economics and Statistics* 65, no. 3: 440-449.

Caves, R. E. (1996). *Multinational Enterprises and Economic Analysis*. Cambridge, Cambridge University Press.

Chang, S.-J. and S. Park (2005). Types of firms generating network externalities and MNCs' co-location decisions. *Strategic Management Journal* 26, no. 7: 595-615.

Chen, C.-H. (1996). Regional determinants of foreign direct investment in mainland China. *Journal of Economic Studies* 23, no. 2: 18-30.

Chen, C. (1997). "Provincial characteristics and foreign direct investment location decision within China." Chinese Economic Research Centre Working Paper no. 97/16. The University of Adelaide.

Chen, G. S.-K. (2008). "Agglomeration Economies and the Location of Foreign Direct Investment: A Study of the Regional Distribution of Taiwanese Investment in China." PhD Thesis, Monash University.

Chen, H. and T.-J. Chen (1998). Network linkages and locational choice in foreign direct investment. *Journal of International Business Studies* 29, no. 3: 445-468.

Chen, T.-J., Ed. (1998). *Taiwanese Firms in Southeast Asia: Networking Across Borders*. Cheltenham, UK, Edward Elgar.

Chen, T.-J. and Y.-H. Ku (2000). The effect of foreign direct investment on firm growth: The case of Taiwan's manufacturers. *Japan and the World Economy* 12, no. 2: 153-172.

Cheng, S. (2006). The role of labour cost in the location choices of Japanese investors in China. *Papers in Regional Science* 85, no. 1: 121-138.

Cheng, S. (2007). Structure of firm location choices: an examination of Japanese greenfield investment in China. *Asian Economic Journal* 1, no. 21: 47-73.

Cheng, S. (2008a). How can western China attract FDI? A case of Japanese investment. *Annals of Regional Science* 42, no.: 357-374.

Cheng, S. (2008b). Location decision variations of Japanese investors in China. *Review of Regional Studies* 38, no. 3: 395-415.

Cheng, S. and R. R. Stough (2006). Location decisions of Japanese new manufacturing plants in China: a discrete-choice analysis. *Annals of Regional Science* 40, no.: 369-387.

Crozet, M., T. Mayer and J. L. Mucchielli (2004). How do firms agglomerate? A study of FDI in France. *Regional Science and Urban Economics* 34, no. 1: 27-54.

Dunning, J. H. (1992). *Multinational Enterprise and the Global Economy*. Workingham, Addison-Wesley.

Fujita, M. and J.-F. Thisse (2002). *Economics of Agglomeration*. Cambridge, MA, Cambridge University Press.

Gao, T. (2005). Labor quality and the location of foreign direct investment: Evidence from China. *China Economic Review* 16, no. 3: 274-292.
Greene, W. H. (2000). *Econometric Analysis*. Upper Saddle River, NJ, Prentice Hall.
Gujarati, D. N. (1995). *Basic Econometrics*. New York, McGraw-Hill.
Hausman, J. and D. McFadden (1984). Specification tests for the multinominal logit model. *Econometrica* 52, no. 5: 1219-1240.
He, C. (2002). Information costs, agglomeration economies and the location of foreign direct investment in China. *Regional Studies* 36, no. 9: 1029 - 1036.
He, C. (2003). Location of foreign manufacturers in China: Agglomeration economies and country of origin effects. *Papers in Regional Science* 82, no. 3: 351-372.
Head, K. and J. Ries (1996). Inter-city competition for foreign investment: Static and dynamic effects of China's incentive areas. *Journal of Urban Economics* 40, no. 1: 38-60.
Head, K., J. Ries and D. Swenson (1995). Agglomeration benefits and location choice: Evidence from Japanese manufacturing investments in the United States. *Journal of International Economics* 38, no. 3: 223-247.
Hensher, D. A. and L. W. Johnson (1981). *Applied Discrete Choice Modelling*. New York, Halsted Press.
Hsu, C.-M. and W.-C. Liu (2004). The role of Taiwanese foreign direct investment in China: economic integration or hollowing-out? *Journal of Korea Economy* 5, no. 2: 207-231.
Kang, S. J. and H. S. Lee (2007). The determinants of location choice of South Korean FDI in China. *Japan and the World Economy* 19, no. 4: 441-460.
Kao, C. (2002). *Economic Reform in China and Cross-Strait Economic Relation (in Chinese translation)*. Taipei, Wunan.
Kim, S.-H., T. S. Pickton and S. Gerking (2003). Foreign direct investment: agglomeration economies and returns to promotion expenditures. *Review of Regional Studies* 33, no. 1: 61-72.
Li, Y. and J.-L. Hu (2002). Technical efficiency and location choice of small and medium-sized enterprises. *Small Business Economics* 19, no. 1: 1-12.
Maddala, G. S. (1983). *Limited-Dependent and Qualitative Choice Behaviour*. Cambridge, Cambridge University Press.
Mariotti, S. and L. Piscitello (1995). Information costs and location of FDIs within the host country: Empirical evidence from Italy. *Journal of International Business Studies* 26, no. 4: 815-841.
Marschak, J. (1960). Binary choice constraints on random utility indications. *Stanford Symposium on Mathematical Methods in the Social Sciences*. K. J. Arrow (eds.). Stanford, CA, Stanford University Press.
McFadden, D. L. (1974). Conditional logit analysis of qualitative choice behavior. *Frontiers in Econometrics*. A. Zarembka, L. Lundqvist, F. Snickars and J. Weibull (eds.). New York, Academic Press.
Mucchielli, J. L. and F. Puech (2004). Globalization, agglomeration and FDI location: the case of French firms in Europe. *Multinational Firms' Location and the New Economic Geography*. J. L. Mucchielli and T. Mayer (eds.). Cheltenham, UK, Edward Elgar.
Qu, T. and M. B. Green (1997). *Chinese Foreign Direct Investment: A Subnational Perspective on Location*. Aldershot, Ashgate.
Rosenthal, S. S. and W. C. Strange (2004). Evidence on the nature and sources of agglomeration economies. *Handbook of Regional and Urban Economics, Volume IV*. V. Henderson and J.-F. Thisse (eds.). Amsterdam, North-Holland.
Sun, Q., W. Tong and Q. Yu (2002). Determinants of foreign direct investment across China. *Journal of International Money and Finance* 21, no. 1: 79-113.
Train, K. E. (2003). *Discrete Choice Methods with Simulation*. Cambridge, Cambridge University Press.

Tuan, C. and L. F. Y. Ng (2004). Manufacturing agglomeration as incentives to Asian FDI in China after WTO. *Journal of Asian Economics* 15, no. 4: 673-693.

Tung, C.-Y. (2000). "China's Economic Leverage and Taiwan's Security Concerns With Respect to Cross-Strait Economic Relations.

Tung, C.-Y. (2003). *Cross-Strait Economic Relations in the Era of Globalization (in Chinese)*. Taipei, Sheng-Chih.

Wade, R. (1992). *Governing the Market: Economic Theory and the Role of Government in East Asian Industrialization*. Princeton, NJ, Princeton University Press.

Wakasugi, R. (2005). The effects of Chinese regional conditions on the location choice of Japanese affiliates. *Japanese Economic Review* 56, no. 4: 390-407.

Wei, Y. and X. Liu (2001). *Foreign Direct Investment in China: Determinants and Impact*. Cheltenham, Edward Elgar.

Wei, Y., X. Liu, D. Parker and K. Vaidya (1999). The regional distribution of foreign direct investment in China. *Regional Studies* 33, no. 9: 857-867.

Yang, J. (1997). The emerging patterns of Taiwanese investment in mainland China. *Multinational Business Review* 5, no. 1: 92-99.

Yang, Y.-H. and Y.-Y. Tu (2004). Analysis of Factors Influencing Taiwan's Unregistered Overseas Investment Behavior. *Asian Economic Journal* 18, no. 2: 213-231.

Zhang, K. H. (2001). What attracts foreign multinational corporations to China? *Contemporary Economic Policy* 19, no. 3: 336-346.

Zhou, C., A. Delios and J. Y. Yang (2002). Locational Determinants of Japanese Foreign Direct Investment in China. *Asia Pacific Journal of Management* 19, no. 1: 63-86.

Zhu, Y. (2005). *Taiwan-Invested Enterprises in China (in Chinese)*. Tokyo, Toyo Keizai Inc.