

## **A Location Analysis of Taiwanese Manufacturing Branch-Plants in Mainland China**

Jack W. Hou<sup>a</sup> and Kevin H. Zhang<sup>b</sup>

<sup>a</sup>*Department of Economics, California State University, Long Beach,  
Long Beach, CA 90840-4607, Email: jackhou@csulb.edu*

<sup>b</sup>*Department of Economics, Illinois State University,  
Normal, IL 61790-4200, Email: khzhang@ilstu.edu*

### **ABSTRACT**

The location decisions of Taiwanese direct investment (TDI) in China are analyzed using a conditional logit model at provincial level. We assess the factors that determine the establishment of Taiwanese new manufacturing-branch-plants in China for three sub-periods (1987-90, 1991-94, and 1995-98). The results indicate that Taiwanese firms prefer the provinces with superior infrastructure and basic industrial activities, along with abundant skilled labor and growing market size. Cultural proximity and favorable FDI incentives are also attractive to TDI. While labor cost has been recognized as one of major motives for TDI in China, cross-province differentials in manufacturing wages seem not affect the site-selection of Taiwanese firms.

*JEL: F21, F23, O53*

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## I. INTRODUCTION

Since the late 1970s inward foreign direct investment (FDI) in China has experienced dramatic changes. The last two decades (1977-98) have witnessed the emergence of China as the largest FDI recipient among the developing countries and, next to the United States, the second in the world (UNCTAD, 1999). Taiwanese direct investment (TDI) in China has contributed significantly to the China's FDI boom. In fact, Taiwan has been the second largest investor in China since 1993, next to Hong Kong (SSB, 1998).

While there is a growing literature on determinants of FDI flows in China (for example, Kueh, 1992; and Zhang, 2000), the empirical studies on the site selection of FDI have been limited. This paper investigates locational decisions of Taiwanese manufacturing branch-plants in Mainland China, based on firm-level data over 1987-98. Despite considerable popular attention and active promotion among provinces, there has been no thorough statistical analysis of Taiwanese branch plant location.

The paper is of interest for several reasons. First, TDI in China has risen substantially since 1987, growing faster than the FDI from other countries. Table 1 shows the number of cases and realized values of TDI in major provinces of China during the period of 1987-98. TDI in China has become important since 1987 when the New Taiwan dollar started to appreciate against the U.S. dollar. The amount of TDI approved in China was merely \$20 million before 1987, but TDI in 1987 alone was \$100 million, and in 1988 reached \$420 million (MOFERT, 1987-1997). Under pressure from Taiwan's business communities and industrial organizations, the Taiwan government finally allowed TDI in China via a third country in 1990. The amount of contracted TDI in 1993 reached 9,965 million U.S. dollars, equivalent to 4.6% of Taiwan's GDP (MOEA, 1995). Up to the end of 1998, the amount of contracted TDI was \$41.5 billion, and the realized TDI in China totaled \$21.8 billion (SSB, 1999). Taiwan has become the second largest source of foreign direct investment in China.

Second, several features characterize TDI in China. Taiwanese cultural and linguistic affinity with China made it much easier for the small- and medium-sized investors to cross the straits than investors from other countries. In fact, linguistic and cultural affinity, plus low labor and land costs were recognized to the top three motivations for most TDI in China (CIER, 1992). Moreover, Taiwan's economic structural adjustment played an important role in TDI boom in China. Substantial benefits exist between Taiwan and China due to the division of labor in production and specialization in production processes. Another motives for TDI is the continuous shift of the international comparative advantage of some products or production processes from Taiwan to China based on levels of development.

**Table 1**  
Taiwanese direct investment in China by regions: 1987-98 (cases in number and values in millions of US dollars)

Provinces	1987-90		1991-94		1995-98							
	Case %	Value %	Case %	Value %	Case %	Value %						
Guangdong*	1208	48.26	328	43.50	3526	32.76	1464	32.17	2902	35.23	2518	33.16
Jiangsu*	56	2.24	25	3.32	2351	21.84	1284	28.21	2311	28.05	2744	36.13
Fujian*	598	23.89	179	23.74	1742	16.18	656	14.41	669	8.12	663	8.73
Hebei*	11	0.44	4	0.53	732	6.80	281	6.17	806	9.78	495	6.52
Zhejiang*	56	2.24	15	1.99	560	5.20	205	4.50	480	5.83	352	4.64
Shandong*	44	1.76	18	2.39	348	3.23	124	2.72	252	3.06	221	2.91
Liaoning*	45	1.80	10	1.33	209	1.94	102	2.24	135	1.64	79	1.04
Sichuan	6	0.24	2	0.27	179	1.66	94	2.07	172	2.09	86	1.13
Hubei	15	0.60	5	0.66	157	1.46	66	1.45	227	2.76	85	1.12
Hunan	13	0.52	2	0.27	128	1.19	61	1.34	106	1.29	53	0.70
Others	451	18.02	166	22.02	832	7.73	214	4.70	178	2.16	298	3.92
Total	2503	100.00	754	100.00	10764	100.00	4551	100.00	8238	100.00	7594	100.00

Notes: (1) The star (\*) denotes provinces located in coastal areas. (2) The period of 1987-90 includes investments in January-April of 1991. (3) The period of 1995-98 does not include investments in October-December of 1998. (4) Sources: *Taiwan-China Economic Monthly Bulletin*, Investment Commission, Ministry of Economic Affairs, Taiwan, ROC, February 1992, 1995, and October 1998.

Third, TDI in China often involves building factories at new sites rather than acquire existing assets, which is germane to the analysis of new plant location. By 1998, Taiwanese companies had established about 20000 new branch-plants, as shown in Table 1 (MOEA, 1998). Most of these new investments were made since 1991. Since most Taiwanese companies enter from offshore and had little presence in China prior to 1987, an existing base of operations does not influence their location search; and their factory births do not simply appear in the hometown of a company founder or an entrepreneur. As new entrants, Taiwanese firms are likely to include all relevant regional and local attributes before making a final selection.

This paper tends to provide a better understanding of location decisions of Taiwanese manufacturing activities in China. In particular, we attempt to answer following important questions about Taiwanese manufacturing location, which have not been investigated systematically. Are Taiwanese manufacturers attracted to cheap-labor provinces? Does market size of a province matter in Taiwanese start-ups? Do the new plants cluster in a province with more manufacturing activities? What about the role of human capital or education played in the siting of Taiwanese-owned branch-plants?

The rest of paper is organized as follows. Section II outlines the theoretical framework and specifies empirical model used. Definitions and measurements of independent variables and the data sources are also discussed in the section. Section III reports main results of estimations. Section IV concludes.

## II. THE ANALYTICAL FRAMEWORK

FDI arises mainly from activities of multinational firms that operate across countries. A firm that goes multinational must possess some special advantages to overcome the inherent disadvantages and high costs of foreign production. The widely accepted theory on the existence of FDI, the "OLI" paradigm (Dunning, 1981), asserts that a firm with certain ownership advantages (e.g., patent or brand name) would open a subsidiary in a foreign country with location advantages (e.g., cheap labor or growing market) to maximize its profits. Both advantages of ownership and location can best be captured by the internalization of production (not exporting or licensing) via direct investment in the foreign country.

The OLI theory is based primarily on the behavior of large multinational firms in the U.S. or other industrialized countries, in which FDI is associated with such intangible assets as leading-edge technology and brand names. Taiwanese multinationals may not be on world frontiers of technology and organizational sophistication. In fact, the ownership advantages of TDI might be derived from either marketing skills that make investors specialize in delivering timely, international marketing networks, uniform quality products to Western markets (Wells, 1993), or the adaptation of mature technologies to more labor intensive contexts and to local raw materials (Vernon, 1979). Another unique

advantage is Taiwanese ethnic connections with China: both share the same language and culture that enables TDI much easier in the negotiation and operation.

### A. An Empirical Model of TDI Location Decisions

Taiwanese multinational firms invest in China to take advantage of China's endowments of resources and growing domestic market. The location of manufacturing TDI is determined with a profit-maximization of the product line. Once a Taiwanese firm has decided to establish a branch-plant in China, the probability of locating in a particular province depends on the province's economic characteristics and resource endowments relative to other competing provinces. Since China is large in areas with significant diversification in terms of economic structure, development levels, and resources endowments, a firm's site selection requires an extensive search for the optimal location. To model where branch-plants are likely to open, one begins with the assumption that Taiwanese firms rationally evaluate all relevant characteristics from a set of alternative locations in order to seek the highest expected profits. Therefore, a Taiwanese firm will choose to invest in a particular province if and only if doing so will maximize its profit.

Given information set describing the attributes of alternative sites, the conditional logit model (CLM) pioneered by McFadden (1974) may be the procedure best suited for estimating location probabilities. The CLM has been used widely in the studies of location analyses of FDI. For example, Coughlin, Terza, and Arromdee (1991), Woodward (1992), Friedman, Gerlowski, and Silberman (1992), and Friedman, Fung, Gerlowski, and Silberman (1996) adopted the CLM to examine the influence of regional determinants on FDI locational choice in the United States. With the same procedure, Woodward and Rolfe (1993) analyzed the location of export-oriented FDI in the Caribbean Basin. More recently, Guimaraes, Figueiredo, and Woodward (1998) used the model to examine agglomeration effects and the location of FDI in Portugal.

We use the procedure to model the province-level determinants of the frequency distribution of TDI across the 30 provinces. For this analysis we take the population the manufacturing Taiwanese firms that have decided to invest in China. The profit ( $\pi_{ij}$ ) that the  $i^{\text{th}}$  Taiwanese firm derives from location in the  $j^{\text{th}}$  province may be written as a function of the characteristics of that location and a disturbance term, that is:

$$\pi_{ij} = C + X_j\beta + \varepsilon_{ij} \quad (1)$$

where  $C$  is the constant term,  $X_j$  is a vector of observable characteristics for  $j^{\text{th}}$  province, the term  $\beta$  is a vector of estimated coefficients, and  $\varepsilon_{ij}$  is a random disturbance term reflecting random errors.

The probability of selecting a specific province depends on the attributes of the selected province relative to the attributes of all other provinces are in the choice set. If the  $\gamma_{ij}$  are independently and identically distributed as Weibull density functions, then McFadden (1974) showed that:

$$P_j = \frac{\exp[X_j\beta]}{\sum_{k=1}^K \exp[X_k\beta]} \quad (2)$$

where  $P_j$  denotes the population relative frequency of locating in the  $j^{\text{th}}$  province.  $K$  is the number of alternatives (provinces, here  $K = 30$ ). The maximum likelihood estimates of  $\beta$  may be obtained by maximizing the likelihood function

$$L(\beta) = \prod_{j=1}^K P_j \quad (3)$$

According to the CLM, the probability of Taiwanese direct investment in a province depends on the levels of its characteristics that affect profits relative to levels of these characteristics in other province. The dependent variable in the CLM is the population relative frequency of cases of TDI in each province. The TDI-case population is defined as total number of cases of TDI in a particular period.

## B. Factors Influencing Location of Taiwanese Branch-Plants

The main force driving TDI in China is the rise in labor costs and industrial upgrading from labor-intensive to capital-technology-intensive production (Chen, 1992). This has forced Taiwanese to relocate labor-intensive production to regions like China with lower labor costs. Since a significant portion of TDI is export-oriented, this type of TDI is largely located in the areas with good excess to port or good transportation conditions. Due to increasing liberalization of China's FDI regime in 1990s, some of TDI began to aim at China's growing domestic market and thus became market-oriented. In addition, geographic proximity and similarities in regional Chinese culture promote TDI in Fujian and other provinces in which the hometowns of Taiwanese investors are located. Along with other considerations, the regional distribution of TDI has been characterized as concentration in the coastal provinces and metropolitan cities (Beijing, Shanghai, and Tianjin), as shown in Table 1.

Based on the preceding discussions of the theory and the TDI pattern, several independent variables that describe regional characteristics may be identified for empirical estimation with the CLM. How each independent

variable is defined and measured in the CLM are discussed next and summarized in Table 2.

**Table 2**  
Definitions and expected impacts of explanatory variables

Labor Cost	Average annual wage of manufacturing workers in a province (-)
Market Size	Gravity adjusted province personal income (+)
Transportation	Railroad in kilometers per square kilometer for a province (+)
Education	Share of secondary-school students in total population in a province (+)
Agglomeration	Share of manufacturing output in a province GDP (+)
R & D	Share of spending on science care in total fiscal expenditures in a province (+)
Cultural Links	Dummy = 1 for Fujian province (+) = 0 for other provinces

Note: The signs (+ or -) in parentheses indicate expected effects on location choice of TDI.

(a) *Labor Costs*: It is well known that labor cost plays an important role in location choices of greenfield investments. This is especially true for many of TDI projects that are labor-intensive and export-oriented, since they are largely motivated by cheap labor by fragmenting the production process across countries by production stages based on labor intensities (Zhang and Markusen, 1999). Cross-province wage differentials thus should have some impact on location choices of Taiwanese new branch-plants. The average annual real wage of manufacturing workers in a province will be used to measure labor costs across regions.

(b) *Market Size*: China's fast growth in income during the last two decades has made its market larger than what is expected. In fact, Chinese market with 1.2 billion people is bound to be extremely attractive to all of foreign investors. The size of local market is particularly important in attracting market-oriented investment because large markets offer greater opportunities to realize economies of scale (Zhang, 2000). For Taiwanese investors at regional levels, the larger the market size of a province, the more TDI is likely to be received. The size of market for a province is a gravity-adjusted measure that accounts for both the market-size of the province and its distance to other province markets (Plaut and Pluta, 1983) as follows.

$$\text{MARKET}_j = \sum_i^{30} \left( \frac{Y_i}{D_{ij}^2} \right) \quad (4)$$

where the size of market of province  $j$  ( $\text{MARKET}_j$ ) is created by taking the sum of personal income ( $Y$ ) of this province and other provinces ( $i$ ), weighted by distance ( $D$ ) between the provincial capitals in province  $i$  and  $j$ . The distance from the province to itself (where  $j = i$ ) is measured by one-half the average radius of the province.

(c) *Transportation*: One frequently mentioned consideration for access to ports for exports (export-oriented TDI) or local accessibility to regional and national markets (market-oriented TDI) is the province's transport linkages. Many studies have suggested the positive role of transportation network in the location of new branch plants (e.g., Bartik, 1985). In China, railroads remain the most efficient mode of transportation for moving raw materials and most heavy-industry products over long distances. Consequently, railroad adjusted for region size is used as a proxy for transportation linkages. This variable is expected to be positively related to TDI.

(d) *Labor Productivity*: Although TDI tends to be labor-intensive in production, basic skill level of labor force may be required. Cheap labor should not be viewed as unskilled workers because what matters to a profit-maximizing firm is the wage relative to productivity. Taiwanese firms in general pay higher-than-average wages compared with their domestic counterparts. The share of secondary-school students in total population in a province will be used to measure education levels that proxies labor productivity.

(e) *Agglomeration*: A primary determinant of location selection for manufacturers is existing manufacturing activity. Firms in the same industry may be drawn to the same location because proximity generates positive externalities or "agglomeration effects", which are central to regional economic theory. Empirical work in general supports the hypothesis that agglomeration economies are decisive location factors (Head, Ries, and Swenson, 1995; Guimaraes, Figueiredo, and Woodward, 2000). Agglomeration effects for a province in this study are measured by the share of manufacturing output in the province's GDP.

(f) *Research and Development*: Taiwanese investors may invest in the areas with advantages in research and development due to spillover effects. The share of spending on science care in total fiscal expenditures in a province will be proxy of the variable.

(g) *FDI Incentives*: Many fiscal incentives such as tax holidays have been adopted in China since the late 1970s to encourage FDI. China's open door policy, however, has been much more oriented to the coastal region. All of the four special economic zones and 14 opened cities were established in the coastal areas, in which special favorable measurements were granted to attract foreign investment including TDI. As a result, a lion share of TDI received in

China has been concentrated in the coastal region. A regional dummy is used to capture the cross-province differences in FDI incentives.

(h) *Cultural Links*: Taiwan and Fujian province not only are geographically adjacent to each other, but also speak the same dialect (Minnan dialect). Such geographic and linguistic proximity are one of major reasons for large TDI flows in Fujian province. A dummy variable for Fujian's special link is also included in the model.

All independent variables are measured in logs; their definitions and expected impacts on TDI are listed in Table 2. Estimating the CLM of TDI in China requires a data set containing information on the location of each branch plant and a data set of province characteristics in different years. The data on TDI are taken from publications of Investment Committee, Ministry of Economic Affairs (MOEA) of Taiwan. There have been three categories of TDI transaction in China: equity joint venture, contractual joint venture, and wholly foreign-owned enterprises. Since no data for each of three categories of TDI transactions are available, the dependent variable used in this study is aggregate investments into which are combined three types of TDI. The data for all independent variables are taken from *Chinese Regional Economy* (1996) and *China Statistical Yearbook* (1997, 1998, and 1999), by State Statistical Bureau (SSB) of China.

### III. EMPIRICAL RESULTS

The results of the conditional logit estimation are presented in Table 3 for three sub-periods of 1987-90, 1991-94, and 1995-98. The regressions are significant according to the chi-square test of the log-likelihood in each of the three cases.

The estimated coefficients for each of the locational determinants are discussed as follows. The coefficient of labor cost is significantly negative in 1980s but not significant in 1990s. This may suggest that Taiwanese investors view cross-province differentials in wages less important over time in their location decisions. It should be noted that this result does not contradict with the fact that most of TDI in China has been motivated by cheap labor there. While China does have advantage in labor cost over other potential host countries in attracting FDI, cross-region differences in labor costs may not influence site selections of foreign firms. Moreover, the insignificance of labor cost in 1990s and positive effects in 1995-98 may also indicate that TDI tends to go to the regions without advantages of cheap labor but with advantages of rapid economic growth and higher labor productivity.

**Table 3**  
Conditional logit estimates of location determinants of TDI in China: 1987-98

Independent Variables	1987-90	1991-94	1995-98
Labor Cost	-0.98* (-1.89)	-0.67 (-1.21)	0.71 (0.87)
Market Size	0.81 (1.08)	0.79* (2.08)	0.91** (2.56)
Transportation	1.27* (1.89)	1.38*** (4.97)	1.55*** (4.56)
Education	3.11 (0.18)	2.60* (2.07)	3.45* (2.10)
Agglomeration	1.25* (1.97)	2.76* (1.88)	2.44** (2.74)
R & D	-1.11 (-0.55)	1.26 (1.15)	2.07 (0.76)
FDI Incentive	0.28*** (4.61)	.036*** (5.15)	0.34** (2.17)
Cultural Links	0.75** (4.66)	0.81** (2.50)	0.11* (2.01)
Likelihood Ratio	628.64	658.13	688.32
Chi-Squared	216.15***	325.89***	311.58***
Sample Size	2503	10764	8238

Notes: t-ratios are in parentheses. \*\*\* (\*\* and \*) denotes significance at the 1% (5% and 10%)

Estimates of market size show a increasing tendency toward market-orientation of TDI within China. While the coefficient of the variable is not significant in 1980s, it turns to be of significance and the expected sign in 1990s, with growing impact over time. This result is consistent with the fact that as Chinese government opened further the domestic market to foreign investors in the early 1990s, Taiwanese firms tend to increase their propensity of local penetration. The insignificance of the coefficient in 1980s is very likely a result of China's FDI regime in that time in which only export-oriented FDI was encouraged and allowed.

As expected, infrastructure conditions (transportation) and labor productivity indeed have positive impact on TDI location decisions. Since

substantial portion of TDI involves export processing in production, transportation costs of intermediate products become an important determinant for a firm's site-selection. During the period of the 1990s, levels of technology related TDI rose as a result of competition from FDI in other countries and China's policy that encourages FDI embodying advanced technology. The technology upgrading in TDI requires local supply of skilled workers or high-productivity labor. Thus the significantly positive effect of education development is consistent with the theoretical prediction that a province with relatively abundant skill labor would attract more Taiwanese manufacturing plants.

The estimates of the three sub-periods show similar results for the coefficients of agglomeration economies with significantly expected signs and R&D with insignificance. Taiwanese firms seem indeed attracted to a area with strong manufacturing activities such that they may benefit from industrial clustering based on economies that are external to a firm but internal to the area. Existing R&D activities in a province seem not have any impact on TDI location choices, suggesting that the spillover effects of local research and development on TDI are negligible or Taiwanese firms are insensitive to levels of local R&D activities.

Institutional factors and cultural links are shown to enhance the export-oriented location pattern of TDI. China's FDI incentive policy such as tax holiday has significantly positive effects on TDI, suggesting that provinces with special economic zones and opened cities indeed are more likely to be chosen as sites of Taiwanese manufacturing branch-plants. The coefficient of dummy for cultural links is positive and significant, which is expected since such cultural and linguistic proximity made Fujian province more attractive to Taiwanese investors than other regions.

It is interesting to note changes in the site-selection of TDI from 1980s to 1990s, suggested by estimating results. While the impact of cross-region differences in labor costs, FDI incentives, and cultural links have gradually decreased over time, size of local market, infrastructure conditions such as transportation and agglomerations, and local supply of skilled labor have become increasingly important in Taiwanese firms' location decisions. These changes reflect the observation that while the early establishments of Taiwanese manufacturing branch-plants in 1980s were dominated by export-oriented projects, Taiwanese investors have started to explore possibility of local sales in China's huge domestic market since the early 1990s. With further liberalization in China's FDI regime, it is expected that future TDI flows would be more oriented toward local markets in coming years, rather than exporting to third markets.

## VI. CONCLUDING REMARKS

The purpose of this paper is to assess determinants of the site selection of Taiwanese direct investment, the most dynamic source of new plant investment

received in China during the period of 1987-98. The estimating results from the conditional logit model with the provincial data indicate that Taiwanese investors prefer the provinces with superior infrastructure and basic industrial activities, along with steady supply of skilled labor and growing market size. This conclusion is quite consistent with widely held belief that TDI in China is in general export-oriented based on cross-strait comparative advantages. Taiwanese cultural proximity with Fujian province is a key motivation for large amount of TDI flows to that region. Favorable FDI incentives provided by Chinese government in coastal areas have made significant differences in regional distribution of Taiwanese manufacturing branch-plants. While labor cost has been recognized as one of major motives for TDI in China, cross-province differentials in manufacturing wages seem not affect the site-selection of Taiwanese firms.

Given the dramatic rise of Taiwanese manufacturing start-ups in China, further research on their location is warranted. A detailed analysis of new investment by industry would be illuminating. A more complete model would also examine the role of political relationship between Taiwan and China in the final site decision. Evaluating this factor, particularly regulations on TDI in China by Taiwanese government, would provide some insights about future development of Taiwanese investment in China and sectoral distribution of the investment. Finally, as Taiwanese direct investment continues to grow and shape China's provincial and local economic development, additional research will be needed to assess how locational determinants have changed as local economies grow over time.

#### NOTES

1. It has been widely recognized that the actual amount of TDI flows into China would be higher than the Taiwanese official figures due to the ambiguous political relationship between Taiwan and Mainland China. The semi-underground nature of the cross-straits TDI resulted in a lot of TDI projects in China that were not registered with Taiwan's Ministry of Economic Affairs (MOEA).
2. It may not be appropriate to combine several types of transactions into a single decision model. A recent work by Friedman, Fung, Gerlowski, and Silberman (1996) showed that in the case of the U.S., site influences differ significantly across the five types of investment. They obtained more intuitive results, with desegregate data, about the impact of some location determinants (such as unionization) on site selections. The aggregate bias in this study, however, may not be a serious problem because the three types of TDI transaction all involved new branch-plants. Moreover, TDI in China does not take the form of merger and acquisition or plant expansion.

## REFERENCES

- Bartik, Timothy (1985), "Business Location Decisions in the United States: Estimates of Effects of Unionization, Taxes, and Other Characteristics of States," *Journal of Business and Economic Statistics*, 3, 14-22.
- Chen, Tain-Jy (1992), "Determinants of Taiwan's Direct Foreign Investment: The Case of A Newly Industrializing Country," *Journal of Development Economics*, 39, 397-407.
- Chunghwa Institute for Economic Research (CIER), *1992 Taiwan-China Economic Yearbook*, Taipei, Taiwan, 1994, page 160.
- Coughlin, Cletus C., Joseph V. Terza, and Vachira Arromdee (1991), "State Characteristics and the Location of Foreign Direct Investment within the United States", *Review of Economics and Statistics*, 73, 675-83.
- Dunning, John H. (1981), *International Production and the Multinational Enterprise*, George Allen & Unwin, London.
- Friedman, Joseph, Daniel Gerlowski, and Jonathan Silberman (1992), "What Attracts Foreign Multinational Corporations? Evidence from Branch Plant Location in the United States", *Journal of Regional Science*, 32 (4), 403-418.
- Friedman, Joseph, Hung-Gay Fung, Daniel Gerlowski, and Jonathan Silberman (1996), "A Note on 'State Characteristics and the Location of Foreign Direct Investment within the United States'", *Review of Economics and Statistics*, 78, 367-368.
- Guimaraes, Paulo, Octavio Figueiredo, and Douglas Woodward (2000), "Agglomeration and the Location of Foreign Direct Investment in Portugal," *Journal of Urban Economics*, 47, 115-135.
- Head, Keith, John Ries, and Deborah Swenson (1995), "Agglomeration Benefits and Location Choice: Evidence from Japanese Manufacturing Investments in the United States," *Journal of International Economics*, 38, 223-47.
- Kueh, Y.Y. (1992), "Foreign Investment and Economic Change in China", *China Quarterly*, No.131, September, pp.637-90.
- McFadden, D. (1974), "Conditional Logit Analysis of Qualitative Choice Behavior", in Zarembka, P. (Ed.), *Frontiers in Econometrics*, Academic Press, New York, 105-42.
- Minister of Economic Affairs (MOEA), *Taiwan-China Economic Monthly Bulletin*, Investment Committee, Taiwan (ROC), 1992, 1995, and 1998.
- Ministry of Foreign Economic Relations and Trade (MOFERT), *Almanac of China's Foreign Relations and Trade (1987-1997)*, Chinese Resources Advertising Company, Hong Kong.
- Plaut, Thomas R. and Pluta, Joseph E. (1983), "Business Climate, Taxes and Expenditures, and State Industrial Growth in the United States", *Southern Economic Journal*, 50, 99-119.
- State Statistical Bureau (SSB), *Statistical Yearbook of China (1992-1999)*, China Statistics Press, Beijing, China.

- United Nations Conference on Trade and Development (UNCTAD), *World Investment Report: 1999*, United Nations, New York, NY, 1999.
- Vernon, Raymond (1979), "The Product Cycle Hypothesis in A New International Environment," *Oxford Bulletin of Economics and Statistics*, 41 (4), 255-67.
- Wells, Louis (1993), "Mobile Exporters: New Foreign Investors in East Asia," in *Foreign Direct Investment*, K. A. Froot, eds., Chicago: The University of Chicago Press.
- Woodward, Douglas P. (1992), "Locational Determinants of Japanese Manufacturing Start-ups in the United States", *Southern Economic Journal*, 58, 690-708.
- Woodward, Douglas P. and Robert J. Rolfe (1993), "The Location of Export-Oriented Foreign Direct Investment in the Caribbean Basin", *Journal of International Business Studies*, 24, 121-44.
- Zhang, Kevin, H. (2000), "Human Capital, Country Size, and North-South Manufacturing Enterprises," *Economia Internazionale / International Economics*, LIII (2), 237-260.
- Zhang, Kevin, H. (2000), "Why is U.S. Direct Investment in China So Small?" *Contemporary Economic Policy*, 18 (1), 82-94.
- Zhang, Kevin H. and James R. Markusen (1999), "Vertical Multinationals and Host-country Characteristics," *Journal of Development Economics*, 59,233-52.