Determinants of U.S. and Japanese Foreign Direct Investment in China

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ABSTRACT

This paper examines the determinants of FDI from U.S. and Japan in China using the provincial data set from 1991 to 1997. The results of the regression analyses are further compared to those of the aggregated FDI as a benchmark case. The study found various similarities and differences in the importance and the magnitudes of the determinants of FDI among three FDI sources. It is shown that both level of GDP and the lagged GDP significantly affects inflow of FDI from all sources. The hypothesis that the good quality of infrastructure is conductive to attract FDI is strongly supported for all FDI sources, although the magnitude of the impact of the variable varies. The policy variables are also found to have significant positive effects on FDI. The labor quality exerts larger influence on Japanese FDI than on U.S. FDI, which may reflect the different structure for coordinating activities between U.S. and Japanese firms. The results for the wage variables are inconclusive. The study also shows the marginal support for the positive effect of cultural proximity between Japanese FDI and the provinces of Manchuria.

1 Introduction

Since China's economic reforms and 'open-door' policy have started in 1979, Foreign Direct Investment (FDI) inflows to China have been nothing short of spectacular. By the end of 1997, China had approved 304,821 foreign invested enterprises (FIE's), with an accumulated contractual foreign capital of US$520.39 billion, out of which US$221.85 billion has been realized. (MOFTEC 1998). In 1997, China approved 21,001 new enterprises with a contractual foreign input of US$51.3 billion and with realized foreign input of US45.26 billion. China is now the largest host of FDI among the developing countries and the second largest host in the world, next only to the United States. The significance of the policy reforms and their commitment to opening-up can be observed in the remarkable achievement of China's economic development. China achieves the fastest growth rate of Gross National Product in the world and is likely to remain attractive for international investors in the next century.

A regional breakdown of inward FDI, however, reveals an important characteristic of FDI in China, namely, its concentration in the Southeast region. The uneven regional distribution of inward FDI continues to exist throughout 1990's. Although inward FDI appeared to have outgrown into inland provinces, the proportion of FDI in central and western parts of the country relative to the national total has increased only slightly over time.

Although Hong Kong and Taiwan are the two largest sources of FDI in China, China also has become a battlefield for multinational enterprises from developed countries. Among those developed countries, two of the largest investors that are actively pursuing business in China are United States and Japan. The purpose of this paper is two folds. First, using the provincial panel data between the years 1991 and 1997, it attempts to investigate the relative importance of the determinants of U.S. and Japanese FDI in China. Second, the estimated results are studied in comparison with the benchmark case using the aggregated FDI from the rest of the world. It attempts to determine whether the factors contributing to attract FDI from U.S. or Japan, specifically, are different from FDI from all other nations.

The remainder of the paper is organized as follows. Section 2 briefly reviews the theories of Foreign Direct Investment. Section 3 describes some characteristics of FDI in China, and is divided into two parts. The first part discusses the FDI in China over the past eighteen years (1979-1997) introducing various changes occurred in investment environments facing foreign investors. The second section illustrates the main characteristics of inward FDI, namely, its concentration in the Southeast region. Section 4 discusses the overview of U.S. and Japanese FDI over time. Section 5 presents the statistical analysis to investigate the effects of the possible determinants of FDI from U.S. and Japan. It also assesses the relative importance of those factors on FDI from all other nations for comparison. The section begins with the description of the variables used in the regression analysis followed by the estimation methodology. The results for all regressions are reported and are analyzed in Section

5-3. Section 5-4 reports the sensitivity analyses to gauge the robustness of the model. Section 6 concludes.

2 Literature Review

2.1 Statistical Analysis of inward FDI

Whether the MNEs are targeting local markets or using host country as an export base, the propensity of firms to produce in a specific location greatly depends on the characteristics that affect relative expected profits of the location over alternative locations. The location decisions then depends on the factors affecting the revenues and costs of the investment project. The existing literature has identified the following factors as important in determining the location choice of FDI.

In the literature, market size is among those most frequently examined. For the foreign investors who serve regional markets, the size of host market, which represents the region's economic condition and/or potential demand for their output, should be important element in their FDI decision-makings. In previous studies, market size or demand has been found to have significant positive association with FDI. Using per capita income as a measure of market size, Coughlin, Terza, Arromdee (1991) have demonstrated the variable to have positive and significant affect on inward direct investment in the United States. Friedman, Gerlowski, and Silberman (1992), in their analysis of foreign manufacturing plants in the United States, identified personal income to be one of the important determinants to attract FDI. The variable was found to play a dominant role in the site selection of Japanese-affiliated manufacturing investments within the United States by Woodward (1992).

Other studies have utilized Gross National Product (GNP) or Gross Domestic Product (GDP) as a measure of market size. The importance of market size has been confirmed in many empirical studies. Examples of such works are Lunn (1980), Scaperlanda and Balough (1983), Culem (1988). In these studies, the lagged GDP and their rate of growth were also examined and found to have a significant positive impact on FDI decision- makings. Wheeler and Mody (1991) reinforced the plausibility of the argument in their study of U.S. manufacturing and electronics investment in 42 countries.

A great deal of papers has investigated the effect of labor cost of the host country on inward FDI. Other thing being equal, foreign firms are expected to prefer lower wage locations to minimize their cost of production. The investigation of the view, however, yielded mixed results. The hypothesis that higher wage rates is a significant deterrent to inward FDI was confirmed by Saunders (1982), Culem (1988), Coughlin, Terza, and Arromdee (1991), and Friedman, Gerlowski, and Silberman (1992). On the other hand, other studies found the positive relationship between labor cost and FDI. For an example, Maki and Meredith (1986) in their study of U.S. manufacturing FDI in Canada found that unit labor cost differentials between Canada and U.S. have a positive impact on U.S. FDI to Canada. Similar results were reported in Swedenborg's (1979) studies of Swedish manufacturing subsidiaries abroad. In contrast to the results reported above, other researchers failed to identify any significant role of unit labor cost or relative unit labor cost as a determinant of FDI. Kravis and Lipsey (1982) Owen (1982), for an example, found a negligible role for relative labor costs.

These contradicting findings can be attributed to the following reasons. First, wage levels may reflect a level of labor productivity or quality of human capital. A host country with high labor costs may attract relatively more FDI if an investing firm perceives it as an advantage to hire high quality and skilled labor, which leads to an increase in productivity. Secondly, the significance of labor cost or labor cost differential may be outweighed by other production costs, transportation costs or by other explanatory variable in the equation, such as political instability in case of developing countries.

The MNEs, as a global profit maximizer, are assumed to be sensitive to tax factors, since they have a direct effect on their profits. Home country can then apply various forms of tax concessions, such as, tax exemption, tax credit, or tax deduction appropriate for their strategies to attract FDI. The evidence of the effect of the tax concessions on the level and pattern of MNE's activities has been documented in many studies. The responsiveness of FDI to tax policies reported in those studies varies. Using dummy variables Friedman, Gerlowski, and Silberman (1992) found that state and local tax is a strong deterrent to FDI in the U.S. The study by Hines (1996) also supports the view that high local tax rates have a significantly negative effect on local investment. Coughlin, Terza, and Arromdee (1991), and Smith and Florida (1994) found the weak negative association between state and local taxes per capita and FDI. Woodward (1992) found no evidence of significant impact of taxes or state promotion attempts on Japanese FDI in the U.S., when they are measured by corporate taxes and the index that was developed by Luger and Shetty (1985). On the other hand, state unitary taxes were found to be a significant deterrent to Japanese FDI.

Another variable that has been frequently examined is the quality of transportation infrastructure. Other things being equal, regions with better-developed transportation infrastructures will be more attractive for foreign investors since it makes transporting goods produced and raw materials or components utilized for local assembly easier. Furthermore, the foreign firms that are unfamiliar with regional production condition, especially in developing country like China, may have preference for better-developed regions. The various measures of the quality of infrastructures have been identified as one of the important variable that has a significantly positive influence on FDI inflow. The importance of a container port for MNEs was confirmed by Friedman, Gerlowski, and Silberman (1992), and Smith and Florida (1993); that of interstate highway system by Woodward (1992); that of highway by Coughlin, Terza, and Arromdee (1991).

The human capital is an important determinant of the marginal value of physical capital. Other things begin equal, the higher quality of labor can be translated into the higher profitability in the overseas production or higher quality of the products. The previous studies on Japanese-affiliated manufacturing firms further suggests that labor skills measured by educational attainment have a significant impact on their FDI (Woodward (1992), Smith and Florida (1993)).

2.2 Statistical Analysis of FDI in China

Cheng and Zhao (1995) analyze the panel data of FDI in 28 Chinese regions over 1983 – 1992, in order to determine statistical importance of geographical location, factor endowments, policies that encourage FDI and the macro-economy conditions. They found that per capita GNP, and the effects of SEZ are all positive and highly significant. In contrast, lagged relative wage, education attainment, failed to be significant. Although the hypothesis that quality of infrastructure enhances FDI was not significantly supported, the increasing importance of good quality infrastructure over time was evidenced.

Head and Ries (1995), using the conditional logit model, analyze the panel data consisted of the 54 Chinese cities over 1984 – 1991. Their findings generally support the findings of Cheng and Zhao (1995), namely, the importance of high quality infrastructure, industrial output, and the various economic zones to attract FDI. The average wage per worker, however, was found to be an insignificant determinant when productivity differences were controlled for.

Cheng and Kwan (1999), using the partial adjustment model to analyze the Chinese FDI data from 1986 to 1995. As in the above previous studies, good infrastructure, various economic zones, and regional income are found to be important determinants of FDI in China. The insignificance of the education attainment used as a proxy for labor quality was consistent with what Cheng and Zhao (1995) found. In contrast to the negligible effect of the wage variable on FDI found by Head and Ries (1995), their findings demonstrate the significant negative effect of real wage on FDI.

3 FDI in China After the Open-Door Policy

3.1 Review of FDI in China from 1979 to 1997

Foreign direct investment (FDI) in China has grown dramatically over the past two decade, since China initiated 'open-door' policy in 1979. The beginning of the open-door policy was marked with promulgation of a joint venture law in mid-1979. It established the principles and procedures for foreign investments (Pearson, 1991). In the following year, four Special Economic Zones (SEZ) were established on its southeast coast, where China has provided a complex of preferential treatments to foreign investors.

In the first half of 1980's, the Chinese government has taken great strides in attracting FDI by promulgating various regulations to improve the investment environment. Furthermore, in 1984, fourteen coastal cities were designated as special open regions in which offer special concessions to investors. As shown in Table1, the volume of both contracted and realized FDI grew rapidly during 1984 and 1985.

The rapid growth of FDI came to a halt in 1986. Although the growth rate of realized FDI was still positive, the volume of contracted FDI declined dramatically compared to the previous year. The rapid growth of economy that China enjoyed in 1984 and 1985 gave rise to a balance of payments problem and high inflation. The decline in the contracted FDI reflects the receded interests of investors because of the difficulty in accessing the domestic market and obtaining foreign exchange to pay for imported intermediate inputs, due to central authorities' tightening of credits and foreign exchange.

In the 1980s, China had experienced an average growth rate in real GNP of approximately 10% a year. In 1988, it had risen to 11.2%, and industrial growth was at nearly 18% (Thorburn, Leung, Chau, and Tang, 1990). By the end of 1988, the economy overheated with two-digit inflation. The Chinese government, in an attempt to control the economy, introduced a set of austerity measures in late 1988. These policies includes credit tightening, increased government control over raw material supplies in an attempt to divert resources back to the state sector, and increased centralization of control over foreign trade (Thorbunr, Leung, Chau, and Tang 1990). As a result of these policy changes, coupled with increased uncertainty of the economy, Chinese economy slowed down in 1989 negatively affecting market demands in China. In addition to the decreased market demand, some existing joint ventures in particular, experienced limited ability to raise capital due to the credit tightening. The steady growth of FDI was disturbed not only by these austerity measures, but also by Tiananmen incidents. These events created foreign investors' perception of increased political risks in China.

After the historical speech that affirms leadership's commitment to reforms and economic liberalization made by Deng Xiaoping, a leader who took initiative to promote FDI in 1980s, FDI in China continued to rewire its growth records in 1992. China's inward FDI grew by 385.3% for contracted FDI and by 152.11% for actual FDI. Furthermore, China designated more cities as economic and technological development zones in 1992. During the same year, the Chinese government announced the adoption of the socialist market economy strategy. During the first half of 1993, new entry or expansion of existing business by large multinational companies, such as, Itochu of Japan, Gillette of U.S., was witnessed. The path of growth continued in 1993. Both contracted and realized FDI grew by 91.7% and by 150.0%, respectively. Since 1994, however, the growth rate of FDI has been moderate, relative only to unusually high growth rate of previous years. The amount of the contracted FDI actually reduced by 25.8%, although it's realized FDI grew by 22.7% in 1994. The Chinese central government tightened their control over monitoring foreign investors' activities by setting up 'administrative procedures for appraising foreign invested property' in 1994. At the same time, the implementation of the tax reform was undertaken and the unification of income tax on domestic firms and foreign firm was introduced. This modification of tax policies marked the beginning of China's effort to created more equal environment for both foreign and domestic investors. Furthermore, in 1995, the State Planning Commission, the State Economic and Trade Commission, and Ministry of Foreign Trade and Economic Cooperation (MOFTEC) issued FDI guidelines that comply with their industrial policies. The industries are classified into four categories, “encouraged”, “permitted”, “restricted”, or “prohibited”. The industries which the Chinese government encourages FDI are technologically-advanced, technology-intensive industries, and projects that generate more foreign exchange revenues. On the other hand, FDI are restricted in sectors, such as the exploration of natural resources, luxury hotels, insurance, or any other sectors in which advanced technologies have already been developed or introduced by the Chinese firms. Foreign projects that could harm the environment or people’s health, manufactures weapons, or manufactures products that utilize technology owned by China are examples of the sectors in which FDI is prohibited. China became more selective in screening potential projects in compliance with those guidelines in order to achieve the objectives in nation’s development and industrial policy. The decrease in the growth rate of contractual FDI in 1994 and 1995 may reflect the increased monitoring of foreign investments by Chinese government.

The year 1996 witnessed another decline in the amount of contractual FDI, although the level of utilized FDI continued to increase steadily. The contractual FDI declined by almost 20% and the realized FDI increased by 11.2% from previous year. China’s continuing efforts in the deepening of reform and opening up were presented in the form of a reform on import tariff policies and the implementation of the system of buying and selling foreign exchange. In April 1996, China reduced the average tariff level by a large margin, however, at the same time, the State abolished the preferential policies of import tariff exemption and reduction enjoyed by many MNEs.

In 1997, despite of the drastic drop in contractual FDI, realized FDI marked a record high volume. In December 1997, new preferential policy was brought into practice in an attempt to encourage FDI. The exemption from Customs duty and import-related tax on the imported equipment were offered to both foreign and domestic investors in the industries that are classified as “encouraged” and “restricted” by Industrial Guidance Catalogue for Foreign Investment.

3.2 Regional Distribution of FDI Over Time

A regional breakdown of inward FDI reveals important characteristics of FDI in China, namely its concentration in the Southeast region. Table 2 reports the regional comparison of contracted FDI as a percentage of the nation’s total FDI for the past fifteen years. In 1985, almost 73.6% of total contracted FDI were located in the Southeast region. The rest of the East was the second in receiving FDI that amounted to 19.3% of total contracted FDI. The proportion of FDI designated to the rest of the country, Central and West, were very small. Throughout the 1980’s, the proportion of FDI in central and western parts of the country remains small. On average, between the years 1985 to 1990, about 10% of total FDI were located in those regions. During the 1990’s, FDI gradually spread over the rest of the country. On average, between the years 1991 to 1997, central and western parts of the country have hosted 11.5% of total FDI. The uneven regional distribution of inward FDI, however, continues to exist throughout 1990's. During the period, the Southeast region still accounts for 71.3% of foreign capital inflow. The rest of East has slightly increased their share from 16.6% to 17.3%.

The imbalance of the regional distribution may partially be attributed to the various coast-oriented open-door policies China has exercised. The provinces that rank first five places in absorbing the FDI for the above period are all located in the southeast coast of China, where many of the China's open-door policies were designated to since 1979. The first effort of attracting FDI was accomplished by establishing Special Economic Zones (SEZ). The first four cities named as a SEZ are in the provinces of southeast coast, namely, Guandong and Fujian. Hainan, another southeast coastal province was approved as China's largest SEZ in 1980. The MNEs that launched into SEZs can enjoy various favorable policies, such as reduced or exempted corporate income tax for certain period of time, exemption from import tariffs on imported equipment and raw materials. Some of the policies were made particularly favorable for those MNEs using advanced technologies or exporting certain percentage of their products to overseas. In 1984, 14 coastal cities were opened and the Chinese government granted them similar policies as it did to SEZs. Out of those 14 cities, ten are located in the southeast coast region and four are in rest of the eastern region. Further in 1985, the preferential policies were granted to coastal economic regions, Pearl River Delta, Yangtze River Delta and Minnan Delta that is south of Fujian. In 1990, Pudong in Shanghai was opened. The preferential policies granted to the area were more extensive than those applied to SEZs. The central government provided the area with not only tax concessions and other preferential policies related to import and export tariffs, it also allowed MNEs to extend their FDI in tertiary sector such as department stores and supermarkets and in financial sector such as banking and insurance. It also allowed international trading companies to establish and to conduct import and export business.

The Chinese government established Economic and Technological Development Zones (ETDZs), an another opportunity for MNEs to enjoy tax breaks and other preferential policies on custom duties and on land rent. These areas are designed for enhancing FDIs from foreign firms that are technologically advanced or export oriented. They are often located in or near provincial capitals or transport hub cities. Furthermore, since 1984, the government established 32 national-level ETDZs (ETDZs can be established at various levels such as state, country, or even town-level). Of those national-level ETDZs, 20 are located in the Southeast coastal area, 6 are in the rest of the east, 4 are in the central part of China, and 2 are in the western region of China. Such zones have outgrown into inland provinces over ten years. ETDZs are by far the fastest growing areas in China.

4 Japan and US FDI Over Time

Table 3 shows both contracted and realized FDI in China by Japanese firms and US firms. After the Beijing's Tiananmen Square incident, U.S. contracted FDI in China declined sharply. Although contracted FDI was on a way for recovery in 1991, realized FDI actually declined from previous year. Japanese FDI, on the other hand, was only affected by this incident during the first half of 1990 and made a quick recovery during the latter half of the year. Both contracted and realized FDI from Japan continued to grow throughout 1991. The FDI inflow from both U.S. and Japan surged since 1992. This was mainly the result of new policies and reforms that opened more regions and sectors to FDI in 1992. The sharp rise in U.S. FDI from 1992 to 1993 is reported in the table. U.S. contracted investments more than doubled and realized investment quadrupled, whereas the growth rate of Japanese FDI was 36% for contracted investment and 87% for realized investment. Since then, realized FDI from both countries grew steadily, although contracted FDI, particularly from U.S. fluctuated from year to year. U.S. is the largest source of FDI in China among developed countries by the end of 1996. As of the end of 1996, U.S. has invested in 22,100 projects with contractual value of US $35.69 billion and realized value of US $13.68 billion.

Also reported in Tables 3.a and 3.b is the average size of the contracted project and the ratio of the actually utilized value of FDI to the contracted FDI value for Japan and U.S. The average capital size of U.S. generally appears to be much larger than that of Japan during the latter half of 1980's. However, the difference in their average capital size has narrowed during 1990's. Since 1994, Japan's average capital size exceeds that of U.S. for four consecutive years. This may reflect the relative shift of Japanese FDI from labor-intensive industries to technology and capital intensive industries, which consequently increases its capital size. Note also that the realized ratio for Japanese FDI has been generally higher than that of U.S. FDI.

5 Statistical Analyses of U.S. and Japanese FDI in China

5.1 A Theoretical Framework for Analysis of U.S. and Japanese FDI

The analysis in this section is an attempt to assess the relative importance of factors in determining the flow of FDI into each province of China from United States and Japan for the period 1991 – 1997. As a benchmark case, the aggregated FDI from all other nations is also studied in comparison with U.S. and Japan.

I start with basic model that is derived from a reduced form specification for demand for inward direct investment. Let FDI_{ij} be the foreign direct investment from country i to country j. Then, the relationship between FDI and its determinants can be written as:

$$FDI_{ij} = f\ (X_{j},)$$

Where X_j is a vector of variables that captures overall attractiveness of province j to FDIs. The variables included in this vector are exclusively dependent on host country's characteristics.

The basic model above can be written as a linear specification of the following form:

$$\ln(FDI_{j,t}) = \alpha_j + \beta_1 \ln(GDP_{j,t}) \text{ (or } LGDP_{j,t}) + \beta_2 \ln(CWAGE_{j,t}) \text{ (or } \ln(RECWAGEj,t)) + \beta_3 \ln(HIWAY_{j,t}) \text{ (or } \ln(RAIL_{j,t})) + \beta_4 (SEZ_{j,t}) + \beta_5 (ETDZ_{j,t}) + \beta_6 \ln(HE_{j,t})$$

Where the subscript "j" and "t" stands for region j at period t and the variables used in this analysis are defined below.

$FDI_{i,t}$ = FDI from country i (U.S., Japan, or all nations) to province j at time t

$GDP_{j,t}$ = GDP of province j at time t

$LGDP_{j,t}$ = The lagged GDP of province j at time t

$WAGE_{j,t}$ = Average wage of province j at time t

RECWAGEj,t = Relative wage of province j to average wage of the nation

$HIWAY_{j,t}$ = kilometers of high quality roads in province j per square kilometer of land mass

$RAIL_{j,t}$ = kilometers of railway in province j per square kilometer of land mass

$SEZD_{j,t}$ = Dummy variable for Special Economic Zones and Open Coatal Cities

$ETDZD_{j,t}$ = Dummy variable for Economic and Technological Development Zones

$HE_{j,t}$ = the ratio of number of students enrolled in higher education in province j to its population

In order to examine the importance of size of the local market, Gross Domestic Product (GDP) of each province is used in the analysis. For the foreign investors, the size of host market, which represent the host country's economic condition and/or potential demand for their output, should be important element in their FDI decision-makings. As the variable is used as an indicator for market potential for the products of foreign investors, the expected sign for the variable is positive. Alternatively, the lagged GDP is included in the equation to allow the time lag of investment response to the change in economic condition in China.

Since the labor costs are major component of the production function, related wage variables are frequently tested in the FDI. A high nominal wage or relative labor cost is, other things being equal, deters inward FDI. This must be particularly so for the firms that engage in labor-intensive production activities. Therefore, conventionally, the expected sign for this variable is negative.

The hypothesis that well developed regions with superior transportation facilities are more attractive to foreign firms relative to others is examined by including the two proxies, distance of roadway and railway. Since the correlation coefficient calculated between the two infrastructure variables is relatively significant at 0.72, they are not used in the regression analysis simultaneously. Therefore, the basic model is consisted of two sets of equations: one that includes the roadway variable together with other explanatory variable and the other that includes the railway variable.

The model includes the dummy variable to examine the effects of policy incentives to attract FDI in SEZs combined with OCCs, and ETDZs. A dummy variable takes the value of 1 for the provinces that are designated as SEZ and OCC or ETDZ, and takes the value of zero, otherwise. Since those areas are granted special policies and flexibility of conducting foreign business, as mentioned before, in order to attract foreign investment, expected signs for all variables are positive. The detailed explanation for each policy destination is given in Appendix A.

‘HE’ is included in the equation to capture the average level of human capital in each province. Although the expected sign of the variable is positive, the importance of this variable would vary with the type of industries that foreign investors are conducting business in.

Next, the above model is extend to examine the possible positive effect of cultural proximity between Japan and the region in China that particularly have a long history with Japan, namely Manchuria which comprises the provinces of Heilongjang, Jilin, and Liaoning. With the seizure of Manchuria in 1931, Japan has established the empire in the region, where it has abundant mineral deposits and shows the great potential for industrial development and war industries. This study examines that this type of long historical relationship would favor Japanese FDI in penetrating into the region relative to other regions.

The physical distance is a variable frequently studied to examine the importance of transportation cost in both international trade and FDI studies. The concept of the cultural proximity or distance as an incentive or an impediment to FDI is also essentially related to the transaction cost. However, there have been few attempts to measure the impact of the variable on FDI mostly because of the difficulty to measure either the cultural proximity or distance. In this analysis, the attempt is made in order to examine the possible effect of this cultural distance by including the dummy variable for the above provinces for Japanese FDI.

The data sources are explained in Appendix B.

5.2 Estimation Method

The estimation used to analyze the models above is the random effects model. The formulation of the model can be specified as follows.

$$y_{it} = \alpha + \beta' x_{it} + \varepsilon_{it} + u_i$$

Where the disturbance term, ε_{it} is associated with both time and the cross sectional units, which are provinces in this analysis, and u_i is the random disturbance that is associated with ith province and is assumed to be constant through time. In another words, the individual specific constant terms are assumed to be randomly distributed across cross-sectional units. The further assumption made for the model is as follows:

$E[\varepsilon_{it}] = E[u_i] = 0,$

$Var[\varepsilon_{it}] = \sigma^2_{\varepsilon},$

$Var[u_i] = \sigma^2_u,$

$Cov[\varepsilon_{it}, u_j] = 0$ for all i, t, and j

$Cov[\varepsilon_{it}, \varepsilon_{js}] = 0$ if $t \neq s$ or $i \neq j$

$Cov[u_i, u_j] = 0$ if $i \neq j$.

The regression disturbance, w_{it}, can be written as;

$W_{it} = \varepsilon_{it} + u_i,$

The variance and covariance of all disturbances are;

$Var[w^2_{it}] = \sigma^2 = \sigma^{\varepsilon}_2 + \sigma^{u}_2,$

and

$Cov[w_{it}, w_{is}] = \sigma^2_u$

.

Therefore, the disturbances in different periods are correlated for a given i, because of their common component, u_i. The efficient estimator, then, is generalized lease squares (GLS). The two-step estimators are computed by first running ordinary least squares (OLS) on the entire sample. Then, the variance components are estimated by using the residuals from the OLS. These estimated variances are then used in the second step to compute the parameters of the model.

5.3 Estimation Results

Estimation results of the model for the all three FDI sources in four different versions with the distance of roadway and with the distance of railway (hereafter 'roadway variable' and 'railway variable') are presented in Table 4-1 and 4-2, respectively.

The size of nominal GDP appears to be discriminating factor in this analysis. The coefficients for the variable are all positive and statistically significant at 1% level confirming the hypothesis that the amount of FDI inflow is positively related to the host region's market size measured by its GDP. In the first set of equations that include 'roadway variable', the Table 6-1 indicates that a one- percent increase in GDP is associated with a 0.75 and 0.67 percentage increase in U.S. FDI, 0.67 and 0.76 percentage increase in Japanese FDI, and 0.69 and 0.63 increase in the other nations' FDI, depending on the different wage variables incorporated in two equations. Therefore, although the importance of the size of each province's market is unmistakably evidenced for all FDI sources, there is no absolute difference in the magnitude of the impact of the variable among the three FDI sources examined. When 'roadway variable' is substituted with 'railway variable' in the second set of the equations in Table 4-2, the level of significance remains high at 1% level. However, the magnitudes of those coefficients are slightly larger for U.S. and over 20% larger to both Japan and all nations.

The lagged GDP was also found to have significant influence on the inflow of FDI from all sources as indicated in the previous studies. The lagged GDP is equally significant for all FDI sources as the current GDP. However, its impact on FDI inflow is consistently smaller relative to the current GDP.

The wage variables appear to be less promising determinant in the analyses. In Table 4-1, the estimated coefficients for nominal wage are negative and insignificant in both equations for U.S. and all other nations. This may be because the average wage variables do not carry sufficient information of the foreign investors' performance such as their productivity or profitability. On the other hand, positive effect of nominal wage is detected for Japanese FDI. In equation (3), in particular, the marginal positive effect is evidenced. This implies that the higher the provincial wage, more likely is Japan engage in FDI in the provinces of China.

Furthermore, correlation coefficients calculated between nominal wage and the nominal GDP and the lagged nominal GDP are found to be relatively high at 0.46 and 0.47. Based on the correlation coefficients, both GDP variables and the nominal wage variable may be intercorrelated, although the information that each variable carries does not completely overlap. Collinearity makes the disentangling separate effects of either of the variables difficult, and may distort the relative importance of the explanatory variables. This possibility is also tested later in the sensitivity analysis.

Unlike the nominal wage variables, the correlation coefficients are very low between the relative wage and the GDP variables. Therefore, if the relative wage plays any roles in determining the amount of FDI in China, the inclusion of the variable is expected to add the new information to the analysis. However, only marginally significant effect of the relative wage is evidenced only for all other nations in Table 4-2.

The effect of the proxy for the average level of labor quality on U.S. and Japanese FDI are distinctively different from that of the all other nations' FDI. The estimated coefficients for U.S. are positive and significant at 1% level for all equations. In the case of Japanese FDI, the labor quality is also found to be strongly significant at 1% level. On the contrary, the labor quality does not appear to play a significant role in the all other nations' FDI. As shown in both Tables 4-1 and 4-2, the magnitude of the variable is very small in the equations that incorporate the nominal wage, and the estimates bear negative sign, although insignificant, in the equations with the relative wage variable. This may reflect the difference in the characteristics of investment projects from all nations on average than those from U.S. and Japan. The large part of the all other nations' FDI is from Hong Kong and Taiwan as mentioned previously. Their investment projects are often said to concentrate in labor-intensive industries such as electrical appliances, food processing, footwear, textiles, and so on, where relatively lower level of skill is required. On the other hand, FDI from U.S. is largely designated in capital and technology intensive industries such as electrical equipment, chemicals, electronics, transportation equipment, and so on, where the labor skill is much more significant factor in determining the profitability of their projects. The similar thing can be said for Japanese FDI in China, although the extent of their investment in capital and technology intensive industries relative to labor intensive industries seems to be less in comparison with U.S.

Another interesting feature can be found in the size of the estimated coefficients between U.S. and Japan. They are generally much larger for Japan than for U.S. This indicates that the impact of the labor quality is larger for Japan in determining where to locate their production in China. The finding of significant impact of labor quality/education attainment on Japanese FDI agrees with previous studies by Woodward (1992), and Smith and Florida (1993). This may be explained by the difference in the structure for coordinating operating activities between U.S. and Japanese firms. Aoki (1988) carefully compared the two distinctive forms of information structure for coordinating operating activities of the firm: hierarchical coordination conducted by the American firms and horizontal coordination conducted by the Japanese firms. He points out the essential difference between the two types of firms as follows. The hierarchical coordination can be characterized by higher degree of worker specialization and job differentiation. The typical American firm is composed of many specialized operating units, which are coordinated through the hierarchy of administrative offices. The typical Japanese firm, on the other hand, relies more on horizontal communication among functional units. The workers acquire skills through learning by doing rather than performing specific task assigned to them. This requires workers to be more versatile and flexible in job demarcation. Furthermore, the integrative skills of workers are vital to effectively utilize on-site information. Japanese firms may assume that the higher level of education enhances workers' capability to acquire the integrative skills, thereby increasing the magnitude of the variable on their FDI.

It is shown that the quality of infrastructure, approximated by distance of roadways and railways has generally significant positive influence on FDI inflow in China from all sources tested in this analysis. However, a closer look reveals the difference in the level of significance and the magnitude of the effect between two variables for different FDI sources. It appears that 'roadway variable' is more significant in determining U.S. relative to 'railway variable'. As shown in Table 4-1, the estimated coefficients for 'roadway variable' are highly significant at the 1% level for all equations for U.S. FDI. On the other hand, the explanatory power of 'railway variable' reported in Table 4-2 is decreased to 5% level for the first equation for U.S. FDI. In case of the other nations' FDI, both variables appear to be equally significant. For Japanese FDI, the estimated coefficients for the roadway for the first two equations are only significant at 5% level. On the other hand, for 'railway variable', they are significant at the 1% level for all equations. In terms of the magnitude of the impact of the variable, the positive effect of 'roadway variable' is much larger for the aggregates than for U.S. and Japan. This may suggest that U.S. and Japan place more emphasis on local market than the aggregates on average. Therefore, the impact of the quality of infrastructure measured on U.S. and Japanese FDI decision-markings is smaller. On the contrary, the difference in the magnitude of 'railway variable' becomes relatively insignificant due solely to the reduction in the magnitude of the coefficients for both U.S. and the aggregated FDI. This may be partially explained by the different size and weight of the goods produced by Japan and U.S./the aggregates, which lead to the different transportation means, however due to highly industry specific nature, which is beyond the scope of this paper, this is an educated guess at best.

The evidence of strong positive impact of these proxies for the quality of infrastructure does not completely agree with Cheng and Zhao's (1995) findings. In their regression analysis, the estimated coefficient for the railway variable was found to be positively significant only at 5% level, and that for the roadway variable was negative, although insignificant. This may be explained by the different sample period utilized between the two studies. The sample period in their analysis is 1983 – 1992, whereas this paper studies the data set from 1991 – 1997. The importance of the infrastructure as a determinant of FDI in China may have been increased over time.

That is that, as the investing environment matures in China over time, better-developed regions with superior transportation facilities became more attractive to foreign investors.

The effect of the policy variables appears to be quite strong. The regression coefficients for the dummy variables for SEZ and OCC are found to have unambiguous positive effect in attracting FDI from all sources. The results support the hypothesis that the government investment policies are one of the key elements in determining the amount of FDI inflow in the provinces of China. In another words, the provinces designated as SEZ and OCC clearly show the advantage of improving the economic environment for FDI than the rest of the country by implementing special policies favorable to foreign investors.

The coefficients in both sets of equations are strongly significant at 1% level. Furthermore, the magnitude of the effect of the variable is the largest among all the variables examined for all FDI sources. What is striking, though, is the difference in the magnitude of the estimates among the three FDI sources. In Table 4-1, the point estimates for Japan are ranging from 1.61 to 1.66, which is larger by 82% to 98% relative to those for U.S., and by 75% to 96% relative to those for all other nations. The results for the second set of equations shown in Table 4-2 are broadly similar in terms of the level of significance and the disparity in the magnitude of the coefficients among the three FDI sources. Clearly, the influence of SEZ and OCC is the greatest on Japanese FDI in the provinces of China among the three sources.

The analysis with ETDZ generates the slightly different results. Although ETDZ appears to be one of the important factors for U.S. and the aggregated FDI to determine where to invest in China, the evidence of importance of ETDZ in determining Japanese FDI is weaker. In the first set of regressions, the dummy variable for ETDZ is found to be positively significant at 1% level in all of the equations for both U.S. and the aggregated FDI, supporting the hypothesis that the preferential policies employed in ETDZ are effective in attracting FDI. The same overall significance of the variable is not found in Japanese FDI. In particular, in equation (1) and (2) with current level of GDP, the variable is only found to be marginally significant at 10% level. Although the variable regains its significance at 5% in equations with the lagged GDP, the magnitudes of the impact of the variable compared with either U.S. or the aggregates is smaller. The results reported in Table 5-2 for the second set of equations are broadly similar. In comparison with the results for SEZ and OCC, the reduction in the magnitude of the estimated coefficients is observed for all FDI sources. This implies that the various preferential policies employed in SEZ and OCC are more effective in attracting FDI than ETDZ.

Next, a dummy variable is added to the above multiple regression analysis to capture the implication of the cultural proximity on Japanese FDI. The results of the analysis are reported in Table 4-3. In the first set of equations, the dummy variable is found to be positive and significant, although mostly marginally at the 10% level, in three equations and at the 5% level in one eqution. This implies that Japan chooses, to some extent, the regions that have been more familiar to them or that they have better understanding of, as a destination of their FDI within China. However, this evidence of the modest cultural proximity is lost when the analysis is repeated with ‘railway variable’.

The impact of the inclusion of the dummy variable on rest of the explanatory variables is generally negligible.

5.4 Sensitivity Analysis

In this section, two separate sensitivity analyses are performed. First, the basic models examined above are re-examined excluding the wage variables, since relatively higher correlation between the nominal GDP and the nominal wage is detected. Secondly, to examine the implication of the different level of labor quality, ‘higher education variable’ is replaced with ‘specialized secondary school variable’. The variable is defined as the proportion of the students enrolled in the specialized secondary school in each province relative to its population. The examination of ‘specialized secondary school variable’ revealed the relatively high correlation with the nominal wage variable at 0.59. This led to the decision to omit the wage variables from the analyses, thereby restricting the each model to five variables. The number of equations for both sensitivity analyses, therefore, is reduced to 2. As previous analyses, there are two sets of equations, one with ‘roadway variable’ and the other with ‘railway variable’.

Table 4-4 reports the results of the analysis for the model without the wage variables. The exclusion of the wage variables does not alter the results much. The sign and the significance of the GDP variables remain similar to those reported in Tables 4-1 and 4-2. It appears that the estimated coefficients are very close, in terms of both the level of significance and the size, to those in the equations that incorporate the relative wage variable in the previous analyses. Furthermore, among all determinants, the magnitude of the influence of SEZ and OCC still is the largest for all FDI sources examined. For ETDZ, similarity in the level of significance and the magnitude of the influence between U.S. and the aggregates remains intact. Again, the influence of the variable on Japanese FDI appears to be much weaker.

Next, the equations are re-estimated including ‘specialized secondary school variable’ as a proxy for labor quality. Table 4-5 presents the results. The interesting feature appears for ‘specialized secondary school variable’. The estimated coefficients for U.S. and Japan are found to be all positive and strongly significant at 1% level, suggesting that the higher quality of labor when measured by the student enrollment in specialized secondary schools attracts the inflow of FDI from both U.S. and Japan. The difference in the magnitude of the estimates between U.S. and Japan, however, is clearly attenuated. As can be seen in Table 4-4, the amount of influence of the higher education variable is much larger for Japan than for U.S. by 66% and 72% in the first set of the equations, and by 37% and 42% in the second set of the equations. The difference becomes much narrower when it is replaced with ‘specialized secondary school variable', ranging from 24% and 40% in the first set of the equations, and from 10% and 12% in the second set of the equations. On the contrary, in the case of the other nations' FDI, in both sets of equations, the estimated coefficients in those equations bear the negative sign, although insignificant. The effects of the inclusion of 'specialized secondary school variable' on other explanatory variables are as follows. The level of significance for Japan has increased from 5% level to 1% level. The table also reports the increase in the level of significance for 'railway variable' for U.S. in the first equation. The similar increase in the level of significance can be seen in the policy variable, ETDZ, for Japan. Furthermore, the difference in the magnitude of ETDZ among three FDI sources observed previously appears to be generally weaker in both sets of the equations.

7 Concluding Remarks

This paper examines the determinants of FDI from U.S. and Japan in China using the provincial data set from 1991 to 1997. The results of the regression analyses are further compared to those of the other nations' FDI as a benchmark case.

This study found various similarities and differences in the importance and the magnitudes of the determinants of FDI among three FDI sources. It is shown that the absolute level of GDP as well as the lagged GDP significantly affects inflow of FDI from all sources. Similarly, the hypothesis that the good quality of infrastructure is conductive to attract FDI is strongly supported for all FDI sources.

The evidence is found that the SEZs and OCCs still have a great advantage over other provinces in attracting FDI by implementing preferential treatments to foreign investors. This positive effect appears to exert larger influence on Japanese FDI relative to U.S. and the aggregated FDI. The effect of the ETDZ on Japanese FDI, however, appears to be weaker than on U.S. and the aggregates.

A major difference between the other nations and U.S./Japan appears in the significance of the average labor quality, measured by the proportion of the students enrolled in the higher education relative to population. The FDI from both U.S. and Japan are significantly influenced by the labor quality, whereas the strong influence is generally not found in the other nations' FDI. This may be because that the large part of the aggregated FDI is from Hong Kong and Taiwan, where FDI are more concentrated in labor-intensive industries that only require relatively low skill of labor. Another difference can be seen in the different magnitude of the estimated coefficients for labor quality between U.S. and Japan. The coefficients of the labor quality are found to be much larger for Japanese FDI. The Japanese investors may perceive the higher education as the indication of the workers' capability to acquire the integrative skills essential to the efficient operations of the firms. When the variable is replaced with the proportion of the students enrolled in the specialized secondary school relative to population, the strong positive influence remain unchanged for both U.S. and Japan, although the difference in the magnitude of the estimates is clearly attenuated.

The estimated coefficients for the wage variables are found to be insignificant determinants for all FDI sources in equations. This may be because the average wage variables do not carry sufficient information of the foreign investors' performance such as their productivity or profitability. The sensitivity analysis is conducted by excluding the wage variables from the regression analysis. The exclusion of the wage variables does not alter the previous results.

The analysis is extended to examine the possible positive effect of cultural proximity between Japan and the provinces of Manchuria that Japan has a long history with. The hypothesis that Japan prefers the regions that have been more familiar to them or that they have better understanding of, as a destination of their FDI is only marginally supported.

The current study demonstrated the interesting similarities and differences in determinants of U.S. and Japanese FDI in the provinces of China even at the most aggregated industry level. However, even within the same home country, the behavior of the foreign investors and factors that possibly influence their investment decision-makings obviously varies according to the type of the industry they operate in and/or their motivation for FDI, such as export-oriented, targeting local markets, or resource-seeking. The issues at more disaggreagted industry level should be the objects of future research on the inflow of FDI in China. At present time, these empirical estimations suffer from the lack of data.

Appendix A

Special Economic Zones:

Shenzhen, Zhuhai, and Shantou in Guangdong; Xizmen in Fujian; Hainan.

Open Coastal Cities:

Dalian in Liaoning; Qinhuangdao in Hebei; Tianjin; Yantai and Quingdao in Shandong; Lianyungang and Nantong in Jiangsu; Shanghai; Ningbo and Wenzhou in Zhejiang; Fuzhou in Fujian; Guangzhou and Zhanjiang in Guangdong; Beihai in Guangxi.

Economic and Technological Development Zones:

Dalian, Yingkou and Shenyang in Liaoning; Qinhuangdao in Hebei; Tianjin; Yantai, Quingdao and Weihai in Shandong; Lianyunggang, Kunshan and Nantong in Jiangsu; Guangzhou and Zhanjiang in Guangdong; Ningbo in Zhejiang; Fuzhou, Rongqiao and Dongshan in Fujian; Minhang, Hongqiao and Caohejin in Shanghai; Wenzhou in Zhejiang; Harbin in Heilongjizng; Changchun in Jilin; Wuhu in Anhui; Wuhan in Hubei; Chongqing in Sichuan; Dayawan and Pnyu's Nansha in Guangdong; Xiaoshan and Hangzhou in Zhejiang, Beijing; Urumqi in Xinjiang.

Appendix B: Data Sources

The following data taken from the Almanac of China Foreign Relations and Trade (various issues):

contracted Japanese FDI for 1993-1997

contracted U.S. FDI for 1993-1997

The following data are taken from the China Foreign Economic Statistical Yearbook 1994:

contracted Japanese FDI for 1991 and 1992

contracted U.S. FDI for 1991 and 1992

The following provincial data for 1996-1997 are taken from the Statistical Yearbook of China, 1997 and 1998, and for 1991-1995 are taken from China Regional Economy A Profile of 17 years of Reform and Opening-Up 1996:

the aggregated FDI

GDP

retail price index

population

number of students enrolled in the higher education

number of students enrolled in the specialized secondary schools

distance of roadway

distance of railway

average wage

REFERENCES

Aoki, M. (1988). Information, Incentives, and Bargaining in the Japanese Economy. Cambridge University Press.

Cheng, L.K. and H. Zhao (1995). "Geographical Pattern of Foreign Direct Investment in China: Location, Factor Endowments, and Policy Incentives," Department of Economics, Hong Kong University of Science and Technology, February 1995.

Cheng, L.K. and Y.K. Kwan (1999). "What Are the Determinants of the Location of Foreign Direct Investment? The Chinese Experience," Journal of International Economics, forthcoming.

Coughlin, C., J. V. Terza, and V. Arromdee (1991). "State Characteristics and the Location of Foreign Direct Investment Within the United States," Review of Economics and Statistics 73, 675-683.

Culem, C. G. (1988). "The Locational Determinants of Direct Investments among Industrialized Countries," European Economic Review 132, 885-904.

Friedman, J., H. Fung, D. Gerlowski and J. Silberman (1992). "What Attracts Foreign Multinational Corporations? Evidence from Branch Plant Location in the United States," Journal of Regional Science 32, 403-418.

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, 38-60.

Hines, J. (1996), "Altered States: Taxes and the Location of Foreign Direct Investment in America," American Economic Review 86, 1076-1094.

Kravis, I. B. and R. E. Lipsey. (1982). "The location of overseas production and production for export by US multinational firms." Journal of International Economics 12, 201-23.

Luger, M. I., and S. Shetty (1985). "Determinants of Foreign PlantStart-Ups in the United States: Lessons for Policymakers in the Southeast." Vanderbilt Journal of Transnational Law 18 (2), 223-45.

Lunn, J. L. (1980). "Determinants of US direct investment in the EEC." European Economic Review, 13, January, 93-101.

Luo, Y. (1998). International Investment Strategies in the People's Republic of China. Published by Ashgate.

Maki, D. R. and L. N. Meredith. "Production cost differentials and foreign direct investmet: a test of two models," Applied Economics, 18, 1127-1134..

Ministry of Foreign Economic Relations and Trade, Almanac of China's Foreign Economic Relations and Trade, various issues.

Owen, R. F. (1982). "Inter-industry determinants of foreign direct investment: a Canadian perspective," in A. M. Rugman, ed. New Theories of Multinational Enterprises, Croom Helm, London.

Scaperlanda, A. and R. Baslough (1983). "Determinants of US direct investment in the EEC revisited." European Economic Review, 21, 381-90.

Smith, D. andR. Florida (1994). "Agglomeration and Industrial Location: An Econometric Analysis of Japanese Affiliated Manufacturing Establishments in Automotive-Related Industries," Journal of Urban Economics 36, 23-41.

Wheeler, C. and A. Mody (1992), "International Investment Location Decisions: The Case of U.S. Firms," Journal of International Economics 33, 57-76.

Table 1

China's Inward Foreign Direct Investment
(in US$ millions)

Year	Contracted	Growth Rate	Realized	Growth Rate
1979-1982	6,010		1,166	
1983	1,732		430	
1984	2,651	53.06%	1,258	192.56%
1985	5,932	123.76%	1,661	32.03%
1986	2,834	-52.23%	1,874	12.82%
1987	3,709	30.88%	2,314	23.48%
1988	5,297	42.81%	3,194	38.03%
1989	5,600	5.72%	3,392	6.20%
1990	6,596	17.79%	3,487	2.80%
1991	11,977	81.58%	4,366	25.21%
1992	58,124	385.30%	11,007	152.11%
1993	111,436	91.72%	27,515	149.98%
1994	82,679	-25.81%	33,767	22.72%
1995	91,282	10.41%	37,521	11.12%
1996	73,276	-19.73%	41,726	11.21%
1997	51,004	-30.39%	45,257	8.46%
1979-1997	520,139		219,935	

Source: Ministry of Foreign Economic Relations and Trade, Almanac of China's foreign Economic Relations and Trade, various years.

Table 2
Regional Distribution of Contracted FDI in China (1985 - 1997)

Year	Southeast coast	Rest of East	Central	West
1985	73.6%	19.3%	4.5%	2.5%
1986	62.5%	29.9%	4.7%	2.9%
1987	60.8%	28.3%	9.9%	1.1%
1988	78.8%	13.7%	6.0%	1.5%
1989	84.4%	10.6%	3.5%	1.5%
1990	78.6%	15.0%	3.4%	3.0%
1991	80.5%	11.8%	5.3%	2.4%
1992	76.6%	12.5%	7.4%	3.5%
1993	69.7%	16.8%	8.2%	5.3%
1994	71.2%	18.9%	6.8%	3.1%
1995	73.5%	15.6%	8.3%	2.6%
1996	71.2%	17.6%	8.7%	2.5%
1997	62.8%	24.9%	9.3%	3.0%
1985-1990	72.7%	16.6%	8.7%	2.0%
1991-1997	71.3%	17.3%	8.0%	3.5%

Source: Author's calculations based on the following data:
SSB, China Regional Economy: A Profile of 17 years of Reform and Opening-Up; MOFTEC, Almanac of Foreign Economic Relations and Trade of China, 1998/1999; SSB, China Statistical Yearbook, 1990 - 1997.

Notes: Provinces included in each area is defined as follows:
Southeast Coast: Shandong, Jiangsu, Shanghai, Zhejiang, Fujian, Guangdong, Hainan.
Rest of the East: Liaoning, Beijing, Tianjin, Heibei, Guangxi.
Central: Heilongjiang, Jilin, Shanxi, Henan, Hubei, Hunan, Jiangxi, Anhui, Inner Mongolia.
West: Xinjiang, Tibet, Xinghai, Yunnan, Gansu, Sichuan, Ningxia, Shaanxi, Guizhou.

Table 3.a

Japanese Foreign direct Investment in China
(in US$ millions)

Year	Contracted	Growth Rate	Realized	Growth Rate	Number of contracted project	Average Size	Realized Ratio
1985	470.68		315.07		127	3.71	66.94%
1986	210.42	-55.29%	201.33	-36.10%	94	2.24	95.68%
1987	301.36	43.22%	219.70	9.12%	113	2.67	72.90%
1988	275.79	-8.48%	514.53	134.20%	237	1.16	186.57%
1989	438.61	59.04%	356.34	-30.74%	294	1.49	81.24%
1990	457.00	4.19%	503.38	41.26%	341	1.34	110.15%
1991	812.20	77.72%	532.50	5.78%	599	1.36	65.56%
1992	2,172.53	167.49%	709.83	33.30%	1,805	1.20	32.67%
1993	2,960.47	36.27%	1,324.10	86.54%	3,488	0.85	44.73%
1994	4,440.29	49.99%	2,075.29	56.73%	3,018	1.47	46.74%
1995	7,592.36	70.99%	3,108.46	49.78%	2,946	2.58	40.94%
1996	5,130.68	-32.42%	3,679.35	18.37%	1,742	2.95	71.71%
1997	3,401.24	-33.71%	4,326.47	17.59%	1,402	2.43	127.20%

Sources: Ministry of Foreign Economic Relations and Trade, Almanac of China's Foreign Economic Relations and Trade, various years.

Table 3.b

US Foreign direct Investment in China

(in US$ millions)

Year	Contracted	Growth Rate	Realized	Growth Rate	Number of contracted project	Average Size	Realized Ratio
1985	1,152.02		357.19		100	11.52	31.01%
1986	527.35	-54.22%	314.90	-11.84%	102	5.17	59.71%
1987	432.19	-18.04%	262.80	-16.54%	104	4.16	60.81%
1988	235.96	-45.40%	235.96	-10.21%	269	0.88	100.00%
1989	640.52	171.45%	284.27	20.47%	276	2.32	44.38%
1990	357.82	-44.14%	455.99	60.41%	357	1.00	127.44%
1991	548.08	53.17%	323.20	-29.12%	694	0.79	58.97%
1992	3,121.25	469.49%	511.05	58.12%	3,265	0.96	16.37%
1993	6,812.75	118.27%	2,063.12	303.70%	6,750	1.01	30.28%
1994	6,010.18	-11.78%	2,490.80	20.73%	4,223	1.42	41.44%
1995	7,471.13	24.31%	3,083.10	23.78%	3,474	2.15	41.27%
1996	6,915.76	-7.43%	3,443.33	11.68%	2,517	2.75	49.79%
1997	4,936.55	-28.62%	3,239.15	-5.93%	2,188	2.26	65.62%

Sources: Ministry of Foreign Economic Relations and Trade, Almanac of China's Foreign Economic Relations and Trade, various years.

Table 4-1
Determinants of U.S. FDI with the roadway variable

	Equation (1)			**Equation (2)**			**Equation (3)**			**Equation (4)**		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTANT	4.32	2.16	5%	3.66	2.79	1%	3.85	1.90	5%	4.29	3.34	1%
CGDP	0.75	6.38	1%	0.67	7.22	1%						
LCGDP							0.62	5.59	1%	0.59	6.50	1%
LRCGDP												
CWAGE	-0.12	-0.70					-0.01	-0.09				
RECWAGE				-0.42	-0.75					-0.50	-0.90	
HE	0.68	3.66	1%	0.69	3.66	1%	0.61	3.30	1%	0.68	3.62	1%
HIGHWAY	0.39	2.89	1%	0.43	3.39	1%	0.46	3.47	1%	0.47	3.73	1%
SEZD	0.84	3.92	1%	0.89	3.88	1%	0.84	3.95	1%	0.91	4.01	1%
ETDZD	0.62	2.63	1%	0.69	2.97	1%	0.76	3.26	1%	0.80	3.47	1%
d.f.	181			181			181			181		
ad. R^2	0.74			0.74			0.73			0.73		

Table 4-1
Determination of Japanese FDI with the roadway variable

	Equation (1)			**Equation (2)**			**Equation (3)**			**Equation (4)**		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTANT	3.02	1.18		3.83	2.05	5%	2.17	0.83		5.01	2.71	1%
CGDP	0.67	4.04	1%	0.76	6.68	1%						
LCGDP							0.46	3.00	1%	0.64	5.82	1%
LRCGDP												
CWAGE	0.13	0.63					0.32	1.53	10%			
RECWAGE				0.35	0.50					0.19	0.26	
HE	0.96	3.62	1%	0.98	3.72	1%	0.87	3.26	1%	1.01	3.82	1%
HIGHWAY	0.44	2.17	5%	0.39	2.15	5%	0.56	2.78	1%	0.43	2.38	1%
SEZD	1.66	5.21	1%	1.61	4.75	1%	1.66	5.17	1%	1.66	4.86	1%
ETDZD	0.45	1.52	10%	0.39	1.36	10%	0.62	2.09	5%	0.53	1.80	5%
d.f.	168			168			168			168		
ad. R^2	0.76			0.76			0.75			0.75		

Table 4-1
Determination of the aggregated FDI with the roadway variable

	Equation (1)			**Equation (2)**			**Equation (3)**			**Equation (4)**		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTANT	5.01	2.30	5%	2.44	1.76	5%	4.34	1.94	5%	3.17	2.28	5%
CGDP	0.69	5.28	1%	0.63	6.20	1%	.					
LCGDP							0.54	4.25	1%	0.54	5.34	1%
LRCGDP												
CWAGE	-0.19	-1.02					-0.06	-0.30				
RECWAGE				0.64	1.09					0.56	0.92	
HE	0.15	0.76		-0.04	-0.19		0.07	0.35		-0.04	-0.20	
HIGHWAY	0.70	4.99	1%	0.74	5.54	1%	0.77	5.38	1%	0.77	5.68	1%
SEZD	0.94	4.08	1%	0.82	3.35	1%	0.95	4.04	1%	0.86	3.44	1%
ETDZD	0.70	2.76	1%	0.72	2.86	1%	0.86	3.36	1%	0.84	3.30	1%
d.f.	166			166			166			166		
ad. R^2	0.72			0.72			0.70			0.71		

Table 4-2
Determination of U.S. FDI with the railway variable

	Equation (1)			**Equation (2)**			**Equation (3)**			**Equation (4)**		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTAN	3.58	1.63	10%	2.98	2.16	5%	2.80	1.25		3.61	2.66	1%
CGDP	0.77	5.96	1%	0.74	8.03	1%						
LCGDP							0.62	5.09	1%	0.66	7.31	1%
CWAGE	-0.06	-0.29					0.08	0.44				
RECWAGE				0.05	0.09					0.00	0.01	
HE	0.61	2.76	1%	0.56	2.56	1%	0.51	2.33	1%	0.55	2.50	1%
RAIL	0.26	2.15	5%	0.27	2.42	1%	0.30	2.53	1%	0.29	2.52	1%
SEZD	1.05	4.97	1%	1.04	4.53	1%	1.08	5.16	1%	1.08	4.72	1%
ETDZD	0.60	2.44	1%	0.61	2.56	1%	0.75	3.08	1%	0.72	3.03	1%
d.f.	178			178			178			178		
ad. R^2	0.71			0.71			0.70			0.70		

Table 4-2
Determination of Japanese FDI with the railway variable

	Equation (1)			Equation (2)			Equation (3)			Equation (4)		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTAN	3.17	1.19		3.13	1.78	5%	2.11	0.78		4.08	2.34	1%
CGDP	0.87	5.14	1%	0.88	7.92	1%						
LCGDP							0.67	4.22	1%	0.78	7.17	1%
CWAGE	0.01	0.05					0.21	0.91				
RECWAGE				0.14	0.18					0.04	0.05	
HE	0.78	2.84	1%	0.77	2.84	1%	0.67	2.43	1%	0.78	2.86	1%
RAIL	0.46	3.05	1%	0.45	3.27	1%	0.51	3.42	1%	0.47	3.31	1%
SEZD	1.85	6.85	1%	1.83	6.17	1%	1.91	7.02	1%	1.89	6.34	1%
ETDZD	0.35	1.22		0.34	1.22		0.53	1.84	5%	0.47	1.66	5%
d.f.	165			165			165			165		
ad. R^2	0.77			0.77			0.76			0.76		

Table 4-2
Determination of the aggregated FDI with the railway variable

	Equation (1)			**Equation (2)**			**Equation (3)**			**Equation (4)**		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTAN	5.85	2.76	5%	1.70	1.00		4.64	1.73	5%	2.63	1.56	10%
CGDP	0.84	6.11	1%	0.72	6.59	1%						
LCGDP							0.62	3.99	1%	0.62	5.70	1%
CWAGE	-0.31	-1.70	10%				-0.09	-0.38				
RECWAGE				1.17	1.61	10%				1.06	1.43	10%
HE	0.22	1.33		-0.16	-0.61		0.10	0.36		-0.14	-0.52	
RAIL	0.33	2.48	5%	0.42	3.13	1%	0.39	2.66	1%	0.43	3.13	1%
SEZD	1.32	5.17	1%	1.15	4.03	1%	1.38	5.17	1%	1.22	4.22	1%
ETDZD	0.65	2.10	5%	0.68	2.47	1%	0.83	2.88	1%	0.80	2.86	1%
d.f.	165			165			165			165.00		
ad. R^2	0.67			0.68			0.65			0.66		

Table 4-3
Regression results for the cultural proximity for Japanese FDI with the roadway variable

variable names	Equation (1) coefficient	t-stat	level of significance	Equation (2) coefficient	t-stat	level of significance	Equation (3) coefficient	t-stat	level of significance	Equation (4) coefficient	t-stat	level of significance
CONSTAN	1.44	0.55		2.98	1.59	10%	0.52	0.19		4.18	2.24	5%
CGDP	0.60	3.74	1%	0.78	6.85	1%						
LCGDP							0.42	2.74	1%	0.66	5.99	1%
LRCGDP								.				
CWAGE	0.25	1.16					0.42	1.98	5%			
RECWAGE				0.70	0.97					0.51	0.70	
HE	0.81	3.08	1%	0.85	3.20	1%	0.71	2.69	1%	0.88	3.30	1%
HIGHWAY	0.53	2.70	1%	0.43	2.48	1%	0.64	3.29	1%	0.47	2.68	1%
SEZD	1.63	5.44	1%	1.54	4.71	1%	1.63	5.36	1%	1.60	4.82	1%
ETDZD	0.47	1.62	10%	0.35	1.24		0.63	2.16	5%	0.49	1.70	5%
DUMMY	0.72	1.61	10%	0.70	1.53	10%	0.82	1.81	5%	0.65	1.40	10%
d.f.	167			167			167			167		
ad. R^2	0.77			0.76			0.76			0.75		

Table 4-3
Regression results for the cultural proximity for Japanese FDI with the railway variable

	Equation (1)			Equation (2)			Equation (3)			Equation (4)		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTAN	2.44	0.89		2.58	1.42	10%	1.29	0.46		3.60	1.99	5%
CGDP	0.85	4.98	1%	0.90	8.02	1%						
LCGDP							0.65	4.04	1%	0.79	7.26	1%
LRCGDP												
CWAGE	0.07	0.27					0.27	1.13				
RECWAGE				0.40	0.51					0.28	0.35	
HE	0.73	2.61	1%	0.70	2.53	1%	0.61	2.19	5%	0.72	2.57	1%
RAIL	0.46	3.11	1%	0.45	3.26	1%	0.52	3.47	1%	0.46	3.30	1%
SEZD	1.87	6.95	1%	1.80	6.08	1%	1.92	7.11	1%	1.86	6.25	1%
ETDZD	0.35	1.21		0.31	1.09		0.52	1.82	5%	0.44	1.55	10%
DUMMY	0.41	0.96		0.45	1.04		0.46	1.07		0.40	0.90	
d.f.	164			164			164			164		
ad. R^2	0.77			0.77			0.76			0.76		

Table 4-4
Determinants of U.S. FDI without the wage variables

	Equation (1)			Equation (2)		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTANT	3.16	2.82	1%	3.68	3.38	1%
CGDP	0.69	7.93	1%			
LCGDP				0.61	7.24	1%
HE	0.62	3.76	1%	0.60	3.64	1%
HIGHWAY	0.43	3.44	1%	0.47	3.79	1%
SEZD	0.83	3.92	1%	0.84	4.02	1%
ETDZD	0.66	2.91	1%	0.76	3.39	1%
d.f.	182			182		
ad. R^2	0.74			0.73		

Table 4-4
Determinants of U.S. FDI without the wage variables

	Equation (1)			Equation (2)		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTANT	3.03	2.55	1%	3.61	3.09	1%
CGDP	0.74	8.33	1%			
LCGDP				0.66	7.60	1%
HE	0.57	3.01	1%	0.55	2.90	1%
RAIL	0.27	2.45	1%	0.29	2.56	1%
SEZD	1.05	5.05	1%	1.08	5.21	1%
ETDZD	0.61	2.63	1%	0.72	3.09	1%
d.f.	179			179		
ad. R^2	0.71			0.70		

Table 4-4
Determinants of Japanese FDI without the wage variables

	Equation (1)			Equation (2)		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTANT	4.23	2.57	1%	5.17	3.18	1%
CGDP	0.74	6.85	1%			
LCGDP				0.63	6.03	1%
HE	1.03	4.39	1%	1.03	4.37	1%
HIGHWAY	0.39	2.18	5%	0.43	2.42	1%
SEZD	1.67	5.35	1%	1.69	5.37	1%
ETDZD	0.41	1.43	10%	0.54	1.86	5%
d.f.	169			169		
ad. R^2	0.76			0.75		

Table 4-4
Determinants of Japanese FDI without the wage variables

	Equation (1)			Equation (2)		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTANT	3.25	2.13	5%	4.06	2.68	1%
CGDP	0.88	8.15	1%			
LCGDP				0.78	7.43	1%
HE	0.78	3.31	1%	0.78	3.26	1%
RAIL	0.46	3.35	1%	0.47	3.41	1%
SEZD	1.85	7.01	1%	1.89	7.13	1%
ETDZD	0.35	1.27		0.47	1.71	5%
d.f.	166			166		
ad. R^2	0.77			0.76		

Table4-4

Determinants of the aggregated FDI without the wage variables

	Equation (1)			Equation (2)		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTANT	3.20	2.58	1%	3.88	3.09	1%
CGDP	0.60	6.04	1%			
LCGDP				0.50	5.12	1%
HE	0.06	0.34		0.05	0.26	
HIGHWAY	0.75	5.45	1%	0.78	5.49	1%
SEZD	0.92	3.93	1%	0.95	3.90	1%
ETDZD	0.77	3.09	1%	0.89	3.50	1%
d.f.	167			167		
ad. R^2	0.72			0.70		

Table 4-4

Determinants of the aggregated FDI without the wage variables

	Equation (1)			Equation (2)		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTANT	3.07	1.98	5%	3.92	2.54	1%
CGDP	0.67	6.17	1%			
LCGDP				0.57	5.31	1%
HE	0.05	0.21		0.06	0.25	
RAIL	0.39	2.82	1%	0.40	2.82	1%
SEZD	1.34	4.94	1%	1.39	5.07	1%
ETDZD	0.75	2.69	1%	0.87	3.06	1%
d.f.	166			166		
ad. R^2	0.67			0.65		

Table4-5
Determinants of U.S. FDI with Specialized Secondary School Variable

	Equation (1)			Equation (2)		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTANT	4.08	2.40	1%	4.74	2.83	1%
CGDP	0.60	6.60	1%			
LCGDP				0.52	5.98	1%
SE	0.67	2.76	1%	0.67	2.78	1%
HIGHWAY	0.57	4.85	1%	0.60	5.20	1%
SEZD	0.73	3.51	1%	0.75	3.67	1%
ETDZD	0.86	4.01	1%	0.95	4.46	1%
d.f.	182			182		
ad. R^2	0.73			0.72		

Table4-5
Determinants of U.S.FDI with Specialized Secondary School Variable

	Equation (1)			Equation (2)		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTANT	3.26	1.81	5%	3.91	2.18	5%
CGDP	0.69	7.22	1%			
LCGDP				0.61	6.52	1%
SE	0.49	1.87	5%	0.49	1.83	5%
RAIL	0.40	4.03	1%	0.41	4.11	1%
SEZD	1.01	4.80	1%	1.04	4.99	1%
ETDZD	0.77	3.43	1%	0.87	3.88	1%
d.f.	179			179		
ad. R^2	0.70			0.69		

Table4-5
Determinants of Japanese FDI with Specialized Secondary School Variable

	Equation (1)			Equation (2)		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTANT	3.84	1.47	10%	5.53	2.08	5%
CGDP	0.65	4.94	1%			
LCGDP				0.51	3.97	1%
SE	0.83	2.43	1%	0.94	2.65	1%
HIWAY	0.62	3.42	1%	0.67	3.71	1%
SEZD	1.47	4.41	1%	1.51	4.50	1%
ETDZD	0.69	2.40	1%	0.80	2.78	1%
d.f.	169			169		
ad. R^2	0.73			0.73		

Table4-5
Determinants of Japanese FDI with Specialized Secondary School Variable

	Equation (1)			Equation (2)		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTANT	2.60	1.11		3.54	1.49	10%
CGDP	0.84	6.81	1%			
LCGDP				0.74	6.05	1%
SE	0.54	1.66	5%	0.55	1.65	5%
RAIL	0.64	5.07	1%	0.65	5.11	1%
SEZD	1.77	6.38	1%	1.82	6.53	1%
ETDZD	0.56	2.01	5%	0.68	2.46	1%
d.f.	166			166		
ad. R^2	0.75			0.74		

Table4-5

Determinants of the aggregated FDI with Specialized Secondary School Variable

	Equation (1)			Equation (2)		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTANT	2.16	1.18		2.94	1.54	10%
CGDP	0.61	5.99	1%			
LCGDP				0.51	5.03	1%
SE	-0.10	-0.40		-0.10	-0.37	
HIGHWAY	0.77	6.08	1%	0.79	6.05	1%
SEZD	0.87	3.84	1%	0.90	3.82	1%
ETDZD	0.84	3.56	1%	0.95	3.95	1%
d.f.	167			167		
ad. R^2	0.72			0.70		

Table4-5

Determinants of the aggregated FDI with Specialized Secondary School Variable

	Equation (1)			Equation (2)		
variable names	coefficient	t-stat	level of significance	coefficient	t-stat	level of significance
CONSTANT	0.52	0.23		1.64	0.71	
CGDP	0.73	6.14	1%			
LCGDP				0.62	5.24	1%
SE	-0.34	-1.08		-0.30	-0.91	
RAIL	0.43	3.57	1%	0.44	3.58	1%
SEZD	1.26	4.63	1%	1.32	4.80	1%
ETDZD	0.84	3.12	1%	0.95	3.49	1%
d.f.	166			166		
ad. R^2	0.67			0.65		