The determinants of U.S. firms to make Foreign Direct Investment decisions in China at the Province-level.

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Advisor: Dr. David Guilkey

Student: Jiarui Liu

Department of Economics, University of North Carolina at Chapel Hill

It is my honor and pleasure to invite Professor David Guilkey from the ECON Department to be my instructor for this Summer Research. I will accumulate the necessary tools and gain new insights into econometrics by doing this summer research.

Abstract

There has been considerable research on the determinants of foreign direct investment in China. However, there are few studies on investment preferences and choices of firms in a single country. And few studies have looked at province-level data. China's provinces vary in population size, educational level, wages, openness, government policies, etc. This study will cover 12 provinces in China for about 11 years and use regression models to investigate the determinants of the location of American FDI in China's provinces. Our findings suggest that market size, infrastructure, market openness, and labor wage level are important variables influencing the location choice of FDI in the United States and have a significant positive relationship with attracting FDI to the United States. In addition, the level of

taxation of provinces and the level of education of the labor force show a significant negative trend on the effect of FDI. Therefore, the higher the average wages in Chinese provinces and cities, the more attractive they are to U.S. investors. In contrast, Chinese provinces with lower-quality labor are more capable of attracting FDI from the U.S. These two points suggest that most of the U.S. FDI to China is due to its large market and large consumer base rather than based on its cheap labor.

Introduction

China's decades of economic growth since the opening-up policy was introduced in 1979 are unprecedented in human history. This growth has been triggered and driven by several factors, one of which is the huge increase in FDI. But why would a company want to manufacture in another country? Why not invest in your own country? The most important reason is location advantage. Take market access as an example; if foreign companies manufacture in China and sell to the Chinese, they can gain a consumer base. In addition, low corporate taxes and a relaxed market regulatory environment allow foreign companies to increase profits by adopting a lower minimum wage than their home country or by emitting limited pollutants in their home country. So, what specific factors influence foreign enterprises' choice of direct investment in China? Previous studies mainly analyzed the determinants of FDI at the national level and less analyzed the sub-national level. However, the distribution of FDI absorption among provinces in China is extremely uneven. FDI is concentrated in China's eastern coastal cities. One possible explanation is that China is so big that its investment climate, the quality of local government, and local corporate income tax rates vary widely from city to city. But what specific determinants can be used to explain why

foreign investors choose particular locations in China? Cities and provinces are the final locations of enterprises. The different characteristics of provinces will inevitably affect the investment decisions of foreign-funded enterprises. In addition, companies in different countries have different considerations when considering FDI. Therefore, if we analyze all the determinants of FDI, it is difficult to control the influence of different countries' political systems, culture, language, and corporate tax policies on investment decisions. Therefore, I will narrow the topic to the incentives for American companies to invest in China. Specifically, I will examine the determinants of U.S. direct investment in China at the provincial level. The results can help U.S. investors more accurately understand investment opportunities and risks in specific Chinese cities, thus enabling U.S. companies to make better investment decisions. And provide insights to Chinese provincial governments on developing policies to attract more FDI.

Firstly, this study is divided into several modules. I started with a literature review and explained the idea of locational advantage in the theory of FDI. Through learning factors determining FDI in previous empirical research, I would then characterize four main factors: cost factor, market conditions, institutional policy, and infrastructure. According to the inspiration given by the literature review, I would choose independent variables and dependent variables next. On the part of the data description, I chose FDI as the dependent variable, which refers to the FDI from the U.S. utilized by the provinces that year. The independent variables were the average wage level of the labor force in each province, the average education level of the labor force in each province, the size of the market in each province, the openness of the market in each province, the average tax level in each province and the degree of infrastructure improvement in each province. I then elaborated on my

empirical strategy. In this study, I used four models: the fixed effect model, the random effect model, the maximum likelihood estimation model, and the fit panel-data models by using GLS. Because of the heteroscedastic and contemporaneously cross-sectionally correlated problems, fit panel-data models using GLS had the best fitting effect for data. It's followed by my analysis and discussion of the results. I explained in detail the meaning of each variable symbol in the model results. Among them, the size of the market, the degree of infrastructure improvement, the degree of provincial opening to the outside world, and the level of labor wages had a significant positive correlation with the FDI attracted by the United States. The education level of the labor force and the tax level of each province and city showed an negative correlation trend on FDI. Finally, in the conclusion section, I gave the policy recommendations to the government inspired by the results of my empirical research model, as well as the advantages and disadvantages of my model and prospects for future research.

Literature Review

The literature review in this chapter is divided into two parts: the first part is a literature review on FDI location choice theory. This part summarizes the previous research and provides theoretical support for the later variable selection and empirical analysis. Based on FDI theory, scholars have chosen many approaches to analyze the factors influencing the location choice of FDI empirically. And the second part is a literature review on the factors influencing the location choice of FDI.

1. The idea of location advantage in the theory of FDI

There are many branches of FDI theories up to now. In 1977, Dunning, a professor at the University of Reading in England, proposed the Eclectic Theory of International Production. The Eclectic Theory of International Production analyzes the sufficient and necessary conditions for a company to make an FDI. Based on the Monopolistic Advantage Theory and Internalization Advantage Theory, The Eclectic Theory of International Production further explains the questions of "why" and "when" a firm invests across borders. In the Eclectic Theory of International Production, Dunning believes that the purpose of multinational corporations in making FDI is to obtain higher corporate profits. So when choosing the location of investment, they must consider their ownership advantages (possessing assets that foreign enterprises do not have, including tangible and intangible assets such as technology), internalization advantages (internalizing ownership advantages and transferring assets through the form of internalization), and location advantages. This is why it is also known as the OLI model. In the OLI model, Dunning views location advantage as a key factor in international investment (Dunning, 1977). Dunning categorized location factors into four categories: (1) market factors: including market size, market growth, etc.; (2) trade barriers: tariff levels (3) cost factors: labor costs, raw material costs, and transportation costs; and (4) investment environment: including policies and regulations on investment and political stability. Dunning's research answers a series of questions from various perspectives on the drivers, location choices, realization methods, and timing of outward FDI by multinational corporations. It opens up a new perspective of FDI research and makes FDI location research develop in a more comprehensive and integrated direction.

However, these theories focus on the comparative advantage of the host country and how the market environment affects firms' choice of FDI location. Still, they do not provide an industry-level explanation of why firms choose a region for FDI. Krugman and Fujita pioneered the new economic geography based on the Dixit-Stiglitz monopolistic competition model, with imperfect competition and increasing returns to scale as basic assumptions. The study focuses on the spatial distribution of economic activities and the mechanisms underlying locational choice. The new economic geography shows that economic activities have a spatial agglomeration effect, and manufacturers prefer to choose locations close to the market when choosing production locations, because they take into account trade costs, market externalities, and increasing returns to scale. The size of the market depends on the population and enterprises, and the number of enterprises is also affected by the size of the market. Therefore, the concentration of population and enterprises makes the market demand in the central area gradually larger than in the peripheral region and attracts more people and enterprises to flow in. At the same time, the lower trade cost due to agglomeration makes the production cost in the central area lower, and the raw materials and consumer goods for production are more easily available. However, on the other hand, the location close to the market is also where manufacturers are more concentrated, and manufacturers will face greater competition in this area. In addition, the immovable factors of land production, the increase in fixed costs due to agglomeration, and negative externalities such as noise, pollution, and congestion may lead enterprises to move to the surrounding areas. The new economic geography is based on changing traditional economic theory assumptions and examining spatial factors and geographical distance, which makes up for the defect of "neglecting space" in mainstream economics. Therefore, it provides a new analytical tool and economic explanation for studying FDI location choice.

2. Factors Determining FDI in Empirical Research

In terms of the empirical evidence of FDI location theory, although many scholars have done a lot of empirical analysis, academics have likewise failed to construct a complete theoretical system from the empirical analysis process. Due to the different methods and data, various empirical analyses have not formed a consistent conclusion. Based on Dunning's Eclectic Theory of International Production and the New Economic Geography Theory, scholars have chosen different approaches to analyze the factors influencing the location choice of FDI empirically, and in general, these empirical studies include the following aspects: cost factors, market conditions, institutional policies, and infrastructure.

2.1 Cost factor

Cost is one of the elements that companies will prioritize when conducting production, which directly affects the size of their profits. Therefore, manufacturers usually choose regions with lower costs to invest in (Wang, 2017). One of the production costs to focus on is labor cost, so firms usually choose regions with lower labor costs, i.e., lower wages, to invest in to save costs. Therefore, it is unsurprising if the empirical results show that regions with lower labor prices attract more FDI inflows. Leornard K. Cheng (2000) found a negative effect of labor cost on FDI using Chinese provincial data as a sample. The study by Dees Stephane (1998) also confirmed this statement. However, Chen (1996) applied a conditional logistic model to analyze data from 30 provinces and autonomous regions for the period 1987-1991 and showed that labor cost differences do not affect the location choice of FDI. Broadman and Sun (1997) applied information on the effect of labor costs on the distribution of foreign investment in various Chinese provinces and autonomous regions at the end of 1992 and found its statistically insignificant effect. In addition, some other empirical analyses have

reached the opposite conclusion. The results of Lu (2000) showed that labor wages are positively related to foreign direct investment. Therefore, the previous studies are not perfect because there are no consistent findings from empirical studies regarding the impact of labor costs on FDI positioning.

In addition, the quality of the labor force is one of the measures of FDI location choice. A high level of labor force implies high productivity and learning ability, which helps reduce firms' costs. Deng (2010) used a panel data model to empirically analyze the factors influencing FDI in 30 Chinese provinces and finally concluded that labor quality is a key factor in attracting FDI inflows. He & Liang (1999), Feng & Zhang (1999) et al. conducted an in-depth study on the determination of inter-provincial differences in FDI in China using a multiple regression model. The results showed that labor productivity positively affects the location choice of foreign investment. Therefore, the reason for the lack of a significant relationship between FDI inflows and wage levels or the positive variation may be that, in most cases, the level of wages reflects the quality of labor, which affects the production efficiency and, thus, the output and profit of the firm. Therefore, firms may consider not only the level of wages but also the quality of labor when making foreign investments. For example, market-oriented FDI focuses on the market size of the host country, while FDI in high-tech industries focuses on the labor quality of the host country. Therefore, a more in-depth study is needed based on specific countries or specific types of FDI. However, there is little research on the location selection factors of FDI in specific countries, such as the United States's FDI in Chinese provinces.

2.2 Market conditions

Generally speaking, a larger market size means a more extensive potential consumer base, a greater potential demand for the product, and at the same time, a greater possibility of achieving economies of scale and higher profits for the firm (Wang, 2017). Therefore, most of the empirical research literature on FDI takes into account the market conditions of the region under study, including the size of the market and the degree of market openness. The relevant studies and findings are as follows: Leung (1990) used data from 1979-1985 to empirically analyze the new increment of FDI in more than three hundred cities in China and concluded that there is a preference to enter regions with the larger market size. Coughlin (1991) used FDI absorbed by the United States as a researcher and proved that market size is positively related to FDI. However, studies by other scholars have come to conclusions that contradict the above. Goldberg (1972) studied U.S. investment in the European Union and found that market size was not a determinant of FDI. Stevens (1969) used data from Mexico and concluded that market size was irrelevant. Therefore, whether market size is one of the determinants of U.S. FDI in Chinese provinces needs to be explored.

Another market-related indicator is the level of market openness, which reflects a region's attitude toward foreign investment. An area with a high level of market openness can reduce a series of barriers to foreign investment and lower the cost of investment. The more open a region's market is, the better the region's ability to accommodate foreign investment, the better the ability to quickly and efficiently introduce advanced foreign design and technology, and the better the ability to quickly find sales channels for products produced by foreign investment in the area, etc. Wang, Peng & Ren (2006) demonstrated the positive relationship

between market openness and FDI inflows through a spatial econometric model, and Xiao & Zhou (2008) also confirmed this view.

2.3 Institutional Policy

Institutional policy differs from the three main factors described above in that it is not so much related to the economy's operation itself but is determined by the local government and the external environment. Institutional policies include government policies, the most widely studied of which is the government's incentive policy for FDI (Wang, 2017). Incentive policies mainly refer to some preferential policies implemented by the government for foreign enterprises, among which the most frequently used measure is the tax relief policy, i.e., to cut the cost of foreign enterprises by reducing certain taxes for foreign enterprises, thus stimulating the investment enthusiasm of foreign enterprises. The results of Lu (2000) showed that preferential government policies significantly positively impact foreign direct investment. Sun (2002) assigned different policy levels to different types of open regions, and the cumulative calculation can get the policy preference index of different areas over the years. At the same time, the panel data of 28 provinces and cities in China were used for research. The results proved that policy preference and other factors strongly correlated with the regional tendency toward foreign investment. That is to say, preferential policies can promote the region's development to attract foreign investment. Li & Lu (2004) divided the tax incentives into six categories, then further studied the data of 68 cities in China between 1989 and 1993, and concluded that all six tax incentives could significantly affect the FDI inflow. Tian & Yang (2012) studied the panel data of 30 provinces in China from 1980-2008 and concluded that tax incentives could significantly promote FDI inflows in the eastern region. However, some empirical studies have also come to a different conclusion that the

implementation of government incentives does not significantly increase FDI inflows. Zhang & Liu (2006) used foreign firms' income tax divided by foreign firms' profits to measure the level of foreign firms' taxation. Using cross-sectional data for major provinces and cities in China in 2003, the study found that tax factors do not significantly impede FDI. Huang & Chai (2006) used data from 29 provinces and cities in China from 1993-2004, and their findings showed that tax incentives could play a facilitating role for FDI inflows, but not significantly.

2.4 Infrastructure

Infrastructure plays an important role in the choice of location for FDI because perfect infrastructure conditions can provide convenient external conditions for business operations, reduce business costs and enhance the region's ability to attract investment. Take transportation infrastructure as an example. Transportation costs can have an important impact on investment decisions. Some products in production must be transferred from one city or region to another to complete the entire production process. The finished products must also rely on a sound transportation network to sell to the various areas. A good transportation infrastructure network can reduce the cost of inter-city and inter-regional commodity flows and improve the efficiency of the production process. Therefore, the more complete the transportation infrastructure is, the lower the overall cost of the product (Zhang, 2008). Lu (2000) showed that infrastructure significantly positively impacts FDI, and foreign investors prefer areas with good infrastructure and a high level of development. Deng (2010) applied a panel data model to empirically analyze the influencing factors of FDI in 30 provinces of China, and finally concluded that infrastructure is the key factor in attracting FDI inflow. Chen (1995) conducted a comparative study on the distribution of FDI in three

regions in China: East, Central, and West, and finally concluded that transportation infrastructure has a significant impact on the distribution of foreign investment. Wei (2000) conducted a comprehensive analysis of FDI location distribution and changes in various Chinese provinces and cities and found that proximity to target markets and convenient transportation were important factors for foreign firms to consider when making location choices.

Not surprisingly, most previous studies have focused on traditional (i.e., economic) factors. However, different provinces in China have adopted different policy regimes at different times. Therefore, other potential determinants specific to these provinces must be identified and incorporated when studying FDI inflows. For China, previous studies have faced some important shortcomings. First, most empirical studies have only investigated a limited range of economic factors and have not compared the explanatory power of economic and non-economic factors (Ngo & Nguyen, 2018). Second, their data often have a short time horizon or are outdated. Third, their findings are sometimes different or contradictory. For example, some find that labor costs are not important for FDI, while others find evidence to the contrary. In addition, some conclude that government policies (measured by using the Provincial Competition Index- PCI) have no effect on FDI, yet Nguyen (2016) uses the results of the PCI and finds the opposite to be true.

Overall, the existing knowledge on the potential determinants of FDI inflows remains far from complete due to different theoretical approaches and data availability. The factors affecting the location choice of FDI are multifaceted, and the heterogeneity of MNCs over time and the heterogeneity of host countries both influence the role of various factors.

Nevertheless, some traditional location factors are generally recognized: cost factors, market conditions, and infrastructure (Liang, 2019). With the deepening of economic globalization, economic phenomena and policies are in a state of flux, both globally and in a particular country. New perspectives for studying FDI location choice have also emerged. New research directions, such as institutional factors have been introduced to continuously enrich the study of the factors influencing FDI location choice based on controlling traditional location variables. For the empirical analysis of FDI, it is because there is not yet a theory that can completely explain the motivation of FDI investment, so the existing empirical studies lack a unified theoretical basis and research methods, which makes different empirical analyses have great subjectivity in terms of analysis angle and variable selection. Most empirical studies follow the path of statistical panel data first and then select some specific variables to carry out the empirical evidence. Hence, the results obtained from different studies are not very comparable. At the same time, different types of FDI have different priorities in choosing investment regions, and the resource endowments of developing and developed countries are also different(Wang, 2017). And few existing literatures have conducted analyses of specific country's FDI decisions. My study aims to partially bridge these gaps by adopting a more comprehensive approach and using a unique dataset of U.S. FDI conducted in 12 Chinese provinces from 2010 to 2020. Our model and methodology are described in detail in the next section.

Data Description

Variables

1.1 Dependent variable:

1. Foreign direct investments (FDI): Dependent variable FDI is measured by the amount of actually utilized Foreign Direct Investment from the U.S. by each Province in that year, calculated in 10 thousand dollars.

2.1 Independent variables:

1. Wages /Labor Cost(WA): Labor cost may be one of the determinants of FDI. Cost minimization has always been one of the goals pursued by various enterprises, and is also an important standard for the location selection of investment enterprises. One of the main purposes of overseas investment by many multinational companies is to take advantage of cheap labor abroad. For developing countries, due to their lack of advantages such as technology and market scale compared with developed countries, low labor cost is a major reason for attracting foreign investment and an important factor for the competitiveness of products of developing countries. The location choice of multinational companies in different regions within the same country is also affected by production costs. In theory, low wage costs are undoubtedly an important advantage of FDI inflows. However, wage level is often associated with labor production efficiency and consumption level. A higher wage level usually means higher production efficiency and consumption ability, which is an important factor for FDI inflow that cannot be ignored. Therefore, the actual impact of wage level on the economy remains to be empirically tested. Swain and Wang(1995) found a positive correlation between China's relatively cheap labor force and FDI. Since an increase in labor costs will reduce investors' profits, an increase in the average real wage in a region will also negatively impact FDI flows (Cheng and Kwan, 2000). This study selects the average wage of employees in each province of China (USD).

2. Education(EDU): Lucas(1990) believes that the stock of human capital impacts location choice. Labor supply affects location choice not only through labor input cost but also through labor quality. Other things being equal, regions with higher human capital are more competitive than other regions in attracting FDI. For US companies, the average education level of the workforce can determine the choice of location for FDI, as these companies tend to be in skill-intensive industries. However, the increase in human capital level often leads to a rise in labor cost. Therefore, the overall impact of an increase in the level of human capital on FDI inflows is uncertain. Currently, there is no unified index to measure human capital, because the accumulation of human capital in a region is closely related to the development level of local higher education. Therefore, we use the number of higher education students per 100,000 population in each province of China as the education variable. This should be a good indicator of the education level and quality of the workforce in different provinces.

3. Market size(MKS): The market is the primary consideration of multinational corporations when they invest overseas, and it is the key factor that affects the location choice of foreign direct investment. Market factors include market potential and scale. Among them, market size is the most important factor affecting the location layout of enterprises. Larger market size can form economies of scale and scope, thereby reducing the cost of enterprises and improving the marginal benefit of capital of enterprises. Therefore, foreign direct investment prefers regions with a certain market size and good market development prospects. This variable is measured as the total value of total retail sales of Consumer Goods (100 million dollars) in each province in China. A similar measurement was used in the work of Record (2008).

4. The openness of the province(OPE): The openness of a province can be measured by the proportion of its exports and imports (100 million dollars) to regional GDP (100 million dollars). The degree of market openness determines the trade costs of foreign investment in the region. Therefore, the higher the degree of market opening in a region, the smaller the trade barriers and the more attractive it is for foreign investors to enter. In addition, the higher the degree of market opening in a region, the closer the relationship between the region and the international market, the more advanced technology and knowledge from abroad can be attracted, and the more foreign investment can be attracted. Therefore, we expect a positive correlation between market openness and FDI.

5. Province-level tax rate(TAX): The foreign investment policy of the host country is the direct embodiment of the country's attitude toward foreign investment. The preferential policies of the host country for direct investment of foreign enterprises, such as land and tax incentives, help enterprises reduce costs and increase capital profit rate. Tung and Cho (2000, 2001) assessed the effect of tax incentives on FDI location decisions, finding that tax incentives were effective in attracting FDI to China and were also important determinants of investment location decisions at the regional level. Therefore, it is reasonable to assume that foreign investors take corporate tax levels at the province level into account when deciding where to invest. Consequently, I use the corporate income tax rate level (100 million dollars) applicable to foreign investment in the target province as a tax variable.

6. Infrastructure development(ID): Perfect infrastructure can promote the efficient allocation and flow of various factors to reduce the economic cost of foreign investment activities, and good infrastructure can improve regional location advantages. Under the same

conditions, foreign-funded enterprises are more inclined to choose a location with perfect infrastructure, which includes many aspects, such as airports, ports, transportation networks, and communication facilities. Many studies have found that transportation infrastructure is a significant factor affecting the regional distribution of FDI. Areas with superior transportation conditions are more attractive to foreign-invested enterprises. I'll use the density of roads in a city, the length of roads per square kilometer in an area, as the infrastructure variable. The degree of infrastructure development is measured by the highway density, which is the ratio between the length of the highway (Kilometers) in the province and the size (1000 square kilometers) of province.

Empirical Strategy

This research will examine the determinants of U.S. companies' investment decisions in different provinces in China. To avoid the unobserved heterogeneity effect bias in our test, I may employ two common specifications: the random-effect model and the fixed-effect model. The choice between the fixed effects and random effects model depends on whether individual and time-specific effects are independent of explanatory variables. So, I will use the Hausmann test to check this independent condition. Mathematically, our model can be presented as follows:

$$\mathbf{FDIit = \beta_0 + \beta_1\, ID_{it} + \beta_2\, EDU_{it} + \beta_3\, WAit + \beta_4\, TAXit + \beta_5\, OPEit + \beta_6\, MKSit + a_i + \mu_{it}}$$

in which subscript ‘i’ denotes province (1, . . ., 12) and ‘t’ denotes time (2010, . . .,2020), and a_i controls for different levels of motivation across provinces that is not observed by the researcher. So it is part of the error term, and it’s a time-invariant part. μ_{it} is a time-varying error that is here for the same reason we always have a random error – errors in measurement and omitted variables.

In the above equation, ID, EDU, WA, TAX, OPE, and MKS represent the infrastructure, labor knowledge level, labor cost, provincial tax rate, openness, and market size respectively. The subscripts i and t represent the ith province and year t, respectively; μ_{it} is time-varying error, and a_i is the individual difference of the cross-section of provinces and cities that does not vary with time.

Data from 12 provinces collected during the same period provide balanced panel data. The analysis of panel data needs to control time-invariant and unobserved factors that affect independent variables. Since each province is specific, the unobserved factor is called province heterogeneity. The characteristics of provinces, such as geographical location, natural resource endowment, and certain population demographic characteristics (education, culture, customs, and traditions), may differ. And the Hausman test shows that the random effect model is more effective than the fixed effect model.

Figure 1-1

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. xttest2

Correlation matrix of residuals:

          __e1     __e2     __e3     __e4     __e5     __e6     __e7     __e8     __e9    __e10    __e11    __e12
 __e1   1.0000
 __e2  -0.0789   1.0000
 __e3   0.1221   0.1208   1.0000
 __e4  -0.1206  -0.5377  -0.6876   1.0000
 __e5  -0.0652   0.1325  -0.5161   0.1598   1.0000
 __e6   0.1496  -0.4605   0.1334  -0.0165  -0.3476   1.0000
 __e7  -0.0093   0.0819   0.0147  -0.4156  -0.2767   0.2172   1.0000
 __e8  -0.4773   0.0485  -0.2584   0.3654   0.0959  -0.5390  -0.5023   1.0000
 __e9  -0.0978   0.2908   0.8448  -0.8245  -0.1535  -0.0941   0.0770  -0.1811   1.0000
__e10   0.3444   0.1845   0.4458  -0.3988  -0.6427  -0.0374   0.4564  -0.3759   0.2919   1.0000
__e11   0.0161   0.2028   0.7513  -0.7318  -0.4586   0.0037   0.5007  -0.4027   0.7529   0.4883   1.0000
__e12   0.2555   0.0361  -0.2779  -0.1908   0.0887   0.5645   0.4692  -0.4315  -0.2478  -0.2344  -0.0059   1.0000

Breusch-Pagan LM test of independence: chi2(66) =   102.333, Pr = 0.0028
Based on 11 complete observations over panel units
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Figure 1-2

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. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (12)  =    3066.68
Prob>chi2 =      0.0000


. xtserial FDI ID EDU WA TAX OPE MKS Province1-Province12 Year1-Year11

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,      11) =      0.644
           Prob > F =      0.4393
```

However, my model also shows heteroscedastic and contemporaneously cross-sectionally correlated (from Figures 1-1 and 1-2). Hoechle(2007) suggests the use of the htgls command in Stata.

Results and Discussion

Figure 2-1

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1 . xtgls FDI ID EDU WA TAX OPE MKS i.Year, corr(ind) panels(correlated)

  Cross-sectional time-series FGLS regression

  Coefficients:  generalized least squares
  Panels:        heteroskedastic with cross-sectional correlation
  Correlation:   no autocorrelation

  Estimated covariances      =        78          Number of obs      =       132
  Estimated autocorrelations =         0          Number of groups   =        12
  Estimated coefficients     =        17          Time periods       =        11
                                                  Wald chi2(16)      =   1987137
                                                  Prob > chi2        =    0.0000
```

FDI	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ID	77.88869	14.64747	5.32	0.000	49.18018	106.5972
EDU	-3.949044	1.342725	-2.94	0.003	-6.580736	-1.317351
WA	2.887957	.746481	3.87	0.000	1.424881	4.351033
TAX	-283.6063	37.27642	-7.61	0.000	-356.6667	-210.5458
OPE	8642.078	3298.189	2.62	0.009	2177.747	15106.41
MKS	14.11129	1.496433	9.43	0.000	11.17833	17.04424
Year						
2011	-10444.34	488.7909	-21.37	0.000	-11402.35	-9486.328
2012	-385.0279	881.4706	-0.44	0.662	-2112.678	1342.623
2013	-5008.387	1500.884	-3.34	0.001	-7950.066	-2066.707
2014	-5304.314	2004.162	-2.65	0.008	-9232.399	-1376.229
2015	-25449.96	2614.85	-9.73	0.000	-30574.97	-20324.95
2016	-29425.59	3227.118	-9.12	0.000	-35750.63	-23100.56
2017	-27260.19	3950.645	-6.90	0.000	-35003.31	-19517.07
2018	-31291.57	4527.031	-6.91	0.000	-40164.39	-22418.75
2019	-44266.71	5394.029	-8.21	0.000	-54838.81	-33694.6
2020	-49257.33	6074.08	-8.11	0.000	-61162.31	-37352.35
_cons	5699.789	3687.806	1.55	0.122	-1528.178	12927.76

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Note: when the number of panels is greater than or equal to the number
      of periods, results are based on a generalized inverse of a
      singular matrix.
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Figure 2-2

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1 . esttab fe re mle xtgls
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	(1) FDI	(2) FDI	(3) FDI	(4) FDI
main				
ID	-154.4	8.133	24.03	77.89***
	(-1.87)	(0.21)	(0.57)	(5.32)
EDU	0.556	1.473	-0.0115	-3.949**
	(0.03)	(0.25)	(-0.00)	(-2.94)
WA	6.141*	5.432*	5.009*	2.888***
	(2.05)	(2.47)	(2.33)	(3.87)
TAX	-269.4	-265.5*	-272.9*	-283.6***
	(-1.68)	(-2.15)	(-2.42)	(-7.61)
OPE	-11816.6	6219.0	6357.1	8642.1**
	(-0.50)	(0.45)	(0.52)	(2.62)
MKS	12.35	14.97**	15.10***	14.11***
	(1.77)	(3.04)	(3.44)	(9.43)
2010.Year	0	0	0	0
	(.)	(.)	(.)	(.)
2011.Year	-10083.5	-11809.7	-11679.6	-10444.3***
	(-1.09)	(-1.29)	(-1.35)	(-21.37)
2012.Year	995.2	-2939.6	-2692.6	-385.0
	(0.10)	(-0.31)	(-0.30)	(-0.44)
2013.Year	-5272.4	-9824.0	-9248.1	-5008.4***
	(-0.45)	(-0.95)	(-0.95)	(-3.34)
2014.Year	-6627.1	-12217.0	-11343.6	-5304.3**
	(-0.49)	(-1.08)	(-1.06)	(-2.65)
2015.Year	-29372.2	-34804.8**	-33597.2**	-25450.0***
	(-1.88)	(-2.75)	(-2.80)	(-9.73)
2016.Year	-36959.5*	-41235.4**	-39714.2**	-29425.6***
	(-2.10)	(-2.87)	(-2.91)	(-9.12)
2017.Year	-35255.5	-42091.0**	-40037.3**	-27260.2***
	(-1.64)	(-2.68)	(-2.66)	(-6.90)
2018.Year	-39453.5	-48682.5**	-46196.1**	-31291.6***
	(-1.53)	(-2.84)	(-2.81)	(-6.91)
2019.Year	-55198.5	-65455.4***	-62306.8***	-44266.7***
	(-1.74)	(-3.34)	(-3.30)	(-8.21)
2020.Year	-63599.6	-74262.4***	-70370.9***	-49257.3***
	(-1.66)	(-3.42)	(-3.34)	(-8.11)
_cons	34008.7	-11733.2	-8066.7	5699.8
	(0.46)	(-0.57)	(-0.42)	(1.55)
sigma_u				
_cons			12884.0**	
			(3.05)	
sigma_e				
_cons			20894.8***	
			(15.01)	
N	132	132	132	132

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Our research compares four models. In Figure 2-2, (1) is the fixed effect model, (2) is the random effect model, (3) is the maximum likelihood estimation model, (4) is the fit panel-data models by using GLS. Among them, (4) has the highest goodness of fit, indicating that the selected explanatory variable explains the explained variable well.

Figure 2-1 shows the statistical results of our analysis. The results show that, among all the factors, market size, market openness, labor cost, and infrastructure development have significant, positive, and continuous impacts on FDI inflow in China's provinces ($P < 0.01$). There is a negative correlation between tax and education level, and FDI. So provinces with larger markets, higher wages, better infrastructure, and open markets will attract more U.S. FDI.

Below I will examine the meaning of each variable symbol:

First, the degree of marketization (MKS) has a positive and significant signal in our regression results. Market size reflects the market capacity and total demand of a region to some extent, and plays a very important positive correlation role in attracting foreign investment. In addition, the market scale also reflects the development degree of a region's economy to a large extent. The larger the market scale, the more developed the local economy. FDI in China is mainly market-oriented. Therefore, the larger the size of the local market, the stronger the attraction for FDI. That means the more market-driven Chinese provinces are, the more likely they attract investors from the United States. Therefore, with the continuous growth of China's economy, the scale of China's domestic market continues to expand, forming a strong attraction for FDI to the United States. More and more American

companies are investing in China as a manufacturing base because of China's huge potential market.

Labor cost (WA) is often an important factor valued by business investment. Our model results show that wages are positively correlated with FDI inflows. In other words, FDI from the United States tends to flow to places where wages are higher. It may be because the higher the salary level, to some extent, shows that the development prospects of the area are better. Foreign investors usually aim to take advantage of cheap labor if the company's production is labor-intensive (Wei, 2003). China is the country with the largest population in the world, is rich in labor resources, and attaches great importance to the education of its people. Therefore, China has a high-quality labor force, many skilled personnel, and a low average wage (Wei, 2003). Zhang(2000) believes that labor cost has little influence on American multinationals' investment decisions in China (perhaps because China is market-oriented), which is also proved by our research. In our results, the signs for wages are positive and significant. This suggests that regions with high average wages are not discouraging investment in the United States. One reason could be that higher wages could bring higher personal disposable income and purchasing power to the region's population. So if U.S. firms target manufacturing, wages could negatively impact foreign direct investment. But if the company targets consumers in the region, the purchasing power of the region's population could have a big impact on investment decisions. As a result, we can also conclude that most U.S. direct investment in Chinese provinces is not aimed at manufacturing but at consumers.

Moreover, market openness (OPE) has a significant positive signal in the results of this model. Market openness reflects a region's attitude towards foreign investment. Areas with high market openness can reduce a series of obstacles to foreign investment and reduce the cost of their investment. The more open a market is in an area, It means that the region has a better capacity for foreign investment, the economic management level of the region is close to the international level, local residents and the government can accept the foreign-invested manufacturers and products produced in the region, the region can quickly and efficiently introduce foreign advanced equipment and technology. Products produced by foreign investment in this region can quickly find a sale channel. These factors affect whether foreign investors invest in this area from different degrees. Because a large part of American enterprises are involved in the import of components and equipment and the export of final products. Therefore, FDI is usually accompanied by a large volume of trade, and "trade openness" is a good indicator of internationalization. Greater openness to trade means that trade costs and restrictions are being reduced, reducing the controls and restrictions faced by investors operating in the Chinese region, incentivizing companies to accept foreign direct investment, and taking advantage of economies of scale.

Our analysis results show that there is a significant positive correlation between infrastructure development (ID) and FDI in each province and city. Areas with FDI concentration usually have good transportation, communication, and other infrastructure as support, directly related to the normal operation of enterprises and the efficiency of production and business activities. The products produced by enterprises need to be sold to the market, so regional traffic conditions are an important factor. As Wheeler and Mody (1992) found, an important

condition for American direct investment in foreign countries, especially developing countries, is that the host country needs to have a relatively developed infrastructure. An important component of the infrastructure is transportation. Whether foreign companies produce for the local market or export to the international market, they need to transport their products to markets or ports. Therefore, other things being basically equal, regions that can provide convenient infrastructure are more favored by American FDI enterprises because it increases productivity and lowers business costs.

To our surprise, there is a non-significant positive correlation between the educational level of the labor force (EDU) and FDI in our first two models, and a significant negative correlation in the last two models. Education level and human capital reflect the quality of the labor force and the scientific and technological ability of the region to some extent. Most of the previous research literature holds that FDI in China has gradually changed from labor-intensive to capital-intensive and technology-intensive. Therefore, there is an increasing demand for talents with certain knowledge and skills. Thus, education level should be positively correlated with the scale of FDI. In general, the endowment of human capital, as reflected in higher education enrollment, promotes FDI in the United States. Because FDI in the United States tends to involve high levels of technology. However, the education level of the labor force in our model shows a negative correlation with FDI, which is inconsistent with our expectations before building the model. The nature of FDI in China may explain this aspect. Historically, most FDI into China has been in low-value-added sectors. In these industries, workers do not receive any additional rewards from higher education. More recently, foreign investment has been shifting to higher-value sectors, where a higher degree can earn a higher return. But the interplay of these two effects may be canceled out. It can be

argued that, in reality, the flow of talent in China is bigger; many graduates will choose to return to their original location to work. At the same time, a considerable number of college graduates from other regions will choose to go to the nearest first-tier cities for employment. Therefore, on the whole, the representativeness of this index is not strong, and the error with reality is relatively large. Therefore, the above situation may lead to a deviation between measurement results and expectations. Moreover, if U.S. companies aim for manufacturing, a highly qualified labor force may positively impact FDI. But if U.S. companies are targeting consumers in the region, the population's purchasing power may have nothing to do with the quality of the workforce. As a result, most U.S. direct investment in Chinese provinces and cities is likely aimed not at manufacturing but at consumers.

In addition, in our results, the provincial-level tax rate(TAX) is negatively correlated with FDI inflows. Government incentive policies are important to consider when studying FDI, especially in developing countries (Sun et al., 2002). Some parts of China provide foreign investors with special preferential policies on taxation, land use, and foreign exchange. Preferential FDI policies may be an important factor in the overwhelming performance of FDI to date (Zhang, 2002). Among them, provincial taxes on business activities are important to maintain a prosperous business environment, which is an important role of government policy. Corporate income tax and tax incentives in different regions directly indicate attitudes toward foreign investment. Tax incentives for direct investment by foreign enterprises in different regions help enterprises to reduce costs and improve profit margins on capital. It is no surprise that regions offer tax incentives to attract U.S. FDI.

Conclusion

1.1 Conclusion

Location choice is an important issue in the process of foreign direct investment of transnational corporations and has become a research hotspot in the field. As mentioned in the literature review, there has not been a theory in the academic circle that can perfectly explain location choice. Although the literature on regional distribution in China is very rich, there are still many gaps and deficiencies in the research. For example, the lack of new research angles and the lack of effective measurement tools. This study narrowed the scope to the FDI location choice of 12 provinces and cities in China by the United States, and collected data from 2010 to 2020. From the perspective of Dunning's Eclectic Theory of International Production and the New Economic Geography Theory, Variables such as market size, labor cost, labor quality, market openness, and infrastructure development are introduced. Based on provincial panel data, fit Panel-data models using GLS are used to investigate the influencing factors of American FDI in Chinese location choice.

Our research results show that market size is an important variable affecting the location choice of FDI in the United States. The larger the market size in China, the stronger the ability to attract FDI from the United States. The improvement of infrastructure has a significant positive correlation with attracting FDI to the U.S. because the improvement of infrastructure reduces the cost of investment in the region. In addition, the degree of openness of a region determines the degree of acceptance of foreign investment by local residents and governments, as well as the speed of response to advanced foreign technology and management ideas. These factors can be in the determination of foreign investment has been

affected to varying degrees. Therefore, strengthening regional openness can improve regional foreign investor confidence. The influence of labor cost on FDI shows a significant positive correlation trend. This means that most US FDI in China is based on its large market and large consumer base rather than on its cheap Labour. As a result, the higher the average wage in China's provinces and cities, the more attractive it is to American investors. In addition, different provincial and municipal tax rates are also a factor for U.S. companies to consider when making FDI decisions. A low tax rate often means low cost, so our results show that the provincial-level tax rate is negatively correlated with FDI inflow. Finally, the accumulation of human capital in a region is closely related to the development level of local higher education. Our research results show that Chinese provinces and cities with lower labor quality are more capable of attracting FDI from the United States. This also explains why FDI from U.S. companies to China does not target manufacturing. Most U.S. direct investment in Chinese provinces and cities is aimed at consumers.

1.2 Policy recommendation

No province or city can be equally attractive to all industries and investment projects. Different provinces and cities have different comparative geographical advantages, so each province should attract foreign direct investment suitable for its own investment environment. Each province and city needs to know the advantages and disadvantages of its location, analyze the types of foreign investment attracted by the location, and analyze the location factors affecting the strategy of multinational corporations. Based on the empirical research results of this paper, from the perspective of all provinces and cities in China, we should enhance the market scale, increase the degree of market opening, expand the market potential, and provide a good market environment for attracting foreign investment. In

addition, it is also necessary to strengthen infrastructure construction in various regions and improve industries' support and service capacity. In addition, the government also needs to provide appropriate preferential policies, such as corporate income tax, preferential policies, and so on. It is developing the transportation industry to reduce the cost of trade and provide the impetus for the agglomeration of foreign investment industries.

1.3 Deficiencies and prospects

Since China's opening-up policy began in the late 1970s, foreign direct investment did not begin until the early 1990s. As a result, previous research on locational advantage lack time-based observations, and almost all FDI empirical analyses use cross-sectional data. My longitudinal data sets can give insight into how U.S. investors' investment decisions are affected as the economic environment and variables shift over time. This study mainly conducted an empirical study on the location distribution of FDI in the United States at the provincial level in China. However, American companies can choose a variety of modes to enter China, such as joint ventures, cooperation, and sole proprietorship. These modes of investment are significantly different in legal forms, risk-bearing and profit distribution. Access to agriculture, Different industries, such as manufacturing and service industries, have obvious differences in factor demand and market characteristics. Therefore, to fully understand the location distribution of American companies in China, it is necessary to systematically compare and analyze the location choice of different investment modes and different. These are places that my research has not covered yet. In addition, this study does not verify the significant spatial effect in China's location distribution, nor does it evaluate the impact of the spatial effect. More work will be needed to answer and refine this question in the future.

Data source

1. China Statistical Yearbook by China's National Bureau of Statistics
2. Urban Statistical Yearbook by National Statistics Bureau each city’s Investigation Brigade
3. CEIC China Premium Database
4. Each target city’s National Economic and Social Development of Statistics Report by National Statistics Bureau
5. China Foreign Enterprise Directory published by the China Economic Review
6. China tax statistical yearbooks
7. Publications of the State Administration of Taxation (SAT)

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