Determinants of the Location of FDI: Evidence from Fujian

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Abstract: By choosing the following variables: labor costs, market size, economic openness, basic labor quality, regional labor supply size, infrastructure development, capital output ratio and the total cumulative FDI stocks, we established a panel data model and estimated the effects of the determinants of foreign direct investment (FDI) in 9 areas of Fujian Province from 1999 to 2007. We found that the total regional foreign trade volume, road density and cumulative FDI stocks had a positive effect, but the average wage levels and the number of primary school students had a negative effect on FDI.

Key words: FDI, Fujian, area distribution, panel data model

1. Introduction

As the ultimate goal of multinational companies is to maximize their profits, international direct investment is a means for them to achieve maximum profits. Research by multinational companies into international investment has been very fruitful. Hymer（1960）[1] To compare the direct and portfolio investment and explain the motion of firms to control enterprises in foreign countries: If the markets are imperfect, if there is horizontal or bilateral monopoly or oligopoly, some form of collusion will be profitable. One form of collusion is to have the various enterprises owned and controlled by one firm. This is one motivation for firms to control enterprises in foreign countries.

Vernon (1966)[2] first proposed the product life cycle theory and gave a very good explanation ofUnited States Foreign Direct Investment. The Theory of Internalization was first advanced by Coase (1937) in a domestic context and by Hymer (1976) in an international dimension; it is also synthesized in a book by Peter J. Buckley, Mark C. Casson (1976)[3] and in a paper by Dunning (1977). This theory argued that FDI takes place in response to imperfections in the goods and factor markets；Dunning (1977)[4] proposed the Eclectic Theory of International Production on the basis of conventional international trade theory. This theory argued that for international investment to take place, the following three advantages should be present: Ownership Specific Advantage, Internalization Advantage, Location Specific Advantage and Kiyoshi Kojima's [5]Comparative Advantage theory (developed in the 1970s) gives a good explanation of Japan's international investment.

Rather than to test the above said theories, the purpose of this paper is to study the determinants of the location of foreign direct investment in Fujian Province. It is not to say the above said theories do not play a role in this paper; on the contrary, they reveal the behavioral patterns of multinational corporations, and provide not only a theoretical foundation for the model of this paper but also the direction.

2. Literature review

Difference in the investment environment is the reason for the location of foreign direct investment. It is generally believed that the investment environment includes the political environment, economic environment, social environment, legal environment and the natural environment. In addition, for a multinational corporation to invest abroad, the reasons for international investment activities are mainly as follows: Search for a market, search for resources, search for technology, and search to reduce the production cost. In this study, the political environment, social environment, legal environment, and even the natural environment are basically the same, because the scope of this study is in Fujian Province. However, there are obvious differences in economic conditions, so from this point to do some study is more reasonable. To synthesize the economic characteristics of Fujian Province, multinational corporations investing in Fujian Province mainly seek a market or want to reduce costs.

A large domestic literature has developed in order to offer explanations of the location of foreign direct investment

(FDI). Weiwei Wang and Jun Hu (2008)[6] in the empirical study of FDI of Anhui Province, hold that the industrial structure is the main constraining factor in Anhui to attract FDI; Yunsheng Mi and Licai Lv (2007) [7]study the factors that affect the distribution of FDI in the Southwestern provinces; the factors they study include the location, technology, labor costs, market size, public capital and the gathered effect of FDI. Tao Liu (2007)[8] does a similar study, the difference is the data of Tao Liu is of Shandong Province. Xia Fang and Qiuyin Ge (2007)[9] of Anhui Province, do an empirical study of FDI in order to analyze the role of human resources and the urbanization process to the FDI-area distribution. Jianhua Zhao and Xiang Ruan (2005)[10] analyze the impact of the industrial cluster to FDI. They hold that the industrial cluster, as a new location factor, is playing an increasing role in foreign direct investment.

Yi He and Mu Tong's (2008)[11] study on FDI location choices of the Yangtze River Delta   draws the conclusion that the difference of aggregation factors, economic strength, manufacturing level, technical level and labor costs have a significantly positive effect on the location of FDI, while the distance to Shanghai shows a negative impact. Jingping Zhang (2008)[12] analyzes the impact of intellectual property protection of the host country to FDI; he holds that a modest and efficient intellectual property protection mechanism will attract more FDI.

3.   Research methods

Many countries see attracting FDI as an important element in their strategy for economic development because FDI is widely regarded as an amalgamation of capital, technology, marketing, and management. FDI causes corresponding employment and economic growth, as in Fujian Province, where FDI is concentrated in the most economically developed areas. As can be seen in Table3-1, the spatial distribution of FDI in Fujian Province is not balanced. The FDI amounts of Fuzhou, Xiamen, Quanzhou and Zhangzhou is over 80 percent of the total FDI in Fujian Province, while the population of the four cities is only 56 percent of that of Fujian Province, and the area and GDP is 30.47 percent and 74.33 percent respectively. It not difficult to find that there is a close relation between FDI and the economic development of Fujian Province.

Table 3-1. Cumulative FDI in Fujian province, by area, 1991-2007(in proportion)

Year	Fuzhou	Xiamen	Putian	Sanming	Quanzhou	Zhangzhou	Nanping	Longyan	Ningde
1999	0.2257	0.3418	0.0578	0.0146	0.1772	0.1207	0.0316	0.0163	0.0143
2000	0.2240	0.3339	0.0596	0.0147	0.1757	0.1281	0.0339	0.0157	0.0143
2001	0.2272	0.3212	0.0597	0.0147	0.1787	0.1336	0.0358	0.0146	0.0144
2002	0.2329	0.3100	0.0594	0.0147	0.1802	0.1371	0.0374	0.0138	0.0146
2003	0.2358	0.3035	0.0584	0.0147	0.1821	0.1385	0.0393	0.0130	0.0147
2004	0.2396	0.2968	0.0563	0.0149	0.1874	0.1360	0.0407	0.0134	0.0149
2005	0.2414	0.2903	0.0548	0.0157	0.1922	0.1335	0.0421	0.0146	0.0153
2006	0.2397	0.2879	0.0550	0.0165	0.1957	0.1303	0.0433	0.0162	0.0155
2007	0.2365	0.2868	0.0559	0.0173	0.1983	0.1273	0.0442	0.0180	0.0157

In this paper, we establish a panel data model and estimate the effects of the determinants of foreign direct investment (FDI) in 9 areas of Fujian Province from 1999 to 2007.According to Economic Development of Fujian Province, multinational operations invest in Fujian generally for two reasons: To reduce production costs and to occupy the market. Thus, the indexes reflecting market size and labor costs are necessary. In addition, some factors on theoretical grounds would likely affect the profitability of investment. These variables typically reflect or affect local market potential, cost of production, and cost of transport, taxes, and the general business environment faced by foreign firms. Specific indicators selected are as follows:

- FDI, investment flow depends on the actual stock.
- S denotes the proportion of tertiary industry in the economy representing industry structure. It is believed that the higher the development of the tertiary industry, the higher the level of economic development.

- Thus, it is predicted that the impact of the tertiary industry is positive.
- W reflects labor cost and is representative of the average wage of workers in cities and towns. The higher labor costs, the more negative of the FDI; thus, it is expected that the index coefficient is negative.
- C measures the total annual consumption of each region, representatives of the regional market size. The larger the market, the greater the impact on FDI should be and the index coefficient is expected to be positive.
- T measures the total foreign trade of each region, on behalf of economic openness. FDI-related theory shows that the higher the degree of economic openness the more attractive to FDI.
- ED refers to the level of general education in school, representing the education level of employed persons. If the purpose of multinational corporations is to reduce costs, then the regions with abundant labor will have advantages to some extent; thus, the coefficient is positive.
- R measures the infrastructure development statement of each region. Almost all the literature on the location of FDI has confirmed that this indicator has a positive the impact on FDI.
- AP refers to the capital-output ratio; it indicates the investment return of a region.
- LJ refers to the total cumulative FDI stock; it points to a self-reinforcing effect of FDI on itself.

3.1 Building model

I chose a simpler empirical model, which focuses on the distribution of annual FDI across regions. The basic empirical specification takes the following form:

$$LnFDI = C + C_1 * S + C_2 * LnW + C_3 * LnC + C_4 * LnT + C_5 * LnED + C_6 * R + C_7 * AP + C_8 * LnLJ + u$$

where u is an error term.

The FDI data of this study is collected from the statistical yearbooks of Fujian Province. Since some information on regional FDI is not available from the main source of Chinese official data—the Fujian Province Statistical Yearbook, the variables are constraint to the source of data. For example, the resident population is an ideal indicator for labor supply, but in some issues, only the registered population in the Statistical Yearbook is available and permanent population statistics are lacking. In terms of labor quality, selecting the number of university students per million people as an indicator is reasonable, but there are no statistics for college students in the Statistical Yearbook. Therefore in this study, I selected the level of general education as indicator to measure the quantity and quality of labor. This is the same as fixed assets investment. Statistics on fixed assets investment are referred to be as fixed capital, while some are fixed assets.

3.2 The form of panel data model

Regression analysis on panel data models need to choose and set the form of the model. The general forms of panel data model are as follows:

$$Y_{it} = a_{it} + X_{it}c_{it} + u_{it} \quad , \quad i=1,2\ldots\ldots N \, , \, t=1,2\ldots\ldots T \qquad (1)$$

Where X_{it} is a 1*K dimensional explanatory variables, c_{it} is a coefficient vector of 1*X dimensions. So the relashionship of K indicators in N economic entity and T time points is considered in the formula (1). It can be divided into three models.

(1) Joint regression model
The model assumes that individual members own neither the individual influence nor the structural changes:

$a_i = a$, $c_i = c$, i=1.2......N

so, $Y_i = a + X_{it}c + u_i$ \quad i=1,2\ldots\ldots.N, t=1.2\ldots\ldots T

(2) Variable intercepts model
The model assumes that individual members own the individual influence but not the structural changes:
$Y_i = a_i + X_{it}c + u_i$ \quad i=1,2\ldots\ldots.N, t=1.2\ldots\ldots T

(3) Varying coefficient models

The model assumes that individual members own both the individual influence and the structural changes:
$Y_i=a_i+X_ic_i+u_i$ i=1,2…….N, t=1.2........T

Which model should be employed can be decided by the following two tests:
H1: c1=c2=....=cN
H2: a1=a2=....=aN
c1=c2=....=cN

If the H2 through the test, then use the model (1), otherwise turn to test H1. If the test is passedthrough, then choose model (2), otherwise choose model (3). Generally speaking, panel data analysis can choose the fixed effects models, the random effects model and the variable coefficient model. The three models all belong to variable intercepts model.

3.3 Model results and analysis

In the regression without weight, FZ stands for Fuzhou city, XM stands for Xiamen city, PT stands for Putian city, SM stand for Sanming city, QZ stands for Quanzhou city, ZZ stands for Zhangzhou city, NP stands for Nanping city, LY stands for Longyan city and ND stands for Ningde city（as below）. Considering the cross-section heteroskedasticity of the residual and the problem that the residual's synchronization is not related, I choose weighted regression. The regression results show that the coefficients of S and AP were not statistically significant. The weighted regression results after excluding S and AP are as follows:

Table 3-2 The weighted regression results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	17.05536	4.895680	3.483758	0.0009
LNW?	-1.096805	0.291799	-3.758773	0.0004
LNC?	-0.062742	0.040146	-1.562825	0.1229
LNT?	0.265617	0.074293	3.575244	0.0007
LNED?	-1.068026	0.287379	-3.716436	0.0004
R?	0.204225	0.099205	2.058623	0.0435
LNLJ?	1.194661	0.294868	4.051509	0.0001
Fixed Effects (Cross)				
FZ--C	-0.041518			
XM--C	-1.782070			
PT--C	-0.318821			
SM--C	0.483963			
QZ--C	0.364379			
ZZ--C	-0.189630			
NP--C	0.314928			
LY--C	0.562783			
ND--C	0.605986			
R-squared	0.999678	Mean dependent var	20.28196	
Adjusted R-squared	0.999609	S.D. dependent var	11.85898	
S.E. of regression	0.234415	Sum squared resid	3.626731	
F-statistic	14619.94	Durbin-Watson stat	0.931011	
Prob(F-statistic)	0.000000			

4. Concluding remarks

The above empirical analysis shows that the weighted cross-section of the fixed effects model is an ideal panel data model in studying the geographical distribution of FDI in Fujian Province. The main conclusions are as follows:

Industrial structure and investment-output ratio are not the factors affecting FDI in Fujian Province. As can be seen from the data of the industrial structure, the proportion of tertiary industry in all regions of Fujian Province is not much different from each other, and clearly, the investment-output ratio is not statistically significant. It is probable that this variable is not a good indicator of investment returns. Average wage and the number of primary school students have a negative impact on FDI. Wage is an important investment cost, so has a negative impact on FDI, which is in line with the economic theory; the latter also shows a negative impact on FDI. This is possibly because family planning or economic development makes the students at school keep a decreasing tendency, and together with the mobility of labor, this indicator is not a good indicator reflecting the labor supply.

Total foreign trade volume and road density have a positive impact to FDI in Fujian Province's regions. Total foreign trade volume is an important indicator of regional economic openness, and road density is an infrastructure variable, which can reflect a region's infrastructure status. Increasing economic openness and improving infrastructure is necessary to attract more FDI. Cumulative FDI has a positive impact on FDI, which is consistent with the studies of other scholars. The effect of regional market size on FDI is not significant. It is probable that FDI flowing into each region of Fujian Province is not attracted by the market, [which they aim at may be the radiation capacity of the region to the whole province even to the whole county] this passage is not clear. This study failed to consider the factor of regional advantages of each region, which is a major flaw of the paper.

Some proposals to promote FDI in regions of Fujian Province: a) Some relevant measures aimed at attracting immigrants are necessary, which can increase the supply of labor and lower wages, thereby reducing the investment cost. b) Strengthen infrastructure construction and improve the investment environment and c) Strengthen economic ties with other areas, extend the scope of the economic radiation, improve the strategic position in transnational capital and improve the overall competitiveness in attracting FDI.

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