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Research on the Employment Effects of Foreign Direct Investment in China

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Abstract: The thesis has not only consummated the existing theoretical model but also used some econometric methods such as co-integration theory and panel data model to empirically research on the direct and indirect employment effects of the Foreign Direct Investment (FDI), taking Liaoning Province in China for example. This study aims at providing the relevant government departments the decision-making basis and improvement recommendations in the investment processes to keep a better balance between economy and employment effects. The research got by this thesis has explained that the foreign direct investment effect of Liaoning Province in China is apparent but both of the indirect employment effect and total employment effect are negative; at the same time there are significant distant among different areas in Liaoning Province. This thesis has considered with the results of the empirical research and analyzed and put forward the relevant countermeasures and suggestions.

Key words: Foreign direct investment, employment effect, crowding-out effect

INTRODUCTION

In recent years, facing the severe employment situation, both Chinese government and academic community have tried to solve the employment problem through a variety of ways. Since the proportion of foreign enterprises in China's economy continues to increase, its role in solving the employment problem has raised more and more attention. Many local governments not only put forward that the policy changes from "investment attraction" to "investment selection" but also begin to regard the influence of FDI on employment as one of the basis for selecting investment projects. However, as an important prerequisite for the government decision-making, the actual influence of FDI on employment remains need to be demonstrated and confirmed.

Foreign scholars have gained abundant research achievements in studying the influence of FDI on employment. Through a lot of investigation, Campbell (1994) found that the foreign direct investment's influence on the country displays in the three aspects of employment quantity, quality and location. From the perspective of employment quantity, we can find that FDI is likely to increase employment opportunities but also reduce it and from the perspective of employment quality, FDI not only increases the wages and productivity but also affects employment, then from the perspective of employment location, it has created opportunities in areas of high unemployment but may cause new unemployment. After Mickiewicz *et al.* (2000) had studied four central European countries' situation, they drew the

conclusion that FDI can create more employment opportunities and restraint the serious consequences caused by mass unemployment in a larger extent. Williams (2003) analyzes the impact of multinational corporations' entry way, originating country and other factors on host country's labor demand but it turns out that these factors have significant influence on the demand for labor. Positive role of FDI on employment growth from the driving effect of utilization of foreign capital to the Italian job growth.

Domestic quantitative researches began in the early 21st century. Tian (2004) studies the effect of FDI on Shanghai's employment. The study shows that the effect of FDI increment on Shanghai's employment is less than zero, while the effect of foreign direct investment stock is greater than zero. Either the increment or the stock of FDI has a positive effect on the employment of Shanghai's tertiary industry, instead of the first secondary industry. Wang and Zhang (2005) divide the employment effect of FDI into direct and indirect parts and also draw the conclusion that FDI has a significant positive impact on China's employment through empirical method. For example, each 1% increase in FDI will drive 0.008% increase in actual employment. In addition, Mou (2007) studies the impact of foreign investment on China's employment. Before 1993, both direct employment effects of foreign investment and negative indirect effect are significant. While after 1993, direct employment effects of foreign investment is reduced and the negative indirect effect is also weakened.

After comprehensive study of domestic and foreign research, we can find that the influence of FDI on employment is much more complex. It differs from each other. Not only the resources endowment, historical culture but also the foreign investment industry in each region will influence the employment effect of FDI. So experts and scholars must comprehensively consider the direct and indirect employment effects of FDI. That is to say, in order get more accurate results, the influence of FDI on host country's overall employment should be analyzed according to the specific circumstances. In addition, the current domestic researches mainly assess national sample and ignore the diversity and concreteness of provincial sample. Therefore, these researches constraint its role as the guide of the local government's foreign direct investment policy. With the development of reformation in Northeast China old industrial base, Liaoning province, as one of the bases, is facing more and more severe employment situation. At the same time, Liaoning province in China also emphasizes attractive investment. Liaoning provincial government should make an important strategic decision which is how to take both economic development and employment growth into consideration during the process of absorbing FDI. Therefore, the study of the employment effect of FDI in Liaoning province of China is not only the supplement and the consummation to the existing research but also contributes to the relevant government departments to formulate more effective policy.

CONSTRUCTION OF A THEORETICAL MODEL

Ideas of construction: In the empirical study in employment effects of FDI, some of the early scholars (Niu, 2001; Wang and Zhang, 2005) mainly used the flow index, they measured the direct and indirect employment effects of FDI by constructing simultaneous equations approach. The methods used in these studies are worth learning but this ignores the effects of stock indexes. Because the flow index belongs to short-term factors, so the stock index may be better reflect the effects of FDI in the long-term process. In recent years, some scholars (Tian, 2004; Mou, 2007) gradually realized that it can not use flow index only but should be integrated use of flow index and stock indexes. In this study, we will introduce the stock index into the theoretical model and then integrated analysis of the employment effects of FDI. Specifically, in order to overcome the lack of theoretical foundation or ignore the lack of an index in previous studies, we will introduce the flow and stock index in the framework of the producer's general equilibrium theory.

In this study, we will use the flows of FDI to measure the directly employment effects, because the flow of foreign investment is mainly affected by the short-term factors, just like the way of entering, the way into the industry and so on. The coefficient of direct employment effect mainly reflects the relationship between the amount of FDI and the employment. If it is positive, indicating that FDI impact the employment positively, the investment and employment has steadily increased; if it is negative, indicating that employment effects of FDI is not significant, the changed of FDI did not cause employment increased accordingly. This may be related to the way of foreign investment and which industry to entry, such as a cooperative and joint ventures may increase the capital-labor ratio, directly reduce the amount of employment; if the entering industry is labor-intensive industries, so it must stimulate employment greatly; if raise capital-labor ratio in labor-intensive industry, then the negative employment effects will be great.

We will use the stock of FDI to measure indirect employment effects, the stock of FDI reflects the host country's overall production scale and technical level. The factors affecting the stock effects are as below: The industry related degree between foreign-invested enterprises and domestic enterprises host, the competition relationship, the promoting industries and economic development effects of foreign-invested enterprises to the host country's, these factors are closely associated with the overall strength of foreign-invested enterprises. If it is positive, indicating that the combined effects of indirect effects on employment is positive. Here though not specifically classified in the end what factors play a big role but can be combined with a comprehensive analysis of quantitative and qualitative, such as foreign investment and domestic investment, "squeeze" and "crowding out" relations and so on.

The empirical analysis of the first part and the third part will respectively measure the direct employment effects of the flow index and the second part will use the overall employment as the dependent variable and use the flow index and the stock index to measure the overall direct and indirect employment effects, we will get the overall employment effects by adding the both.

Construction of theoretical model: Based the theory of the firm, this article will feature its sources of capital into the domestic capital and foreign capital, the production function is expressed as follows:

$$Q = Af(K_d, K_f, L) \quad (1)$$

in the Eq. 1, Q is the total output, A is the level of technological, K_d is domestic capital and K_f is foreign capital, L is labor input. The cost function is:

$$C = wL+r(K_d+K_f) \tag{2}$$

in the Eq. 2, w is the wage per worker, r is the price level of capital. Assuming the production function is the Cobb-Douglas form which is constant returns to scale, the object of firm is maximized profit. The profit function of firm is:

$$\pi = AK_d^\alpha K_f^\beta L^\gamma - wL - r(K_d + K_f) \tag{3}$$

where, α, β, γ represent the corresponding output elasticity of various elements respectively. Then take derivative for L from both sides:

$$\frac{\partial \pi}{\partial L} = \gamma AK_d^\alpha K_f^\beta L^{\gamma-1} - w = 0 \tag{4}$$

Equation 4 can be expressed as follows after logarithmic transformation:

$$\begin{aligned} \ln L^* &= \frac{1}{1-\gamma} \ln \gamma + \frac{1-\gamma}{\alpha} \ln K_d + \frac{1-\gamma}{\beta} \ln K_f - \frac{1}{1-\gamma} \ln w + \frac{1}{1-\gamma} \ln A \\ &= C_1 + C_2 \ln K_d + C_3 \ln K_f + C_4 \ln w + C_5 \ln A \end{aligned} \tag{5}$$

Assuming without considering technological advances and changes in wage rates, then Eq. 5 can be further simplified as:

$$\ln L^* = C_1 + C_2 \ln K_d + C_3 \ln K_f \tag{6}$$

The coefficient C_1, C_2, C_3 in Eq. 6 are different from the coefficient C, C_2, C_3 in Eq. 5.

Equation 6 is the basic empirical analysis model. Based on this model, we will measure the direct employment effect of FDI, the overall employment effect of FDI and the regional effect of FDI in Liaoning province. The specific econometric models are as follows:

- Model of the direct employment effect of FDI:

$$\ln FDIL_t = C_1 + C_2 \ln FDI_t + \mu_t \tag{7}$$

where, $FDIL_t$ is the employment of FDI at the end of t year, FDI_t is the real amount of FDI at t year, μ_t is the error correction term. C_2 is the direct employment effect coefficient of FDI.

The mode of the overall employment effects of FDI:

$$\ln L^* = C_1 + C_2 \ln ID_t + C_3 TID_t + C_4 \ln IF_t + C_5 \ln TIF_t + C_6 \ln IF_t(-1) + \mu_t \tag{8}$$

where, L^* represents the employment at the end of t year, ID_t means that domestic investment flow at t year, TID_t

means that the domestic stock investment at t year, IF_t means the flow of FDI at t year, TIF_t means the stock of FDI at t years. Because the investment has the chromatic of lag, so we select one lag of investment. $IF(-1)$ denotes the one lag flow of FDI, the one lag of ID is not significant, so it is omitted. C_4 is the overall direct employment effect coefficient of FDI, C_5 is the overall indirect employment effect coefficient of FDI, μ_t is the error correction term.

The model of regional direct employment effect of FDI in Liaoning province of China:

$$\ln FDI_{it} = C_1 + C_2 \ln FDI_{it} + \mu_{it} \tag{9}$$

where, $FDIL_{it}$ is the employment of FDI at t year in i city. FDI_{it} is the flow of FDI at t year in i city. C_2 is the regional direct employment effect of FDI, μ_{it} is the error correction term.

EMPIRICAL ANALYSIS

Direct employment effect of FDI: Taking into account the availability of data, the employment of FDI and the real FDI begin in 1990 and take regression analysis for 21 years from 1990 to 2000. The exchange rate is the U.S. dollar exchange rate, which derived from the “China Financial Yearbook”.

From the unit root test result, we can find all series are integrated of order, hence using the Granger residual test method to test for the regression equation. The result is:

$$\ln FDIL = 1.6054 + 0.5182 \ln FDI_1 \tag{10}$$

The results show that the equation is good fit, the coefficient of direct employment effects of FDI is significantly at the 1% significance level, the DW of equation is less than 2, there may be positive serial correlation but through residuals autocorrelation and LM test shows that there is no autocorrelation problem, F statistic is significant at the 1% significance level, indicating the model fit very well.

Empirical results show that FDI per 1% change in employment 0.5182%. The coefficient of direct employment effects of FDI is 0.5182, indicating that the increasing of FDI in Liaoning Province's has play a direct role in boosting employment. In 1990, the amount of employment in FDI was only 46,000 people in Liaoning Province but the number has reached 546,000 by 2007, the employment effect of FDI is significantly.

The overall employment effect of FDI: Taking into account the availability of data, all of the selected data range for 1982 to 2010. The stock of FDI and domestic

stock investment is calculated from 1985 year, we here ignore the depreciation. Exchange rate data is the annual weighted average exchange rate. All data are from the “Liaoning Statistical Yearbook” and “China Financial Yearbook”. The estimated result is:

$$\ln L^* = 7.096 + 0.007 \ln ID + 0.052 TID + 0.035 \ln IF - 0.05 \ln TIF + 0.013 \ln IF(-1) + 0.011 \ln ID(-1) \quad (11)$$

Taking ADF unit root test for the residual series of regression Eq. 11, we find that the t statistic is -5.240, indicating that it will reject the null hypothesis of a unit root at the 5% significance level, so the residual series is stationary, indicating that it exists the co-integration relationship between variables without “spurious regression” problem. The result of econometric analysis is good, all parameters is significant at the 5% significance level, F statistic is significant at the 1% significance level indicating the model fit very well. According to DW test and the residuals autocorrelation LM test show that there is no autocorrelation problem.

The empirical results show that flow of domestic investment did not play a direct role in promoting employment but the stock of domestic investment had a great indirect role. The flow of FDI had played a direct role in promoting employment, the coefficient of direct employment effect is 0.035 and this is consistent with the above result of the effect of the flow of FDI, indicating that the flow of FDI has indeed improved the level of employment in Liaoning Province. However, the coefficient of the stock of FDI which means the indirect employment effect is -0.05, which indicates the “crowding out” effect may exist and even greater than the direct promotion of FDI. The crowding out of FDI for the domestic investment and the less association of industries may be the reasons. Then summing the direct and indirect coefficient of FDI’s employment effect, we can get the coefficient of overall employment effect of FDI (0.015), so the overall employment effect of FDI is not significant.

Further analysis of industry distribution of FDI in foreign Liaoning Province in 2007, which shows that the proportion of secondary industry accounted for 60% of the amount invested, the tertiary industry is about 35 and 5% of primary industry, general industry distribution is very balance. Also unevenly distributed within each industry, the proportion of the manufacturing secondary industry in secondary industry accounted for 90 and the total investment amount accounted for more than 50%; the proportion of the real estate industry in tertiary industry accounted for 60% and the total investment amount accounted for more than 20%.

The FDI is mainly concentrated in these two sectors in Liaoning Province and these industries are highly competitive for domestic enterprises, so it is no doubt that the entry of FDI may enhance the competition. While FDI involved too little in other areas is not conducive to the adjustment of industrial structure of Liaoning province and this will exacerbate the domestic competition, so it must have a clear understanding. Excessive concentration of FDI also reflects that linkage between the FDI and domestic investment industry is not strong.

In order to determine whether FDI crowded out the domestic investment, we will establish a simple econometric model. The “absolute squeeze and extrusion model” of Teanravitsitsagool (1998) is the main reference. Due to interest rates in the model is not significant, many studies have proved this point. Therefore the following econometric model is established in this study:

$$Id_t = C_1 + \beta_1 IF_t + \beta_2 gdp_t + \mu_t \quad (12)$$

Id_t denotes the total assets of domestic investment at t year, which is approximately equal to the total fixed assets investment minus the amount of FDI, IF_t means the amount of FDI at t year, gdp_t means the real GDP at t year. The estimated result is as follows:

$$ID = -4119.30 - 1.51IF + 72.17gdp + (ar(1) = 1.33) \quad (13)$$

$\beta_1 < 0$, indicating that FDI does produce a crowding out for domestic investment, FDI per unit change in a domestic investment decreased 1.51 units.

The regional direct employment effect of FDI in Liaoning province of China: Taking into account the data of region begin as 1995, so select the sample data interval of 13 years between 1995 and 2007. All data are from the “Liaoning Provincial Statistical Yearbook”.

This study will test at the different roots and the same root situations using the methods of the LLC and the Im-Pesaran test. Test results show that in both cases the sequences reject the null hypothesis at the 5% significance level, indicating that there is no unit root.

We will estimate the Eq. 9 by using the fixed effects model. In order to eliminate the heteroscedasticity between the cross-sections, this weighted of sections is adopted. The estimated results are as follows in Table 1.

In which, $R^2 = 0.978$, $Adjust-R^2 = 0.974$, $DW = 1.82$, $F = 245.5$, the model fits very well and passes through the related test. However, the coefficients of some variables in the model are not significant, indicating that the relationships between the FDI and employment are not significant in some areas.

Table 1: Regression result on Eq. 9

Variable	C	T	p-value
c	0.264	3.363	0.0010
Log (FDI_SY)	-0.084	-1.174	0.0887
Log (FDI_DL)	0.276	1.889	0.0609
Log (FDI_AS)	-0.290	-2.237	0.0267
Log (FDI_FS)	-0.239	-1.553	0.1225
Log (FDI_BX)	-0.711	-5.282	0.0000
Log (FDI_DD)	-0.238	-1.005	0.3165
Log (FDI_JZ)	-0.035	-0.605	0.5462
Log (FDI_YK)	-0.192	-1.418	0.1584
Log (FDI_FX)	-0.247	-1.911	0.0579
Log (FDI_LY)	-0.477	-1.331	0.1854
Log (FDI_PJ)	0.003	0.032	0.9742
Log (FDI_TL)	0.314	1.953	0.0527
Log (FDI_CY)	-0.072	-0.142	0.8875
Log (FDI_HLD)	0.567	2.371	0.0190

The empirical results show that the direct employment of FDI in Shenyang, Dalian, Anshan, Benxi, Fuxin, Tieling, Huludao are significant at 10% significance level. However, the relationship is different, such as, in the three regions of Dalian, Tieling, Huludao there are positive correlation; but in the four regions of Shenyang, Anshan, Benxi, Fuxin exist a negative correlation. It should be noted that when there is a negative correlation, it does not mean FDI does not create jobs but rather that the ability to create jobs relative to the total investment has not been significantly enhanced.

FDI is mainly concentrated in Shenyang and Dalian in Liaoning Province, Shenyang and Dalian but the relationship between the FDI and employment in Shenyang and Dalian is different. This is worth considering. The direct employment effect coefficient of Dalian is 0.276 and the Shenyang is -0.084. This phenomenon is not difficult to understand, the amount of FDI in Shenyang firstly exceeded Dalian in 2003 and this has continued ever since but the employment of Shenyang, is only one-third of Dalian, so we can find that relative to the greater investment the amount of employment did not increase greatly. Further analysis of the industry distribution of Shenyang and Dalian areas show that the employment of Liaoning Province are mostly located in the secondary industry, the amount is 100,000 in Shenyang by the end of 2006, while the average annual amount of industrial enterprises reached 120,000 million people, indicating that the employment is more concentrated. The trend of intra-manufacturing in the second industry must be focused, which may be accounted for 98% in Shenyang and Dalian. While the manufacturing industry differentiation within more serious in Shenyang and Dalian. In the case of the same amount investment, the employment of equipment manufacturing industry accounted for 60% of manufacturing employment in Shenyang City but the Dalian is 43%. The amount of FDI in Shenyang is four

times of Dalian but the proportion of foreign employees accounted for 2.1 and 4% in Dalian, indicating that employment is less more than Dalian.

CONCLUSION

First, the direct employment effect of FDI is obvious. To guide the ways of FDI entry and the chosen field can promote the direct employment effect. We found that each 1% change in FDI will drive 0.62% increase in direct employment level in Liaoning province of China. For a long time, the policies for inviting outside investment are mainly focus on attracting foreign investment to make up the deficiency of capital in Liaoning province and even China. Under the background of international financial crisis, the withdrawal of some foreign markets happens. In fact, this is an opportunity to adjust the foreign investment policy. And the government must advocate the employment-oriented capital strategies. In addition to the increasing scale of investment, other factors which affect foreign direct employment effects should also be noticed. The employment effect of investment flow is mainly concerned with the way of foreign investment entry and its field. The entry of foreign-funded enterprises is mainly two types: One is raising science technology investment, which will directly promote employment level; the other is through the form of cooperative (contractual) or equity joint ventures. If the capital-labor ratio is raised, the level of employment will be reduced. But if the foreign enterprises raise investment, the level of employment will raise. If the foreign companies entering the labor-intensive industries, it can have a dramatic effect on employment. For example, in recent years, wholly foreign owned enterprises as well as its investment in the tertiary industry have played an important role in stimulating employment in Dalian city. Therefore, actively guiding foreign investment mode and entry industry is the key to expand the direct employment effects of FDI.

Second, FDI has a negative indirect employment effect. The negative indirect employment effect reflects the importance of selection from a certain extent. The government should change previous investment ideas which pay attention to quantity instead of quality. From an empirical analysis of Liaoning province of China, it can be found that the sum effect coefficient is -0.05. Further empirical analysis shows that foreign investment dose have a crowding-out effect on domestic investment. Therefore, expanding direct employment effect of FDI (such as the expansion of industrial relevancy and strengthen the relationship between foreign direct investment industry and domestic industry) is the key. What's more, reducing indirect employment effect of FDI

(such as reducing excessive competition between foreign and domestic investment) is also the key. Therefore, during the process of “attracting investment”, relative departments should examine complementarity of foreign investment project and local enterprises, as well as linkage efficiency of foreign investment project. The selection of wide spread project with high complementarity, is not only beneficial to improve the employment effect but also helps to perfect and upgrading industrial structure in Liaoning province.

Third, the employment effect of FDI varies in each region. Using the macro overall planning to cause synergic effect, this approach can greatly enhance the positive effect of FDI on employment. The employment effect of FDI varies in each region in Liaoning province of China, especially in Shenyang and Dalian. This has an important reference value on determining the local foreign investment. In order to ensure a better and faster development of Liaoning province economy, the government should promote balanced development among regions. At the same time, combined with the local industrial structure and employment, the government should actively guide FDI distribution and promote balanced development among regions. During the process of policy changes from “investment attraction” to “investment selection”, the different effect of FDI in each region just offer a rare opportunity for government to make overall plans. The practice to expand the Shenyang’s and Dalian’s investment strategy over the province will greatly improve the level of overall employment in Liaoning province of China.

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