The FDI Effect on Income Gap of Manufacturing Sector in Yangtze Delta Region
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Abstract: In this paper, we use panel data from the Yangtze Delta (two provinces and one city) between 1995~2004 to study the effect of foreign direct investment (FDI) on the Income Gap of Manufacturing in the Yangtze Delta adopting fixed effects model. We find that FDI has positive effect on reducing the income gap of manufacturing in Yangtze Delta. Furthermore, FDI is the most important factor than other factors, and some suggests are also advanced.

Keywords: FDI, Yangtze Delta, Income Gap, Fixed Effects

1 Introduction

The imbalance of FDI location has effect on the regional economic development. And is it the key factor to form diversity of regional income gap? The relationship between FDI and income gap is the topic international economists and labor economists concern about. Especially with the upswing of anti-globalization in many developing countries recently, and corresponding research results have been highly lightened by every government.

Karl Taylor, Nigel Driffield (2005) have studied the data between the year 1983-1992, on the imbalance effects on Britain Manufacturing skilled workers and unskilled workers by FDI. The results demonstrated FDI would aggrandize the demands of Britain Manufacturing skilled workers, and widen the income gap between skilled workers and those unskilled ones, and Robert C. Feenstra, Gordon H. Hanson (2001) reached the same conclusion. Yong-Yil Choi (1998) divided the whole global into northern (developed) and southern (developing) economic bodies. Through the research of imbalance income of three level economic bodies in north, they found free trade had no significant effects on the imbalance of northern economic entire income.

Refer to the relation between FDI and income gap, Zhao Ying (2003) theoretically and empirically studied the effects of income gap because of opening up of China. The results indicated numerous FDI and efficient salary from foreign companies which were along with opening up could increase the income of those high quality technicians, thus widen Chinese income gap. Bu contrast, He Zhang, Tan Donghai (2003) took China for example to study multi-provinces, the research results revealed the opening degree which is the quotient FDI/ GDP had reversal relationship with income distribution, in other words, the addition of FDI can narrow the income gap.

There were seldom researches studied the relationship between FDI and income gap in the Yangtze Delta. The main results includes Xuan Yi and Zhao Shudong (2005) ’ research. They imposed factor price function model and Jiangsu relative economic data, and respectively made elemental regression analysis on Jiangsu province, southern Jiangsu, middle Jiangsu and northern Jiangsu areas. The results indicated the imbalance of regional FDI distribution is the main factor caused the regional income gap. Since innovation and opening up, the Yangtze Delta is in virtue of opportunities such as its ascendant geography location, favor policy and international manufacturing centre transferring to China, then it has been the preference for foreigners. Nevertheless, the income gap in the Yangtze Delta, especially Income Gap of Manufacturing is widening increasingly meanwhile. From figure 1, we can find the FDI amount in the Yangtze Delta is increasing steadily since the middle of 1990s. it increased from less than 10billion$ in 1995 to 2.536 billion$ in 2004, and the proportion accounting for the whole country increases from 24.76% to 41.83%. meanwhile, the income gap of manufacturing is widening increasingly, the coefficient of variation increased from 0.286 in 1995 to 0.455 in 2004. It shows the parallel increasing yearly between the Yangtze Delta FDI and the income gap of manufacturing. Now that, is there any relationship between the extent of the income gap of manufacturing and FDI in
Yangtze Delta? If there is, what is the causality? This paper will use industrial data to study the effect of foreign direct investment (FDI) on the Income Gap of Manufacturing in the Yangtze Delta.

Figure 1 the quantity statue of FDI and the coefficient of variation of the Income Gap of Manufacturing (1995 - 2004) in the Yangtze Delta


2 Model assumptions

The data period this paper studies on is from 1995 to 2004, and the cross section is the Yangtze Delta, including Jiangsu, Zhejiang and Shanghai. The panel data analyzing method combining time and cross section data is more suitable for this paper, and it can also eliminate the multi-linearity.

The common panel data model formation is:

\[ Y_{it} = A_i + B_i X_{it} + U_{it} \quad i = 1, \ldots, T \quad (1) \]

Here, \( X_{it} \) is the vector of \( 1 \times K \), \( B_i \) is the vector of \( K \times 1 \), \( K \) stands for the number of explaining variables, the average of error term \( U_{it} \) is 0, the variance is \( \sigma_u^2 \).

Here are three current models:

1. \( A_i = A_j, \quad B_i = B_j, \quad i \neq j, \quad i = 1, \ldots, n \quad t = 1, \ldots, T \)
2. \( A_i \neq A_j, \quad B_i = B_j, \quad i \neq j, \quad i = 1, \ldots, n \quad t = 1, \ldots, T \)
3. \( A_i \neq A_j, \quad B_i \neq B_j, \quad i \neq j, \quad i = 1, \ldots, n \quad t = 1, \ldots, T \)

Refer to 1, there is no unity difference on the cross section and no structure change, and we can get the coherence effective estimation of \( A \), \( B \) by OLS(Ordinary Least squares). Here the model can be intitled as mixed estimate model; it is equal to accumulating data of many periods as sample data.

Function 2 is intercept changeable regression model, and it has different intercept model with the different individual, it can be divided into two kinds: one is fixed effect model, and the other is random effect model. Due to the random effect model needs individual number more than the explaining number, meanwhile we consider the explaining number relative large in this paper, so we omit random effect, and adopting fixed effect model.

Function 3 is coefficient changeable regression model, it figured out regression coefficient of explaining variable preserved significant difference according to different individual, so we didn’t list this model into consideration in this paper.

Basing on the income conducting function of Chen Limin and Xie Huaizu (2004), we followed certain factor indexes in that paper, adding the factor of opening and labor productivity, and metamorphose each index properly, forming the following fixed effect regression model:

\[ \ln ICV_{it} = A_i + B_1 \ln FDI_{it} + B_2 \ln K_{it} + B_3 \ln OPEN_{it} + B_4 \ln LCV_{it} + B_5 \ln PrCV_{it} + u_{it} \quad (2) \]

On forum (2), \( B_1 \cdots B_5 \) stands for coefficient, \( i \) stands for area, \( t \) stands for time, \( A_i \) is fixed effect, \( u_{it} \)
is random error term.

3 Data resources and variable description

The data of each index in models in this paper respectively originated from Chinese Labor Statistic Yearbook, Chinese Statistic Yearbook, Zhejiang Statistic Yearbook, Jiangsu Statistic Yearbook, Shanghai Statistic Yearbook, the year are all from 1996 to 2005. In order to keep the data identity, this paper selected the 28 industries of manufacturing in the Yangtze Delta, and we expel craftwork and other manufacturing, abandoned resources and deposed material recycling processing industries which started to be measured from 2003, 2004, as well as other manufacturing which was measured before 2003.

Independent variable ICV is the variation coefficient which measures the income gap of manufacturing in the Yangtze Delta. There are many indexes which measure income gap, such as Gini coefficient, Theil index and residual expectation coefficient (Shang Weiping, 2003). However, these indexes have the problems of complex calculating, numerous workload and diverse results. Based on above indexes, this paper designed a new index reflecting income gap —— variation coefficient (CV), which can overcome the shortages of above indexes, and meanwhile meet the needs of our research. The formula of variation coefficient is: ICV = industrial labor reward standard deviation / industrial labor reward mean.

Explained variables includes FDI, K, OPEN, LCV and PCV. Here we add explained variables except for FDI aiming at controlling other possible factors which will affect income gap. FDI stands for the foreign direct investment stock. We use FDI stock to concern about the effects of income gap of manufacturing in the Yangtze Delta because it can not only figure out short-term effects but also its long-term effects (Chen, 1997). This paper limits research period from 1995 to 2004. Therefore we select the year 1994 as the start of FDI stock, adopting the method of Hall and Jones (1999), which the formula is FDI<sub>1994</sub> = <i>F</i><sub>1994</sub> / (<i>G</i><sup>1</sup> + &delta;). Here, FDI<sub>1994</sub> stands for the area FDI stock in 1994, <i>F</i><sub>1994</sub> stands for the area FDI in 1994, <i>G</i> stands for the area average GDP increasing rate from 1994 to 2004, &delta; seems 6% as depreciation rate (Hall and Jones, 1999), then we use Sustainable Saving methods formula to calculate: FDI<sub>(t)</sub> = FDI<sub>(t-1)</sub> - &delta;FDI<sub>(t-1)</sub> + <i>F</i><sub>(t)</sub>. In order to indentify the units, we exchange FDI into RMB according to chinese yearly exchange rate.

K stands for the domestic investment stock in the Yangtze Delta. The current year whole community fixed asset amount subtracts FDI induces the current year domestic investment amount. The calculation method of domestic asset stock amount is the same as the FDI.

OPEN stands for foreign trade dependence degree, which is measured as export and import amount account for GDP amount, here we exchange export and import amount into RMB, so as to precisely measure foreign trade dependence degree.

LCV stands for the coefficient of variation of working staff number., PrCV stands for the coefficient of variation of manufacturing labor productivity.

4 Regression result analysis

In view of the existense of different variance and autocorrelation, we get logarithm to each index, and adopt the method called “appear irrelevance regression” in fixed effect regression by Eviews4.0, which can self-correct different variance and self-correlation on cross section, and adopt alternating until constriency, ensuring parameter estimate until constriency, and through testing, it proved the correctness of using the fixed effect model.

Regression results is following:

<table>
<thead>
<tr>
<th>Explaining</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>T statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNFDI</td>
<td>-0.775448</td>
<td>0.119177</td>
<td>-6.506701***</td>
<td>0.0000</td>
</tr>
<tr>
<td>LNK</td>
<td>0.683164</td>
<td>0.037725</td>
<td>8.666755***</td>
<td>0.0000</td>
</tr>
<tr>
<td>LNOPEN</td>
<td>0.326955</td>
<td>0.037725</td>
<td>8.666755***</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

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<tr>
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</thead>
<tbody>
<tr>
<td>LNLVC</td>
<td>-0.250036</td>
<td>0.103177</td>
<td>-2.423378**</td>
<td>0.0241</td>
</tr>
<tr>
<td>LNPCV</td>
<td>0.023597</td>
<td>0.024523</td>
<td>0.962249</td>
<td>0.3464</td>
</tr>
<tr>
<td>R²</td>
<td>0.957946</td>
<td>Residual sum of square</td>
<td>0.050019</td>
<td></td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.944565</td>
<td>DW test statistic</td>
<td>2.165061</td>
<td></td>
</tr>
</tbody>
</table>

Note: **, *** respectively stands for variable coefficient which is significant different from zero above the level of 5% and 1%. To be precise, we omit the fixed effect standing for individual difference in model.

R² of fixed effect model reaches 0.9579, indicating each factor has achieve the explaining ability of income gap more than 95%, the DW value of is 2.165, at the significant level of 0.05, dₜ(=1.83)≤DW(=2.165) ≤4 - dₜ (=2.17), hence, we can think its non- autocorrelation at the significant level of 0.05 . What this research focuses on is the effect FDI affects the income gap. From Table 1, coefficient estimate value of FDI stock is -0.775, which indicates FDI stock has the widening effect on income gap of manufacturing in the Yangtze Delta, namely FDI stock increases by 1 percent, it will promote the decreasing of the significant level 0.775 percent of the income gap of manufacturing in the Yangtze Delta. This effect is quite significant, and from Table 1, the effects of FDI stock has been beyond those of other explaining variables. This outcome narrates to some extent the abundant inflowing of FDI in the Yangtze Delta, especially the input to manufacturing, has restrained the expending complexion of manufacturing income gap.

In this model, domestic capital stock K is a significant variable inferior factor to foreign investment. It will promote 0.683 percent of the income gap of manufacturing in the Yangtze Delta when increases 1 percent. The result indicates due to uneven distribution and overlapping investment of domestic capital cause industrial productivity efficiency gap, pricking up the uneven of inner manufacturing income gap. The coefficient of OPEN is 0.327, and it is quite significant, which indicates that foreign trade dependence degree accelerates the income gap of manufacturing in the Yangtze Delta. Namely OPEN increases by 1 percent, it will increasing 0.327 percent of the income gap of manufacturing in the Yangtze Delta.

The elasticity coefficient of LCV is -0.25, which indicates that the LCV can benefits to the reducing income gap inner manufacturing. It indicates the high income and high skilled industries demand for technicians in labor market manufacturing in the Yangtze Delta, which accords with the reality of the Yangtze Delta. Quite a lot employers require employees should be at least undergraduate students, even graduate student, by contrast, the demands for the below undergraduates is decreasing greatly. Although the income level of those high income industries is lower than those low ones, with the labor number of high income industries increases and the labor number of low income industries decreases, income gap will definitely tend to shorten among industries, thus the enlarging of working staff number difference of manufacturing in the Yangtze Delta can benefits to the reducing income gap inner manufacturing.

The coefficient of PrCV is not significant , and the elasticity coefficient is only 0.024. The above indicates the influences of PrCV is not as significant as we expect. It is likely to have two causes, one is the fewness of sample number, due to the limitation of data, we only get ten years’ unify manufacturing labor productivity data in the Yangtze Delta, indeed the short period of data cann’t prove absolutely; the other reason is that as a matter of fact this variable is not important. The author thinks the former explanation is more reasonable, and the only way to solve the problem is adding the yearly data to have embedded research in future.

5 Conclusions

This paper use the panel data from the Yangtze Delta between 1995 ~ 2004 to study the effect of FDI on the Income Gap of Manufacturing adopting fixed effects model. The data indicates FDI and the income gap of manufacturing in Yangtze Delta keep the similarly increasing tendency, and it seems to be the most important factor to widen the income gap among different industries. Nevertheless, the regression result shows the factors such as foreign trade dependence degree and domestic capital are enlarging the income gap, while FDI has positive effect on reducing the industrial income gap, it will decrease 0.775
percent of the income gap of manufacturing in the Yangtze Delta when increases 1 percent. Furthermore, FDI has the most significant effects. Just because of the effects the narrowing effects FDI has on the income gap of manufacturing in Yangtze Delta, we should encourage foreign investment on Yangtze Delta. Meanwhile we should broaden policy limitation, industry admittance and providing policy preference, and create a favorable system and policy environment. Refer to those advantageous but relative low income industries such as fabric industry, except for creating a favorable investment environment, we should fully absorb and take advantage of the technology and manage experience FDI brings, thus improve industrial producing efficiency and science and technology level, and benefit to promote industrial staff income level, and lessen the income gap with those high income industries.

Although the introducing of FDI can restrain the expending of income gap of manufacturing in the Yangtze Delta, from Figure 1 we can’t retort the reality of expending only depending on inflowing of FDI, there are many other factors influencing its income level. The empirical results make clear, domestic capital K is a factor just inferior to the effect of FDI, but the effects are opposite. Because no matter it is the whole nation or the Yangtze Delta, the main composition of investment originates from domestic investment. The imbalance of domestic distribution or misleading will result in expending of income gap. From that point, we should pay more attention to domestic effects, and lead its flowing direction and distribution among industries. Aggrandizing domestic investment to those low income industries, and improve its producing level can shrink the income gap among industries as well. Thus, under the background of China entering WTO, it is unnecessary to make great efforts to attract FDI, the wiser way is to create a favorable market environment, set up a perfect market system. Treat domestic and foreign investment equally in each industry, not only absorb foreign investment but also lead domestic capital reasonably, making the capital exert its advantage, and achieve the goal of shortening income gap.

References


