Stylized Facts about Manufacturing Outward Foreign Direct Investment and China's Premature Deindustrialization

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Abstract

In recent years, China's industrial structure has undergone tremendous changes. The continuous decline in the scale of the industrial sector indicates that China has entered the stage of deindustrialization, and China's deindustrialization has shown the characteristics of "premature". Through a large number of detailed analysis, this paper comes to the following conclusions: Firstly, the scale of manufacturing employment is positively correlated with the number and share of manufacturing outward foreign direct investment and the correlation between the share of manufacturing outward foreign direct investment and the scale of manufacturing employment will vary with the level of industrial development. Secondly, the number of manufacturing outward foreign direct investment, the average growth rate of manufacturing outward foreign direct investment and the average growth rate of manufacturing outward foreign direct investment share are all positively correlated with the decreasing rate of manufacturing employment scale.

Keywords: outward foreign direct investment; manufacturing; premature deindustrialization

The industrial development usually follows a hump shape path. In the initial stage of economic growth, the primary product sectors such as agriculture are gradually shrinking, while the industrial sector is expanding rapidly. As the per capita income level con-

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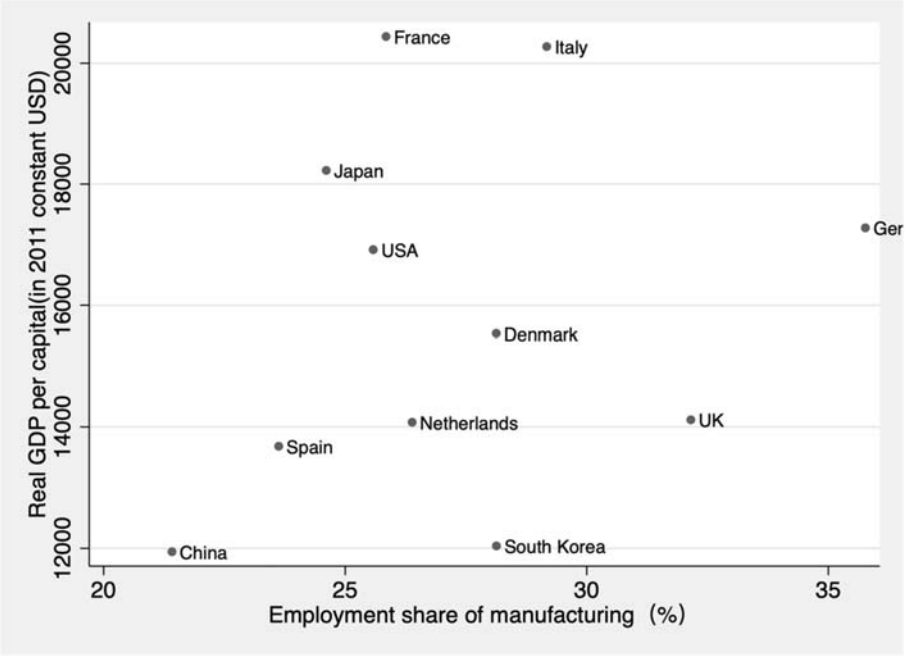
tinues to increase, when the degree of industrialization gradually reaches a certain level, the share of industrial output or employment begins to continue to decline. A country is considered to have embarked on the deindustrialization phase when its share of industrial or manufacturing employment peaks. Compared with the early industrialized developed countries, China's deindustrialization has shown the characteristics of "premature", that is, when deindustrialization occurs, the country's industrial or manufacturing scale and economic development level are still at a relatively low level. According to the World Bank's standards, China's per capita GDP has not reached the level of developed countries, and it belongs to the middle-income level. The turning point occurred during this period, indicating that China's deindustrialization can be regarded as premature deindustrialization.

1. Stylized facts on China's premature deindustrialization

Figure 1 shows the share of manufacturing employment and the real GDP per capita (in 2011 constant USD) in China and some developed countries at the time of deindustrialization, it can be seen from the figure that when China enters the stage of deindustri-



Date source：CSMAR database

Figure 1: Scatter plot of real GDP per captial and peak manufacturing employment share of selected country

Table 1: The scale of manufacturing employment and real GDP per capita at the beginning of deindustrialization in some provinces of China

Provinces	Year	Peak manufacturing employment share	Real GDP per capita (in 2000 constant RMB)
Shanghai	2012	0.39	120057.4
Tianjin	2011	0.42	85231.75
Guangdong	2013	0.51	55797.72
Zhejiang	2008	0.43	35748.12
Jinlin	2013	0.26	31393.32
Henan	2016	0.32	29313.49
Jiangsu	2007	0.44	28546.71
Hainan	2013	0.11	28044.87
Jiangxi	2016	0. 3	28010.29
Beijing	2005	0. 2	39723.418
Anhui	2016	0.24	27137.83
Hubei	2011	0.29	25494.21
Fujian	2006	0.51	22177.94
Shandong	2006	0.38	20279.1
Hunan	2011	0.23	20059.54
Liaoning	2005	0. 3	19119.82
Qinghai	2011	0. 2	18886.07
Sichuan	2011	0.23	17747.74
Guangxi	2012	0. 2	17276.86
Heilongjiang	2005	0.21	14171.12
Hebei	2005	0.24	13049.3
Shanxi	2007	0. 2	12541.67
Yunnan	2009	0.19	11051.16
Ningxia	2007	0.19	10363.9
Shanxi	2005	0.26	7961.51
Gansu	2005	0.23	6387.284
Neimenggu	2005	0.18	5871.794
Chongqing	2005	0.25	5157.315
Guizhou	2005	0. 2	4363.299

Note:1.In this paper, there are two sense of manufacturing scale change can be viewed as deindustrialization : The first, from 2005 to 2020, when the share of manufacturing employment continues to decline for a period of time; the second,even if it rises, but it does not exceed the highest value of the previous stage. 2 .Some provinces,such as Beijing and Heibei,have seen their scale of manufacturing begin to decline in the late 1990s, table 1 takes the highest point of these provinces during the investigation period as the peak manufacturing employment share.3.Date source:National Bureau of Statistics of the People's Republic of China

alization, the scale of manufacturing employment and per capita income are much lower than those of developed countries such as Japan and the United Kingdom.

From regional perspective, China's regions are affected by differences in resource endowments, geographical and cultural environments, and economic development foundations, leading to significant differences in industrial development among regions. On average, the scale of manufacturing in the eastern coastal areas is relatively large, while in the central and western region it is relatively small.

It can be found from Table 1 that although the actual per capita income level of the southeastern coastal provinces at the beginning of deindustrialization is much higher than that of the provinces in the central and western regions, most of them are still lower than the level of income of early industrializers at the same stages. In addition, figure 2 shows that the provinces in the southeast coastal regions are not only starting to deindustrialize at relatively high levels of income, but also are able to build a large industry sectors such like the peak manufacturing employment share of Zhejiang province was about 43% and about 51% in Guangdong province. When the other provinces entered the deindustrialization stage, the average per capita income level and the employment scale of the manufacturing was much lower than that of the eastern provinces. We can con-

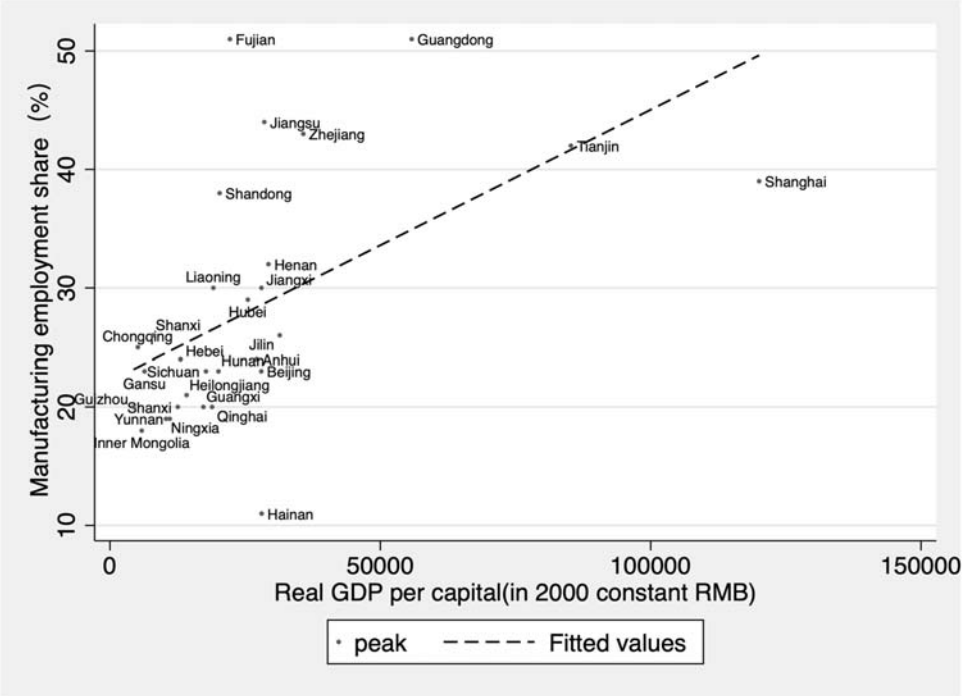


Figure 2: Scatter plot of real GDP per capital and peak manufacturing employment share in selected provinces of China

clude that the premature deindustrialization is common in the regions with different economic development level in China.

2. Stylized facts on China's manufacturing outward foreign direct investment

Manufacturing outward foreign direct investment（OFDI）is an important component of OFDI in China, and its share of the total OFDI remained stable at about 20 per cent between 2005 and 2020.From the regional distribution of manufacturing OFDI, there are obvious differences between different regions of China. China's manufacturing OFDI is mainly concentrated in Beijing, Guangdong, Zhejiang and Shanghai, the average number of manufacturing OFDI from 2005 to 2020 is about 48.3, 39.5, 28.3 and 27 respectively. The provinces with the least manufacturing OFDI are Tibet, Guizhou and Qinghai, and the average number of manufacturing OFDI（from2005 to 2020）is only 0.125, 0.125 and 0.25. It is worth noting that regions where manufacturing OFDI is relatively concentrated does not mean that the share of manufacturing OFDI in all OFDI（calculated based on the

Table 2: Average number and share of manufacturing OFDI（2005-2020）in some provinces of China

Provinces	Average number of manufacturing OFDI	Average share of manufacturing OFDI	Provinces	Average number of manufacturing OFDI	Average share of manufacturing OFDI
Shanghia	27.063	0.194	Jiangsu	23.250	0.312
Yunan	0.875	0.210	Jiangxi	2.688	0.362
Inner Mongolia	1.375	0.299	Hebei	6.750	0.433
Beijing	48.313	0.166	Henan	4.188	0.427
Jilin	2.625	0.527	Zhejiang	28.313	0.336
Sichuan	5.625	0.343	Hainan	1.313	0.094
Tianjin	3.313	0.301	Hubei	5.563	0.320
Ningxia	0.500	0.283	Hunan	5.375	0.436
Anhui	8.063	0.553	Gansu	0.875	0.204
Shandong	21.563	0.413	Fujian	6.875	0.241
Shanxi	1.438	0.450	Guizhou	0.125	0.094
Guangdong	39.500	0.224	Liaoning	6.125	0.438
Guangxi	1.188	0.327	Chongqing	6.000	0.548
Shanxi	2.188	0.320	Qinghai	0.250	0.188
Heilongjiang	0.938	0.236			

Date source: The data were compiled by the author according to BvD-Zephyr database and fDi-Markets database.

number of investments) is also relatively high. In the past fifteen years, the provinces with a higher average share of manufacturing OFDI are Anhui (about 55%), Chongqing (about 54%) and Jilin (52%), while the average proportion of manufacturing OFDI in Beijing is only 16%, only 22% in Guangdong province and 19% in Shanghai. (See Table 2 for details).

3. China's manufacturing OFDI and premature deindustrialization

In the past decade, affected by the rapid rise of labor, land and environmental protection costs, some enterprises have chosen to transfer domestic factories and production lines to abroad such as Southeast Asia to alleviate the pressure caused by the rise of production costs. As a necessary way for enterprises to produce overseas, OFDI is closely related to the declining of the scale of domestic manufacturing sectors. In terms of industry distribution, China's manufacturing OFDI is mainly concentrated in basic metals and metal products manufacturing, machinery and equipment manufacturing, radio and television and communication equipment manufacturing, automobile, trailer and semi-trailer manufacturing and other sub-sectors. At the same time, the data on the average number of workers employed by industrial enterprises above designated size shows that the employment in industrial enterprises (above designated size) continued to rise from 2005 to 2014, and then began to decline. By 2019, the average number of workers employed by industrial enterprises (above designated size) had decreased by 20,481,300. Among them, the average number of employees in the basic metals and metal products industries fell by up to about 2.449 million, and the average number of employees in other industries where OFDI is concentrated has also seen a significant decline.

In addition to above direct relationship, there is an indirect link between manufacturing OFDI and the scale of manufacturing sectors. Some studies believe that OFDI may crowd out domestic investment through methods such as tightening liquidity (Yang, 2019).Taking Shanghai as an example, Table 3 lists the investment completion value of selected manufacturing industries in Shanghai's Pudong New Area from 2009 to 2019 and the share of selected industries OFDI in the total manufacturing OFDI in Shanghai. Overall, investment completion value in the manufacturing sector showed an upward trend, rising from 19.87 billion yuan to 39.826 billion yuan in 10 years, while most OFDI intensive industries showed a downward trend in investment completion value, and compared with the industries with small share of OFDI, the industries with high OFDI share had a greater decline in investment completion value from 2014 to 2019.

Table 3: Investment completed value and OFDI share of selected industries in Pudong New Area, Shanghai

	2009		2014		2019	
Industries	Investment completed value (100 million yuan)	OFDI share (%)	Investment completed value (100 million yuan)	OFDI share (%)	Investment completed value (100 million yuan)	OFDI share (%)
Basic metals and metal products manufaturing	4.6	0	5.72	10	0.97	1.96
Food manufacturing	3.4	3.92	1.34	12	1.83	7.84
Machinery and equipment manufacturing	30.33	3.92	37.35	7	32.03	5.88
Electrical machinery manufacturing	14.521	0	8.22	1	5.18	1.96
Pharmaceutical manufacturing	5.3	0	31.33	15	8.89	11.76
Manufacturing	198.7	100	303. 8	100	398.26	100

Note:1. Due to the lack of data on industrial investment completed value in manufacturing subsectors in Shanghai, this table uses the data of Pudong New Area, which has the largest industrial output value in Shanghai.2. Date source: Shanghai Pudong New Area Statistical Yearbook

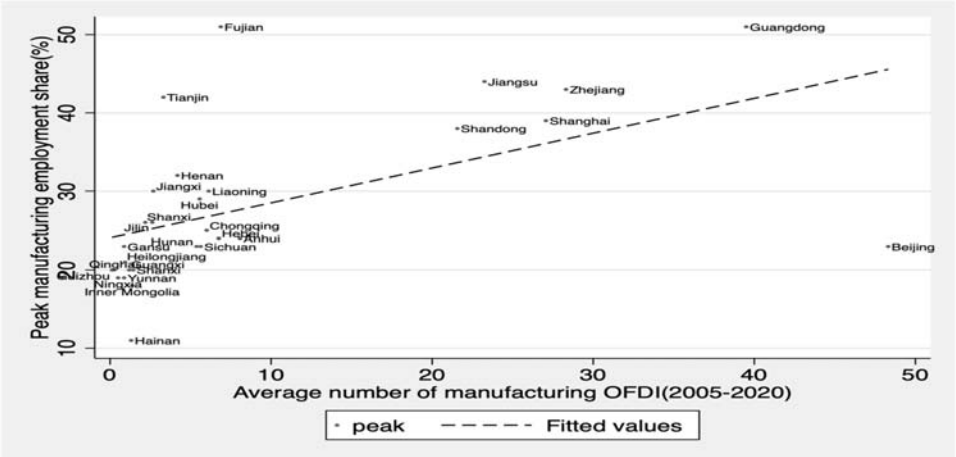


Figure 3: Scatter plot of the average number of manufacturing OFDI and the peak manufacturing employment share

Figure 3 is a scatter plot of the average number of manufacturing OFDI and the peak manufacturing employment. The fitting line in the figure is inclined to the upper right, which indicates that the higher the level of industrialization, the higher the level of manufacturing OFDI, and the number of manufacturing OFDI in regions with high levels of industrialization is much higher than regions with lower levels of industrialization. The possible reasons for this are: First of all, regions with higher manufacturing development levels tend to have higher overall OFDI levels, and manufacturing OFDI as a part of them will naturally be higher. Second, manufacturing costs tend to rise faster in more industrialized regions, making it more possible for local manufacturing firms to deploy their production overseas via OFDI to reduce production costs.

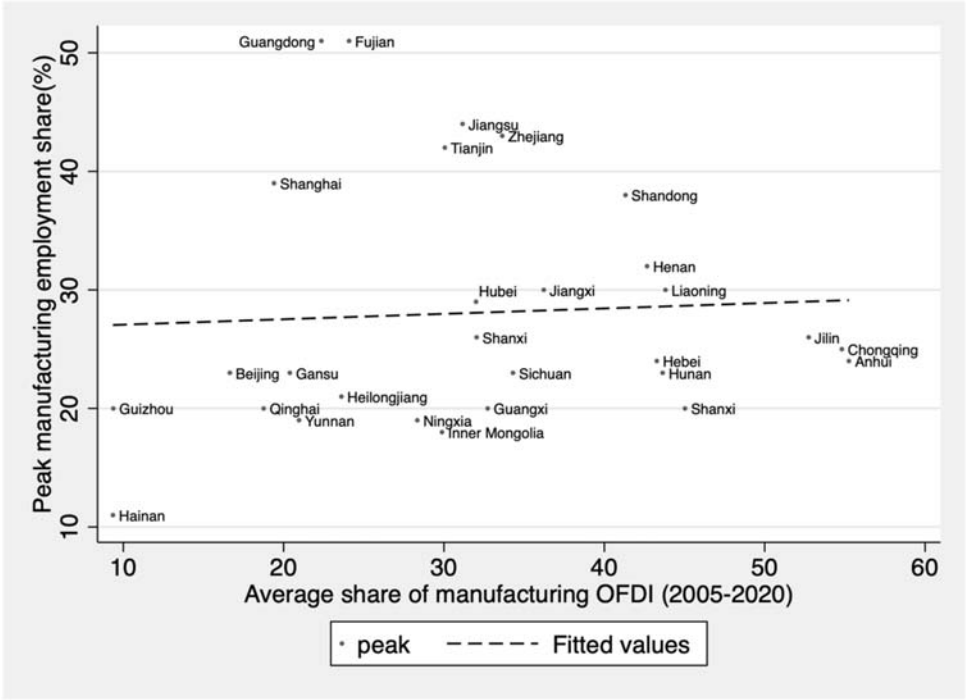


Figure 4: Scatter plot of the average share of manufacturing OFDI and the peak manufacturing employment share

Figure 4 illustrates the relationship between the average manufacturing share and the peak manufacturing employment share. Although the fitting line slopes upward, it tends to be flat, which indicates that the positive correlation between the share of manufacturing OFDI and the scale of manufacturing employment is not obvious. When we carefully observe the data distribution in the figure, we can find that in regions with large manufacturing sectors（where peak manufacturing employment share accounts for more than

30%), the share of manufacturing OFDI is negatively correlated with the level of industrialization, for example, in Guangdong and Fujian provinces, the share of manufacturing employment is as high as about 50% and the average manufacturing OFDI share is only about 21%, while in Shandong and Henan provinces, the scale of manufacturing employment is relatively small, but the average manufacturing OFDI is more than 40%. In the regions with small manufacturing scale, there is a positive correlation between OFDI and employment scale: provinces with high manufacturing OFDI, such as Jilin Province (about 53%), the peak employment share of manufacturing industry is about 26%, while provinces with lower levels of manufacturing OFDI, such as Hainan province (about 9%), its share of manufacturing employment peaked at just 11 per cent.

In order to further study whether the difference in the level of industrialization will cause the difference in the correlation between the share of manufacturing OFDI and the scale of employment in the manufacturing sectors, this part draws the scatter plots of manufacturing OFDI share and manufacturing employment in regions with high industrial development level (the peak level of employment is more than 30%) and regions with low industrial development level. The distribution of data and the downward trend of fit-

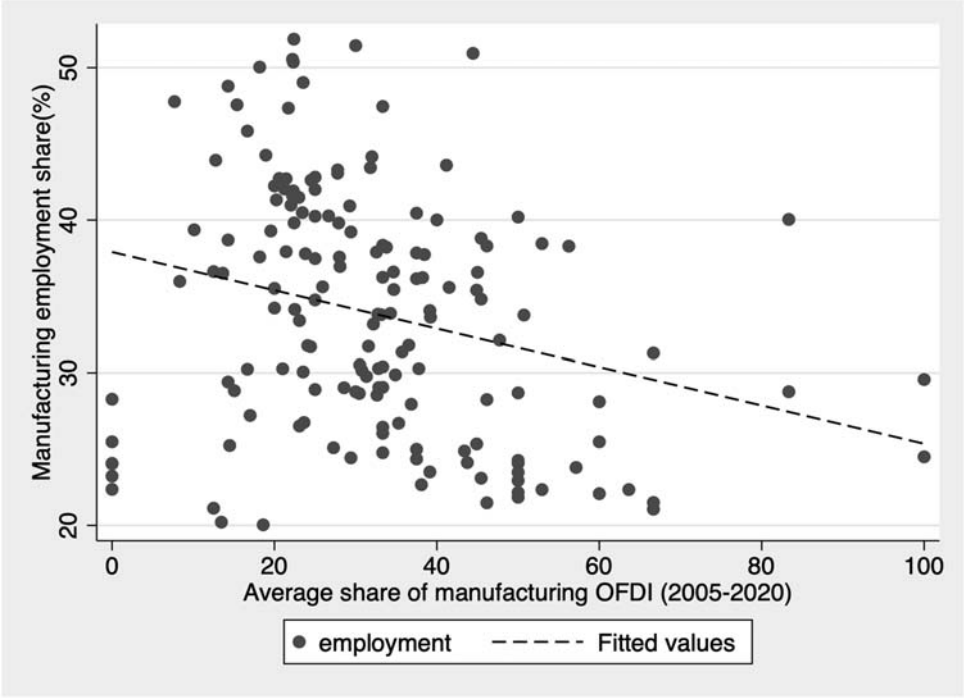


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Figure 5: Scatter plot of the share of manufacturing OFDI and the manufacturing employment share in high industrialized regions

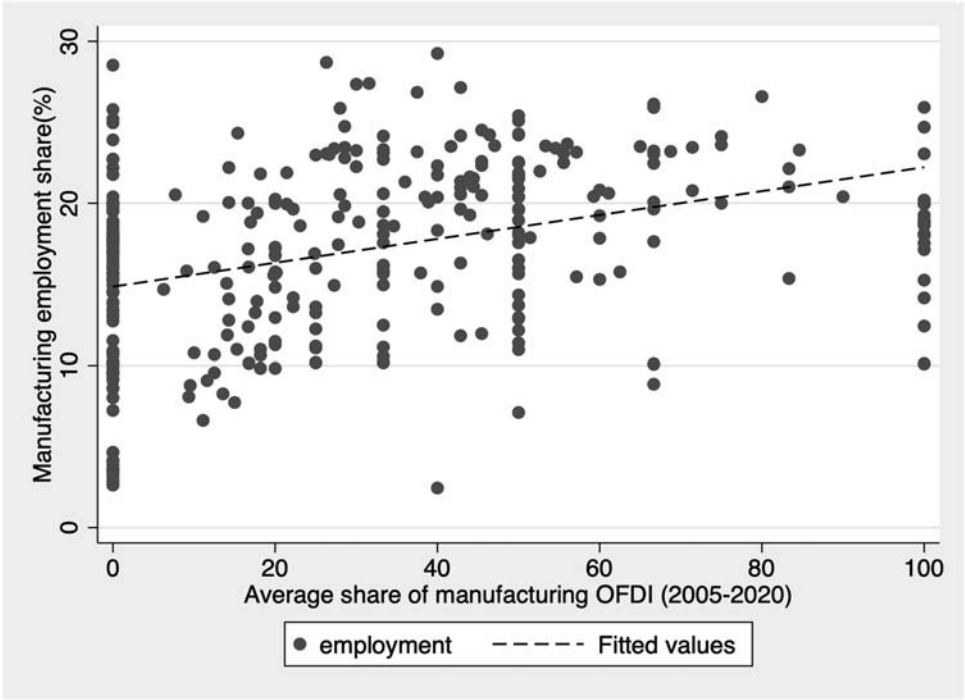

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Figure 6: Scatter plot of the share of manufacturing OFDI and the manufacturing employment share in low industrialized regions

ting lines in figure 5 show that in regions with a high level of industrialization, the higher the share of OFDI in manufacturing, the smaller the size of manufacturing employment, that is, the increase in the share of manufacturing OFDI will lead to a greater degree of deindustrialization. Figure 6 shows that in less industrialized regions, manufacturing employment scale increases as the share of manufacturing OFDI increases.

The above part proves the correlation between manufacturing OFDI (including the number and share of manufacturing OFDI) and the employment scale of manufacturing, but at the same time, the rapid reduction of industrial sector is one of the feature of premature deindustrialization in China. From 2005 to 2020, the average annual increase in the value-added share of China's service sectors was about 0.88 percentage, rising rapidly from 41.3% in 2005 to 54.5% in 2020, while the proportion of industrial added value decreased from 42% in 2006 to 30.8% in 2020, with an average annual decline of more than 1.3 percentage points. Furthermore, compared with other developing countries in the world, the proportion of service industry output in developing countries such as India and Latin America increased by an average of 7 percentage points between 1985 and 2014,

while the proportion of China's service sectors output increased by 21.3% during this period (Wei,2019). Therefore, this section further analyzes the correlation between OFDI in manufacturing and the rate of decline in manufacturing employment share. The rate of decline is calculated by averaging decrease of manufacturing employment share from the year when the manufacturing employment share in each province reaches its peak to 2020, for example, the share of manufacturing employment in Zhejiang Province reached

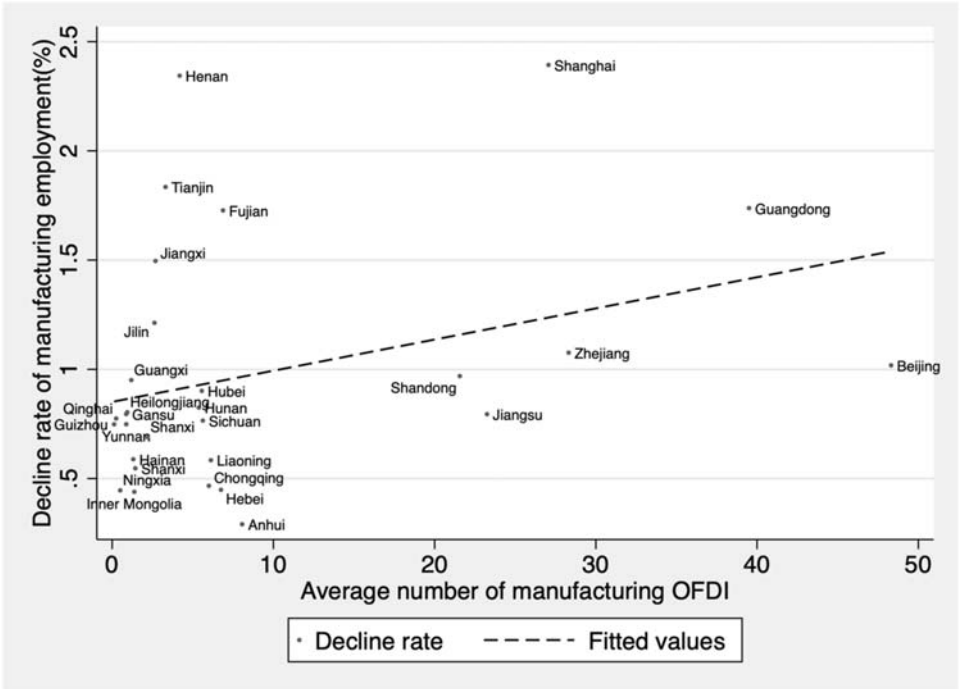
Table 4: Change rate of manufacturing employment scale and manufacturing OFDI in some provinces of China

Provinces	Rate of decline in manufacturing employment scale	Average growth rate of manufacturing OFDI	Average growth rate of manufacturing OFDI share
Shanghai	2.393	45.276	15.194
Yunan	0.749	−37.037	−20.741
Inner Mongolia	0.439	101.111	−5.951
Beijing	1.018	8.122	−2.212
Jilin	1.213	23.571	−10.529
Sichuan	0.765	8.862	−1.56
Tianjin	1.835	40.444	1.531
Ningxia	0.446	−25	−35.556
Anhui	0.291	35.167	7.812
Shandong	0.969	32.602	9.47
Shanxi	0.547	16.071	−1.753
Guangdong	1.738	12.803	0.168
Guangxi	0.951	−31.667	10.667
Jiangsu	0.795	32.519	8.546
Jiangxi	1.496	5.076	−19.486
Hebei	0.448	37.463	12.472
Henan	2.344	31.071	14.494
Zhejiang	1.076	19.364	2.109
Hainan	0.588	−56.818	−53.042
Hubei	0.901	11.752	13.696
Hunan	0.825	38.345	47.485
Gansu	0.795	−14.583	−17.411
Fujian	1.727	30.516	16.708
Guizhou	0.748	−50	0
Liaoning	0.584	38.743	64.59
Chongqing	0.467	54.84	10.689
Shanxi	0.689	50.139	32.524
Qinghai	0.775	−50	−50
Heilongjiang	0.803	−35	−34

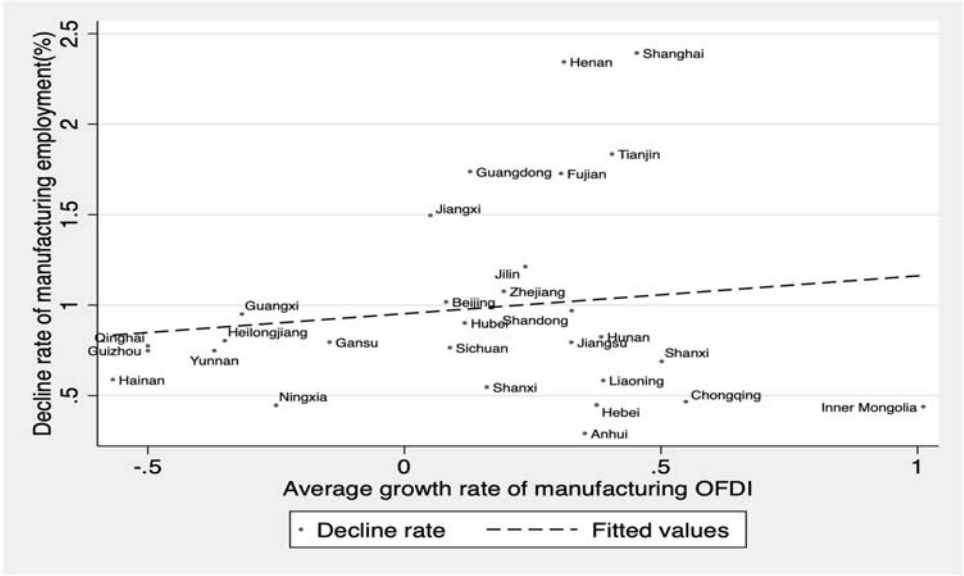
a peak of 43% in 2008. By 2020, the share of manufacturing employment is about 30%, which means a decrease of 13% in 12 years. Therefore, the rate of decline in the scale of manufacturing employment in Zhejiang Province is 1.08% per year.

Table 4 lists the decline rate of manufacturing employment scale, manufacturing OFDI and its share in China's provinces. It can be seen from table 4 that Shanghai, Henan and Tianjin are the regions with the fastest decline in manufacturing employment scale and the regions with the smallest decline rate are Anhui, Inner Mongolia and Ningxia. Although, on average, the higher the level of economic development, the faster the reduction of manufacturing employment scale, the decline rate of manufacturing employment scale in some provinces such as Henan and Jilin is significantly higher.

Figures 7 and 8 are the scatter plot of the rate of decline in manufacturing employment with the average number of manufacturing OFDI and the average growth rate of manufacturing OFDI. It can be seen from the figures that both the manufacturing OFDI and its rate of increase are positively related to the scale of manufacturing employment, that is, the increase in the number of manufacturing OFDI will accelerate the process of deindustrialization.



Figures 7: Scatter plot of the rate of decline in manufacturing employment with the average number of manufacturing OFDI



Figures 8: Scatter plot of the rate of decline in manufacturing employment with the average growth rate of manufacturing OFDI

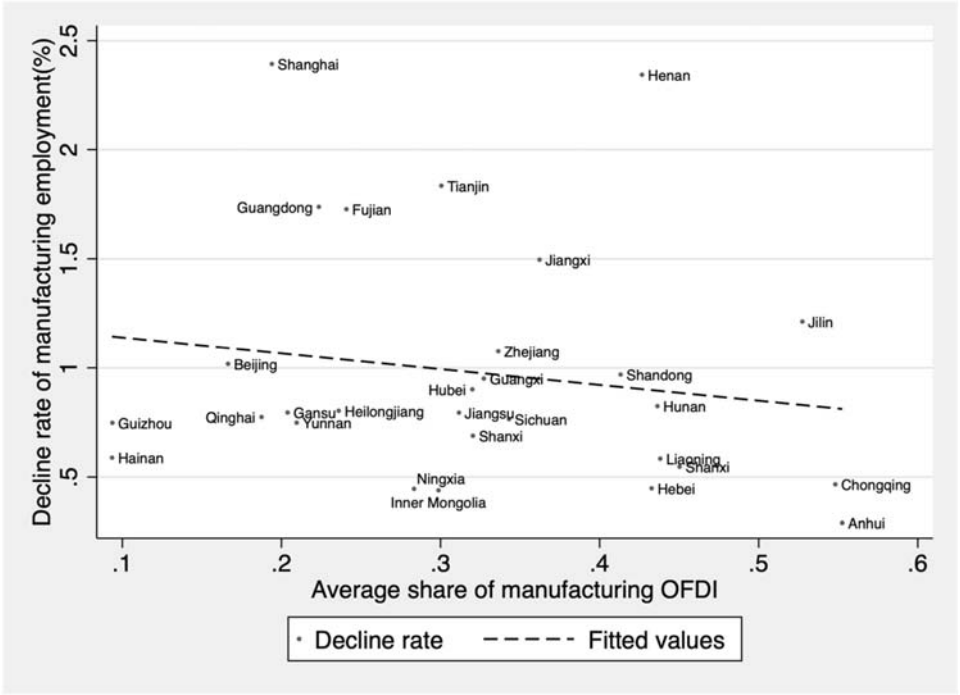


Figure 9: Scatter plot of the rate of decline in manufacturing employment with the average share of manufacturing OFDI

Figures 9 and 10 are the scatter plot of the rate of decline in manufacturing employment with the average share of manufacturing OFDI and the average growth rate of manufacturing OFDI share. From the figures, we can find that although the scale of manufacturing employment and the share of manufacturing OFDI are negatively correlated, this may be due to the heterogeneity of industrialization level, however, it is positively correlated with the average growth rate of manufacturing OFDI share, which indicates that the faster the increase in manufacturing OFDI share, the faster the decline in manufacturing employment scale.

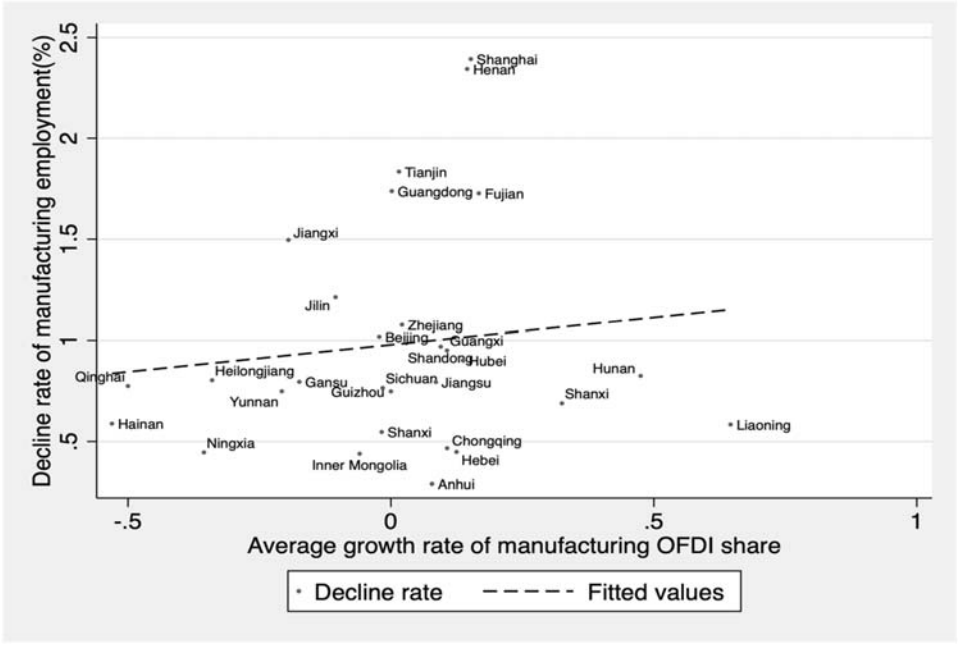


Figure 10: Scatter plot of the rate of decline in manufacturing employment with the average growth rate of manufacturing OFDI share

Conclusion

Rapid convergence on developing economies has historically required a well-developed and strong industrial sector. However, China as the largest developing country, it's industrial sector still has problems such as uneven development among regions and lack of core technologies, premature deindustrialization may restrict the sustainable development of China's industry and even the whole economy. In recent years, a growing number of Chinese manufacturing companies have invested overseas for the purpose of seeking technology and markets or reducing costs, however, the home country economic effects of

OFDI have been controversial. So what kind of correlation exists between manufacturing OFDI and China's premature deindustrialization？Through a large number of detailed analysis, this paper comes to the following conclusions: Firstly, premature deindustrialization has appeared in most regions of China. Secondly, this paper proved that the scale of manufacturing employment（peak）is positively correlated with the number and the share of manufacturing OFDI from the industry level and province level. Moreover, the correlation between the share of manufacturing OFDI and the scale of manufacturing employment will vary with the level of industrial development: In regions with higher levels of industrialization, the greater the share of manufacturing OFDI, the lower the scale of manufacturing employment, and in regions with lower levels of industrialization, the greater the share of manufacturing OFDI, the greater the manufacturing employment scale. Finally, this paper further examines the correlation between the rate of decline in manufacturing employment and manufacturing OFDI, the results show that the number of manufacturing OFDI, the average growth rate of manufacturing OFDI and the average growth rate of manufacturing OFDI share are all positively correlated with the decreasing rate of manufacturing employment scale.

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