Research on Free Trade Zone and Industrial Structure Upgrade -- Empirical Research based on Chinese Provincial Panel Data

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Abstract. Industrial structure upgrading is of great significance to continuous growth of economy, establishing Free Trade Zones(FTZs) as an important space-oriented industrial policy space carrier, leading regional industrial structure upgrade .This paper uses panel data from 31 provinces (autonomous regions and municipalities) in mainland China from 2000 to 2015, makes an empirical analysis of the industrial structure upgrading effect of FTZs, it is found that the rationalization effect of the industrial structure of China's free trade zone is significant, the effect of advanced industrial structure is not significant; In the east, the rationalization effect of the industrial structure of the free trade zone is significant, in the Midwest, the industrial structure of the free trade zone has a significant effect on the advanced nature.

Keywords: Free Trade Zone; Rationalization of industrial structure; Optimization of the industrial structure.

1. Introduction

The economic transformation under the slowdown of economic growth is a major challenge that the Chinese economy must face today, the core of economic transformation lies in the upgrading of industrial structure. Establishing FTZs as an important measure to lead the transformation of the local economy, the industrial function of the park is transformed from the development of bonded logistics, international trade and export processing industries to the development of tertiary industries with finance, shipping, commerce, culture, professional and social services, it plays an important role in promoting the upgrading of local industrial structure.

The liberalization of global economic trade has promoted the rapid development of free trade zones, the establishment of a free trade zone as an important measure for the government to develop the local economy is self-evident for the importance of economic development. Domestic and foreign scholars have conducted a lot of research on the economic performance of FTZs, Chen et al. (2016) empirically analyzed the role of export processing zones in promoting export trade. The consistency of export processing zones and local leading industries will strengthen this role; Cao Xuping (2015) believes that the institutional innovation of the Shanghai Free Trade Zone will form an overflow of the Yangtze River Delta region and drive innovation and optimization of the regional industrial value chain; Zhao Lan and Chang Wei (2008) empirically examined the impact of import and export trade activities in the bonded area on the hinterland economy.

2. Research Design

2.1 Model Setting

In order to empirically test the industrial structure upgrading effect of the FTZ, this paper constructs the following measurement model:

$$\ln Indu_{it} = \alpha + \beta \ln FTZ_{it} + \eta X_{it} + \upsilon_i + \nu_t + \varepsilon_{it}$$

Where subscripts i and t represent regions and years, α is a constant term, υ_i and ν_t represent unobservable individual fixed effects and time fixed effects, ε_{it} is a random error term; Indu is the industrial structure upgrade; FTZ is the scale of free trade zones; X is a collection of control variables,

including economic development level, foreign investment level, trade openness, technological innovation level and fiscal decentralization.

2.2 Variable Description

This paper selects 31 provinces (autonomous regions and municipalities) in mainland China from 2000 to 2015 as research objects. The data comes from the 2001-2016 China and Provinces Statistical Yearbook and compilation of statistics on the 60 years of New China. The variables are set as follows:

Explained variable: Indu is industrial structure upgrade. Drawing on the research of Gan Chunhui et al. (2011), select industrial property rationalization (Indus_TL) and industrial structure advanced (Indu_TS) indicators to measure industrial structure upgrade, using the Theil index to measure the rationalization of the industrial structure, the calculation formula is as follows:

$$Indu\_TL_{it} = \sum_{k=1}^{3} \left(\frac{Y_{itk}}{Y_{it}} \right) \ln \left(\frac{Y_{itk}}{L_{itk}} \bigg/ \frac{Y_{it}}{L_{it}} \right)$$

Among them, Y_{itk} represents the total output value of the k-th industry in the t-year, Y_{it} represents the total output value of all industries in the t-year, L_{itk} represents the total number of employees in the k-th industry in the t-year, and L_{it} represents the total number of employees in all industries in the i-year, k represents the kth industry.

Explanatory variables: FTZ represents the size of the free trade zone, drawing on the research of Zheng et al. (2016), the area of the FTZ is chosen to measure. The list data is from the China Development Zone Network and the year and area are confirmed based on the park list.

Control variables: (1) rgdp indicates the level of economic development, using per capita GDP to indicate the level of economic development, per capita GDP is the actual value expressed in 2000 constant prices; (2)tech represents the level of technological innovation, the ratio of the number of domestic patent applications accepted to the national average indicates the level of technological innovation. (3) FDI indicates the level of foreign investment, use the ratio of the total investment of foreign-funded enterprises to GDP to express the level of foreign investment; (4) open indicates trade openness, this paper selects the proportion of total imports and exports as a percentage of GDP to indicate trade openness; (5) gov indicates fiscal decentralization, the ratio of the total fiscal revenue and expenditure/GDP of the local finance to the total fiscal revenue and expenditure/national GDP is used to indicate fiscal decentralization.

Table 1. Statistical description of the main variables

Variables	Sample number	Average	Standard deviation	Minimum	Maximum
Indu_TL	496	1.782	0.483	1.085	4.494
Indu_TS	496	0.995	0.481	0.497	4.035
FTZ	496	8.467	12.664	0.000	75.640
rgdp	496	18502.120	12468.590	2758.934	62899.920
tech	496	1.000	1.356	0.002	7.771
fdi	496	0.550	0.682	0.058	7.483
open	496	0.424	0.533	0.037	2.529
gov	496	2.193	1.265	0.971	10.753

3. Empirical Analysis

3.1 Basic Analysis

As shown in table 2, the regression coefficient of the free trade zone scale (lnFTZ) is significantly negative in the industrial structure rationalization equation, and is not significant in the industrial

structure advanced equation. This shows that the rationalization effect of the industrial structure of the FTZ is obvious, and the advanced effect of the industrial structure is not obvious.

Table 2. Baseline estimation results

	Indu_TL		Indu_TS	
	(1)	(2)	(3)	(4)
lnFTZ	-0.00319*	-0.00406**	-0.00234	0.00179
	(-1.87)	(-2.43)	(-0.88)	(0.81)
lnrgdp		0.201***		-0.819***
		(4.99)		(-15.47)
lntech		-0.0717***		0.0705***
		(-5.02)		(3.75)
lnFDI		-0.00133		-0.00737
		(-0.08)		(-0.34)
lnopen		-0.0271		-0.0463**
		(-1.52)		(-1.97)
lngov		0.0733		-0.110
		(1.29)		(-1.47)
C	0.526***	-1.396***	-0.0175	7.277***
	(28.51)	(-3.87)	(-0.61)	(15.34)
Individual effect	Yes	Yes	Yes	Yes
Time effect	Yes	Yes	Yes	Yes
Sample number	496	496	496	496
R2	0.416	0.473	0.290	0.541
F test	61.76***	27.15***	79.24***	68.09***
Hausman test	48.91***	53.87***	83.44***	300.98***

Note: ***, **, and * indicate significant levels of significance at 1%, 5%, and 10%, respectively, and T values in parentheses. The table below is the same.

3.2 Regional Heterogeneity Analysis

In order to further analyze the impact of FTZ in different regions on the upgrading of industrial structure, we divide the sample into Eastern and Midwest for estimation. The results are shown in Table 3, the regression results of the free trade zone scale (lnFTZ) show that, in the eastern region, the rationalization effect of the industrial structure of the free trade zone is significant, in the central and western regions, the industrial structure of the FTZ has a significant effect on the advanced nature.

Table 3. Regional heterogeneity estimation results

	Indu_TL		Indu_TS	
	Eastern	Midwest	Eastern	Midwest
lnFTZ	-0.0155***	-0.00670	-0.00319	0.00612**
	(-4.41)	(-1.21)	(-1.53)	(2.38)
C	-0.589	6.230***	-1.726***	5.190***
	(-1.22)	(8.21)	(-2.65)	(6.49)
Control variable	Yes	Yes	Yes	Yes
Individual effect	Yes	Yes	Yes	Yes
Time effect	Yes	Yes	Yes	Yes
Sample number	176	320	176	320
R2	0.716	0.735	0.477	0.565

4. Summary

This paper empirically analyzes the industrial structure effect of FTZs by using panel data of 31 provinces and cities from 2000 to 2015. The empirical results show that the rationalization effect of the industrial structure of China's FTZ is significant, and the advanced effect of industrial structure is not significant; in the eastern region, the rationalization effect of the industrial structure of the free trade zone is significant; in the central and western regions, the industrial structure of the free trade zone has a significant effect on the advanced nature.

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