Does the opening of the service sector have any impacts on the industrial upgrading in Jiangsu province?

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Abstract: since 2015, service sector has been the largest part of Jiangsu province’s economy. Under the New Normal economic situation in China since 2010, Jiangsu province is in urgent need of upgrading its industrial structure. Firstly this paper analyzes the opening level in Jiangsu province’s service sector from the aspects of the foreign direct investment and the service trade. Then we analyze empirically the impacts of the opening level in the service sector on upgrading it’s industrial structure based on the VAR model by on the samples from 1995-2015. In conclusion, (1)We find that the opening level in Jiangsu province’s service sector in the aspects of foreign direct investment and service trade is not very high. (2)The openness in Jiangsu’s service trade has some positive impacts on the industrial structure upgrading to some extent but not very remarkable. (3)The positive impacts on Jiangsu’s industrial structure upgrading by the shock of openness to foreign direct investment is stronger and last longer than that by the shock of openness to service trade. In the end, it is suggested that Jiangsu province should continue its opening-up in the service sector, especially to promote the efficiency of utilizing foreign direct investment and developing its service trade.

1. Introduction

After more than 30 years’ high-speed development, since 2010 the economy of China has been presenting a series of new characters, such as the economy growth at medium speed, accelerating the upgrading of economic structure, the transformation of to the innovative-driven economic growth pattern, which have been called “the New Normal”. From the objective pressure or the necessity of economy transformation subjectively, the New Normal of Chinese economy proposes the importance of developing service industry. Jiangsu province, scarce in natural resource per capita and high in population density, has always depended on the export-oriented economy mainly to develop its economy. So, under the circumstance of the New Normal economy, it is a pressing matter of the moment of maintaining its strong economy for Jiangsu province to upgrade the industrial structure and develop its economy. So it is very important and necessary to find the way of how to develop the service industry and make use of the opening in the service sector to improve Jiangsu province’s industry structure and economy.

2. Literature Review

Some local scholars have studied the impacts of the service industry from the aspects of foreign direct investment (FDI) and service trade on upgrading the industrial structure and the economy growth.
Liu and Lian (2006) analyzed the impacts of the outsourcing of service industry on the host country’s industrial structure. They found that it was beneficial for the host countries’ upgrading industrial structure by undertaking the service outsourcing, but there was limited impact on promoting the quality of the service outsourcing industry undertaken abroad\[6\]. Yang (2010) studied the ways to upgrade the industrial structure of the “catch-up” countries and thought that China should promote and accelerate the liberalization and opening of the service industry to upgrade the industrial structure\[8\]. Xia (2008) found the service industry and the economy growth, the industrial structure of Zhejiang province will affect each other positively\[5\].

Wu, Zhang (2009) found the service trade promoted the industrial structure through the mediating role of the human capital accumulation and physical capital accumulation and technology progress to positively promote the industrial structure\[9\]. Zhu (2017) empirically used system Gaussian Mixture Model method to study the impacts of two-way FDI on the upgrading of manufacturing industrial structure, based on the relevant provincial panel data of two-way FDI and manufacturing industry during the period from 2000 to 2013, and found that the inflow FDI was beneficial to the industry structure upgrading while the marginal impacts was decreasing, presenting a upside down “U” model wholly. She also found that outflow FDI has outstanding impacts on the manufacturing sector structure improvement; and the coordinating development of the two-way FDI has promoted the manufacture industrial structure\[1\].

Through reviewing the past relevant literature works, we learned that the openness of the service industry interacts the industry structure promotion. Those works offer solid research foundation for this paper. This research contributes to the extant literature in the following aspects. First of all, there are no relevant researches to study the opening situation of Jiangsu province’s service sector as the objective. Secondly, this paper employs vector auto regressive (VAR) model to better examine the impacts of the opening level of Jiangsu province’s service industry from two aspects: service trade and FDI.

3. The measurements of openness in Jiangsu province’s service sector

3.1 The openness in service sector of Jiangsu province to FDI

Until 2015, the investment of Jiangsu province has kept increasing and the annual growth of the investment in fixed assets has been 16.2%. The weight of investment in the service industry accounts for 49.6% and investment by the private accounts for 69.7%, which implies that the structure of Jiangsu province’s FDI has been improved. As the province with the second largest GDP of China, Jiangsu province always take an active part in the globalization strategy to develop the opening-oriented economy and is one of the leading province in utilizing FDI. Until 2015, the total amount of FDI actually utilized is 242.118 billion dollars, the accumulative amount of the registered capital is 152.549 billion dollars.

We use the opening degree in service industry from the aspect of FDI to describe how a country or an area allows FDI to enter its service industry, which is the ratio of the total amount of actually utilizing FDI in service sector to the total amount of added value of service industry.

![Fig.1 1995-2015 the openness of the service industry of Jiangsu province from the aspect of FDI](image-url)

From 1995 to 2001, the opening of Jiangsu province’s service industry from the aspect of FDI has
been a tendency of declining from 2.9% to 1% (Fig.1), although there was a rally to 3% in 1997. During this period, the economic system of the service industry was imperfection. For example, there were remarkable business controls, the market access of FDI to the service industry was very limited, only open to the commercial retail sales and the catering industry partly, as well as the conditionally opening of the bank industry and the insurance industry, on which there were lots of limitations of business operation and area market access. From 2001 to 2007, the openness in Jiangsu province’s service industry to FDI has increased from 1% to 3.89%. Since China’s entry to WTO in 2001, China has continued to improve and reform the service industry system, regulate market behaviors and push openness in service sector step according to the international regulations and rules. The competitive advantage of Jiangsu province’s service industry has been promoted. For example, its service industry has undertaken the national treatment according to the rules of World Trade Organization, changing from the moderate protection, broadened the ranges and directions of opening-up and relaxed FDI’s shareholding ratio as well as limitation to ease access to the domestic market. During this period, the market access to FDI has been increasing and reached the peak for 20 years. In 2007, the economic crisis spread across the world. The world economy has been in recession and demand declined. With the credit crunch, the capital has been cautious, which has some negative impacts on the flow of FDI to Jiangsu province. The opening degree of FDI in Jiangsu province has presented the tendency of decline from 3.7% to 2% during the period of 2008 to 2015.

3.2 The openness in service sector of Jiangsu province from the aspect of service trade
The size of Jiangsu’s service trade has been increasing and the service outsourcing has developed rapidly. In 2014, the total amount of Jiangsu’s service trade comes to 47.72 billion dollars, and ranks No.4 in China, increasing by 18.7% more than that of last year, and 6% higher than the annual growth rate. The export of service trade amounts to 14.03 billion dollars while the import is 33.69 billion dollars. In 2014, the offshore outsourcing amounts to 17.47 billion dollars, increasing by 26.9% than that of last year and accounts for 31.2% of the country’s total amount. Till the end of 2014, there are 8,167 registered outsourcing enterprises and 1.046 million employees. In Jiangsu province, there are 202 outsourcing enterprises whose amount of offshore outsourcing business is more than 10 million dollars, 500 enterprises, whose offshore outsourcing business is more than 300 million dollars. There are 124 large outsourcing enterprises, whose employees is more than 1,000, and 14 outsourcing enterprises whose employees is more than 5,000 in Jiangsu province.

The measuring index of service sector’s openness from the aspect of service trade is the ratio of the total export of service trade to GDP of the service sector in a certain country or an area in a certain period. The index shows the participation level of the area in international service trade and the dependence level of the area’s economic growth on the international business.

As unavailability of Jiangsu province’s service trade data, this paper uses the sum of the real income of the Contracted Projects Overseas, income of international tourism and the income of Foreign labor cooperation employers to represent the export of the service trade.

Jiangsu’s openness in service sector from the aspect of the service trade has gone up steadily from 1995 to 2006 (Fig.2). During this period except in 2003 a little decline due to the SARS contagion, it has risen rapidly and reached the maximum of 7.2% in 2006, which benefited from China’s entry into WTO and the opening-up. Since 1990s, Jiangsu began to reform and improve its rules and policies in the service sector, such as tax breaks, to relax foreign exchange controls, to facilitate trade procedures and documentation, and to regulate subsidy policy to support the openness in the service sector and development of the service trade. Meanwhile, after entrance into WTO, China developed into a major country as “world factory”, undertaking major part of the international industrial transfer, especially to Jiangsu province. Therefore, Jiangsu, as one of the leading area being world factory in China, has developed more competitive manufacturing industry to contribute to demand and development for the producer service industry and promote the opening-up in service sector.

During the period of 2007 to 2015, the openness in Jiangsu’s service sector of service trade showed the tendency of obvious decline, due to the influence of world economic crisis, which was aroused by
the financial crisis in USA in 2007. Until 2015, the world economy was still in recession and there was a long way to go to recover. So the shrink world demand, to some extent, has some negative impacts on the slowdown of openness in Jiangsu’s service sector of service trade. Meanwhile, the thirteenth five-year plan starting in 2016, Jiangsu province is confronted with many issues, including excess supply of low-end manufacturing industries, disappearing demographic dividends, and industrial shifts outflow partially to the Southeast Asia, economic transforming and upgrading, and manufacturing industry depression, which made the demand for service industry, especially the producer service industry decline dramatically.

In conclusion, Since service trade always reflects the international competitiveness of the service industry, the openness of Jiangsu’s service trade has developed but not rise obviously during the period from 1995 to 2015, which states that the openness in the service sector from the aspect of service trade is not very high, around 3% and always below 8%, and the international competitiveness of Jiangsu’s service industry has not improved remarkable and could be improved largely.

![Fig. 2 1995-2015 openness of Jiangsu’s service trade (%)](image)

4. Empirical Analysis

4.1 Methodology and Data

There are a lot of measures of the industrial structure. Taking not only the size structure of the industrial structure but also the improvement of quality in the aspect of the productive efficiency of the industrial structure, this paper refers to the measure of Zhou and Wei (2007), and simplifies it to calculate the measure index of industrial structure [21] as shown by (1).

\[
H = \sum_{i=1}^{n} (k_i \times H_i) = \sum_{i=1}^{n} (k_i \times \sqrt{P_i})
\]  

(1)

Of which, H indicates the industrial structure of the area; \( H_i \) represents the industrial structure of sector i, the bigger figure of which means the more improved industrial structure, higher labor productivity and higher added value of sector i. \( k_i \) represents the ratio of gross production of sector i to the gross domestic production of the region. \( P_i \) represents the gross production of sector i, \( l_i \) represents the employees of sector i, i=1,2,3, representing the first, second, third industry respectively.

In the following sections, FO dinotes the measuring index of service sector’s openness from the aspect of FDI and SO denotes the measuring index of service sector’s openness from the aspect of service trade. We choose H as the explained variable, and FO and SO as the explanatory variables based on the samples from 1995 to 2015 from “Jiangsu Statistical Yearbook” over years. In order to avoid the dramatic fluctuation and the possible heteroscedasticity, we take natural logarithm of H without changing the original cointegration relationships between the variables, which is denoted by \( \ln H \). Eviews 7.0 is the software employed to analyze the model in this paper.

4.2 Automatic direction finder unit root test

When analyzing the economic phenomenon through the time series, the time series must be stationary, i.e. It is free from random trends or deterministic trends, or it may lead to spurious regression. Most of the time series data in the real world are non-stationary, so it is necessary to take
The paper employs Automatic Direction Finder (ADF) unit root test on lnh, FO, SO (Table 1).

In the type of the test equation (C, T, K), C shows that the test equation has a constant term, T indicates a trend term; K is the delay number, and the ADF test uses the Mackinnon critical value test. (Table 1) at the level of 5%, the first difference of variables is stationary, which means there may be the cointegration relationships between them.

4.3 Establishment and Estimation of VAR Model
There is no prior constraint condition in VAR, so a VAR model can not only carry on forecasts on the related time series, but also analyze the the dynamic impact of the random disturbance on the joint endogenous variable. Therefore, this paper employs VAR model and the pulse response function to analyze the dynamic effects of Jiangsu’s FDI and the industrial structure upgrading, shown in (2).

\[ y_t = A_1 y_{1,t} + A_2 y_{2,t} + \ldots + A_j y_{t-j} + w_t \quad (2) \]

where \( y_t = (\ln h(1), \text{fo}(1), \text{so}(1)) \), \( A \) is vector coefficient, \( j \) is the lags of the model, \( w_t \) is the error term.

4.4 Co-integration test
Johansen test as the method of co-integration test is used to test the variables. As for the lags of the model, the lag period is order 4, based on the rules of FPE, LR, SC and AIC comprehensively (Table 2).

After the lag is confirmed, Johansen test is taken. Based on the trace statistics from the results in Table 3, indicate that there are 3 Johansen co-integration relationships and there is a long-term equilibrium relationship between the variables of H, FO, SO.

| Variable | Type of Test | ADF Test Statistic | Mackinnon critical value (1%, 5%, 10%) | Stationarity |
|----------|--------------|-------------------|----------------------------------------|--------------|
| lnh      | (C, 0, 0)    | -0.267857         | -3.808546 -3.020686 -2.650413         | non-stationary|
| fo       | (C, 0, 0)    | -2.042555         | -3.808546 -3.020546 -2.650413         | non-stationary|
| so       | (C, 0, 0)    | -0.859717         | -3.808546 -3.020546 -2.650413         | non-stationary|
| d(lnh)   | (C, 0, 0)    | -2.677213         | -3.831511 -3.029970 -2.655194         | stationary   |
| d(fo)    | (C, 0, 0)    | -3.535511         | -3.857386 -3.040391 -2.660551         | stationary   |
| d(so)    | (C, 0, 0)    | -3.393143         | -3.831511 -3.029970 -2.655194         | stationary   |

| Lag     | LogL       | LR        | FPE       | AIC       | SC         | HQ        |
|---------|------------|-----------|-----------|-----------|------------|-----------|
| 0       | 7.173071   | NA        | 0.000119  | -0.521634 | -0.376773  | -0.514216 |
| 1       | 14.44817   | 10.91265  | 0.000153  | -0.306022 | 0.273420   | -0.276350 |
| 2       | 22.17225   | 8.689583  | 0.000210  | -0.146531 | 0.867492   | -0.094605 |
| 3       | 56.66699   | 25.87106  | 1.37e-05  | -3.33374  | -1.884770  | -3.259193 |
| 4       | 105.9640   | 18.48638* | 3.21e-07* | -8.370501*| -6.487316* | -8.274066*|

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistics | 5% Critical Value | Max-Eigen Statistics | 5% Critical Value |
|---------------------------|------------|------------------|-------------------|----------------------|-------------------|
| None *                    | 0.999404   | 140.2022         | 29.79707          | 118.8136             | 21.13162          |
| At most 1 *               | 0.581597   | 21.38865         | 15.49471          | 13.94096             | 14.26460          |
| At most 2 *               | 0.372167   | 7.447694         | 3.841466          | 7.447694             | 3.841466          |
4.5 Analysis of Impulse Response Graphs
In this section, an method of ordinary least squares (OLS) estimate is made on the VAR model of the impacts of Jiangsu’s FO, SO on the industrial structure upgrading and the impulse response graphs are shown in Fig. 3 and Fig. 4.

As can be seen from the response of H to the openness of Jiangsu province’s service industry to FDI from Fig.3, there is no responses at the beginning and then a positive shock of the openness in Jiangsu province’s service sector to FDI by the size of one unit standard deviation has a positive impact on H from the second period. The impact reaches its peak value 1.323% at the third period and then begins to decline to have a negative impact in the sixth period. Thereafter, the impact rise slightly and gradually be stabilized to zero. The impacts on H lasts for about 9 periods by FO. There is no impacts on H, when it responses to the shock of the openness in Jiangsu province’s service sector from the aspect of service trade by the size of one unit standard deviation at the first period(Fig.3). And from the second period to the sixth period, there are positive impacts always on H, although there are some fluctuation during this period and the response are very slightly, compared to the response to the shock of FO. Till the sixth period, the impact is stabilized to zero. The impacts on H lasts for about 8 periods by the shock of SO.

![Response of DLNH to DFO and DSO](image)

Fig. 3 the response of Jiangsu’s industrial structure upgrading to the shock of openness in service sector to FDI and the shock of openness in the service sector of service trade

There is a remarkable positive response of Jiangsu’s industrial structure upgrading to the shock of itself by one unit standard deviation at the beginning and reaches its maximum 1.7% (Fig. 4). Then there is a declining trend of the response and a negative impacts til the sixth period. Afterwards it begin to rise to be stabilized to zero since the ninth period. It implies that a shock of Jiangsu’s industrial structure will has positive impacts on itself and last for about 4 periods.

![Response of DLNH to DLNH](image)

Fig. 4 the response of Jiangsu’s industrial structure upgrading index to the shock of itself

In conclusion, comprehensively the improvement of Jiangsu’s industrial structure has the most remarkable impacts by the shock from itself and the peak value reaches 1.7%, much higher than the impacts by the shock from FO and SO. Meanwhile, the positive impacts last for 5 periods and the negative impact is very slight for 3 periods, the negative peak being -0.7%. The response of Jiangsu’s industrial structure upgrading to the shock of FO and SO is zero in the first period and has four periods’ positive impacts only, which are lower than the impacts by H itself, with the maximum
impact of FO and SO being 1.3% and 0.77% respectively. Therefore, as far as the long-term impacts is concerned, the openness in Jiangsu province’s service sector to FDI and service trade has not very remarkable contribution to the upgrading of industrial structure. However, the impact from FO is much more marked than the impact from SO.

5. Conclusion and suggestion
This paper establishes VAR model based on the samples from 1995 to 2015, to carry out impulse response function analysis and finds that the openness in Jiangsu’s service industry from the aspects of both FDI and service trade has long-term contribution to Jiangsu’s industrial structure upgrading, but not very remarkable. Both the strength and the duration of the positive impact by the openness of Jiangsu’s service industry to FDI on the improvement of the industrial structure is much more than that of the openness to the service trade. Nevertheless, the current situation is that both the level and quality of the openness in Jiangsu’s service industry being not very high, and the positive impacts on upgrading the service industry by FO and SO is not very remarkable. Taking the marked positive effects of the openness in service industry to the improvement of industrial structure in other developed countries or areas for reference, Jiangsu province should improve its openness of service trade especially the modern service trade and improve the efficiency of utilizing FDI. It is still a long way to go to make full use of the positive impacts on the industrial structure upgrading by opening up Jiangsu province’s service sector to service trade.

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