Research on Impact of Producer Service of Hubei Provinces

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Keywords: Producer services, Producer services FDI, Degree of industrialization.

Abstract. Producer service is part of the economic developing most rapidly. Based on the data of productive service industry in Hubei Province from 2003 to 2013, this paper uses gray relational analysis method to find out that labor investment, capital investment and industrialization level are most closely related to the development of productive service industry in Hubei Province. Then the author uses the vector autoregressive method to carry on the empirical analysis, the result shows that the labor input and the capital investment has the remarkable promotion function to the big development of the productive service industry in Hubei province, and the industrialization level starts to inhibit the development of the productive service industry in Hubei province, But to a certain level will promote the development of producer services.

Introduction

The producer service industry is a hotspot in research in recent years. There are rich research achievements about its influencing factors at the national level: Du Derui et al. (2014) analyzed the influencing factors of the producer services. Liu Junbin et al. (2013) used the panel data of 20 provinces and cities in China to analyze the influencing factors of specialized division of labor. From the perspective of region, the existing results are mainly concentrated in economically developed areas, the Yangtze River Delta and other economic circles: Luo Yi (2015) analyzed the influencing factors in the development of producer services in Zhejiang Province. However, there is little research on the productive service in Hubei Province. Liu Liyan (2012) analyzed the present situation of producer services in Hubei province. Yu Chunjiao and Zheng Guangfeng (2010) analyzed the interactive development degree of producer services and manufacturing industry in Hubei Province. The influencing factors and countermeasures of development of producer services in Hubei province are not yet studied.

Considering the availability of data, this paper determined the producer services as six industries: transportation and warehousing and postal services, information transmission, wholesale and retail, computer services and software industry, finance, real estate, leasing and business services, science research, technical services and geological exploration.

Status Quo of the Development of Producer Services in Hubei Province

Aggregate Analysis

The scale of service industry in Hubei Province has been expanding from 2003 to 2013, and the value-added in service industry is increased by 3.65 times from 202.278 billion dollars to 939.877 billion yuan. At the same time, producer services in Hubei Province have also made rapid progress with the added value increasing by 2.61 times from 113.609 billion yuan to 409.748. In addition, the proportion of value added of the producer services in the service industry decreases first and then increases, remaining at about 44%.

Structural Analysis

From the internal structure of the producer services in Hubei Province, the internal structure of the producer services is being optimized. Before 2013, the transportation, warehousing and postal services occupied the most proportion in producer services in Hubei Province, but the share of financial sector surpassed the transportation, warehousing and postal services for the first time in 2013, followed by the real estate, the information transmission, software and information
technology services, and the wholesale and retail industry; but the scientific research, technical
services and geological exploration had the smallest proportion.

Analysis Methods of Influencing Factors of the Development of Producer Services in Hubei
Province

Model Construction and Variable Description

Explained variable PS: The proportion of producer services in GDP or employment proportion in
Hubei Province.

Explanatory variables include:

Factor input: Labor input L is represented as the proportion of practitioners in producer services
in Hubei Province in all practitioners. Capital input K is represented as the production of fixed-asset
investment of producer services in Hubei Province in the total investment.

Economic development level RGDP: RGDP was used to present the level of economic
development in Hubei Province.

Producer services FDI: Here the proportion of FDI in GDP represents the openness degree of
foreign investment, meeting the expectations.

The openness degree of service industry: It is presented as the dependence of service trade (ST)
in Hubei Province.

Degree of industrialization INDUS: The proportion of industrial added value in GDP is used to
represent the degree of industrialization in this paper.

In this paper, the value-added (PS) and employment proportion of producer services in Hubei
Province were used as the explained variables. The explanatory variables included: labor input L,
capital input K of producer services, economic development level (RGDP), proportion of producer
services FDI in FDI (FDI), service trade dependence (ST) and industrial development level
(INDUS). The measurement model is established:

\[ \ln PS = \beta_0 + \beta_1 \ln K + \beta_2 \ln L + \beta_3 \ln FDI + \beta_4 \ln ST + \beta_5 \ln INDUS + \beta_6 \ln RGDP + \varepsilon_1 t \]

\( \beta_0 \) denotes the constant coefficient, \( \beta_i \) (i = 1, 2, 3, 4, 5, 6) denotes each coefficient and \( \varepsilon_1 t \)
denotes a random variable,

Data Description

The data in this paper were from the Statistical Yearbook of Hubei Province. Since the official
statistical data published at present only included the input-output data of 2002, 2005 and 2007, this
paper combined the input-output data and those Statistical Yearbook of Hubei Province and annual
data in the annual report of Hubei Province. It is expected that the coefficients of the above
variables are positive.

Table 1. Descriptive statistics of samples.

<table>
<thead>
<tr>
<th></th>
<th>lnY</th>
<th>lnK</th>
<th>lnL</th>
<th>lnRGDP</th>
<th>lnFDI</th>
<th>lnST</th>
<th>lnINDUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>2.920</td>
<td>3.627</td>
<td>2.530</td>
<td>9.874</td>
<td>-0.160</td>
<td>0.161</td>
<td>3.863</td>
</tr>
<tr>
<td>Median</td>
<td>2.941</td>
<td>3.605</td>
<td>2.537</td>
<td>9.896</td>
<td>-0.636</td>
<td>0.297</td>
<td>3.884</td>
</tr>
<tr>
<td>Max.</td>
<td>3.173</td>
<td>3.713</td>
<td>2.646</td>
<td>10.660</td>
<td>1.246</td>
<td>0.615</td>
<td>3.993</td>
</tr>
<tr>
<td>Min.</td>
<td>2.784</td>
<td>3.567</td>
<td>2.404</td>
<td>9.033</td>
<td>-0.960</td>
<td>-1.155</td>
<td>3.740</td>
</tr>
<tr>
<td>SD</td>
<td>0.112</td>
<td>0.051</td>
<td>0.075</td>
<td>0.563</td>
<td>0.861</td>
<td>0.518</td>
<td>0.085</td>
</tr>
</tbody>
</table>

Method Description

The influencing factors of producer services in Hubei Province received the gray relational analysis
to determine the correlation degree of different influencing factors with the producer services in
Hubei Province, so as to find important influencing factors. And then the Var model was used for
further empirical analysis. Var model is used to determine the relationship between variables using
a non-structural method; more importantly, it can explain the dynamic relationship between variables to overcome the endogenous problems of variables in traditional analysis.

**Empirical Results of Influencing Factors of Development of Producer Services in Hubei Province**

**Gray Correlation Results**

In terms of the influencing factors of the development of producer services in Hubei Province, the gray relational analysis is performed to identify it. The gray correlation results are shown in the Table below.

The grey correlation results showed that the labor input $L$ had the greatest impact on the correlation of producer services in Hubei Province from 2003 to 2013, and the average correlation coefficient was 0.905, followed by fixed-asset investment ($K$) (0.8405). It suggested that the current growth of producer services is mainly dependent on its own labor input and capital input. In addition, the correlation level of INDUSI was also around 0.80, which was obviously higher than FDI and service trade dependence, indicating that the degree of industrialization is closely related to the development of producer service. Producer services, as the intermediate input of industrial production, provide input elements for industrial production, thus it is closely related to the industry. In addition, from the perspective of FDI and ST, they also have very significant impacts on the producer services.

**Var Model Results**

The results of gray relational analysis showed that the labor input and capital investment and degree of industrialization INDUS had the largest relationship with the consumer services in Hubei Province. The VAR model was used to further analyze the above influencing factors.

**Stability Test of Variables**

If the data is non-stationary, the regression results will show "pseudo-regression". So the data stability receives the ADF test first. Since the natural logarithm of data does not change the nature of time series and can eliminate the heteroscedasticity, the natural logarithm is taken for the relevant variables. The ADF test results of the data after taking the logarithm are shown in Table 2.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Test form (C,T,K)</th>
<th>ADF test statistic</th>
<th>5% critical value</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln PS</td>
<td>(C,0,0)</td>
<td>-1.3958</td>
<td>-1.9823</td>
<td>Unstable</td>
</tr>
<tr>
<td>D ln PS</td>
<td>(C,0,0)</td>
<td>-3.9292</td>
<td>-1.9889</td>
<td>Stable</td>
</tr>
<tr>
<td>ln K</td>
<td>(C,0,0)</td>
<td>-1.2252</td>
<td>-1.9882</td>
<td>Unstable</td>
</tr>
<tr>
<td>D ln K</td>
<td>(C,0,0)</td>
<td>-5.4917</td>
<td>-1.9882</td>
<td>Stable</td>
</tr>
<tr>
<td>ln L</td>
<td>(C,0,0)</td>
<td>-0.6715</td>
<td>-1.9823</td>
<td>Unstable</td>
</tr>
<tr>
<td>D ln L</td>
<td>(C,0,0)</td>
<td>-3.5716</td>
<td>-1.9959</td>
<td>Stable</td>
</tr>
<tr>
<td>ln INDUS</td>
<td>(C,0,0)</td>
<td>-0.3975</td>
<td>-1.9823</td>
<td>Unstable</td>
</tr>
<tr>
<td>D ln INDUS</td>
<td>(C,0,0)</td>
<td>-2.9368</td>
<td>-1.9882</td>
<td>Stable</td>
</tr>
</tbody>
</table>

Note: The results in this Table are obtained via EVIEW7.0 software. C, T, and K in the test form (C, T, K) represent the constant term, time trend and lag order in the test equation, determined as the AIC minimum criterion; N represents the trend item T, 0 represents no constant or time trend items. D represents the first-order difference of the variable.

The horizontal sequences of $\text{LnK}$ and $\text{Lnl}$ and $\text{LnINDUS}$ are non-stationary, but they are stable after the first-order difference. The test statistic of ADF in each sequence variable is the critical value more than 5%, all of which are first-order integration sequence.
The lag length is used to determine the lag structure of VAR model, and the lag order is determined as the first-order lag. In addition, the model modulus reciprocal is less than 1 and falls within the unit circle, indicating that the model is stable. The results showed that the unit roots of the variables are within the unit circle, indicating that the model is stable.

**Causality Test**

The following causality test results showed that the capital investment variable K is the Granger cause of development of producer services in Hubei Province, and the increase in fixed asset investment is also the Granger cause affecting the producer services industry growth.

The degree of industrialization INDUS is also the Granger cause for the development of producer services in Hubei Province; that is, the change in the degree of industrialization is the Granger cause that affects the growth of producer services (as the Table below).

<table>
<thead>
<tr>
<th>Original hypothesis</th>
<th>Ch2</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>L is not the Granger cause of PS</td>
<td>0.03236</td>
<td>0.8572</td>
</tr>
<tr>
<td>K is not the Granger cause of PS</td>
<td>3.9631</td>
<td>0.047</td>
</tr>
<tr>
<td>INDUS is not the Granger cause of PS</td>
<td>10.5748</td>
<td>0.0011</td>
</tr>
<tr>
<td>PS is not the Granger cause of K</td>
<td>0.007826</td>
<td>0.9295</td>
</tr>
<tr>
<td>PS is not the Granger cause of L</td>
<td>0.3452</td>
<td>0.5568</td>
</tr>
<tr>
<td>PS is not the Granger cause of INDUS</td>
<td>2.5797</td>
<td>0.1082</td>
</tr>
</tbody>
</table>

**Impulse Response Analysis**

We can see from the perspective of input factors that the producer services are gradually increased under the positive impact of labor input, but shows a downward trend after reaching its peak in the fourth period; the capital input shows a downward trend after reaching its peak in the third period. In addition, when the degree of industrialization suffers from the external positive impact, the value-added of producer services is increased first and then decreased, reaches its peak in the sixth period and becomes stable afterwards. This also suggests that there is a reverse relationship between the degree of industrialization and the value added of producer services in Hubei Province. The possible reason is that the current degree of industrialization in Hubei Province is in the middle stage.

**Summary**

The gray relational analysis and the measurement model revealed that the increased added value of producer services in Hubei Province is more dependent on labor input, followed by capital input, and the degree of industrialization has an important influence. The empirical results show that the development of industrialization will first inhibit the development of producer services, but will promote the development of producer services later. The degree of industrialization in Hubei Province is still in the middle stage, so it is needed to further improve the degree of industrialization in Hubei Province to promote the development of producer services in Hubei Province.

**References**


