On the Factors Influencing the Competitiveness of Chinese Service Trade after Entering WTO
- An Analysis Based on Grey Incidence

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Abstract: - Service trade is an important force influencing economic development. Using international market share of service export, service trade competitive index and revealed comparative advantage of service trade as the indexes to measure the competitiveness of Chinese service trade respectively, three grey incidence models are built up to conduct an empirical analysis on the main factors affecting the competitiveness of service trade after China entering WTO or during 2002 and 2008. The result indicates that urbanization level has the maximum impact on the competitiveness of service trade, followed in turn by foreign direct investment, GDP in service industry, human capital and commodity trade. Further discussion provides train of thought for the upgrade of the competitiveness of Chinese service trade.

Key-Words: - Service Trade; Competitiveness; Influencing Factors; Grey Incidence

1 Introduction
With the strong promotion of economic globalization, service trade has been developed very quickly. Its proportion in the global trade is expanding continuously and its status in the world economy is upgrading day by day. Service trade has increasingly become the focus of world attention and competition, and its development has become an important index to measure a nation’s comprehensive strength.

Commodity trade and service trade are two aspects of a nation’s foreign trade. Although the scale of Chinese service trade is smaller than that of commodity trade, its strong growth tendency after entering WTO has aroused wide attention. According to the statistics of World Trade Organization, during 2002 and 2008, the value of Chinese service export and import increased obviously. Where the value of service export increased from USD39.38 billion in 2002 to USD146.47 billion in 2008, with an annual increasing rate of 23.93%, which was higher than the annual increasing rate of world service export (14.47%) in the same period; while its value of service import increased from USD46.08 billion in 2002 to USD158.00 billion in 2008, with an annual increasing rate of 22.21%, which was still higher than the annual increasing rate of world service import (13.40%). Meanwhile, the proportion of Chinese service export to total world service export rose to 3.85% from 2.47%, the proportion of Chinese service import to total world service import rose to 4.47% from 2.96%.

However, in the international financial crisis, the impacts faced with Chinese service trade should not be ignored. In 2009, compared with in 2008, though Chinese service import only decreased by 0.32%, far below the world service import declining rate (11.91%), its service export dropped significantly by 12.12%, almost equal to the falling rate of world service export (12.94%).

According to the opinion of Balassa Bela et al.\[1\] (1965), the industry competitiveness of a nation is reflected in the international market share of its product finally. On the surface, the international market share of Chinese service trade should be the proportion of the value of Chinese service trade to that of world service trade, but from the global scope, the export of one country is the import of another, and industrial competitiveness eventually embodies in export. Then the obvious decline of Chinese service export in 2009 shows the weak level of its service trade competitiveness. Therefore, judging the main factors affecting Chinese service trade after entering WTO, building up model to analyze the influencing

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degree and then getting relevant implications, will help to improve the competitiveness of Chinese service trade and promote the harmonious development of Chinese economy.

2 The Indexes Measuring Service Trade Competitiveness and the Influencing Factors

2.1 The Indexes Measuring Service Trade Competitiveness

Many indexes can be used to measure the competitiveness of service trade, three indexes, say international market share of service export, service trade competitive index[2] and revealed comparative advantage of service trade[3], will be used in this paper to demonstrate the competitiveness of Chinese service trade.

International market share of service export (MS) is the ratio of Chinese service export to the world service export. The computational formula is

\[ MS = \frac{X_{CS}}{X_{WS}} \]

where \( X_{CS} \) denoting the value of Chinese service export, \( X_{WS} \) denoting the value of world service export. The bigger the MS, the higher the competitiveness of Chinese service trade.

Service trade competitive index (TC) is the ratio of Chinese value of net service export to that of total service trade. The computational formula is

\[ TC = \frac{X_{CS} - M_{CS}}{X_{CS} + M_{CS}} \]

where \( X_{CS} \) denoting the value of Chinese service export, \( M_{CS} \) denoting the value of Chinese service import. TC is fluctuating between -1 and 1. \( TC > 0 \) shows that service trade has competitiveness, and stronger competitiveness if TC is closer to 1. \( TC < 0 \) means low competitiveness of service trade, and weaker competitiveness if TC is closer to -1.

Revealed comparative advantage of service trade (RCA) measures the relative performance of Chinese service export. The computational formula is

\[ RCA = \frac{X_{CS}}{X_{W}} \]

where \( X_{CS} \) denoting the value of Chinese service export, \( X_{W} \) denoting the value of world service export, and \( X_{W} \) denoting the value of world service export and commodity export. \( RCA > 1 \) declares that China has comparative advantage in service trade, and the bigger the RCA, the larger the advantage. \( RCA < 1 \) means that China has comparative disadvantage in service trade, and the smaller the RCA, the clearer the disadvantage.

2.2 The Influencing Factors

The competitiveness of service trade is influenced by many factors. In the existing representative empirical studies[4][5][6][7][8] (Table 1), scholars generally made use of econometric methods to do regression analysis on the various factors affecting service trade competitiveness, and got different results. Based on these results, and considering the availability of the data, GDP in Service Industry (SGDP), Value of Commodity Trade (VCT), Foreign Direct Investment (FDI), Human Capital (HC, Number of Students Enrollment in Regular Institutions of High Education per 100 Persons), and Urbanization Level (UL, the ratio of Urban Population to Total Population), are used as the influencing factors in this paper.

<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Index measuring the service trade competitiveness</th>
<th>Influencing factors</th>
<th>Method</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE Wei et al. (2005)</td>
<td>Value of service export</td>
<td>Human capital, Urbanization level, FDI</td>
<td>Econometric methods</td>
<td>1982-2002</td>
</tr>
<tr>
<td>SHI Zili et al. (2007)</td>
<td>Value of service export</td>
<td>Value of commodity export, FDI, Open degree of service industry</td>
<td>Econometric methods</td>
<td>1982-2005</td>
</tr>
<tr>
<td>WANG Yongning et al. (2009)</td>
<td>Value of service export</td>
<td>Human capital, GDP in service industry, Development level of service industry, Gap between urban and rural</td>
<td>Econometric methods</td>
<td>1985-2006</td>
</tr>
</tbody>
</table>

Source: Sorting by the author
3 Empirical Analysis

3.1 Model and Data
Since we want to analyze the factors influencing the competitiveness of Chinese service trade after entering WTO, we only have extremely limited samples, therefore, the typical mathematical statistical methods based on large samples cannot be used, and the grey system analytical method is appropriate to use in this analysis. Specifically, we will use the grey incidence analysis method. The fundamental idea of this method is that the closeness of a relation is judged based on the similarity level of the geometrical patterns of sequence curves. The more similar the curves are, the higher degree of incidence between sequences; and vice versa. We will use this method to analyze the various factors which influence the competitiveness of Chinese service trade. With international market share of service export (MS), service trade competitive index (TC) and revealed comparative advantage of service trade (RCA) served as reference series respectively, GDP in Service Industry (SGDP), Value of Commodity Trade (VCT), Foreign Direct Investment (FDI), Human Capital (HC) and Urbanization Level (UL) served as comparative series (Table 2), we will calculate out the grey incidence degree and get the grey incidence order, so as to determine the relationship between the competitiveness of Chinese service trade and various influencing factors.

<table>
<thead>
<tr>
<th>Variable number</th>
<th>Variable name</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y_1</td>
<td>MS</td>
<td>0.0247</td>
<td>0.0253</td>
<td>0.0279</td>
<td>0.0298</td>
<td>0.0324</td>
<td>0.0360</td>
<td>0.0385</td>
</tr>
<tr>
<td>Y_2</td>
<td>TC</td>
<td>-0.0784</td>
<td>-0.0837</td>
<td>-0.0714</td>
<td>-0.0590</td>
<td>-0.0464</td>
<td>-0.0303</td>
<td>-0.0380</td>
</tr>
<tr>
<td>Y_3</td>
<td>RCA</td>
<td>0.5468</td>
<td>0.4919</td>
<td>0.4878</td>
<td>0.4619</td>
<td>0.4567</td>
<td>0.4659</td>
<td>0.4858</td>
</tr>
<tr>
<td>X_1</td>
<td>SGDP</td>
<td>602.86</td>
<td>676.63</td>
<td>780.03</td>
<td>896.43</td>
<td>1062.76</td>
<td>1366.12</td>
<td>1734.84</td>
</tr>
<tr>
<td>X_2</td>
<td>VCT</td>
<td>620.77</td>
<td>850.99</td>
<td>1134.56</td>
<td>1421.91</td>
<td>1760.44</td>
<td>2176.18</td>
<td>2563.26</td>
</tr>
<tr>
<td>X_3</td>
<td>FDI</td>
<td>527.43</td>
<td>535.05</td>
<td>606.30</td>
<td>724.06</td>
<td>727.15</td>
<td>835.21</td>
<td>1083.12</td>
</tr>
<tr>
<td>X_4</td>
<td>HC</td>
<td>0.7033</td>
<td>0.8579</td>
<td>1.0259</td>
<td>1.1944</td>
<td>1.3228</td>
<td>1.4266</td>
<td>1.5218</td>
</tr>
<tr>
<td>X_5</td>
<td>UL</td>
<td>0.3909</td>
<td>0.4053</td>
<td>0.4176</td>
<td>0.4299</td>
<td>0.4390</td>
<td>0.4494</td>
<td>0.4568</td>
</tr>
</tbody>
</table>

Source: MS, TC and RCA are calculated out according to the relative data from WTO Database; VCT (billion USD) is from WTO Database; FDI (billion USD) is from UNCTAD Database; SGDP (billion USD), HC and UL are from the Database of National Bureau of Statistics of China.

The specific calculation steps are as follows\(^9\). Suppose the time sequences of related indexes during 2002 and 2008 are
\[ Y_i = (y_i(1), y_i(2), \ldots, y_i(7)) \]
\[ i = 1, 2, 3 \]
\[ X_j = (x_j(1), x_j(2), \ldots, x_j(7)) \]
\[ j = 1, 2, 3, 4, 5 \]
Where \( Y_i (i = 1, 2, 3) \) are the indexes of measuring the competitiveness of Chinese service trade, \( X_j (j = 1, 2, 3, 4, 5) \) are the influencing factors.

Step 1: Calculate the initial image of each sequence.
\[ Y'_i = Y_i / y_i(1) = (y'_i(1), y'_i(2), \ldots, y'_i(7)) \]
\[ i = 1, 2, 3 \]
\[ X'_j = X_j / x_j(1) = (x'_j(1), x'_j(2), \ldots, x'_j(7)) \]
\[ j = 1, 2, 3, 4, 5 \]
Step 2: Calculate the difference sequence.
\[ \Delta_y(k) = \{ y'_i(k) - x'_j(k) \} \]
\[ i = 1, 2, 3 \]
\[ j = 1, 2, 3, 4, 5 \]
\[ k = 1, 2, 3, 4, 5, 6, 7 \]
Step 3: Calculate the maximum and minimum difference.
\[ M = \max \max \Delta_y(k) \]
\[ m = \min \min \Delta_y(k) \]
\[ i = 1, 2, 3 \]
\[ j = 1, 2, 3, 4, 5 \]
\[ k = 1, 2, 3, 4, 5, 6, 7 \]
Step 4: Calculate the incidence coefficient.
\[ \gamma_y(k) = \frac{m + \xi M}{\Delta_y(K) + \xi M} \]
\( \xi = 0.5 \)
\[ i = 1, 2, 3 \]
\[ j = 1, 2, 3, 4, 5 \]
\[ k = 1, 2, 3, 4, 5, 6, 7 \]
Step 5: Calculate the grey incidence degree.

\[ \gamma_{ij} = \frac{1}{7} \sum_{k=1}^{7} \gamma_{ij}(k) \]

\( i = 1,2,3 \)

\( j = 1,2,3,4,5 \)

\( k = 1,2,3,4,5,6,7 \)

From the grey incidence degree, we can get the grey incidence order, which indicates the different influencing degree of various factors on the competitiveness of Chinese service trade.

3.2 Calculating result

Using the above steps, we can calculate out the grey incidence degree of influencing factors and each service trade competitive index (Table 3).

<table>
<thead>
<tr>
<th>Competitiveness indexes</th>
<th>SGDP</th>
<th>VCT</th>
<th>FDI</th>
<th>HC</th>
<th>UL</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS</td>
<td>0.8169</td>
<td>0.6659</td>
<td>0.8237</td>
<td>0.8056</td>
<td>0.8658</td>
</tr>
<tr>
<td>TC</td>
<td>0.7084</td>
<td>0.6046</td>
<td>0.8173</td>
<td>0.6999</td>
<td>0.8456</td>
</tr>
<tr>
<td>RCA</td>
<td>0.7165</td>
<td>0.5842</td>
<td>0.7973</td>
<td>0.7111</td>
<td>0.8648</td>
</tr>
</tbody>
</table>

Source: Calculated by the author.

4 Conclusion

In the economic globalization era, quantitatively analyzing the factors influencing the competitiveness of service trade plays an important role in accelerating the development of service industry and promoting the transformation of foreign trade growth mode.

Using international market share of service export, service trade competitive index and revealed comparative advantage of service trade as the indexes to measure the competitiveness of Chinese service trade respectively, three grey incidence models are built up to conduct an empirical analysis on the main factors influencing the competitiveness of service trade and the different influencing degree after China entering WTO or during 2002 and 2008. The empirical result shows that various factors have different influencing degrees on the service trade competitiveness. Within the five influencing factors, urbanization level has the maximum impact on the competitiveness, illustrating that urbanization can promote the upgrade of the competitiveness of Chinese service trade through different channels such as providing demand for service industry and service trade, improving resource endowment for service development, and forming gathering effect of service industry. Foreign direct investment has the second biggest impact on the competitiveness, since the increase in FDI can improve the situation of lowness in capital quality and scarcity in knowledge and management factor in China, thus increase the supply level and export capability of service product. FDI can also drive the upgrade of technology level and management capability of the service company through demonstrating effect, personnel training effect, correlation effect, and so on, thus increase the competitiveness of service trade. However, commodity trade has minimum impact on the competitiveness, showing that although China is a big country in commodity trade, the commodity trade doesn’t have an obvious function on the service trade. Therefore, great importance should be continuously attached to exerting the promoting effect of urbanization level and foreign direct investment on the development of service industry, accelerating industrial structure adjustment, expanding service industry scale, training advanced factors such as human capital, realizing the linkage effect of commodity trade and service trade, so as to promote the development of service industry and the increase of service trade competitiveness, and achieve the continuous, healthy, and orderly development of Chinese economy.

References:


