Study on the Measurement and Evaluation of the Domestic Circular Development Level of China's Economy

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Abstract. Since reform and opening up, China has actively promoted the development of the international economic cycle, but there are still some areas that are at a disadvantage in the value and supply chain in long-term international transactions. Although the New Crown epidemic has had a huge impact on the global economy, the domestic economy has gradually recovered and international trade has recovered. Against this background, General Secretary Xi Jinping has proposed to accelerate the construction of a new development pattern “with the domestic cycle as the main body and the domestic and international cycles promoting each other” . This paper takes the demand side of the domestic cycle of China's economy as the entry point, selects the consumption base, consumption willingness, consumption structure and other specific indicators of 31 provinces in China from 2015 to 2020, and adopts the entropy value method to study China's domestic cycle at this stage. The study finds that (1) there are obvious regional differences in China's economic domestic cycle, and the eastern and central regions are important contributors to the domestic cycle; (2) the development of China's economic domestic cycle is in a positive trend after the epidemic; (3) the level of economic exchanges between regions is low, and there is the problem of unbalanced and insufficient development. An in-depth understanding of the role and pattern of China's economic double cycle in the domestic economy will help grasp the actual level of the new development pattern.

Keywords: domestic general circulation; consumption structure; regional economic differences; entropy approach.

1. Introduction and literature review

At present, the uncertainty of the global economic and political situation has become more and more prominent, posing a great challenge to the Chinese economy, which is mainly based on external circulation. General Secretary Xi Jinping pointed out that “we should promote the formation of a new development pattern with the domestic macrocycle as the main body and the domestic and international dual cycles mutually promoting each other. This new development pattern is a strategic choice to reshape China's new advantages in international cooperation and competition” (2020). He also emphasized that “it needs to be accurately grasped and actively promoted from a global perspective” (2021). China has recognized that future economic development must shift its focus to domestic supply and demand.

Regarding the study of China's economic double cycle, present-day empirical studies have achieved relatively rich results. For example, Zhao Wenju et al. (2021) measured the level of coupled coordination of China's economic double cycle, analyzed its spatial and temporal evolution and convergence, and put forward suggestions to accelerate the construction of the pattern. Ding Xiaojie et al. (2021) compare the degree of competition between two domestic and international markets and two resources and find that China's economic double-cycle has always maintained a strong trend of centralization, while the degree of centralization in the outer cycle is greater than that in the inner cycle, but the inner cycle of the economy has always occupied a dominant position in the low competitive disadvantage. Based on this, we study in this paper from the perspective of the demand side of the domestic cycle.
2. Research design

2.1 Indicator construction

The data for the indicators in this paper come from the China Statistical Yearbook, with a time span of five years (2015-2020). Considering regional representativeness, analyze the consumption base, consumption willingness, and consumption structure of 31 provinces over the past 5 years.

Table 1. Domestic indicators of circular development

<table>
<thead>
<tr>
<th>Target level</th>
<th>Guideline level</th>
<th>Specific indicators</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Circular Development Indicator System</td>
<td>Consumption base</td>
<td>Disposable income per capita</td>
<td>CNY</td>
</tr>
<tr>
<td>Consumption Willingness</td>
<td>Consumption expenditure per capita</td>
<td>CNY</td>
<td></td>
</tr>
<tr>
<td>Consumption Structure</td>
<td>(Per capita expenditure on household equipment and services + expenditure on transportation and communication + expenditure on cultural, educational and recreational goods and services + expenditure on medical care + expenditure on luxury goods and other goods and services)/total consumption expenditure</td>
<td>%</td>
<td></td>
</tr>
</tbody>
</table>

2.2 Research methodology

1. The standardized calculation formula for indicators is:

\[ X_{kij} = \frac{x_{kij} - \min(x_{kij})}{\max(x_{kij}) - \min(x_{kij})} \]  \hspace{1cm} (1)

where is the indicator value before standardization for indicator j in area k of year \( x_{kij} \), is the indicator value after standardization for indicator j in area i of year k, and \( \max(x_{kij}) \) and \( \min(x_{kij}) \) are the maximum and minimum values of indicator H, respectively.

2. Calculate the information entropy of each indicator by applying the standardized indicator values, and the calculation formula is shown in Equation (2).

\[ E_j = \frac{1}{\ln(rn)} \sum_{i=1}^{n,m} \left( \frac{X_{kij}}{\sum_{i=1}^{n,m} X_{kij}} \right) \ln \left( \frac{X_{kij}}{\sum_{i=1}^{n,m} X_{kij}} \right) \]  \hspace{1cm} (2)

Where r is the year of measurement and n is the number of regions measure.

3. Calculate the weight value of each indicator by applying the measured information entropy, which is calculated as shown in formula (3).

\[ W_j = \left( 1 - E_j \right) / \sum_{i=1}^{m} \left( 1 - E_j \right) \]  \hspace{1cm} (3)

Where m is the number of indicators.

4. Calculate the index, the specific formula is shown in (4).

\[ S_{ki} = \sum_{i=1}^{k} W_j X_{kij} \]  \hspace{1cm} (4)
3. Evaluation of the level of circular development within the economy

3.1 Time-series analysis of regional economic recycling levels

Table 2 and Figure 1 show the trend of the domestic recycling development index for the whole country and the four major regions. From 2015 to 2019, the national domestic circulation development index exhibited a steady upward trend. However, in 2020, the growth trend of domestic recycling development at the national level and in the four major regions slows down. This reflects that during the global pandemic, the circular development of China's domestic economy has been greatly impacted.

Table 2. Trends in the domestic recycling development index at the national level and in the four regions

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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>National</td>
<td>0.3067</td>
<td>0.3375</td>
<td>0.3682</td>
<td>0.4016</td>
<td>0.4372</td>
<td>0.4337</td>
</tr>
<tr>
<td>Eastern Region</td>
<td>0.4241</td>
<td>0.4630</td>
<td>0.5013</td>
<td>0.5448</td>
<td>0.5896</td>
<td>0.5780</td>
</tr>
<tr>
<td>Northeast Region</td>
<td>0.3006</td>
<td>0.3315</td>
<td>0.3595</td>
<td>0.3864</td>
<td>0.4107</td>
<td>0.3877</td>
</tr>
<tr>
<td>Central Region</td>
<td>0.2536</td>
<td>0.2825</td>
<td>0.3104</td>
<td>0.3418</td>
<td>0.3757</td>
<td>0.3719</td>
</tr>
<tr>
<td>Western Region</td>
<td>0.2357</td>
<td>0.2630</td>
<td>0.2896</td>
<td>0.3201</td>
<td>0.3523</td>
<td>0.3550</td>
</tr>
</tbody>
</table>

Fig. 1 Trends in the domestic recycling development index for the country as a whole and for the four regions

The trend of the domestic recycling development index in the eastern region is significantly higher than that of the whole country and the other three regions. These data show that there are obvious imbalances in the development of domestic recycling in various regions of China, and that the domestic recycling development index of each region has significant regional characteristics.
3.2 Time-series analysis of the level of recycling in each province of the regional economy

Fig. 2 Trend of domestic recycling development index by province in the eastern region

Fig. 3 Trend of domestic recycling development index by province in the Northeast region

Fig. 4 Trend of domestic recycling development index by province in the central region
Even if the economy of each region within the region of the provinces within the cycle there are obvious geographical differences, from the vertical dimension alone, the eastern region of the provinces in the domestic recycling development index is located in the upper limit of the index above 0.25-0.9, and the northeastern region, the central region, and the western region of the provinces in the domestic and the recycling development index is located in the range of 0.25-0.5 range.

4. Conclusions and recommendations for response

4.1 Conclusions of the study

First, there are always obvious regional differences in the internal cycle of China's economy, and compared with the western and northeastern regions, the eastern and central regions of China are important contributors to the internal cycle;

Second, on the whole, the development trend of China's economic internal circulation tends to be favorable, and although it has declined due to the impact of the epidemic, there is a solid foundation for the domestic circulation;

Third, the new development pattern of China's international and domestic double cycle is driven by the endogenous factors of China's economic development, and now the pattern of China's domestic economic macrocycle has been gradually perfected, but the degree of economic interaction and exchange between regions is low, and the problem of unbalanced and insufficient development still exists.

4.2 Recommendations for countermeasures

First, strengthening and improving the domestic value chain, industrial chain and supply chain, promoting the strength of the domestic supply side and demand side, and forming a benign circulation of domestic economic resources.

Secondly, national consumption should be encouraged, national consumption capacity should be strengthened, and the domestic consumption structure should be upgraded and the structure of domestic demand should be advanced.

Thirdly, to open up the difficulties and blockages in each region of the domestic macro-cycle, to promote the completion of the unified cycle of the national economy, to remove regional barriers, and to realize the synergistic development of resources.
References

