

Research on the Evaluation of the Coordinated Development of Beijing-Tianjin-Hebei Region

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Abstract. Since the Beijing-Tianjin-Hebei integration strategy has been upgraded to the national strategy, the integration of Beijing-Tianjin-Hebei has made significant progress in several key areas. However, it still faces many problems, especially in the coordinated development of population and economy. The Beijing-Tianjin-Hebei coordinated development index is constructed in this paper, and the calculation results show that the coordinated development of Beijing-Tianjin-Hebei is still showing a downward trend, but the decline is narrowing. In order to improve the coordination, the coordination and cooperation mechanism of Beijing, Tianjin and Hebei should be perfected, and new financial and tax coordination mechanism should be explored and established.

1. Introduction

From the time that strategy of Beijing-Tianjin-Hebei Region integrated development has been elevated to national strategy, Beijing-Tianjin-Hebei Region integrated development has gain significant progress in multiple major fields. From the strategic aspect, with issuing and implementation of programming, the top-level design and the strategic plan is becoming continuously more clear and the strategic layout has basically completed. From the concrete aspect, in the past five year, the integration effect of Beijing-Tianjin-Hebei Region has been strengthened continuously, traffic integration has been promoted continuously, the cooperation in ecological environment protection has been deepen continuously, the quality of regional environment has been improved apparently and industrial upgrading and transfer has been boosted continuously. Though Beijing-Tianjin-Hebei region integrated development has gained remarkable effect, there are still many problems, especially there are serious problems in the aspect of coordinated development in population and economic. To solve the problem of unbalanced and uncoordinated development the urban agglomeration of Beijing-Tianjin-Hebei Region faced, we firstly need to measure and analyze the coordinated development of urban agglomeration Beijing-Tianjing-Hebei Region to understand the current situation of coordinated development of Beijing-Tianjin-Hebei Region and then start with reformation and innovation of the mechanism to promote Beijing-Tianjin-Hebei Region integrated development to reach a new high stage.

2. Theoretical foundation

In order to clearly understand the present situation of the synergetic development of Beijing-Tianjin-Hebei Region, it is necessary to evaluate it first. At present, the evaluation research of the present situation of Beijing-Tianjin-Hebei Region integrated development is mainly reflected in two aspects: construction of index system for overall integrated development of Beijing-Tianjin-Hebei Regio and construction of index system for integrated development of a certain field or industry. The research on the index system of the overall integrated development of Beijing-Tianjin-Hebei Region has only gradually increased in the past two years. The most representative is the Blue Book of the Beijing-Tianjin-Hebei Region Development Report, published by the research team of the Capital University of Economics and Trade for many years in a row, and the research on evaluation index system of Beijing-Tianjin-Hebei Region integrated development

index by Beijing-Tianjin-Hebei Region integrated development index research group of Chinese Academy of Social Sciences Beijing-Tianjin-Hebei Region integrated development think-tank (2017). In Blue Book, the concept of "Beijing-Tianjin-Hebei Region Integrated Development Index" is put forward for the first time[1]. While Beijing-Tianjin-Hebei Region synergetic development index research group of Chinese Academy of Social Sciences Beijing-Tianjin-Hebei Region synergetic development think-tank (2017) have constructed a comprehensive synergetic development index and five development synergetic indexes[2].

In the aspect of local integrated development evaluation, the existing research mainly uses analytic hierarchy process (AHP), principal component analysis (PCA), entropy method and fuzzy comprehensive evaluation (FCE) method to evaluate integration in a certain field or industry[3]. Overall, the evaluation results basically show that the degree of integration has gradually increased in recent years, but there are regional differences, and the degree of coordination and balance still need to be improved.

These researches have evaluated and studied the integration of Beijing-Tianjin-Hebei Region from different angles. However, in the index evaluation system, few scholars consider the coordinated development of industry and population, especially the quantitative analysis of coordinated development of industry and population. Since the core of Beijing-Tianjin-Hebei Region integration is the release of Beijing's non-capital functions, population release is an important manifestation of its achievements. Therefore, the coordinated development of industry and population should become an important index to measure Beijing-Tianjin-Hebei Region integrated development. In the existing research, most scholars only analyze the industrial synergy or population development respectively. The population development index is constructed in the Beijing-Tianjin-Hebei Region Blue Book, which is mainly measured by three aspects: population vitality, population structure and quality of life, without considering population distribution and coordinated development of population and industry. In the Beijing-Tianjin-Hebei Region integration index system established by the Chinese Academy of Social Sciences, the five development indexes of innovation, coordination, green, opening and sharing do not take into account the population factor. This paper focuses on the evaluation of the coordination of Beijing-Tianjin-Hebei Region, and increases the measurement of the coordination between industry and population on the basis of the evaluation of the Chinese Academy of Social Sciences, and puts forward the innovative system and mechanism to promote Beijing-Tianjin-Hebei Region coordinated development.

3. Evaluation of the Status Quo of Coordinated Development of Beijing-Tianjin-Hebei Region

3.1 Index Construction of Beijing-Tianjin-Hebei Region coordinated development

There are four prominent problems with coordinated development since Beijing-Tianjin-Hebei Region synergetic development: the economic gap, urban-rural gap, public services gap and unbalanced population distribution. Therefore, this paper constructs four target layers in coordinated development index system: regional gap, urban-rural gap, public service gap and the balance of regional economy-population distribution, to reflect the status quo of Beijing-Tianjin-Hebei Region coordinated development. The specific target layers are: (1) Regional gap: Through the calculation of Theil Index, the regional gap of per capita GDP is selected as the index to measure the gap among the three place of Beijing-Tianjin-Hebei Region. (2) Urban-rural gap: The income gap between urban and rural residents in the three place of Beijing-Tianjin-Hebei Region is selected as an index to measure the urban-rural gap in Beijing-Tianjin-Hebei Region. (3) Public service gap: Using Theil Index to calculate, select the regional gap of per finance capita budget expenditure to measure the public service gap among the three places of Beijing-Tianjin-Hebei Region. (4) Coordination deviation of regional economy-population distribution: Regional economic-population distribution coordination deviation index (HD) was used to measure. The HD index is an index specially designed to measure the coordination of regional economy-population distribution, namely:

$$HD = \sqrt{\sum_{i=1}^n p_i (GPR_i - 1)^2} \quad (1)$$

Among them, p_i indicates that the population of n sub-administrative districts in the region accounts for the proportion of the population of the whole region. GPR_i represents the ratio of the gross regional domestic product and the population of the n sub-administrative regions of the region to the proportion of the region respectively as a whole.

HD is similar to the standard deviation, focusing on reflecting the deviation degree between the regional economy-population distribution and the completely ideal coordination state, and its theoretical value range is $[0, +\infty]$. It is assumed that the regional distribution of population in $GPR_i=1$ is more concentrated, and with the deviation of GPR_i from 1, the proportion of population in the region decrease progressively. GPR_i distribution ($0.8 \leq 1.2$) is used as a more coordinated qualitative judgment interval of regional economy-population distribution. Then, $HD < 0.30$ is in a coordinated state, $0.30 \leq HD \leq 0.40$ is in a more coordinated state, $0.40 \leq HD \leq 0.55$ is in a less coordinated state, and $HD > 0.55$ is in an uncoordinated state[4].

3.2 Calculation method of index system[2]

This index system is based on the index value of Beijing-Tianjin-Hebei Region in 2012, and reflects the development trend of coordination indicators in Beijing-Tianjin-Hebei Region through the time change.

Table 1 evaluation index system of Beijing-Tianjin-Hebei coordinated development

First level index	Secondary level index	computing method	Index type
Coordinated development	Regional gap	the regional gap of per capita GDP: Theil Index	—
	Urban-rural gap	The income gap between urban and rural residents	—
	Public service gap	the regional gap of per finance capita budget expenditure: Theil Index	—
	Coordination deviation of regional economy-population distribution	Regional economic-population distribution coordination deviation index (HD)	—

Note: “—” represents this index as a reverse index

(1) The determination of the weight. In this paper, by making the method of equal weight, the weight of the standardized data is analyzed, and the secondary index value is added to get the primary, so as to judge the status quo of coordinated development of Beijing-Tianjin-Hebei Region. In addition, for the regional gap of per capita GDP and the regional gap of per finance capita budget expenditure, this paper uses the relevant data of each region (based on 2012), and use the Theil Index to calculate the relevant data.

(2) Data standardization. In order to facilitate the additivity of all index data, it is necessary to standardize each indicator index at first. Because the evaluation index system of coordinated development of Beijing-Tianjin-Hebei Region index mainly reflects the longitudinal change trend of the whole region, this paper takes 2012 as the base period to do the standardization processing. In the standardization processing, the indexed can be divided into the forward indexes and the contrary ones. Coordinated development index belongs to contrary index, so the standardized processing of contrary index is adopted.

The standardized processing methods are as follows: M_t is the measured value of a certain index, M_{2012} is the measured value of a certain index in 2012, and P_t is the standardized index value.

Standardization processing of forward index: $P_t = M_t / 2012$ (2)

Standardization processing of contrary index: $P_t = 1/(M_t / M_{2012})$ ($t=2012, \dots, 2016$) (3)

(3) Data description of index measurement. The measurement data are all from the authoritative data published by the National Bureau of Statistics, the Bureau of Statistics of the three places and the relevant departments of provinces and cities. The data include relevant data for 2012-2016.

4. Status Quo Analysis of Coordinated Development of Beijing-Tianjin-Hebei Region

According to the above evaluation index system sum calculation method, the coordinated development index of Beijing-Tianjin-Hebei Region can be calculated. As can be seen from Fig.1, coordinated development of Beijing-Tianjin-Hebei Region as a whole has been on a downward trend since 2012, but this downward trend has begun to slow since 2015, especially in 2016. This indicates that although Beijing-Tianjin-Hebei Region has made a lot of achievements in integrated development since the implementation of integrated development strategy, coordinated development of Beijing-Tianjin-Hebei Region is still an important issue in Beijing-Tianjin-Hebei Region regional integration. Then, we will analyze the specific situation of the four indexes.

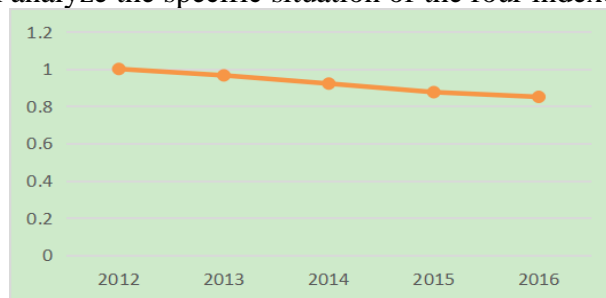


Fig. 1. Changing trend of coordinated development of Beijing-Tianjin-Hebei Region

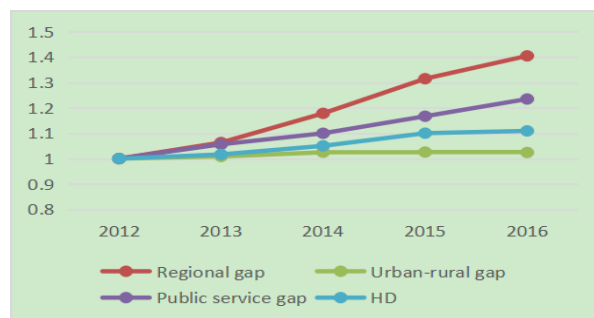


Fig.2. Changing trend of regional gap, urban-rural gap, public service gap and HD in Beijing-Tianjin-Hebei Region

As can be seen from figure 2, Beijing-Tianjin-Hebei Region interregional regional gap is the most significant. Regional gap increased greatly from 2013 to 2015, and the growth rate of regional gap decreased significantly in 2016. Because of the huge population base and the simplification of industry in Hebei Province, its per capita GDP is still quite different from that of Beijing and Tianjin. However, with the continuous development of Beijing-Tianjin-Hebei Region regionalization, it is expected that the gap in Beijing-Tianjin-Hebei Region will continue to narrow.

The public service gap was generally lower than regional gap, but higher than urban-rural gap and regional economy-population distribution coordination deviation index. The development trend of public service gap is the same as that of regional gap, and it is still increasing.

Beijing-Tianjin-Hebei Region regional economy-population distribution coordination deviation index increased slowly between 2012 and 2015, but stabilized after 2015 with a small increase. For a long time, the population of Beijing has been too concentrated because of the significant polarization effect. With the promotion of Beijing-Tianjin-Hebei Region integration strategy and the release of Beijing's non-capital functions, the resident population of Beijing has maintained a double decline in incremental growth for four consecutive years in recent years, and showed its first negative growth since 2000 at the end of 2017. From 2015 to 2017, the proportion of the population in Beijing and the areas around Beijing declined, but the proportion of the total Beijing-Tianjin-Hebei Region population in the country increased. This shows that the importance of Beijing-Tianjin-Hebei Region in the national population distribution is increasing. at the same time, the economic-population distribution structure within Beijing-Tianjin-Hebei Region will be continuously optimized with the releasing of Beijing industry.

Of the four indexes, the smallest gap is the urban-rural gap. Since 2012, urban-rural gap in the Beijing-Tianjin-Hebei Region keep stabilizing. Urban-rural gap improved slightly until 2014; but

after 2014, urban-rural gap entered a stable period, with a slight decline in urban-rural gap in 2016. This shows that under the promotion of Beijing-Tianjin Region synergetic development strategy, the income gap between urban-rural residents is narrowing, the public resources in urban-rural areas are more balanced, and the level of urbanization is constantly improving.

5. Suggestions on Improving the Coordinated Development of Beijing-Tianjin-Hebei Region

5.1 Perfecting the Coordination and Cooperation Mechanism of Beijing, Tianjin and Hebei

Beijing-Tianjin-Hebei region needs to coordinate the complex relations between central and local governments, relations between different levels and same levels of provinces, cities and counties within the region. Firstly, the leadership should be strengthened of "Jing-Jin-Ji integration Leading Group", which promotes the strategic planning, major problems encountered in coordinated development, monitor and evaluation of the progress of coordinated development, so as to enhance the implementation of Beijing-Tianjin-Hebei integration. Secondly, a good cooperation mechanism among local governments should be built to strengthen the interaction and cooperation among local governments.

5.2 Exploring and establishing New Financial and Tax Coordination Mechanism

Firstly, on the basis of the existing horizontal transfer payment system, continue to innovate the horizontal financial transfer system in Beijing-Tianjin-Hebei region, and expand the financial transfer payment mode of Beijing-Tianjin to Hebei, so that the regions with low per capita financial resources can naturally obtain a corresponding high share of financial transfer. Secondly, establish a vertical financial transfer payment system, increase the proportion of general transfer payments such as infrastructure and public goods investment in township areas, and consolidate the basis for coordinated development. Thirdly, give full play to the role of "guiding indicator" and "staff assistant" in Tax Economic analysis, and better serve the national strategy of Beijing-Tianjin-Hebei coordinated development. Fourthly, establish a mechanism for evaluating the effect of fiscal and taxation policy implementation in Beijing-Tianjin-Hebei region, and apply the evaluation results to the revision and improvement of fiscal and taxation policy.

6. Conclusion

The coordinated development of Beijing-Tianjin-Hebei is still in a downward trend, but the decline is narrowing. In order to improve the coordination, coordination and cooperation mechanisms of Beijing, Tianjin and Hebei should be perfected, and new financial and tax coordination mechanisms should be explored and established.

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