

Measurement and Influencing Factors of Local Government Basic Public Service Equalization: A Case Study of Shandong Province

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Abstract

Equitable access to basic public services is not only a driving force for coordinated regional development, but also a focal point for achieving common prosperity. Based in Shandong province to build scientific and appropriate level of basic public services development evaluation index system, and USES the entropy value method, Dagum gini coefficient and its decomposition, the Kernel density estimation, QAP analysis to its level of development, regional differences, the distribution of dynamic and measure to explore the factors which influence. Study found that: from 2009 to 2018 in Shandong province equal basic public services development level rising steadily, highlight trend to strengthen, multipolar differentiation characteristics, the overall difference stems mainly from super variable density, but its contribution degree is on the decline, health care, stylistic differences between services, social security and infrastructure is influence the main factors of the development of basic public service equalization. In order to accelerate the realization of basic public service equalization in Shandong Province, policy suggestions are put forward from transfer payment system, optimization of digital service platform, and promotion of diversified supply.

Keywords

Equal Access to Basic Public Services; Dagum Gini Coefficient; Kernel Density Estimation; QAP Analysis.

1. Introduction

In the 14th Five-Year Plan, it is emphasized that "to basically achieve the strategic goal of equalization of basic public services by 2035, improve the quality and efficiency of the supply of basic public services". The 10th meeting of the Central Finance and Economics Committee also put forward "adhering to ensuring and improving people's livelihood in the process of development, and taking the promotion of equalization of basic public services as an important task to solidly promote common prosperity." Although my country has initially established a basic public service standard system, due to The long-standing tendency to focus on the economy over the society and the uneven development of basic public services have seriously hindered my country's economic and social development and the pace of achieving common prosperity [1]. As a strategic deployment and an important measure to promote the development of people's livelihood in my country, the equalization of basic public services is the top priority of local government governance [2]. Local governments have successively issued and implemented a series of policies to promote the level of equalization of local basic public services. Shandong Province has continued to accelerate the process of equalization of basic public services and promoted the balanced supply of basic public services in different dimensions. However, with the formation of a new structure of the population, the new characteristics of the society and the diverse requirements of the public for basic public services, the current development level of basic public services in Shandong Province is still not high, and problems such as non-equilibrium are still prominent.

2. Literature Review

In recent years, the equalization of basic public services has become a research hotspot of public management, and domestic scholars have conducted a lot of research on it. As for the factors influencing the equalization of basic public services, factors such as urbanization, transfer payments, fiscal decentralization, human capital distribution, and financial support levels still make the development gap of basic public services between regions still obvious, which hinders the equalization of basic public services. the realization of [3-7]. Regarding the measurement analysis of the equalization of basic public services, it can be divided into two levels: the national level and the provincial level according to the different research objects. From the national level, most scholars in the existing research are based on the comprehensive evaluation method, the analytic hierarchy process, and the principal component analysis method. The TOPSIS method of entropy weight weights the evaluation indicators to measure the development level of comprehensive or single-dimensional basic public services in China, and then uses comprehensive index, Gini coefficient, set-pair analysis model, multi-level gray correlation evaluation and other methods to analyze the degree of equalization [8-13]; at the provincial level, some scholars have measured the equalization level of their basic public services based on relevant data from Henan Province, Zhejiang Province, and Liaoning Province [14-16]. Most research results show that there are still significant differences in the development of basic public services across the country, between urban and rural areas, and between provinces, but the level of equalization of basic public services is generally on the rise. The above studies have provided good experience for this article, but there are still problems to be further explored in the existing studies. The research objects in the existing literature are mainly concentrated at the national level, involving less at the provincial level, and the research at the provincial level also mainly measures its level of equalization, lacking regional differences, evolution trends and impacts on the equalization of provincial basic public services. Factor analysis, and there are few literatures that measure and analyze the equalization of basic public services in Shandong Province. Accelerating the equalization of basic public services is the key to achieving common prosperity. In view of this, based on the actual situation of Shandong Province, a scientific and appropriate evaluation index system for the development of basic public services was constructed. The entropy method was used to calculate the development level of basic public services in Shandong Province from 2009 to 2018, and the Dagum Gini coefficient and its decomposition were used to analyze regional differences. , Kernel density estimates show absolute differences and polarization trends. QAP analysis is used to explore the influencing factors of the equalization level of basic public services in Shandong Province, and to reveal its equalization status; Equalization of Services and Shared Prosperity provides valuable policy advice.

3. Methods and Data

3.1. Methods

3.1.1. Entropy Method

The entropy method assigns weights to each index according to the degree of dispersion of the data. If the internal value of the index has a large difference and the distribution is discrete, it means that the index has a greater impact on the total index than other indexes, and the weight is larger; otherwise, less weight. The entropy method can overcome the randomness caused by subjective weighting, so this paper selects the entropy method to weight each index and calculate the comprehensive score, and uses the extreme value standardization method to eliminate the difference between the dimensions and orders of magnitude of each index to evaluate impact on results. In formula (1), S_j represents the comprehensive score of the j

indicator, W_j refers to the weight of the j indicator, and P_{ij} represents the proportion of the j th indicator in the i th region.

$$S_j = \sum_{j=1}^m W_j P_{ij} \times 100 \tag{1}$$

3.1.2. Dagum Gini Coefficient

This paper uses the Dagum Gini coefficient and its decomposition to analyze the equalization level of basic public services in Shandong Province and its regional differences. In formula (2), G represents the overall Gini coefficient, k is the total number of regions, j and h represent the number of regions, i and r are the number of inland-level cities in the region, n is the total number of prefecture-level cities, and n_j (n_h) is j (h) The number of inland-level cities in the region, y_{ji} (y_{hr}) represents the development level of basic public services in any prefecture-level city in the j (h) region, and \bar{y} is the average level of development of basic public services in Shandong Province.

$$G = \frac{1}{2n^2\bar{y}} \sum_{j=1}^k \sum_{h=1}^k \sum_{i=1}^{n_j} \sum_{r=1}^{n_h} |y_{jr} - y_{hr}| \tag{2}$$

The overall Gini coefficient (G) can be decomposed into three parts: intra-regional difference contribution (G_w), inter-regional difference contribution (G_{nb}) and hypervariable density (G_t), and satisfy $G=G_w+G_{nb}+G_t$. The specific formula is as follows:

$$G_w = \sum_{j=1}^k G_{jj} p_j s_j = \sum_{j=1}^k G_{jj} \frac{n_j n_j \bar{y}_j}{n \bar{y}} \tag{3}$$

$$G_{nb} = \sum_{j=2}^k \sum_{h=1}^{j-1} G_{jh} (p_j s_h + p_h s_j) D_{jh} \tag{4}$$

$$G_t = \sum_{j=2}^k \sum_{h=1}^{j-1} G_{jh} (p_j s_h + p_h s_j) (1 - D_{jh}) \tag{5}$$

3.1.3. Kernel Density Estimation

Kernel density estimation is a non-parametric estimation method that measures and reflects the overall shape and dynamic evolution characteristics of sample distribution based on comparative analysis of sample distribution characteristics at different time points [17]. As shown in Formula (6), $f(x)$ is assumed to be the density function of random variable x , K is kernel density, X_i is independent and identically distributed observed value, N represents the number of observed value, and h is bandwidth. In this paper, Gaussian Kernel function is selected to analyze the dynamic evolution process of the development level of basic public services in Shandong Province, and its Kernel function expression is shown in Formula (7).

$$f(x) = \frac{1}{N_h} \sum_{i=1}^N K\left(\frac{X_i - x}{h}\right) \tag{6}$$

$$f(x) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{x^2}{2}\right) \tag{7}$$

3.1.4. Quadratic Assignment Procedure

The quadratic assignment program can effectively overcome the interference of the autocorrelation in relational data to the analysis results by comparing the correlation between the elements of matrices, calculating the correlation coefficient between matrices, and performing non-parametric test on the coefficients [18-19]. Therefore, this paper adopts QAP to conduct correlation analysis and regression analysis on the influencing factors of basic public service equalization level in Shandong Province. The specific model is set as follows:

$$BPS=f(PE,SS,MHE,CGS,I,ES) \quad (8)$$

Level of basic public services development in Shandong province (BPS) is a comprehensive public education (PE), social security (SS), Medical and health care (MHS), style (CGS), infrastructure (I) and environmental services (ES) of six dimensions 25 indicators to measure, this article will be more than six dimensions of regional differences as influencing factors and build difference matrix, To measure their impact on the development level of basic public services in Shandong Province.

3.2. Indicators and Data

Table 1. Evaluation index system of basic public service development level in Shandong Province

Level indicators	Secondary Indicators	Positive and Negative	Weight
Public education	Per capita expenditure on education	+	0.041
	Number of regular primary and secondary schools per 10,000 people	+	0.060
	Teacher/student ratio in ordinary primary and secondary schools	+	0.021
Social security	Registered urban unemployment rate	-	0.016
	Per capita social security expenditure	+	0.045
	The number of people participating in old-age insurance per 10,000 people	+	0.065
	The number of medical insurance enrollees per 10,000 people	+	0.068
	The number of people enrolled in unemployment insurance per 10,000 people	+	0.068
Medical and health	Per capita expenditure on health care	+	0.045
	Number of health facilities per 10,000 people	+	0.052
	Number of beds in health facilities per 10,000 people	+	0.052
	Number of health technicians per 10,000 people	+	0.056
Cultural and sports services	Per capita expenditure on culture and sports	+	0.047
	Per capita public library collection	+	0.053
	Number of public cultural venues per 1,000 people	+	0.040
	Number of public cultural venues per 1,000 people	+	0.012
	Population coverage of radio programs	+	0.010
Infrastructure	Urban road area per capita	+	0.019
	Public transport vehicles per thousand people	+	0.109
	Number of street lamps per 10,000 square meters	+	0.057
	Gas penetration rate	+	0.006
	Water penetration rate	+	0.005
Environmental services	Per capita park green area	+	0.045
	Domestic sewage treatment rate	+	0.005
	Harmless treatment rate of household garbage	+	0.002

Based on the "13th Five-Year Plan for Promoting Equal Access to Basic Public Services", "National Standard for Basic Public Services (2021 Edition)" and existing research results, Six dimensions of public education, social security, medical and health care, cultural and sports

services, infrastructure and environmental services were selected to construct an evaluation index system to reflect the development level of basic public services in Shandong Province from 2009 to 2018, as shown in Table 1. The original data involved in the indicators in this paper came from The Statistical Yearbook of Shandong Province. Considering that Laiwu was incorporated into Jinan in 2019, Laiwu was removed from the sample, and panel data of 16 prefecture-level cities in Shandong province from 2009 to 2018 were finally selected. For a small amount of missing data of some indicators, supplement it by contacting relevant departments of the city and consulting the Statistical Yearbook of the city, and supplement it by means of average annual growth rate for other data that cannot be obtained. About the division, according to the government of shandong province issued "the guiding opinion on accelerating the development of economic integration, the provincial capital, the guiding opinion on accelerating the development of southern shandong economic integration and the guiding opinion on accelerating the development of jiaodong economic integration, the capital of shandong province is divided into three big economic circle, Provincial Capital(PC), Jiaodong(J), and Lunan(L).

4. Empirical Results

4.1. Regional Difference Analysis

(1) Typical facts.

In order to reveal the evolution trend of the development level of basic public services in Shandong province as a whole and in the three economic circles during the observation period, this paper calculated the development level of basic public services in Shandong Province from 2009 to 2018 based on the entropy method, and then averaged the development level of shandong province as a whole and in the three economic circles. Draw the evolution trend of basic public service development level in Shandong province as a whole and in three economic circles, as shown in Figure 1.

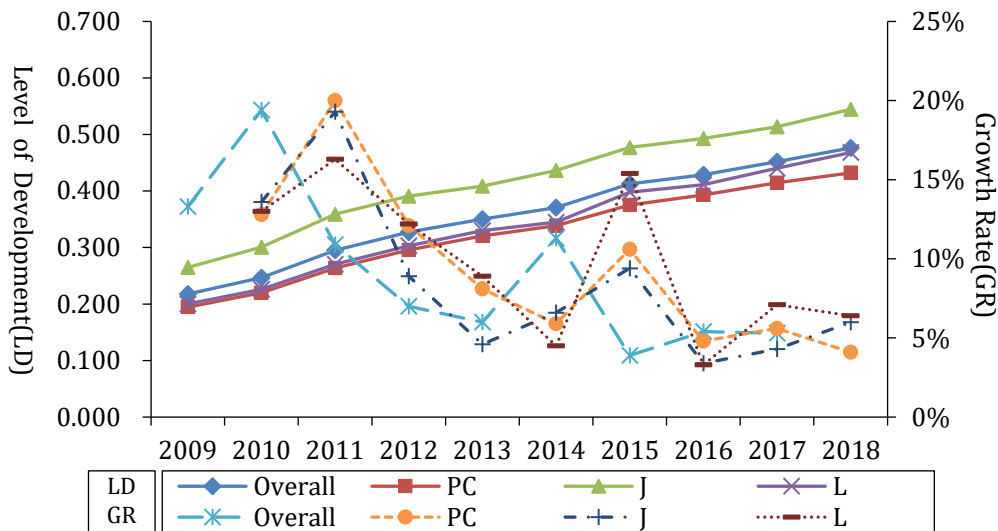


Figure 1. Evolution trend of basic public service development level in Shandong Province and the three economic circles

Due to the influence of regional economic strength, fiscal expenditure scale, regional resources and other related factors, the average development level of basic public services in Shandong province during the observation period can be arranged into Jiaodong economic circle, Shandong province as a whole, Southern Shandong economic circle and provincial capital economic circle. In shandong province from the point of the change process, overall and three

big economic circle average all showed a trend of steadily increasing, although during the economy into a new normal, deepen the reform, the comprehensive construction of well-off and carried forward to the construction of digital government the superposition of multiple factors, such as growth present the "three litre drop" fluctuation change trend, But overall it is still mainly steady growth. During the observation period, the average annual growth rate of shandong province as a whole, provincial capital, Jiaodong and Southern Shandong reached 9.17%, 9.33%, 8.46% and 9.68%, respectively. The average annual growth rate of Jiaodong economic circle was the lowest, while provincial capital and southern Shandong economic circle were significantly higher than the total, highlighting a certain catchup trend. Analysis of the reason is that the improvement of economic development in shandong province in recent years, the economic and social environment is relatively stable, and national and the provincial government to promote the equal basic public services and a series of policies and measures, including more policy and financial support to provincial capital economic circle, and southern shantung local basic public services to get fast development.

(2) Overall and regional differences.

In order to further explore the overall difference and source of the equalization level, this paper adopts Dagum Gini coefficient and its decomposition to measure and analyze the equalization level of basic public services in Shandong Province during the sample observation period. Figure 2 describes the evolution trend of basic public service equalization in shandong province as a whole, provincial capital economic circle, Jiaodong economic circle and Southern Shandong economic circle during the sample observation period. On the whole, the spatial difference of the basic public service equalization level in Shandong province showed an obvious downward trend during the observation period, and the equalization trend was strengthened. Accordingly, the gini coefficient decreased by 0.041, or 25.15%, from 2009 to 2018, with an annual decline rate of 2.57%. This suggests that the basic public service system construction of shandong province, equal basic public services planning, certain achievements have been made in the related policy, to a certain extent, improve the level of the province within the scope of the equalization, but the current level of basic public services development gap between cities still highlights, the government should continue to be high quality, efficient, accelerate the implementation of "equal basic public services and implement.

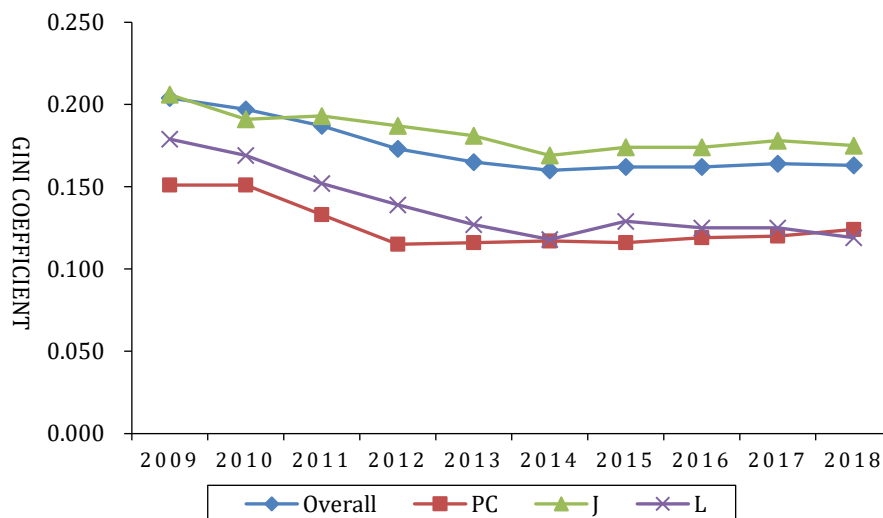


Figure 2. Overall and regional variation evolution trend of basic public service equalization in Shandong Province

In terms of the three economic circles, the evolution trend of regional differences in the level of equality of basic public services in provincial capital, Jiaodong and Southern Shandong showed a downward trend during the sample observation period, indicating that the degree of difference within each region was shrinking and the trend of equality was strengthening. Analysis of the reason is that with the improvement of economic development level and quality of life, make government has more plentiful source of revenue, the public also produce more demand for basic public services, the government in order to satisfy the public demand increases the money supply of basic public services, strong narrow the area of the development of basic public services gap between the prefecture level. Specifically, during the observation period, the provincial capital economic circles showed a downward trend as a whole, and their Gini coefficient decreased from 0.151 in 2009 to 0.124 in 2018, with a decline rate of about 21.77% and an average annual decline rate of about 2.43%. During the observation period, the Gini coefficient decreased by 0.031, or about 15.05%, with an average annual decline of about 1.74%. Specifically, from 2009 to 2014, the Gini coefficient fluctuated from the highest value of 0.206 to the lowest value of 0.169, and from 2015 to 2018, the Gini coefficient showed a trend of low growth, with an increase of about 3.55%. During the observation period, the evolution trend of the Southern Shandong economic circle can be roughly divided into three stages of "decline, rise and decline", and the Gini coefficient decreases by 0.06, or about 33.52%. Specifically, during the observation period, the Gini coefficient of Southern Shandong Economic circle decreased steadily from the highest value of 0.179 in 2009 to the lowest value of 0.118 in 2014, and after a slight increase in 2015, it showed a slight downward trend to 2018. Compared with the lowest value in 2014, the gini coefficient in 2018 increased by 0.001, or about 0.85%. In terms of the size of the gini coefficient within the region, the value of the Gini coefficient in Jiaodong economic circle is the highest during the observation period, which is higher than the overall level of the province, indicating that the differences in the internal development of basic public services in Jiaodong increase the degree of inequality of basic public services in the province. This can be attributed to the economic strength of prefecture-level cities in the three economic circles, financial self-sufficiency rate, government attention and population density and other internal and external factors on the development of basic public services.

(3) Regional differences.

Figure 3 describes the evolution trend of regional differences in the equalization of basic public services in the provincial capital, Jiaodong and South Shandong economic circles, which all show a downward trend. Specifically, in terms of the evolution trend, the regional difference between provincial capitals and Jiaodong and the regional difference between provincial capitals and Southern Shandong showed a two-stage trend of "steady decline and slight increase". During the observation period, the regional differences between provincial capitals and Jiaodong showed a steady downward trend from 2009 to 2014, and then showed a slight upward trend until 2018, but the overall level still tended to decline. During the observation period, the gini coefficient between the provincial capital and Jiaodong decreased by 0.037, or 17.79%, with an average annual decline rate of 2.12%. The gini coefficient between provincial capitals and southern Shandong decreased from 0.168 in 2009 to 0.137 in 2018, with a decrease of 18.45% and an average annual decrease rate of 3.22%. However, the difference between Jiaodong and Southern Shandong showed a steady decline during the observation period, and the Gini coefficient decreased by 26.05% from 0.215 in 2009 to 0.159 in 2018, with an average annual decline rate of 2.05%. In terms of numerical value, the gini coefficient between provincial capitals and southern Shandong was always at a low level, while the gini coefficient between provincial capitals and Eastern Shandong and between Eastern Shandong and Southern Shandong was at the highest level alternately. Before 2013, the Gini coefficient between eastern Shandong and southern Shandong was the highest, and from 2013 to 2018, the Gini coefficient between provincial capitals and Eastern Shandong was the highest. Presents

the trend of the main reason is that jiaodong economic circle in most cities in the coastal areas, and Qingdao, yantai and weifang GDP occupy the top in the province, and geographic location, foreign investment, economic development level, scale advantage factors such as the government fiscal revenue, makes jiaodong steady rise of economic development level of basic public services. Although the development level of the provincial capital and southern Shandong economic circle has been improved in recent years under the influence of relevant policy support, energy endowment and other factors, the development level of the provincial capital and southern Shandong economic circle is still relatively backward compared with that of Jiaodong Economic circle, which makes the development level of basic public services of the two economic circles relatively low. At the same time, provincial capital, lunan economic circle compared to have more similarity, the gap between each other is relatively small.

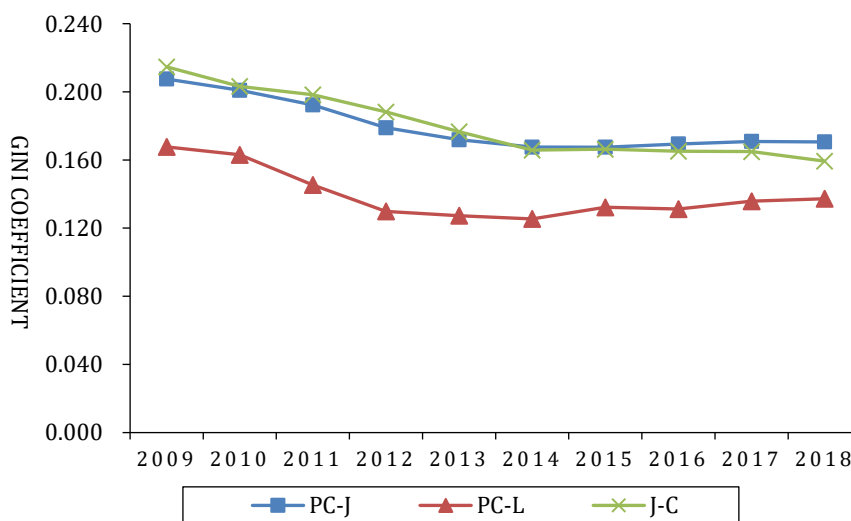


Figure 3. Evolution trend of regional differences in the equalization of basic public services in Shandong Province

(4) Contribution rate of regional differences and its sources.

Figure 4 describes the evolution trend of regional differences and contribution values of basic public service equalization in Shandong Province. On the whole, during the observation period, the evolution process of the contribution rate of the difference in the intraregional, interregional and supervariable density showed a relatively stable, fluctuating decline and rising trend, respectively. Specifically, the change of contribution rate can be roughly divided into two stages: the contribution rate of regional difference before 2013 and the contribution rate of supervariable density from 2013 to 2018. In terms of specific values, the contribution rate of regional differences decreased from 34.20% to 29.76% after "M" type fluctuation from 2009 to 2017. On the contrary, the variation trend of the contribution rate of supervariable density showed a "W" type fluctuation. The contribution rate decreased from 36.13% in 2009 to 33.27% in 2011, and then fluctuated to 40.69% in 2017, and then showed a downward trend. In the observation period, the contribution rate of regional differences remained stable and the value was the lowest, indicating that regional differences did not become the main factor for the overall difference of basic public service equalization in Shandong Province. Taking 2009 as the base period, the inter-regional and intra-regional differential contribution rate decreased by 4.74% and 0.01% respectively in 2018, while the overvariable density contribution rate increased by 4.51%. The contribution rate of super variable density is the highest, which indicates that the overlap of different regions has become the main factor of the overall difference of basic public service equalization in Shandong Province.

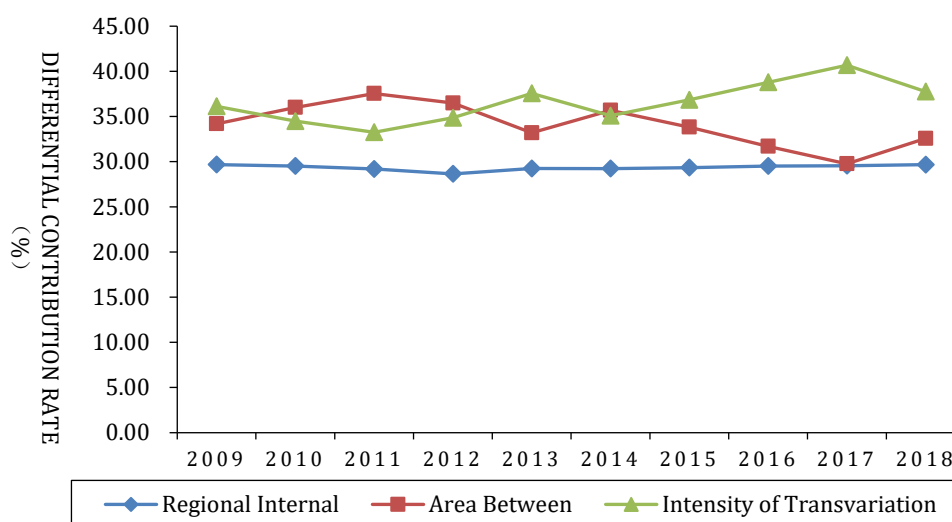


Figure 4. Evolution trend of differential contribution rate of basic public service equalization in Shandong Province

4.2. Kernel Density Estimation Analysis

The research based on Dagum Gini coefficient presents the equalization level of basic public services in Shandong Province, which reflects the relative differences in the development level of basic public services in Shandong Province, but cannot describe the distribution and evolution trend of the absolute differences in the development level of basic public services in Shandong Province. Therefore, this paper further uses Kernel density estimation method to analyze the distribution position and form, ductibility and polarization characteristics of basic public service development level in Shandong province as a whole and provincial capital, Jiaodong and South Shandong economic circles.

(1) Overall level of Shandong Province.

Figure 5 (a) depicts the distribution and evolution trend of the overall development level of basic public services in Shandong province during the observation period. Specifically, during the observation period, the Kernel density function center of the development level of basic public services at the overall level of Shandong province moved to the right, and the peak value of the main peak continued to decline, indicating that the development level of basic public services at the overall level of Shandong Province increased year by year, but the overall absolute difference showed a slight trend of expansion. In Shandong province at the same time, the overall level of basic public service level of development plays a significant role in distribution curve right trailing phenomenon, its distribution showed a trend of right to broaden the extension, it shows that the level of basic public services development gap between regions of Shandong province is gradually expanding, the province exists the phenomenon of "better performers", high level of development areas there is still a high growth rate. In addition, in the context of its wave evolution process, the overall level of basic public services development in Shandong province distribution presents the obvious characteristics of multi-polarization, including, in Shandong province from 2008 to 2011 the overall level of basic public services development distribution mainly there is a main peak and two side peaks are highlighted, in 2014 after two side fengfeng value rise significantly, As of 2018, there are four obvious side peaks except one main peak. This shows that the rapid economic and social development of Shandong province has significantly improved the development level of basic public services in Shandong Province. However, there are significant differences among cities in the economic development level, government financial resources, digital construction and population density that affect the development of basic public services. In the short term, the areas with low level of basic public service development are difficult to catch up with the areas

with high level of public service development, which makes the development level of basic public service in Shandong province has a certain gradient effect, showing an obvious trend of multi-pole differentiation.

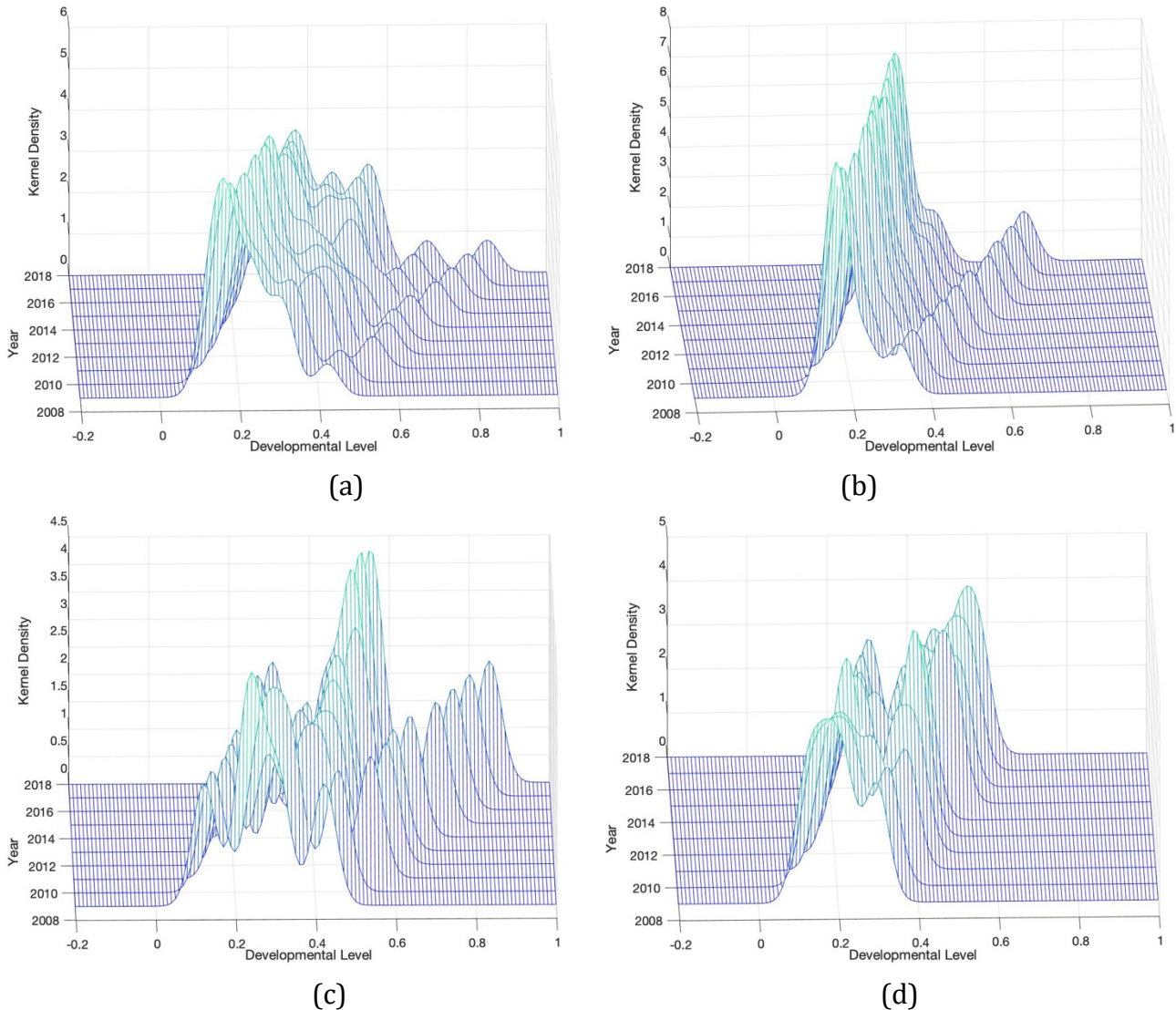


Figure 5. Distribution evolution of basic public service development level in Shandong Province as a whole and in three economic circles

(2) Three economic circles.

Figure 5 (b), (c) and (d) respectively depict the evolution trend of basic public service development level in provincial capital, Jiaodong and South Shandong economic circles during the observation period, and the specific distribution dynamic characteristics are as follows. In terms of distribution location, the Kernel density centers of the development level of basic public services in the three economic circles showed an obvious trend of right movement, indicating that the development level of basic public services in the three economic circles showed a steady increase on the whole. In terms of distribution pattern, the peak value of the main peak of provincial capital economic circle decreased in a low range during the observation period, indicating that the absolute difference of provincial capital economic circle increased to a certain extent. The height of the main peak in Jiaodong economic circle experienced a "decrease-rise" evolution process, and the width of the main peak decreased slightly, indicating that the absolute difference in Jiaodong economic circle tended to decrease as a whole. The peak value of the main peak in the southern Shandong economic circle shows a trend of fluctuation decline

on the whole, and the width of the main peak shows a slightly decreasing trend, indicating that the absolute difference in the southern Shandong economic circle increases gradually on the whole. In terms of distribution ductibility, only the Kernel density curve of provincial capital economic circle has a right trailing phenomenon, indicating that there is an internal phenomenon of "the better is better", while the Kernel density curve of jiaodong and South Shandong economic circle shows a trend of widening to the right. In terms of polarization characteristics, the three economic circles showed multi-polarization characteristics during the observation period. The distribution of basic public service development level in provincial capital economic circle gradually changes from "one main side" bimodal state to "one main side" multi-modal state, which indicates that provincial capital economic circle has the trend of multi-polar differentiation over time. Jiaodong Economic circle changed from "one main side" to "one main side" from 2009 to 2010 to "one main side and three sides" from 2011 to 2018, and the side peak-to-peak value is relatively low, which means that the gradient effect and multi-pole differentiation of Jiaodong economic circle are prominent and still prominent over time. From 2009 to 2013, its distribution was composed of one main side, and then to 2018, its distribution changed to one main side, and the side peak-to-peak value is high, so the gradient effect and multi-pole differentiation trend of the southern Shandong economic circle is prominent.

4.3. Analysis of Influencing Factors

(1) QAP correlation analysis.

Based on the QAP correlation analysis of 5000 random displacement, the correlation coefficient between the difference matrix of basic public service development level and the influencing factor matrix was calculated and tested. The analysis results are shown in Table 2. Among them, the larger the correlation coefficient is, the greater the influence of corresponding independent variables on the development level difference of basic public services in Shandong Province is.

Table 2. QAP correlation analysis of influencing factors of basic public service equalization in Shandong Province

Variables	Correlation Index	Significance Level	Mean	Std.Dev.	Min	Max	P≥0	P≤0
PE	0.008	0.436	-0.002	0.100	-0.227	0.647	0.436	0.566
SS	0.776	0.000	0.0004	0.116	-0.341	0.536	0.0002	1.000
MHS	0.515	0.000	0.002	0.092	-0.290	0.548	0.0004	1.000
CGS	0.527	0.000	0.001	0.110	-0.318	0.494	0.0002	1.000
I	0.675	0.000	-0.001	0.128	-0.284	0.569	0.0002	1.000
ES	-0.053	0.270	-0.001	0.092	-0.272	0.419	0.732	0.270

The results of QAP correlation analysis show that the correlation coefficient between the development level of basic public services in Shandong province and social security (SS), medical and health (MH), cultural and sports services (CSS) and infrastructure (I) is positive and significant at 1% level. It shows that the differences of social security, medical and health care, cultural and sports services and infrastructure have a significant positive impact on the overall development level. Among them, the correlation coefficient of social security is 0.776, which is significantly higher than other variables, indicating that social security has a great impact on the overall development level. The correlation coefficients of public education (PE) difference and environmental service (ES) difference are 0.008 and -0.053, but they are not significant, indicating that the overall development level difference is not strongly correlated with public education difference and environmental service difference.

(2) QAP regression analysis.

In order to avoid the interference of autocorrelation and multicollinearity in relational data on the analysis results, In this paper, QAP regression analysis was used to further test the influence of the difference matrix of public education (PE), social security (SS), medical and health (MH), cultural and sports services (CSS), infrastructure (I) and environmental services (ES) on the difference matrix of basic public service development in Shandong Province. The analysis results are shown in Table 3 and Table 4.

Table 3. Model fitting effect

R ²	Adjusted-R ²	Probability	Obs
0.706	0.698	0.000	240

QAP regression analysis results as shown in table 4, social security, health care, stylistic difference in infrastructure and services of regression coefficient is positive, and all at 1% significance level, that between around the city social security, health care, stylistic differences between services and infrastructure, the greater the overall level of basic public services development in shandong province, the greater the difference. The difference of environmental services is significant at the level of 5%, but the regression coefficient is negative, indicating that under the influence of other variables, the expansion of environmental services difference is beneficial to narrow the development level difference of basic public services in Shandong province during the study period. However, the difference in public education did not pass the significance test of QAP regression analysis, indicating that the distribution of public education resources in Shandong province is relatively balanced, which has no significant impact on the development level of basic public services in Shandong Province.

Table 4. QAP regression analysis of influencing factors of basic public service equalization in Shandong Province

Variables	Unstandardized Coefficients	Standardized Coefficient	Significance Level	Probability 1	Probability 2
Intercept	0.061	0.000			
PE	0.001	0.001	0.512	0.512	0.488
SS	0.427	0.418	0.000	0.0002	1.000
MH	0.222	0.223	0.000	0.0004	1.000
CSS	0.163	0.163	0.005	0.005	0.995
I	0.274	0.259	0.001	0.001	0.999
ES	-0.100	-0.100	0.021	0.979	0.021

Analysis for the following reasons, one is the overall level of economic development in shandong province is rising steadily in recent years, but the economic and social development between each district cities there is still a big gap, local economic development level is the guarantee of equal basic public services goal implementation, it determines the size of government financial support and primary distribution pattern in the field of basic public services. In prefecture-level cities with strong economic strength, stable and sufficient fiscal revenue effectively guarantees the fund supply of basic public services. On the other hand, prefecture-level cities with weak economic strength take promoting local economic growth as the goal and spend a large amount of fiscal expenditure in areas with significant economic growth, resulting in insufficient fund supply in areas such as social security, medical and health care, cultural and sports services and infrastructure. Second, with the growth of economic income and the continuous improvement of life quality, the public's demand for basic public

services presents diversity. The increase in the cost of meeting the demand for basic public services will put downward pressure on the supply efficiency of basic public services, and the population structure presents new characteristics with the growth of population. The structural contradiction between demand and supply of basic public service in Shandong province is more prominent. However, affected by the population, the construction of digital service platform and the level of economic development, the degree and level of social security in various regions of Shandong province are different. There is imbalance in the total quantity of quality health resources and the allocation of medical and health resources among prefecture-level cities, and there are not many large-scale and high-level medical institutions in the province. In the province, the supply of high-level and high-quality cultural and sports services is still relatively short, and the problem of "lack of cultural and sports services in individual areas" still exists. With the promotion of service-oriented and digital government transformation construction, Shandong province continues to increase investment and construction of infrastructure, but there are still deficiencies in urban and rural greening and infrastructure construction of people's livelihood in underdeveloped areas, and there is a big gap with jinan, Qingdao and other areas with higher development level. In addition, the overall level of urbanization in Shandong province is not high, and there are obvious differences among cities in the province. The level of urbanization will significantly affect the level and scale of regional basic public services, and then affect the level of equality of basic public services [3]. Three is public education difference has not through the test of significance, can be attributed to "twelfth five-year", in shandong province during the period of "much starker choices-and graver consequences-in" developed and implemented to promote compulsory education balanced development of a series of policies, focusing spot to fill short board, promote the building of school running conditions, teachers, school funding and digital campus level four integration development, A network of "pair assistance" has been established to deepen reform and promote equal access to public education, effectively narrowing the gap in public education between different regions.

5. Conclusions and Recommendations

Based on the construction of the evaluation index system of basic public service development level in Shandong Province, the development level, regional difference, absolute difference, polarization trend and influencing factors of basic public service development in Shandong province from 2009 to 2018 were measured and analyzed by entropy method, Dagum Gini coefficient and its decomposition, Kernel density estimation and QAP analysis. Study found that: from 2009 to 2018 in shandong province equal basic public services development level rising steadily, highlight trend to strengthen, multipolar differentiation characteristics, the overall difference stems mainly from super variable density, but its contribution degree is on the decline, health care, stylistic differences between services, social security and infrastructure is influence the main factors of the development of basic public service equalization. To effectively solve the problem of unbalanced development of basic public services among regions is the key to achieve common prosperity. Based on this, this paper puts forward the following suggestions: We will coordinate regional economic development and improve the transfer payment system. We should perfect the system and mechanism for the coordinated economic development of the whole province, strengthen the radiating power of jiaodong economic circle to the development of surrounding areas, and strengthen the support to the provincial capital and the southern Shandong economic circle. We will improve the fiscal expenditure mechanism for basic public services that is commensurate with the growth of government financial resources and the supervision and evaluation mechanism that is commensurate with the fiscal system, ensure that local governments at all levels make precise fiscal expenditures, and effectively

improve their ability to guarantee basic public services. In Shandong province based on the regional difference characteristics of development of basic public services, improve the management and supervision mechanism of transfer payments, increase the capital, southern Shandong economic circle in the development of basic public services, financial transfer payments and special transfer payments, equal to adjust the transfer payment for target strength and structure, and narrowing the wealth gap between each prefecture level in Shandong province.

We will optimize basic digital public service platforms and increase resource utilization. We will empower basic public services with digital technologies, continuously optimize digital service platforms for basic public services based on cloud computing and big data technologies, establish a database of public demand and service resources, break down barriers between regions and departments, and establish a data resource sharing mechanism. Strengthen trans-regional, cross-sectoral, across levels of linkage enjoyment and overall coordination, promote the standardization of data and information, through the information barriers, reduce caused by asymmetric information service efficiency is reduced, the market feedback information and the public demand information in time into the government public services such as decision-making, improve the utilization rate of basic public service resources. Increase investment in information infrastructure construction, especially in provincial capitals and cities with low development level in southern Shandong economic circle, and narrow differences in information infrastructure between regions.

We will improve the supply mechanism for basic public services and promote diversified supply. We will deepen the reform and innovation of the supply model of basic public services, pay attention to the use of various channels under modern information technology, and respond to the diverse needs of the public for basic public services. To establish the government-leading multi-agent supply mechanism, such as outsourcing, franchising contract, preferential subsidies mechanism to guide and encourage nongovernmental organizations and other social forces to participate in the basic public service supply, form "at the helm of the government and other subject" paddle "pattern of basic public service supply, combining flexible government security advantages and market advantages. We will optimize the allocation of basic public service resources, and give more preferential policies, economic support and resource allocation to key areas such as medical and health care, social security, cultural and sports services and infrastructure.

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