



Research on the Equalization Level of Public Services Under Urban-Rural Integration Development in Heilongjiang Province Based on Empirical Data Analysis

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Abstract. To guarantee equitable access to fundamental public services is of great significance to achieve common prosperity. As China has stepped into a well-off society and lifted the poor out of poverty, the government has proposed a major strategy of countryside revitalization, calling for the integration of city and countryside development, mutual promotion. What is the level of how to ensure equitable access to fundamental public services under integrated city-countryside development? Has it been effectively promoted? On this issue, based on empirical data in Heilongjiang province as an example, using the AHP and entropy method to quantify the standard of the equal fundamental public service between city and countryside areas of HLJ China. Then, the grey correlation model is used to verify the factors that affect the equalization level of fundamental public services in city and countryside areas, and it is demonstrated that various factors in the integrated progress of city and countryside areas promote the equalization of fundamental public service.

Keywords: Integration · Public Service · Equalization Level

1 Einleitung

City-countryside integration is one of the primary ways to deal with Industrial Relations, peasants, city or countryside areas and try to deal with the issue of balance development between city and countryside region in the fresh field. Its purpose is to narrow the gap between city or countryside development and the gap between residents' living standards, rationally allocate public resources between city or countryside areas, and promote the free flow of factors, so as to achieve a fresh type of city-countryside relationship that is fully integrated and prosperous. Ensuring equitable access to fundamental public services refers to ensuring that the fundamental public service related to the most fundamental survival and life of the public can be provided relatively fairly and justly to members of the society. Since fundamental public services are a kind of public goods, the government assumes the main responsibility, and the supply of funds for public services is mainly based on government investment.

The concept of equalization of fundamental public services has been around for chron, and many scholars have studied the equalization level between regions and between city and countryside areas. However, there are still few researches on the standard of balance of fundamental public service in the process of city and countryside integration development. Does the city and countryside integration development further raise the standard of equality of fundamental public service? Do various policies in the city-countryside integration development affect the standard of equality of fundamental public service? Studies on these issues are not yet clear. Based on this situation, this paper analyzes the empirical data of city-countryside integrated development in HLJ China, studies the integration standard of city and countryside fundamental public services in Heilongjiang Province, and analyzes the influence mechanism of integrated development and to ensure more suitable way to fundamental public services in city and countryside areas.

2 Research on Theoretical Mechanisms

City or countryside integrated development includes the coordinated evolution of city and countryside industries, economy, ecology, and institutions. After the gradual integrated development of city and countryside relations, it will greatly improve the conditions for realizing the equalization of fundamental public services in city and countryside places and promote the equalization of fundamental public services in city and countryside places.

Industrial city and countryside integration refers to the coordinated configuration of city and countryside industrial chains to achieve high-quality operation, which usually provides a material basis for the equalization of city and countryside fundamental public services. From the economic aspect, city and countryside integration will increase the economic exchanges between cities and countryside, and make the economic relations become closer, thus providing economic conditions for the equal development of fundamental public services in city or countryside places. From the perspective of institutional integration of city and countryside areas, with the in-depth integration of city and countryside relations, a series of systems to promote city and countryside integration, such as orderly progress in urbanization of migrant agricultural population and incentive system for city talents to move to countryside areas, have been continuously established, creating a good institutional environment to guarantee how to ensure equitable access to basic public services.

Therefore, the process of city and countryside integrated progress will naturally be accompanied by the equal development of fundamental public services, which will narrow the gap between city and countryside areas and improve the industrial, economic, institutional and ecological conditions of city and countryside development. With the deep integration of city and countryside relations, the equal development of fundamental public services is inevitable. Policies and measures in the process of city and countryside integration will also affect the equal level of fundamental public services and promote the balanced development of city and countryside places in fundamental public services.

3 Equalization Level Measurement of Fundamental Public Services

In order to study how to ensure the fair way to fundamental public services under the integration of city and countryside areas, this paper discusses the influencing factors of how to ensure the fair access to fundamental public services in the development of city and countryside integration. The equalization level of fundamental public services should be reasonably quantified first. By collecting relevant data from the statistical yearbook, we measure the balance standard of city and countryside fundamental public services in HLJ China by using subjective AHP and objective entropy method.

3.1 Selection of Indicators

Concerns about availability and data validity, the scientific nature, the objectivity and other principles of the pointer system, in order to comprehensively reflect the public service projects that can best ensure the fundamental survival and living rights of the public, this paper evaluates the equalization level of city and countryside fundamental public service in HLJ China from four dimensions: fundamental education, social insurance, medical care and infrastructure (Table 1).

Table 1. Indicator System.

Target Layer	Criterion Layer	Index Layer
Equalization of fundamental public services in city and countryside areas	Public Education (B ₁)	Per Student Education Expenditure in Secondary Schools (C ₁)
		Per Student Education Expenditure in Primary Schools (C ₂)
		Teacher-Student Ratio in Secondary Schools (C ₃)
		Teacher-Student Ratio in Primary Schools (C ₄)
	Social Security (B ₂)	Per capita pension expenditure (C ₅)
		Coverage of fundamental medical insurance (C ₆)
		Proportion of employment number (C ₇)
	Medical Treatment and Public Health (B ₃)	Number of beds per 10,000 people (C ₈)
		Number of hospital technicians per 10,000 people (C ₉)
		Number of professional professional doctors per 10,000 people (C ₁₀)
	Infrastructure Construction (B ₄)	rate of water-served population (C ₁₁)
		rate of gas-used population (C ₁₂)

3.2 Confirm of Indexes Proportion

In terms of determining the index weight, this paper uses a combination of two methods, namely the subjective weight method and the objective weight way. The AHP way is used to determine the sub-weight, and the entropy way is used to determine the objective weight.

AHP Method. When using the AHP method to determine the index weight, it is necessary to gradually determine the weight according to the relative importance of each index at the same level on the basis of establishing the hierarchical structure model. The steps of AHP to decide the index weight are as follows:

According to the relative importance between the elements, construct a pairwise comparison judgment matrix $A = (a_{ij})_{n \times n}$, where a_{ij} is the value of the pairwise comparison of the importance of the i -th row index relative to the j -th column index, a_{ij} is the numbers 1–9 and its reciprocal.

Compute the maximum eigenvalue λ_{max} of the judgment matrix A and the normalized eigenvector w .

$$Aw = \lambda_{max}w \tag{1}$$

Consistency check. CR is calculated according to the judgment matrix consistency indicator CI and the given random consistency indicator RI. When the consistency ratio $CR < 0.10$, it indicates that can accept the consistency of the judgment matrix, and the vector w is the corresponding weight of each indicator.

$$CR = \frac{CI}{RI} \tag{2}$$

$$CI = \frac{\lambda_{max} - n}{n - 1} \tag{3}$$

Entropy Method. The entropy method can determine the weight of the evaluation indicator according to the level of difference between the indicator values. Specifically, the greater the entropy value, the smaller the indicator weight; the smaller the entropy value, the greater the index weight. The steps of deciding index weight by entropy way:

Let x_{ij} be the surveyed cost of the j -th indicator in the i -th appraise object. ($i = 1, 2, \dots, n; j = 1, 2, \dots, m$).

Compute the indicator cost ratio of the i -th evaluated object on the j -th appraise indicator.

$$P_{ij} = \frac{x_{ij}}{\sum_{i=1}^n x_{ij}} \tag{4}$$

Compute the entropy cost of the j -th appraise indicator.

$$e_j = -\frac{1}{\ln n} \sum_{i=1}^n P_{ij} \ln(P_{ij}) \tag{5}$$

Compute the different coefficient g_j of the appraise indicator x_j .

$$g_j = 1 - e_j \tag{6}$$

Determination of weight.

$$w_{2j} = g_j / \sum_{j=1}^m g_j, j = 1, 2, \dots, m \tag{7}$$

Determination of the Comprehensive Weight of Indicators. The comprehensive weight of the indicator is obtained by combining the weight w_{1j} obtained by AHP with the weight w_{2j} obtained by entropy method (Table 2).

$$w_j = \frac{1}{2}w_{1j} + \frac{1}{2}w_{2j} \tag{8}$$

Table 2. Comprehensive weight of indicators.

Criterion Layer	Index Layer	w_{1j}	w_{2j}	w_j
B ₁	C ₁	0.05968	0.03728	0.04848
	C ₂	0.04926	0.01347	0.03136
	C ₃	0.19187	0.11714	0.15451
	C ₄	0.11465	0.03759	0.07612
B ₂	C ₅	0.09269	0.17061	0.13165
	C ₆	0.16127	0.21662	0.18895
	C ₇	0.03549	0.06663	0.05106
B ₃	C ₈	0.08882	0.08669	0.08775
	C ₉	0.05650	0.00579	0.03115
	C ₁₀	0.02396	0.03708	0.03052
B ₄	C ₁₁	0.03145	0.00385	0.01765
	C ₁₂	0.09434	0.20725	0.15079

3.3 The Result of the Equalization Index

The city and countryside fundamental equal access to public services level index of Heilongjiang Province can be obtained according to the value of the established fundamental public service equalization index and the weight obtained after subjective and objective analysis. In this paper, the city and countryside fundamental public service balance index can be computed according to the following formula:

$$S = \sum_{j=1}^m w_j \times x_{ij} \tag{9}$$

That is, when computing the balance index of each fundamental public service, the equalization level is obtained by using the method of weighted sue for peace of the standardizing value of the index and the homologous index weight. In order to remove the impact of dimension on equalization index, it is determined to carry out standardization processing and adopt the method of comparing city data with countryside data (Table 3).

Table 3. Equalization level of city and countryside public services.

Year	Indicator of equalization of public services
2009	0.649783
2010	0.658627
2011	0.705193
2012	0.716655
2013	0.78149
2014	0.779955
2015	0.7611
2016	0.748631
2017	0.6708
2018	0.671545
2019	0.638806

4 Further Analysis: Factors Affecting the Equalization of Fundamental Public Services

4.1 Analysis and Screening of Influencing Factors

To guarantee equitable access to fundamental public services under city-countryside integration is an significant content and key link of city-countryside integrated development. The policy measures implemented during city-countryside integrated development are likely to affect the level of balance of fundamental public services. Therefore, the factors affecting how to guarantee equitable access to fundamental public services can be inferred according to the level and characteristics of the balance development of city and countryside fundamental public services in Heilongjiang Province.

Firstly, the scale of fiscal expenditure on fundamental public services affects the overall quality and level of fundamental public services in city and countryside areas. Only with sufficient financial funds can we raise the supply level of fundamental public services and promote to how to guarantee equitable access to fundamental public services under city-countryside areas. Secondly, the policy orientation in the process of city-countryside integration development is also a factor affecting the equitable development of fundamental public services in city and countryside areas. It can be proved that the degree of city-countryside equalization in medical and health care and infrastructure in HLJ China is low, and the proportion of city and countryside areas is gradually decreasing. Therefore, it is speculated that when the level of fundamental public services in the whole province is low, the policy will be more biased towards cities. Thirdly, financial support for agriculture and countryside areas will also affect the level of balance of fundamental public services in city and countryside places. With the proposal of the countryside revitalization strategy, the development of agriculture and countryside areas is very important, and the strength of support for agriculture directly affects the supply

system of countryside and fundamental public services Fourthly, behind the reform of the tax-sharing system, the financial resources of local governments have weakened, and the growing gap in fiscal revenue and expenditure has also prevented local governments from fully exerting their information advantages and cannot drive the effective provision of fundamental public services in city and countryside areas.

4.2 Grey Relative Analysis

As a method to measure the degree of correlation between factors, grey relational analysis method is used to judge the degree of correlation by comparing the influence of the change of sequence index on the reference sequence index. The fundamental idea of grey incidence analysis is to decide the correlation degree by analyzing the influence of the comparison sequence index on the reference sequence index. The larger the correlation degree is, the stronger the correlation degree between the comparison order and the reference order is; otherwise, the weaker the correlation degree is.

This paper adopts the way of grey incidence analysis to discuss the degree of correlation between the level of how to ensure equitable access to city and countryside fundamental public services or the scale of financial investment, local financial gap, financial support for countryside areas, and government policy bias. Among them, the gap between the amount of fiscal expenditure and income y_1 represents the fiscal gap of the government, the public expenditure on agriculture, countryside places and farmers y_2 represents the government’s support to countryside areas, and the fiscal expenditure on education y_3 , medical expenditure y_4 and social security expenditure y_5 represents the investment intensity of fiscal funds. Meanwhile, the word frequency ratio of “city” and “countryside” in the government work report y_6 was used to indicate the city-countryside bias of the policy (Table 4).

The steps of grey correlation analysis are as follows:

Set up reference sequence and comparison sequence. The 2009–2019 city and countryside fundamental public service equalization index in Heilongjiang Province is used as the reference sequence $Y_0(k)$ to represent the public service equalization index in the k th year; the factors that affect how to guarantee equitable access to fundamental public services are used as the comparison sequence $Y_i(k)$ to represent the data of the i -th influencing factor index in the k -th year.

The initial value method was used to standardize the data, and the ratio of the i -th data to the data of the first year was obtained.

$$Y'_i(k) = \frac{Y_i(k)}{Y_i(1)} \tag{10}$$

Get the difference sequence and the second order minimum (large) difference.

$$\Delta_i(k) = \left| Y'_I(k) - Y'_0(k) \right| \tag{11}$$

$$\Delta_{min} = \min_i \left[\min_k \left| Y'_I(k) - Y'_0(k) \right| \right] \tag{12}$$

$$\Delta_{max} = \max_i \left[\max_k \left| Y'_I(k) - Y'_0(k) \right| \right] \tag{13}$$

Compute the correlation coefficient ξ_i and the correlation degree r_i . Usually, $\rho = 0.5$

$$\xi_i(k) = \frac{\Delta min + \rho \Delta max}{\Delta_i(k) + \rho \Delta max} \tag{14}$$

$$r_i = \frac{1}{n} \sum \xi_i(k) \tag{15}$$

4.3 Correlation Results

Based on the grey system theory, the degree of correlation between the balance level of city and countryside public services in HLJ China and the financial input, financial support for agriculture, and the financial gap of local authorities under the tax-sharing system can be obtained. The higher the correlation, the greater the impact on how to ensure equitable access to city-countryside fundamental public services.

Table 4. Statistical description of variables.

Variable name		Mean	Std. Dev.	Min	Max	
Y ₀	y ₀	0.70751	0.05335	0.63881	0.78149	
Y _i	y ₁	571.008	239.517	192.42	881.99	
	y ₂	2476.08	851.943	1236.12	3748.8	
	y ₃	479.339	111.520	266.61	573.11	
	y ₄	651.637	278.726	306.06	1113.27	
	y ₅	227.974	68.8126	135.18	314.423	
	y ₆		1.00465	0.29484	0.71875	1.48101

As what shows in Table 5, the correlation between every influencing factor and how to ensure equitable access to basic public services in city and countryside places is between 0.55 and 0.85. It shows that the factors of financial gap, agricultural support and financial expenditure of fundamental public services are all important factors that can affect how to ensure access to fundamental public services in a equitable way in HLJ China.

Table 5. Interdependence coefficients.

index	y ₁	y ₂	y ₃	y ₄	y ₅	y ₆
relational degree	0.71	0.55	0.73	0.75	0.79	0.83

5 Conclusions

Through the quantification of the standard of can affect how to guarantee well access to fundamental public services in Heilongjiang and the analysis of its influencing factors, it can be concluded that the policy measures in the process of city-countryside integration development will indeed affect the standard of how to ensure equitable way to fundamental public services.

The amount of financial input and the bias of policies have the most direct effect on the equalization of fundamental public services. Public service is a social public product, and the government's financial input determines the level of social public service. The government's preference for city and countryside development also directly affects the level of public service equalization between city and countryside areas. If the government's fiscal policy is non-agricultural, the level of fundamental public service in city areas will be better than that in countryside areas. In addition, the financial situation that income does not cover expenditure and the investment in agriculture also affect the standard of how to guarantee equitable way to fundamental public services between city and countryside areas in HLJ China to one certain extent. If the local government's income does not cover its expenditure, it cannot actively guide the realization of the standard of how to guarantee equitable way to fundamental public services. If the importance of village areas is not taken seriously, the gap between city and countryside fundamental public services cannot be eliminated.

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