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Examining Regional Disparities in Higher Education Equity in Terms of Size, Faculty, and Funding

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Abstract: With the expansion of higher education in China and the relaxation of policies, the popularization and massization of higher education have led to the connotative development and steady improvement of higher education in China. However, due to the different environments of economy, policy and geography, there are some regional differences and equity problems in the process of rapid development of higher education in China. In this paper, the education data of 31 provinces, municipalities directly under the central government and autonomous regions in China will be used as the basis to study the three aspects of education scale, faculty and education expenses through the Gini coefficient analysis method. The research results show that with the efforts of some aspects such as national policies, the regional differences in higher education in China have become more and more relatively fair in recent years. In contrast, compared to the central and western regions, the eastern region is the region where the greatest disparity exists in higher education development.

Keywords: Higher Education; Regional Differences; Gini Coefficient.

1. Background of Higher Education Regional Disparity Study

If education is prosperous, the country will be prosperous; if education is strong, the country will be strong. Higher education is an important symbol of a country's development level and development potential. And educational injustice is the greatest injustice, and educational equity is the prerequisite for social equity and an important foundation for social harmony[1]The resource allocation among higher education regions plays an important role in the development of regional equity in higher education, and is an indispensable and important part of the development process of higher education, which is related to the overall coordinated and sustainable development of China's higher education system and the construction of a harmonious society in China[2] The development of higher education Regarding the construction of higher education, in recent years, the number of general colleges and universities and postgraduate training institutions in China has steadily increased year by year, while the number of adult higher education schools has been decreasing year by year. in 2019, there were 2,688 general colleges and universities, 828 postgraduate training units, and the total number of all forms of higher education institutions was 3,784. However, due to the profound political, economic, scientific and technological, demographic and cultural differences among regions, together with the common reasons of national macro political system, economic system, higher education management system and policy, economic development strategy, and the individual reasons of provinces and regions' own natural resource endowment, economic development level, economic structure, population, etc. There are some uneven problems in the integrated development of regions and types of higher education in China. Based on the reference of related researches, this paper researches the differences of regional higher education in China from three aspects of education scale, faculty and funding, and further describes the regional differences existing in higher education in China through Gini coefficient analysis, so as to provide reference for each region to improve the higher education system, and then realize the regional equity of higher education in China.

According to the economic region division method promulgated by the National Bureau of Statistics in 2011, the 31 provinces and cities in China are divided into four major regions and cities in the east, central, west and northeast (as shown in Table 1). This paper intends to examine the regional imbalance of higher education in China by analyzing the scale of higher education, faculty and education funding in each province and city in China.

Table 1. China's four major economic regions

Region	Provinces and cities included
East	Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Hainan
Middle	Shanxi, Anhui, Jiangxi, Henan, Hubei, Hunan
West	Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang
Northeast	Liaoning, Jilin, Heilongjiang

Data source: National Bureau of Statistics of China website http:// www.stats.gov.cn

2. Research Methodology

2.1. Sources of Information and Indicators

The data of this study are mainly obtained from the 2019 China Statistical Yearbook, covering 31 provinces, cities and autonomous regions in mainland China. Based on the reference to previous research results, this paper selects indicators such as population and number of schools in each provincial area to measure education scale; indicators such as population and number of higher education staff in each provincial area to measure teacher strength; and indicators such as population and education expenditure in each provincial area to measure education funding, taking into account the collection of actual data.

2.2. Gini Coefficient

The Gini coefficient is a high-level tool used to assess the equity of resource distribution within a given population and geographic area, based on the Lorenz curve, with the x-axis representing the cumulative percentage of population (number of people in the area) and the y-axis representing the cumulative percentage of higher education resources (number of schools, number of higher education faculty, and education funding). The Gini coefficient G represents the ratio of the area between the Lorenz curve and the 45° line to the entire area below the 45° line. It ranges from 0 in 0 to 1, and the closer it is to 0, the stronger the equity; the closer it is to 1, the weaker the equity. Usually, G<0.2 means absolute fairness; G between 0.2~0.3 means comparative fairness; G between 0.3~0.4 means general fairness; G between 0.4~0.5 means comparative unfairness; G above 0.5 means serious unfairness. The calculation formula is as follows.

$$G = 1 - \sum_{i=0}^{k-1} (Y_{i+1} + Y_i)(X_{i+1} - X_i) \quad (1)$$

3. Results

3.1. Regional Differences in the Scale of Higher Education Development

The education scale of regional higher education mainly includes the number of colleges and universities and the number of college students. Among them, this paper selects "the number of regional general higher education schools (institutions)" to reflect the index of the number of colleges and universities. According to the data of China Statistical Yearbook 2019, the regional distribution of higher education development scale in China is more balanced, as shown in Figure 1. In terms of the total number of general higher education schools, the Gini coefficient of the four major economic regions in China is less than 0.2, so it is absolutely fair, with the most obvious change of decreasing year by year in the western region and the fairest in the northeastern region. This indicates that the state has given full play to the leverage of policy in regional higher education resource allocation and implemented "tilted" support policies for higher education in central and western regions, which has achieved more promising results[3]

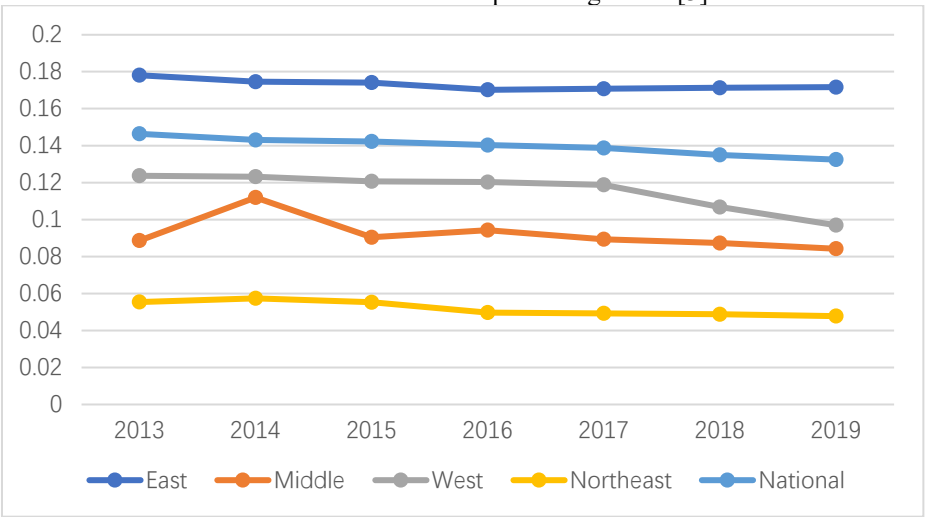


Figure 1. Graph of the change of Gini coefficient of school size

3.2. Regional Differences in Teacher Input in Higher Education

The main indicators for measuring the faculty of regional universities are the student-teacher ratio and the number of faculty members. In this paper, we choose "the number of higher education staff" as the indicator. The smaller the Gini coefficient is, the fairer it is. As shown in Figure 2, from the faculty input situation, the eastern region and the western region in 2013 exceeded 0.2, which is relatively disadvantaged, but it is also decreasing year by year, and all regions are less than 0.2 in 2019, so the eastern region is relatively fair, while other regions are still absolutely fair.

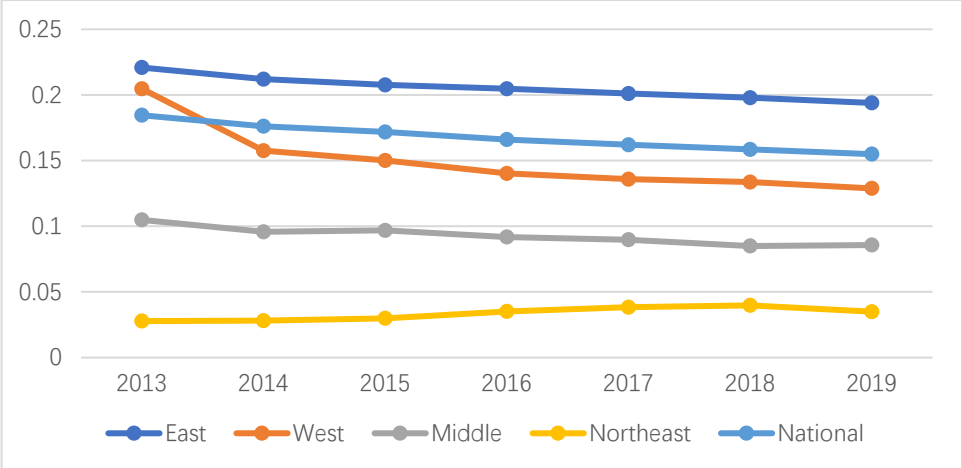


Figure 2. Graph of the change of Gini coefficient of teachers

3.3. Regional Differences in Higher Education Funding

The investment in education funding also affects the quality of higher education development in a region, and the Gini coefficient calculated from the data statistics, as shown in the line graph in Figure 3, although there are ups and downs every year, but all of them are less than 0.2, and the central region is the most equitable, and the eastern region should continue to improve the equity in relative terms, so that the investment in higher education funding between regions is also absolutely equitable, and there is no There is no significant difference.

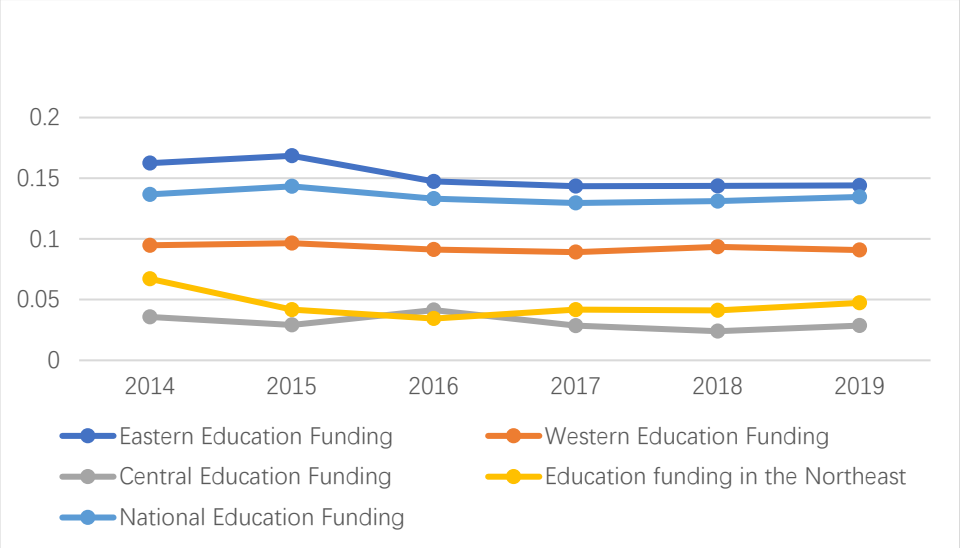


Figure 3. Change in Gini coefficient of education expenditure

4. Discussion

4.1. Overall Equity in Scale, Faculty, and Financial Investment among Regions of Higher Education in China

In the study, it was found that the regional differences in higher education in China have become more and more equitable in recent years, which shows that China is paying more and more attention to the aspect of regional equity in higher education, trying to guarantee the right of every citizen to higher education, and also being able to equip faculty and introduce education funding according to the difference in population size in each region. Similarly, in recent years, the government has also played a certain regulatory role in effectively promoting the coordinated development of higher education between provinces and regions, paying attention to the existence of disparities in the development of higher education between regions, increasing the proportion of investment in relatively backward regions, implementing different angles and degrees of inclination for different regions, ensuring the stable development of higher education scale, faculty, and financial investment in relatively backward regions, with the goal of promoting educational equity. The goal is to promote the coordinated development of higher education between provinces and regions. In the 14th Five-Year Plan, it is also pointed out in the outline that we should promote the classification and management of higher education and the comprehensive reform of higher education schools, and the Office of the Central Government and the Office of the State Council have also issued important documents such as the Opinions on Revitalizing Higher Education in Central and Western China in the New Era, which have promoted the equity of regional development of higher education.

4.2. Differences in the Scale, Faculty, and Funding of Higher Education in the Eastern Provinces

Although the scale of higher education, faculty and education funding investment in the four major regions of the country are relatively equitable, it is found in the study that there are still significant differences in the development of higher education among provinces within the eastern region, as shown in Table 2, it can be seen that the ratio of colleges and universities in Guangdong, Shandong and Hebei reaches only 1.3, while cities like Tianjin Beijing, where the state focuses on development investment, reach 3.6 or even 4.3, and Shandong and Hebei have been also the provinces with very large population in China, but the ratio is very small, while Beijing and Tianjin have relatively much smaller population, but the number of colleges and universities is very large, which also proves the phenomenon of uneven development of higher education scale within the eastern region. And the gap is more obvious as shown in Table 3, Guangdong, Hebei, Shandong and other provinces only 14.6, 14.74, 16.38, while Tianjin and Shanghai reached 30.93, 31.81, and Beijing even reached 67.46, which shows that provinces like Tianjin, Shanghai and Beijing are far ahead with overwhelming superiority in education resources, but the gap in the ratio of education expenditure shown in Table 4 is not as large as the teacher input It can be seen that the highest percentage of education expenditure in the eastern region is in Guangdong, while the lowest is in Hainan and Tianjin, accounting for only 2.01 and 3.37. Thus, it can be seen that there is still a big gap in the allocation of higher education resources among provinces within the eastern region. In the critical period of building a moderately prosperous society to the basic realization of socialist modernization, the target task of China's higher education reform and development is to implement the strategic plan of "China Education Modernization 2035" of the CPC Central Committee and the

State Council, and strive to create a new situation of high-quality development. The "China Education Modernization 2035" points out that in the face of the new situation and new tasks, it must be soberly recognized that the development of education in China is still unbalanced and insufficient, one of the prominent manifestations of which is that there is still an obvious gap between the development levels of regions[4]

Table 2. Number of colleges and universities in the eastern provinces as a percentage of the total population

Region	Population ratio of number of colleges and universities (percentage)
Guangdong	1.3
Shandong	1.4
Hebei	1.6
Zhejiang	1.8
Jiangsu	2.1
Hainan	2.1
Fujian	2.3
Shanghai	2.6
Tianjin	3.6
Beijing	4.3

Table 3. Ratio of faculty to staff in the eastern provinces

Region	Faculty and Staff Ratio
Guangdong	14.6
Hebei	14.74
Shandong	16.38
Zhejiang	17.02
Hainan	17.69
Fujian	18.61
Jiangsu	21.71
Tianjin	30.93
Shanghai	31.81
Beijing	67.46

Table 4. Percentage of education spending in the eastern provinces

Region	Percentage of education spending (percentage)
Hebei	9.23
Shandong	13.99
Fujian	6.66
Jiangsu	15.01
Guangdong	22.67
Hainan	2.01
Tianjin	3.37
Zhejiang	12.75
Shanghai	7.12
Beijing	7.18

5. Recommendations

The development of higher education cannot be achieved without the strong support of national policies and the balanced allocation of resources such as teachers and funding. In the study of this paper, we can see that in fact, in recent years, the state has adopted a lot of policies for the fairness of regional differences in higher education, and the effect is very significant, the regional development of higher education in the four regions of East, West and Northeast is becoming more and more fair, from the scale, faculty and education funding can be reflected in a relatively fair. However, in the further study of the regional differences of the provinces within the eastern region, it is found that there are still many unbalanced problems, in cities like Beijing, Tianjin and Shanghai are more equipped with resources, so the higher education in these cities has been out of high quality development, not only to produce a lot of international innovative talents, but also because of the high quality of higher education development, in the continuous drive of high quality economic development. Therefore, if we want to build a strong human resource country, we should continuously improve the modern socialist education system with Chinese characteristics, run a good education to the satisfaction of the people, and promote the synergistic development of higher education and economic and social development in all provinces of the country. As a quasi-public good, the government should assume the main role in playing the role of the market in the allocation of resources in higher education[5]Therefore, it should increase the construction of local colleges and universities, and the local governments with slow development should continuously increase the support in terms of school funding, construction of special disciplines and talent team, and guide local governments to promote the development of construction colleges and universities in a tiered and classified manner, so that the advantage of resource allocation and investment can be transformed into the advantage of education quality. To "compensate the disadvantaged", that is, to compensate the relatively disadvantaged areas for the investment to improve the comprehensive strength of general colleges and universities, so as to eliminate the inequality in education, which will significantly improve the equity of regional differences in higher education.

6. Conclusion

This study adopts the Gini coefficient analysis method, based on the scale of higher education construction, the introduction of faculty and education funding in the four major regions of East, West and Northeast, and analyzes the equity of regional differences in higher education in China, and finds that in recent years, with the continuous support of China's policies and systems, the scale of higher education construction, faculty and funding in the four major regions are generally equitable, but in the study and analysis of the four major regions compared to However, when we analyzed the eastern region, which has the largest Gini coefficient, we found that there are inequities in scale, faculty, and funding, with developed cities like Beijing, Shanghai, and Tianjin having less population but more adequate resources, and provinces with large population like Shandong and Hebei having far less than half the resources of developed cities. Therefore, increasing the balance of higher education resources allocation within the eastern region and establishing corresponding policies will enhance the equity of regional differences in higher education nationwide more.

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