

# Efficiency Evaluation of Financial Education Expenditure in the Middle Reaches of the Yangtze River

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**Abstract.** This paper uses the data of financial education expenditures of 28 cities in the middle reaches of the Yangtze River in 2011-2017, and uses data envelopment analysis to study the efficiency of financial education expenditure in the middle reaches of the Yangtze River. The basic conclusions are: the overall efficiency of financial education expenditure in the middle reaches of the Yangtze River is low, mainly due to the low scale efficiency; regional differences in the efficiency of financial education expenditure in the middle reaches of the Yangtze River, and the highest efficiency of education expenditure in Changsha, Zhuzhou and Xiangtan City Group (CZX), Wuhan City Circle (WH) is second, and Poyang Lake City Group (PYH) is the lowest.

**Keywords:** Fiscal Education Expenditure Efficiency; DEA-BCC Model; Middle Reaches of the Yangtze River.

## 1. Introduction

In April 2015, the State Council issued the approval of the "Development Planning of the Middle Reaches of the Yangtze River", aiming to cultivate the middle reaches of the Yangtze River into a new economic growth pole. The government invests in education through financial education expenditures and other means to provide education services to the society. Therefore, in-depth analysis of the efficiency of financial education expenditure in the middle reaches of the Yangtze River is of great significance for promoting the optimal allocation of educational resources within the city group, improving the level of collaborative management of educational affairs within the group.

At present, the research on the efficiency of China's financial education expenditure mainly focuses on three aspects: the construction of evaluation index system, evaluation methods and influencing factors. In the aspect of evaluation index system, there is no consensus in the academic circle. Scholars have constructed the education expenditure efficiency index system from different angles such as evaluation object [1] and education expenditure process [2]. In terms of evaluation methods, there are parametric methods such as stochastic frontier analysis [3] and data envelopment analysis [4], and local frontier [5] nonparametric methods. In terms of influencing factors, based on the efficiency measurement, scholars analyzed the external environment such as economic development level and population density through Tobit [6] and other methods [7], fiscal decentralization, government competition and other institutional factors [5, 8]. The impact of fiscal education expenditure efficiency.

In summary, scholars' research on the efficiency of financial education expenditure provides important support for the research of this paper, but there are still the following problems: First, most of the existing research is based on the national level to examine the impact of provincial education expenditure efficiency, there are few studies on the urban level, especially in urban agglomerations. Second, existing studies have more emphasis on compulsory education in primary and secondary schools when assessing the efficiency of education expenditures without incorporating high school and university education into the evaluation system. In this regard, this paper takes the panel data of 28 cities in the middle reaches of the Yangtze River in 2011-2017 as a sample, and establishes the DEA-BCC model to analyze the financial education expenditure efficiency of the middle reaches of the Yangtze River from three levels: global, sub-group and prefecture.

## 2. Empirical Research Design

### 2.1 DEA-BCC Model

The DEA-BCC model can measure the relative technical efficiency of the decision-making unit's production activities under the condition that the decision-making unit has variable income, and the technology is based on "technical efficiency (te)=pure technical efficiency (pe)×scale efficiency (se)". Efficiency is decomposed into pure technical efficiency and scale efficiency.

### 2.2 Variable Selection and Data Source

The DEA model measures production efficiency based on input and output. In terms of input indicators, most scholars use the expenditure of education business to measure, considering the availability of data, this article is expressed by the per capita financial education expenditure. In theory, the output indicators of educational fiscal expenditure should include students' academic performance, moral level, number of qualified graduates and many other indicators [9], but these indicators are difficult to measure or data is difficult to obtain. Therefore, combining the availability and consistency of statistical data related to the urban agglomerations in the middle reaches of the Yangtze River, and based on the research of Cheng Kan [10], this paper takes the number of primary schools, general secondary schools, and ordinary higher education schools per 10,000 people, the teacher-student ratio of primary schools, general secondary schools, and general higher education institutions as output indicators.

The above data are mainly from the China Urban Statistical Yearbook (2011-2017), and some data are from the statistical yearbooks of Jiangxi, Hubei and Hunan provinces. Due to the serious lack of data in Xiantao City, Tianmen City and Qianjiang City, the sample of this study does not include these three cities. Therefore, the sample of this paper is the relevant data of 28 cities in the middle reaches of the Yangtze River in 2011-2017.

## 3. Empirical Analysis

### 3.1 Technical Efficiency (te) Analysis

Technical efficiency represents the comprehensive measurement and evaluation of the scale, management level and technology of the financial education expenditure of the decision-making unit. When  $te=1$ , it indicates that the financial education expenditure is fully and effectively utilized; when  $te<1$ , it indicates that the financial education expenditure has not been fully and effectively utilized.

From the perspective of the city, there are significant regional differences in the technical efficiency of financial education expenditure in the middle reaches of the Yangtze River. The annual average technical efficiency of Nanchang, Xiangtan, Hengyang and Loudi is 1, and the education and financial expenditures are fully and effectively utilized; other cities have a certain degree of technical efficiency loss, and the financial education expenditure funds have not been effectively utilized. Among them, there are 20 cities with an average annual technical efficiency greater than 0.8, exceeding 71% of the sample, and 8 cities have an average annual technical efficiency of less than 0.8; Ji'an has the lowest technical efficiency of only 0.65. From the perspective of sub-groups, the CZX has the highest utilization efficiency of financial education expenditure, with an average annual technical efficiency of 0.927; the second is the WH, with an average annual technical efficiency of 0.895; the lowest in the PYH, the average annual technology efficiency is 0.798, and the comprehensive utilization rate of financial education expenditure in the PYH needs to be improved. The overall annual average is 0.857 less than 1. Therefore, the utilization efficiency of financial education expenditure in the middle reaches of the Yangtze River still has a large room for improvement.

### 3.2 Pure Technical Efficiency (pe) Analysis

Technical efficiency can be decomposed into the product of pure technical efficiency (pe) and scale efficiency (se). The pure technical efficiency represents the management efficiency of financial education expenditure funds in various regions after eliminating the influence of scale.

From the perspective of the city, in addition to Xinyu, Yichun, Fuyang and Xianning, the annual average technical efficiency of financial education expenditures in other cities is above 0.9. Among them, the annual average technical efficiency of Nanchang, Wuhan, Jingzhou, Ezhou, Xiangtan and Loudi reached 1, which indicates that under the current expenditure scale and management system, the management of financial education expenditure funds in these six cities is efficient. From the perspective of sub-groups, the highest pure technical efficiency of fiscal education expenditure is the CZX (0.979), followed by the WH (0.960), and the lowest is the PYH (0.959), but the gap between PYH and WH is extremely small, and the gap with the CZX is also smaller than the gap between comprehensive technical efficiency. Overall, the management efficiency of financial education expenditure in the middle reaches of the Yangtze River has reached a high level, but there is still room for improvement on the whole; the differences in pure technical efficiency of the three major subgroups are also small, which leads to the three major subgroups. The main reason for the difference in technical efficiency may be the difference in scale efficiency.

### 3.3 Scale Efficiency (se) Analysis

Scale efficiency indicates whether the scale of financial education expenditure reaches the optimal level after separating management factors. If  $se < pe$ , it indicates that the lack of technical efficiency is caused by the low scale efficiency. At this time, the scale of funds for education expenditure should be adjusted appropriately to improve the efficiency of expenditure.

From the perspective of cities, except for Jiujiang, Xinyu, Ji'an, Yichun, Fuyang and Changsha, the annual average scale efficiency of other cities is above 0.8. Among them, the annual average scale efficiency of Yichang, Xiangtan, Hengyang and Loudi is 1, indicating that their financial education expenditure has reached the optimal scale, which is also an important reason for the average annual technical efficiency of the four cities. Among them, the average annual scale efficiency of Yichang and Ji'an is less than 0.6, indicating that the scale of financial education expenditure is still far from the optimal scale. In addition, combined with 3.1, it can be seen that the technical efficiency of Yichang and Ji'an is low, mainly due to its low scale efficiency. From the perspective of sub-groups, the scale of efficiency of financial education expenditure is still the highest in CZX, followed by WH, and the lowest in PYH. The average annual scale efficiency is 0.945, 0.894, and 0.830. Combined with 3.1 and 3.2, it can be seen that the difference in technical efficiency between the three major subgroups is mainly due to the difference in scale benefits. In particular, the PYH is similar to WH and CZX in terms of pure technical efficiency, and the scale efficiency difference is large. Therefore, the technical efficiency of the PYH is the lowest, mainly because its scale of financial education spending has not yet reached the optimal scale. On the whole, the scale of financial education expenditure in the middle reaches of the Yangtze River has not yet reached the optimal level, and there is room for improvement.

## 4. Conclusions and Policy Recommendations

### 4.1 Conclusions

Overall, the technical efficiency of financial education expenditure in the middle reaches of the Yangtze River is lower overall and the room for improvement is larger. From the perspective of the subgroup, the CZX have the highest educational expenditures, followed by the WH, and the PYH is the smallest. At the city level, there are significant urban differences in the efficiency of financial education expenditure. The average annual technical efficiency of Nanchang, Xiangtan, Hengyang and Loudi is 1, and the average annual technical efficiency of Ji'an is 0.65, which is more discrete.

The difference in the efficiency of financial education expenditure in the middle reaches of the Yangtze River is mainly due to the difference in scale efficiency.

## 4.2 Recommendations

Strengthen the supervision of funds and increase the scale efficiency of expenditure funds. Schools should reasonably arrange the use of financial disbursement and strengthen supervision of financial education funds. On the one hand, schools should update the teaching-related infrastructure in a timely manner, and introduce advanced teaching methods and concepts; on the other hand, it is necessary to strengthen the supervision of existing resources, avoid duplication of investment and waste of funds, and increase the scale efficiency of education expenditure.

Actively introduce talent technology and improve the technical level of using funds. First of all, we must actively introduce excellent educational talents, including excellent managers and teachers. Second, we must pay attention to the application of new technologies such as the Internet in education. The application of new technologies such as the Internet can effectively compensate for the shortage of teachers, improve the quality and efficiency of education, and increase the output of education expenditure.

Promote regional exchanges and cooperation and improve the efficiency of regional overall education expenditure. Cities with relatively low expenditure efficiency can learn from the experience of technology-frontier cities, improve the use and management of financial education funds according to their own characteristics, and improve the utilization efficiency of education funds. The government can guide the cooperation between the three major sub-groups in the field of education, and promote the exchange and cooperation of educational talents and technologies, such as promoting the exchange of courses and teachers in schools in Wuhan, Changsha and Nanchang.

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