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The Influence of Guangdong Province Basic Education on Residents' Consumption Structure

—Based on Grey Correlation Analysis Method

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Abstract

In order to know the influence of basic education on residents' consumption structure, this paper uses grey correlation method to analyze the relationship between based education spending and consumer spending in Guangdong. The author discovered the based education spending is not only the important index of basic education services equalization degree, but also associated with the urban and rural residents' consumption structure. Balancing urban and rural basic education spending can improve the structure of urban and rural residents' consumption.

Keywords

Basic Education, Urban and Rural Areas, Residents' Consumption Structure, Grey Correlation

1. Research Background

What's Basic Education? Professor Gu MingYuan (1992) [1] made a clear definition in "The Comprehensive Dictionary of Education". It said, basic education is also called "national education" and it not only developed citizens' basic quality education but provided a basis for continuing education or employment training education. In terms of the current status of education orientation and in China, basic education mostly refers to the content of the nine-year compulsory education. It provides the national basic quality education and provides the foundation for citizens entering the high school education.

As the important indicators of residents' quality of life and welfare level, residents' consumption structure reflects the residents' composition proportion of consumer spending in consumption expenditure.

According to the "China Statistical Yearbook", consumer living spending can be divided into 8 events as follows: expenditure for Food, Clothing, Residence, Family equipment thing and service, Health care, Transportation and Communication, Recreation Education and Cultural Service, Miscellaneous goods and services.

With the speeding up transformation of the China's economic growth mode, the gap between urban and rural residents' consumption spending is further reduced; the optimization of the urban and rural residents' consumption structure becomes a problem worthy of further research. Thereinto, ELES model is the most common model while studying residents' consumption structure. Zhang Hongwei and Wu Jin (2011) [2] used ELES to empirically analyze the urban and rural residents' consumption structure in China and here came the conclusion: Rural residents' consumption is at lower levels in general. Although the consumption structure had been upgraded yearly than before, it was obviously lagging behind urban residents' consumption structure at the same time. While rural residents still gave priority to basic livelihood guarantee consumer spending, urban residents increased their enjoy type and developing type of consumption. In recent years, more and more scholars began to study the relationship between education and consumption. Li Xiang, Zhu Yuchun (2013) [3] and Li Jun, Huang Yuan, Xie Weiyi (2015) [4] all established panel data models to analyze impacts of education level on rural residents' consumption structure. And they found out that per capita fixed number of year of the education and the consumption structure coefficient were positively correlated. The Higher Education degree rural residences had, the higher marginal propensity to consume. And vice versa. Yang Li, Chen Chao (2013) [5] established a panel model between education, medical supply of public goods and the marginal budget share of all kinds of consumer goods. The conclusion came that rising rates of current public education expenditure increased the education expenditure of rural families. It crowded out other consumer spending of life to a certain extent which led to a decline in the quality of life in rural areas. To sum up, so far there are few scholars who focus on the relationship between basic education and residents' consumption structure. Basic education is one way for the human capital investment. Academics had proved that residents can rise their income levels through the ascension of human capital. And the continuous improvement of income level not only increased the total consumer spending but also optimized residents' consumption structure (as **Figure 1** shows).

In this paper, grey correlation analysis method is the main research method, and we added up education spending of both ordinary primary schools and ordinary secondary schools in Guangdong province to get the total basic education spending of Guangdong province. Firstly, takes the basic education spending of Guangdong province as a measurement index to calculate the Theil index values of expenditure in basic education that represent equal education degree of Guangdong province. Secondly, figures out the Grey Correlation between basic education spending and equal education degree of basic education of Guangdong province. Then uses grey correlation values to analyze the relationship so that we will realize how much impact the urban-rural basic education spending can have on the residents' consumption structure in Guangdong.

2. Analytical Framework

Research Method—Grey Correlation Analysis Method

Grey Correlation Analysis Method is a method that quantitatively compares or describes the correlation degree between various factors in or between systems. If the change trend of two comparative sequences is basically identical or similar, it means that the synchronous change level is high. So that the relevance level of the two is higher, whereas the relevance level is lower. In this paper, the concrete steps for application are as follow:
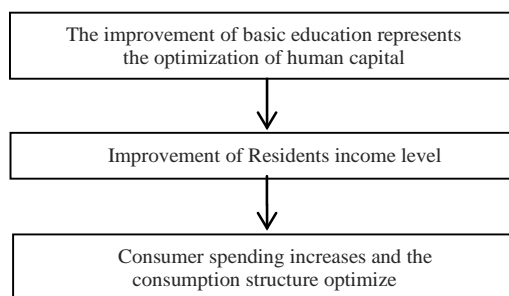

Figure 1. Mechanism on how basic education level influence the residents' consumption structure.

1) Identifies analysis series

To set a reference sequence: $X_0' = \left\{ X_0'(k), k = 1, 2, \cdots, n \right\}$, and the compare sequence:

$X_i' = \left\{ X_i'(k), k = 1, 2, \cdots, n \right\}$ $(i = 1, 2, \cdots, m)$. While n stands for the study year, m stands for the number of consumer spending projects.

2) Applies dimensionless method to variables sequences

In order to ensure the reliability of analysis results, we apply dimensionless method to reference sequences (X_0) and compare sequences (X_i). In this paper, dimensionless method uses mean value changes and initialization sequences are achieved: $X_0(k) = \dfrac{x_0'(k)}{x_0'(1)}$, $X_i(k) = \dfrac{x_i'(k)}{x_i'(1)}$

3) Determines the correlation level

$\varepsilon_i(k) = \dfrac{\min \left| x_0(k) - x_i(k) \right| + \rho \max \left| x_0(k) - x_i(k) \right|}{\left| x_0(k) - x_i(k) \right| + \rho \max \left| x_0(k) - x_i(k) \right|}$, among them ρ is resolution ratio and ρ takes the value

between [0, 1] in general cases. In this paper, $\rho = 0.5$. Then we bring the correlation coefficients into the following formula: $r_i = \dfrac{1}{m} \sum_1^m \varepsilon_i(k), k = 1, 2, \cdots, n$, so that the correlation level of reference sequences and compare sequences is measured.

4) Ranks the correlation levels

The paper ranks the eight correlation levels to show respectively how strongly the reference sequences and compare sequences are connected, so that we can judge out the main influencing factors of comparative sequence changes. The greater the r_i value Indicates the better correlation between the reference sequence and this compare sequence.

3. Grey Correlation Analysis on Basic Education Spending and Consumption Structure of Urban-Rural in Guangdong Province

3.1. Theil Indexes for Urban and Rural Basic Education Spending in Guangdong Province

Firstly, to use Theil indexes to show the changeable tendency of urban and rural basic education spending in Guangdong. Theil indexes are often used to measure the income gap between person to person or region to region. It values from 0 to 1. The more close to 0 means the more equalization of wealth distribution, whereas the more close to 1 the lower equalization. To divide number of students in basic education stage and education spending amounts in Guangdong respectively into two groups: urban and rural. Then to evaluate the equalization level of basic education in urban-rural in Guangdong according to the Theil indexes we obtained above. The

Theil indexes formula we used is as follows: $T(X) = \sum_{n=1}^n \dfrac{n_i}{n} \log \left(\dfrac{n_i / n}{x_i / x} \right)$. Among them, $i = 1, 2$ stands for ur-

ban education or rural education respectively; n_i stands for number of students in basic education stage of urban-rural in Guangdong; n stands for total number of students in basic education stage in Guangdong; x_1, x_2 stand for public finance funds for basic education spending in urban and rural respectively in Guangdong; x stands for total amount of urban-rural public finance funds for basic education spending in Guangdong.

Taking years from 1995 to 2013 as an inspection interval, during when China had experienced the changes from a preliminary understanding about "Implementation of the strategy relying on science and education is the inevitable choice of history" to "Further implement the strategy of developing the country by relying on science and education and the strategy of reinvigorating China through human resource development". The Theil indexes of urban-rural education spending for ordinary primary schools and ordinary secondary schools in Guangdong change as **Figure 2** shows. We found out that from 1995 to 2013, the Theil indexes decreased firstly and then increased and the growth trend begin significantly from 2011. Regard 2003 as a turning point, the equalization levels of basic education in urban-rural in Guangdong are overall improved before 2003. After that, the equalization levels decreased significantly, especially from 2011 to 2013.

3.2. Data Sources and Index Selection of the Grey Correlation

To use Engel's coefficient to measure residents' living standard in Guangdong: the lower a family's income was,
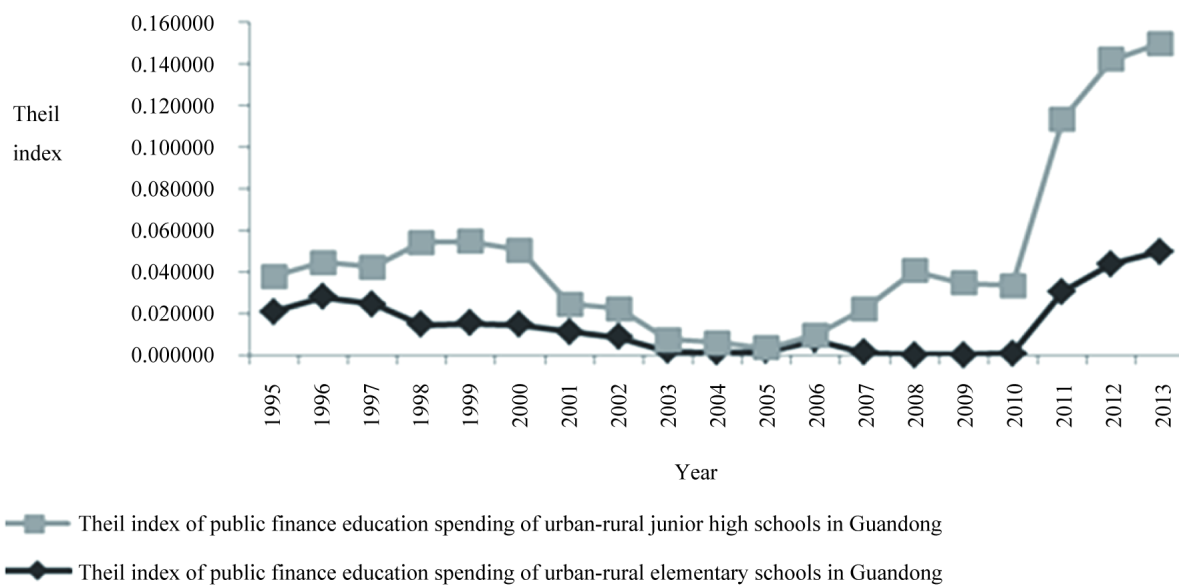
Figure 2. Tendency of Theil index of public finance education spending of urban-rural elementary and junior high schools in Guangdong.

the larger proportion spending used to buy food in household spending. And with the increase of family income, the spending proportion used to buy food in the total spending will falls. From 1995 to 2013, the proportion Guangdong urban residents per capita food consumption accounts for an average per capita consumption expenditure is 49.62% according to "Guangdong Statistical Yearbook" (1996-2014). It's 39.20% far higher than rural of the same period which is not difficult to find that many urban residents live wealthier than rural residents.

We set urban-rural basic education spending as reference sequence X_0, and per capita spending on food as subsequence X_1; and per capita spending on clothing as X_2; per capita spending on residence as X_3; per capita spending on as family equipment thing and service X_4; per capita spending on as health care X_5; per capita spending on as transportation and communication X_6; per capita spending on as recreation education and cultural service X_7; per capita spending on as miscellaneous goods and services X_8. The data of urban and rural basic education spending in Guangdong come from "Educational finance statistical yearbook" and "The national education funds execution statistics bulletin". And the data of per capita consumption expenditure of urban and rural come from "Guangdong Statistical Yearbook".

3.3. To Use Grey Correlation Method to Analyze Urban-Rural Basic Education Spending and Household Consumption Expenditure in Guangdong

We also selected year 1995-2013 as the research phase, using SPSS 19.0 to do cluster analysis on urban-rural basic education spending and household consumption expenditure in Guangdong. As a result, the time series of rural household consumption expenditure are divided into two phases with significant differences according to the tree diagram: Phase 1 is 1995-2003 and Phase 2 is 2004-2013. We use grey correlation method to analyze urban-rural basic education spending and household consumption expenditure in Guangdong of the two phases and **Table 1** and **Table 2** are made to see the rank of correlation level of urban-rural basic education spending and household consumption expenditure in Guangdong.

From **Figure 2**, **Table 1** and **Table 2**, it is found that, correlation level of Phase 1 is mainly between 0.55 and 0.95 while it is between 0.55 and 0.9 in Phase 2. It proves that there is close correlation between basic education spending and household consumption expenditure in Guangdong. What's more, the changed tendency of the equalization level of basic education in urban-rural in Guangdong in two phases has been noticed by observing the Theil indexes of urban-rural basic education spending. And meanwhile, the grey correlation level of household consumption expenditure and basic education spending in Guangdong has changed too. During the Phase 1, at the very top of both urban and rural correlation rank, there are four events: residence, health care, recreation

Table 1. Grey correlation level of basic education spending and household consumption structure in Guangdong from 1995 to 2003.

Rank	Correlation level of urban household consumption expenditure		Correlation level of rural household consumption expenditure	
	Correlation level	Expenses	Rank	Expenses
1	0.9174	Health care	0.8180	Health care
2	0.8170	Residence	0.7975	Recreation education and cultural service
3	0.7812	Recreation education and cultural service	0.7766	Miscellaneous goods and services
4	0.7465	Miscellaneous goods and services	0.7698	Residence
5	0.7340	Transportation and communication	0.7624	Clothing
6	0.6725	Family equipment thing and service	0.7532	Food
7	0.6680	Food	0.7257	Family equipment thing and service
8	0.6477	Clothing	0.5823	Transportation and communication

Table 2. Grey correlation level of basic education spending and household consumption structure in Guangdong from 2004 to 2013.

Rank	Urban household consumption structure		Rural household consumption structure	
	Correlation level	Expenses	Correlation level	Expenses
1	0.8361	Family equipment thing and service	0.8807	Clothing
2	0.8334	Miscellaneous goods and services	0.8407	Family equipment thing and service
3	0.8209	Clothing	0.8395	Residence
4	0.7722	Transportation and communication	0.8095	Health care
5	0.7305	Food	0.7700	Food
6	0.6725	Recreation education and cultural service	0.7647	Miscellaneous goods and services
7	0.6700	Residence	0.7432	Transportation and communication
8	0.6473	Health care	0.5729	Recreation education and cultural service

education and cultural service, miscellaneous goods and services. There's no difference between rank and correlation level. The correlation level of basic education spending and the four events above still maintained between 0.74 to 1, which means the relationship remain tight. And in this phase, the equalization level of basic education in urban-rural in Guangdong is higher that Phase 2. When comes to Phase 2, the correlation rank of the four events above has significantly decreased. The rank of urban and rural family equipment thing/service rise to the first and second place respectively. The data of urban in Phase 1 is 0.6725 while the rural is 0.7257, and they all rise to more than 0.8 in Phase 2. The relationships between urban-rural basic education spending and urban-rural family equipment thing/service rise sharply.

3.4. Research Results

1) To compare the correlation rank of urban-rural basic education spending and household consumption structure in the 2 phase, we can find the following situations in both two phases: urban basic education spending is much higher than the rural areas during the same period, the impact basic education spending have on rural residents living consumption expenditure prefer to necessity consumption, such as food expenses. And the impact on urban residents prefer to development-oriented consumption such as transport and communications and enjoying type consumption, such as family equipment thing and service. It means that the inequality of urban-rural basic education aggravates the differences of household consumption structure between urban and rural residents. Under this circumstance, urban residents pay more attention to high level of consumption which means the consumption structure of urban residents is much more optimized. While the consumption structure of rural residents is still at a lower level and the consumption structure remains to be optimized. To sum up, the improvement of urban-rural basic education equalization level plays an active role in optimizing urban-rural household consumption structure. But the grey correlation level between urban-rural basic education spending

and household consumption structure of both two phase are not more than 0.95, and some grey correlation level are wandering in the 0.6. So the conclusion comes that the relationship between the two is limited according to the definition of grey correlation level.

2) The correlation level between clothing expenditure and basic education spending of rural residents is higher than urban residents during the same period. In Phase 1, the correlation level between urban basic education spending and household consumption structure is 0.7624. In Phase 2, the number rises to 0.8209 while the correlation level between rural basic education spending and household consumption structure jumped to No.1, up to 0.8807. It shows that with the improvement of basic education, rural residents begin to spend more on clothing. Clothing is one of the important carriers of the external performance and the external performance is the pattern of manifestation of connotation. Life taste and pursuit can often been seen from a person's clothes. Basic education can gradually improve the taste of rural residents, making the rural residents not only stay on the initial thermal requirements but pay attention to additional factors, such as the brand, style, design and color.

3) As **Figure 2** shows, the Phase 2 (2004-2013) has lower equalization level of basic education in urban-rural in Guangdong. From **Table 1** and **Table 2**, we can see that during the Phase 1 to the Phase 2, the close relationship between basic education spending and urban-rural development-oriented or enjoying type consumption become weaker. It shows up as the fact that grey correlation index of recreation education and cultural service in both urban and rural residents decrease significantly, from 0.7812 and 0.7975 to 0.6725 and 0.5729 respectively. And the fall of correlation level between rural basic education spending and recreation education and cultural service is obvious. However, basic education spending and necessity consumer spending are sharing much closer relationship, as the grey correlation level between food and clothing increases apparently. It means that with the lower of equalization level of basic education in urban-rural in Guangdong, the basic education spending enhances its impact on necessity consumer spending. The expansion of gap between urban and rural basic education level makes urban and rural residents put higher levels of consumer demand aside but focus on necessity consumer spending. The stay back of equalization level of basic education also has negatively impacted the residents' consumption structure.

4) To contrast with the driving table of two phases, we can find that urban-rural household consumption structure in Guangdong of the phase (1995-2003) is more reasonable. During this period, the rank of grey correlation level between basic education spending and household especially urban residents' development-oriented and enjoying type consumption in Guangdong, including health care and recreation education and cultural service. It means that with higher equalization level of basic education, urban and rural residents are no longer satisfied with the solution of the food and clothing, but have the ability to spend more on higher levels of consumer demand than just production consumption.

4. Conclusions and Policy Recommendations

The driving table of urban-rural household consumption structure in Guangdong shows that urban-rural basic education expenditure and the per capita living consumption expenditure of urban and rural residents have been relevant to some certain extent. With the increase of gap between urban and rural basic education spending, the optimum level of consumption structure of urban and rural residents becomes lower. This suggests that the basic education basic equal education equalization level is one of the important factors affecting the urban and rural residents' consumption structure. On this basis, some policy suggestions are put forward:

4.1. To Perfect the Rural Social Security System and to Guide the Optimization of Rural Residents' Consumption Structure

The long time formation of the "dual society" results in the chronic segmentation of China's rural and urban system and creates a phenomenon that the economic status and quality of life of urban residents are all obviously higher than that of rural residents, especially in health care, education and other social security. Although the widen gap between basic education spending has led to the inequality of urban-rural basic education, the impact on rural residents' consumption expenditure is greater than the urban residents. And the differences in development-oriented and enjoying type consumption are particularly prominent.

The improvement of the rural social security system can fundamentally changes the status which rural residents' necessity consumption ratio is too large. The rural social security system framework has been set up, but it can't be ignored that a lot of improvements should be made in the execution of rural social security and cur-

rent policies and measures should be revised and perfected according to the problems exposed in the practice.

4.2. To Determine the Reform of Guarantee Mechanism of the Compulsory Education Funds and to Gradually Realize the Equalization of Basic Education

In China, after the enrollment rates of ordinary elementary schools and junior high schools in both rural and urban are guaranteed, the equalization of basic education has made substantial progress. It realizes the same fair opportunities for the citizens to accept education and ensures every student at the legal age can enjoy equal education opportunity without discrimination. In order to further promote the equalization process of basic education, the equalization level of basic education spending in urban-rural is urgently needed. Only the balance of per capita basic education spending between urban and rural is made, can every student enjoy equal treatment during their education processes.

At the same time, because of the firm relationship between basic education spending and household consumption structure, basic education spending is not just about the promotion of equalization of urban-rural basic education, but the significance of the optimization of household consumption structure should not be ignored. So it is urgent to balance urban and rural basic education spending levels. At present, the national compulsory education has exempt from fees like books, tuition and accommodation. The government can raise allowance standard and expand scope for boarder in poor families on this basis to help rural students from poor families to receive better compulsory education.

4.3. To Optimize Rural Credit Consumption Policy and to Improve the Predictable Income Level for Rural Residents

The lower consumer credit level and lower income of rural residents both restrain their disposable funds. For nearly 30 years, rural credit impact on rural residents' consumption expenditure in China relies mainly on the mediation effect of farmers' net income, which means that there is a huge room to improve on the level of consumer credit in rural areas in China to strengthen the support of policy financial services, such as to improve rural consumers' demand through fiscal interest discount service, to improve risk control ability of rural credit cooperatives and other formal rural credit agencies and then to improve the supply quantity of consumer credits.

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