Influencing Factors in Regional Income Gap in Guangdong

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Abstract: The widening income gap may lead to a “middle income trap”. As a province of economic strength in China, Guangdong’s widening regional income gap will have a negative impact on its economic development. By adopting a time series regression research method, this paper found that changes in educational human capital and traffic facility have a significant influence on the widening regional income gap. Therefore, it is suggested to narrow the regional income gap by increasing education expenditures, allocating education expenditures in various regions, as well as planning traffic routes rationally.

1. Introduction

Guangdong has been a pioneer in China’s economic development for many years, and its GDP contribution rate is always at the top. However, regional income gap has appeared and gradually become a prominent problem with a widening trend. According to Guangdong Provincial Bureau of Statistics, Guangdong Province is geographically divided into four parts—the Pearl River Delta Region, the Eastern Region, the Western Region and the Northern Region (the mountainous areas)—of which the per capita GDP increased from 40691 RMB yuan, 9,747 RMB yuan, 11,626 RMB yuan, 8,847 RMB yuan in 2005 to 130,182 RMB yuan, 38,340 RMB yuan, 46,203 RMB yuan, 34883 RMB yuan in 2018 respectively. The increase is 89,491 RMB yuan, 28,593 RMB yuan, 34,577 RMB yuan, and 26,036 RMB yuan respectively. It can be noted that the per capita income of the Pearl River Delta Region is significantly higher than the three other regions, which witnesses a big inconsistency with the concept of “coordinated regional development” proposed by the Chinese government, and the three other regions are far away from the goal of common prosperity. It is the concern of the government and the people to study the regional income gap in Guangdong, narrow the income gap between regions, and improve people’s living standards and sense of happiness. Therefore, for the benefit of the development of society, it’s essential to us to study the influencing factors in regional income gap in Guangdong and provide a basis for shortening the gap.

Many scholars at home and abroad have done in-depth research on the influencing factors in income gap. As early as the 1960s, Theodore William Schultz put forward the theory of human capital. He believes that human capital is the main foundation of modern economic growth and education investment affects technological innovation [1]. Educational human capital and the flow of population can widen the economic growth gap between outflow and inflow areas. [2] Therefore, it is believed that education expansion will aggravate income distribution inequality [3], and traffic facility which makes a great difference in the economy development of backward areas will greatly affect the income of the local residents: a widening or shortening trend of the income gap among different regions. Fan Gang (2004) [5] found that the economic gap between the eastern and western regions of China was widening after comparing the differences in GDP, capital, and labor between various regions; and explained that the influencing factors in regional income gap includes capital, human capital, labor mobility and allocation in various regions; Zou Haishuang (2017) [6] conducted an empirical research
using a fixed-effect model after analyzing the panel data from six provinces in the eastern, central, and western regions of China and came to a conclusion: government investment and human capital have a directly effect on income, and local government investment in regional human capital strongly increases the income of residents.

By studying the research literature at home and abroad, it's found that scholars have different views on the influencing factors in the income gap, but most scholars hold that human capital, traffic facility, geographic location, policy and other factors have a certain influence on the regional income gap. In the existing studies at home and abroad, the results, however, are almost the same and most scholars tend to study the regional income gap in the whole country. Although a small number of scholars have analyzed the regional income gap in Guangdong, they have not systematically demonstrated the causes of the gap. Thus it is particularly necessary to study the regional income gap in Guangdong.

2. Status of Regional Income Gap

2.1 Regional Economy Division of Guangdong

Guangdong can be roughly divided into four parts: the Pearl River Delta Region, the Eastern Region, the Western Region and the Northern Region (the mountainous areas). Among them, the Pearl River Delta Region includes 9 cities: Guangzhou, Shenzhen, Foshan, Dongguan, Zhongshan, Zhuhai, Huizhou, Zhaoqing, and Jiangmen; The Eastern Region includes 4 cities: Shanwei, Shantou, Chaozhou, and Jieyang; The Western Region includes 3 cities: Maoming, Zhanjiang, and Yangjiang; The Northern Region includes 3 cities: Qingyuan, Yunfu, Shaoguan, Heyuan and Meizhou.

The Secondary and the Tertiary Industries are the main industries in the Pearl River Delta, and its regional GDP ranks the first by accounting for 80.1% of Guangdong’s. The Primary Industry remains the main industry in the Western Region, the Eastern Region and the Northern Region, and the regional GDP accounts for 7.4%, 6.6% and 5.9% of Guangdong’s respectively. There is quite a big gap between the Pearl River Delta Region and the other regions.

2.2 Status of Regional Income Gap

First of all, by analyzing the total per capita GDP in these regions, it’s noted that the Eastern Region, the Western Region and the mountain areas are basically growing synchronously, but the Pearl River Delta Region is growing much faster. The income gap between the Pearl River Delta Region and the other regions is widening year by year, showing a price scissors.

Note: Data from Guangdong Statistical Yearbook 2019 by Guangdong Provincial Bureau of Statistics

Figure 1. Disposable per capita income in different regions of Guangdong
Second, from the perspective of income sources, disposable income includes wage income, operating income, property income and transfer income. It can be seen from Figure 2 that the main reason for the widening income gap between the Pearl River Delta Region and the other regions is the difference in wage income. The wage income in the Pearl River Delta Region is roughly twice more than that in any other region. The second reason is the difference in property income. The per capita income in the Pearl River Delta Region is about 5,500 RMB yuan, and the income in the other regions is very small, even negligible. The level of these two incomes can directly reflect the level of regional economic prosperity.

Finally, from the point of the Gini coefficient. It’s believed by the international academics that a Gini coefficient of 0.4 is a warning line. If it is higher than 0.4, it is considered that the social income distribution is unfair. The larger the Gini coefficient is, the more unfair the income distribution becomes. The Gini coefficient of Guangdong is shown in Figure 3. From 2010 to 2018, the overall household Gini coefficient has increased significantly from 0.50 to 0.578, which indicates that the income gap is widening and the distribution is very unfair. The Gini coefficient of rural areas fluctuates greatly between 0.44 and 0.60, and the Gini coefficient of urban areas is relatively stable around 0.48. However, the Gini coefficient of either the rural or urban residents is significantly greater than the internationally recognized warning line. This shows that Guangdong’s overall income distribution tends to expand, and income distribution in rural areas fluctuates greatly on an unfair basis.

Note: Data from *Guangdong Statistical Yearbook 2019* by Guangdong Provincial Bureau of Statistics

**Figure 2.** Comparison of various income sources in different regions of Guangdong.
3. An Empirical Analysis of the Influencing Factors in Regional Income Gap in Guangdong

3.1 Data Sources
The original data of this paper is from Guangdong Statistical Yearbook (2010–2019) by Guangdong Provincial Bureau of Statistics. The sample includes the road density of Guangdong, the disposable per capita income, and the public expenditure on education in various cities of Guangdong. The empirical data are obtained through calculation and sorting.

3.2 Factor Selection
There are many factors that affect the regional income gap. The unbalanced investment in education in the region leads to its negative correlation with the stock of human capital, resulting in the expansion of regional income. [7] Factors such as productivity, production status of enterprises in different industries, workers’ capabilities, ownerships, distribution forms, etc. all have an influence on the regional income gap. [8] The development of traffic infrastructure can promote resources allocation and industrial agglomeration, which in turn plays an important role in accelerating the development of the regional economy. [9] Nowadays with the development of computers and internet, human capital plays a decisive role in the development of the national economy. Besides, traffic facility has an indispensable role in attraction of talents and communication of economic activities. Therefore, this paper mainly analyzes the regional income gap in Guangdong from two aspects: human capital and traffic facility. The specific indicators are as follows:

Explained variable: disposable per capita income of Guangdong. When selecting a measure of regional income gap, it is not difficult to find that there are many indicators that reflect the regional income gap of Guangdong, such as the Theil index, Gini coefficient, and per capita GDP, etc. These indicators are closely related to a region’s GDP which in turn has an important relationship with the consumption level of residents in the region, and they are closely related to disposable per capita income; Therefore, disposable per capita income of Guangdong is selected as the explained variable in this model.

Explanatory variables: (1) Education expenditure. Human capital includes education, health, public health, etc. Among them, education is an important factor to promote the quality of labor and accelerate the efficiency of social production. (2) Highway density. Traffic is a bridge for communication between regions, and it's also a channel for people to flow, as well as an important medium for economic development. The amount of traffic mileage and the number of roads in a region...
can demonstrate the region’s contact with the outside world. The area of the region and the amount of resources in it are related to its population which is closely related to the traffic volume. Therefore, the ratio of the area of Guangdong to the mileage of highway in it is selected as the road density in this model. The road density is the main parameter to explore the relationship between highway density and regional income.

### 3.3 Model Building

A panel data regression model is established based on the following indicators: disposable per capita income, public expenditure on education, and road density in the four regions of Guangdong.

Among them, $\alpha$ is the constant term; $\beta$ is the explanatory variable coefficient; $\varepsilon$ represents the residual term; $Y$ represents the explained variable; $X$ represents the explanatory variable. In order to better reflect the influence of the selected indicators on the regional economy, this model uses a time series multiple regression model from the level of Guangdong.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

Eviews is used to deal with the data, and the following regression results are obtained:

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|-------|
| C        | -9356.929   | 7062.020   | -1.324965   | 0.2268|
| X1       | 9.117240    | 0.875969   | 10.40818    | 0.0000|
| X2       | 15.25131    | 7354.157   | 2.073835    | 0.0768|

| R-squared | 0.995433 | Mean dependent var | 24472.78 |
| Adjusted R-squared | 0.994128 | S.D. dependent var | 7336.523 |
| S.E. of regression | 562.1808 | Akaike info criterion | 15.74485 |
| Sum squared resid | 2212331. | Schwarz criterion | 15.83562 |
| Log likelihood | -75.72425 | Hannan-Quinn criter. | 15.64527 |
| F-statistic | 762.8745 | Durbin-Watson stat | 1.188740 |
| Prob(F-statistic) | 0.000000 |                      |         |

### 3.4 The Hypothetical Test

#### 3.4.1 Multiple linearity test

It can be seen from Table 1 that the coefficient of determination is $R^2=0.9954$, and the coefficient of correction is $\bar{R}^2=0.9941$, which shows that the model is well built. Under the condition of significance level $\alpha = 0.05$, the test value $F$ is 762.8745, and the $p$ value of the overall equation is 0 (smaller than the significance level of 0.05). Highway density and education expenditure have a significant impact on disposable per capita income. However, by checking the t distribution table, it’s found that $t_{\alpha/2(n-k)}=2.306$ and the t values of $X_1$ and $X_2$ are 10.408 and 2.07 respectively. The t value of $X_2$ is obviously smaller than 2.306, and its $p$ value is also greater than 0.05, indicating the model may have multiple linear relationships.

In order to check whether there are multiple linear relationships in the model, the Variance Expansion Factor (VIF) test method and the auxiliary regression equation are used, that is, each $X$ variable is used as an explanatory variable to regress the remaining $X$ variables. Eviews is used to deal with the regression results, and the results are shown in Table 2:
### Table 2. VIF value table

| Explanatory variable | the coefficient of determination $R^2$ | VIF = $\frac{1}{1-R^2}$ |
|----------------------|----------------------------------------|-------------------------|
| X1                   | 0.899                                  | 9.901                   |
| X2                   | 0.899                                  | 9.901                   |

Note: Data from the regression model.

It can be seen from Table 2 that the variance expansion factors of the two explanatory variables X1 and X2 are both smaller than 10, which indicates that the model does not have multiple linear relationships.

#### 3.4.2 Autocorrelation test

Since the model is a multi-order regression model, the Lagrange principle test (LM test) is used. Through the calculation and analysis by Eviews, it is concluded that $TR^2$ is 6.180, P value is 0.230; under the condition of given significance level $\alpha=0.025$, $X_{0.025}^2(p) = 7.378 > TR^2$, and $P > \alpha$, indicating that there is no autocorrelation in this model.

#### 3.5 Economic interpretation

The regression coefficient of education expenditure is 9.12. When its significance level is 0.05, the disposable per capita income of Guangdong will increase as education expenditure increases. When the other conditions remain unchanged, every increase of 100 million RMB yuan in education expenditure will lead to an increase of 9.12 RMB yuan in the disposable per capita income.

The regression coefficient of the highway density and railway density is 15.25. Under the condition of a significant level of 0.05, the disposable per capita income of Guangdong will increase as its traffic density increases. When the other conditions remain unchanged, one more kilometer in the highway density and railway density will lead to an increase of 15.25 RMB yuan in the disposable per capita income.

From the above analysis, we can see that educational human capital and traffic facility have a significant influence on income. Therefore, it is urgent and practically important to narrow the regional income gap by increasing education expenditures, allocating education expenditures in various regions, as well as planning traffic routes rationally.

#### 4. Recommendations for Policy Makers

##### 4.1 Increase Education Expenditure and Broaden the Sources of Education Funds

Education is an important factor in economic development, and the development of education provides strong talent support for economic development. Therefore, to increase education expenditure, it is quite necessary for the government to use scientific means to develop education and invest in education. Besides, the government should play its leading role in the market and encourage enterprises and individuals to invest in education. Absorbing private capital and expanding the sources of education funds can alleviate the government’s economic pressure, foster the sustainable development of education, and guarantee the citizens a right for the basic education more comprehensively.

##### 4.2 Distribute Education Expenditures Reasonably in Various Regions and Promote Coordinated Regional Development

Education, as a public product with strong positive externalities, prevents it from being regulated by the market, and requires a rational and scientific allocation of resources by the government to promote equity in education. If the gap in education expenditure between regions is too large, the income gap will also widen. Thus, it is necessary to rationally allocate educational resources and balance the regional public expenditure on education so as to narrow the regional income gap. Therefore, it is necessary to rationally divide the education funds of Guangdong and allocate them reasonably according to the needs of the relevant regions.
4.3 Plan Traffic Routes Reasonably According to the Local Conditions
Since ancient times, traffic facility has been an important hub for economic development, and easily accessible transportation can provide a communication platform among regions as well as basic conditions for trade exchanges. The government should focus more on the planning and construction of roads and railways in the other regions except the Pearl River Delta Region to increase highway density and railways density, which is very helpful in facilitating the logistics of economically backward areas to expand their business transactions.

5. Acknowledgement
Fund: One of the periodic achievements of Guangzhou College of Technology and Business-- 2020 academic research projects of “Study on the Ways of Brand Construction of Guangdong Private Universities from the Perspective of Ecological Theory” (PROJECT NO. KA202005).

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