Research on the Influence of Talent Agglomeration Investment on Hainan Regional Economy

Lin Wang1, Shuxia Xie2
1School of Business Administration, Haikou University of Economics, Haikou 571127, China
2Sichuan Technology and Business University, Meishan 620000, China
whu05@qq.com

Abstract. Human capital agglomeration is a regional phenomenon, which can promote economic growth. Based on the statistical yearbook data of Hainan Province in 2016, this paper compares the present situation of economic growth and talent agglomeration in Hainan cities and counties, and makes a statistical analysis of it by using Eviews software. It is concluded that the investment of talent agglomeration has an important influence on regional economic growth. And put forward several countermeasures to the influence of talent agglomeration investment on the regional economic growth several countermeasures.

1. Introduction
Talent has become an important source and endogenous factor of social economic growth in recent years. Hainan, as a special island province in China, has a relatively scarce talent. As a whole, the distribution of talents in all regions of Hainan Province is also very uneven. Haikou, Sanya, Qionghai and other eastern regions relatively concentrated talent, while the western region relatively short of talent. It shows that the phenomenon of talent agglomeration in Hainan is obvious. To a great extent, the imbalance of talent agglomeration affects the economic and social development of Hainan.

2. The external Model of Lucas' Talent growth
If we want to study and analyze the role of talent agglomeration in economic growth comprehensively and accurately, it is very important to construct the corresponding model of the relationship between economic growth and factor variables. Therefore, in the analysis of the impact of talent agglomeration input on regional economy, this paper selects the data promulgated by the Bureau of Statistics of Hainan Province and the State of China in 2016 as the research basis, constructs the econometric analysis model through the principle of production function, in addition, In order to ensure the rationality, accuracy and authority of data analysis and theoretical analysis, Lucas' external growth model of human capital is adopted as the research method. The standard form of Lucas' model is expressed as: \( Y = AK^e - \alpha H^e \). In this equation, \( Y \) is the total output and \( A \) is invariant, and \( H \) is the per capita human capital \( K \) means the material capital input \( N \) is the total human capital.

3. Research data sources and their variable descriptions
Because everyone has some differences in how to deal with and understand indicators, it is necessary to interpret the methods and sources of variable processing. The research subject of this paper is the relevant indexes of the population's education years and educational level in the main cities and
counties of Hainan Province in 2016, and the Statistical Yearbook of Hainan Province 2016 is the source of the data. The measures of regional physical capital and economic growth are as follows: the index of regional economic growth is the GDP of each city and county, and the amount of fixed assets represents material capital. The data of cities and counties in the same period can be found out in the statistical yearbook for convenient research and analysis.

Human capital measurement: (1) Per capita human capital. In Hainan Statistical Yearbook 2016, we can find out the education level and the education years of the population in each city and county. The level calculated by the weighted average is the average talent level per person in each city and county. The measurement equations are as follows:

\[ H = (17h_1 + 12h_2 + 0h_0 + 10h_7 + 7h_4) / (h_1 + h_2 + h_0 + h_4 + h_7) \]

The equation indicates different levels of education, including junior college, junior high, junior secondary, primary and illiterate.

(2) When the total human capital number \( N \) and the regression analysis are normal linear, it can be known that the calculation can be realized by adopting the Lucas talent growth external model calculated:

\[ \ln(Y/N) = \alpha \ln(K/N) + \beta \ln H + C \]

and because both material capital and gross domestic product are the total amount data category, to ensure consistency of the equation variables, it should be ensured that \( K/N \) represents the per capita material capital input, and \( Y/N \) represents the per capita output. In addition, in the context of illiteracy, the degree of illiteracy is expressed as 0, so the total number of people in each city is represented by \( N \) (total human capital level).

4. Analysis of Regional gathering of talents

In order to analyze and discuss the regional agglomeration of talents, it is necessary to explain and analyze the different degree of talent agglomeration in different regions through the data of cities and counties. There are two ways to express the degree of talent agglomeration: the first way is the number of college and above talents per hundred people in the enterprises. The second way is the average number of years of education of the educated population over 6 years old. Based on the 2016 city and county data, we can calculate the number of talents per hundred people in cities, counties and enterprises, As shown in figure 1.

![Figure 1. Number of Talents Per Hundred People in Each City and County](image)

It can be seen from figure 1 that the difference between cities and counties in terms of talents per 100 or more people is obvious. Among them, the regions with a relatively high degree of talent concentration are Haikou and Sanya, and the areas with average talent concentration are Qionghai, Danzhou and other places. The low level of talent concentration is the east, Wuzhishan and other places. That is to say, there is a positive correlation between the degree of regional talent concentration and the number of talents per hundred people. It fully shows that the amount of human resources is relatively large in some areas of Hainan, but very small in other regions, the phenomenon of regional agglomeration is obvious, and in different regions, there are some differences in the number of talents.
Figure 2 shows that the average number of years of education of the population in each city and county also has a strong effect of regional concentration of talents. In Haikou, Sanya, the number of years of education is relatively high, basically more than 10 years, and Qionghai, Danzhou, Dongfang, education years of about 8 years, the lowest is the Wuzhishan, the average years of education in about 6 years. It fully shows that Haikou and other economically developed areas have a relatively high level of education, so the high level of talent agglomeration is relatively high, the lowest level of education in Wuzhishan, its talent concentration is very low.

Therefore, although the provincial government’s policy towards each region is basically the same, due to the differences of regional economic environment, geographical conditions and so on, the phenomenon of talent gathering is also different. In the economic growth model, human capital is the endogenous factor, so the investment of talent agglomeration will affect the regional economic growth to a large extent.

5. Model analysis and conclusion

In order to analyze the influence of talent agglomeration input on regional economic growth, according to the relevant data indicators of cities and counties in 2016 and Lucas’ external model of talent growth, the results can be estimated by using Eviews6 software. That is:

\[ Y = A K^{0.702} H^{0.125} N^{0.187} \]

\( n=20, \ R^2=0.798 \)

From the above results estimated we can found the t-Statistic of H and K are 3.786 and 9.012, respectively. Through the test, the overall significance of the econometric model is high, and the goodness of fit is also high, which indicates that the regression equation is more representative and has important significance in the model. It is fully explained that the four data of N, H, K, Y in Hainan are in accordance with the external model of talent growth, and the model is suitable for Hainan counties from the perspective of empirical analysis. In addition, the output elasticity of total human resource level N and per capita talent level H was 0.187/0.148, respectively. The result shows that the investment of talent agglomeration plays an important role in the regional economic growth of Hainan, and increasing the average number of years of education will help to improve the output of GDP. In addition, physical capital investment can stimulate regional economic growth to a large extent, and the output elasticity is much more important than talent agglomeration. This fully shows that Hainan has a majority of cities and counties with an underdeveloped economy, and its material capital investment space is still relatively large, especially in the western part of Hainan and in the central and western parts of Hainan. At the same time, it is limited by material capital. So that the degree of talent concentration impact on regional economic growth is not particularly significant.

According to the regional data of Hainan cities and counties in 2016, we can draw the following conclusions: firstly, the degree of talent agglomeration is quite different, and the degree of talent agglomeration is relatively high in Haikou, Sanya and other developed regions. The degree of talent agglomeration in less developed areas such as Wuzhishan is relatively low. This phenomenon indicates that talent agglomeration has an extremely obvious regional phenomenon. Moreover, the degree of talent agglomeration in different regions is also very different. Secondly, the output
elasticity of average talent level H and talent level Summary N is 0.148, 0.187, while that of material capital level is 0.796. Through comparative analysis, it is found that the degree of human capital agglomeration can promote economic growth. But its output elasticity has no high level of material capital.

6. Countermeasures of talent agglomeration to influence regional economic growth

Present is the key period of the economic and social development in Hainan. How to promote the sustainable and coordinated development of economy and society and accelerate the transformation of the mode of economic development are the important problems that each city and county of Hainan solve and face together. Further speeding up the accumulation and accumulation of talents is very beneficial to solve the above problems. Therefore, it is necessary and basic strategic investment to increase the investment of talent agglomeration.

6.1. Increasing investment in higher education to give priority to the accumulation of human capital

A large number of scientific research results show that higher education affects Hainan's economic growth to a large extent, but the contribution will be greatly different from each other due to the speed, scale and structure of regional economic development. For example, Haikou and Sanya, from the two regions of higher education impact on economic growth, the higher the number of years of education, the greater the impact on regional economic growth and the contribution rate, As shown in tables 1 and 2.

| Year   | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  |
|--------|-------|-------|-------|-------|-------|-------|
| Number of years of education per capita (year) Haikou  | 8.23  | 8.42  | 8.56  | 8.72  | 8.93  | 9.13  |
| Per capita number of years of education (year) Sanya  | 8.01  | 7.85  | 8.27  | 8.54  | 8.85  | 9.01  |
| Per capita number of years of higher education (year) Haikou | 0.20  | 0.22  | 0.31  | 0.43  | 0.51  | 0.55  |
| Per capita number of years of higher education (year) Sanya | 0.18  | 0.19  | 0.24  | 0.32  | 0.45  | 0.49  |

Table 2. Comparison of the Educational Level of Employees in Haikou, Sanya, From 2011 to 2016 on the Local Economic Growth and its Contribution Rate (%)

| Areas | Annual economic growth rate (%) | Average annual growth rate of comprehensive indicators of education | Impact rate of Education on Regional Economic growth (%) | Percentage of higher education in average annual growth rate of education index Eh | Educational Index growth rate after exclusion of higher Education eh | Contribution rate of higher Education to Regional Economic growth Rh |
|-------|---------------------------------|---------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|
| Haikou | 5.83                            | 20.52                                                         | 10.15                                                  | 18.74                                                                           | 2.01                                                          | 2.23                                                          |
| Sanya  | 6.04                            | 18.78                                                         | 8.76                                                   | 16.12                                                                           | 1.98                                                          | 2.07                                                          |

In the 13th Five-Year Plan for Social and Economic Development in most areas of Hainan Province, it is proposed to upgrade and adjust the industrial structure through continuous innovation and to change the mode of economic development strategically, and the implementation of this innovation drive must be supported by talents. Therefore, only by increasing the investment in education in Hainan can we accumulate and train all kinds of talents. In addition, the current international and domestic economic growth slowdown still affects the economic and social
development of Hainan, especially the depressed western euro zone economy, which seriously restricts the economic growth rate of China and Hainan. Therefore, the increasing investment of higher education can not only promote Hainan's economic growth through education, but also accumulate talents for the future rapid economic development to ensure that the role of higher education can be brought into full play. Under the background of low social economy, increasing investment in higher education is also an important strategy of western developed countries.

6.2. Continue to increase investment in regional talent agglomeration in order to effectively pool innovative talents
Taking Haikou and Sanya as examples, these two economically developed regions pay more attention to the training and accumulation of talents. The average number of years of education and higher education per person employed in Haikou during the period from 2011 to 2016 is 0.22 years and 7.21 years respectively. Both indicators far exceed the average education years in Hainan Province. However, talent agglomeration investment plays an important role in the demand of regional economic and social development. Therefore, the medium- and long-term talent gathering program of Haikou and Sanya has formulated detailed strategic plans such as personnel training objectives, policy guarantees, mechanism innovation and organizational implementation. If we want to effectively implement the talent development program, it is necessary to continuously invest in talent agglomeration, so as to speed up the efficiency of regional talent agglomeration. The evaluation results show that the more developed regions such as Haikou and Sanya should increase the regional investment of talents in order to further improve the education level of the masses and ensure that the talents of higher education can contribute to the regional economic and social development.

6.3. Focus on conjugate drivers of two inputs in regional economic growth
Whether it is to increase the investment of talent agglomeration or to increase the investment of higher education, it has been recognized and implemented by the government and related departments. However, there is still a conjugate relationship between the two inputs on the premise of the talent agglomeration investment. If the state of these two inputs is conjugate, then the conjugate driving economic growth can be achieved. Conjugation is a modernized view of regional investment relationship in the investigation of regional economic growth. In addition, there are mainly two types of conjugation: conjugate has relatively stable architecture, the whole function is coordinated, the elements are closely related, and the conjugate has strong adaptability to the environment. When conjugate is dynamic, it can move from one state to a higher state. According to the demand and present situation of resource allocation, the essence and core of the two kinds of input conjugation are analyzed, the conjugate model is compared quantitatively, and the actual situation of the two inputs is clarified to give full play to the conjugate effect.

7. Conclusion
To sum up, this paper analyzes the impact of talent agglomeration on regional economic growth through Lucas external talent growth model and regional data of Hainan cities and counties in 2016. The results show that talent agglomeration is conducive to promoting regional economic development. However, the elasticity of talent output is lower than that of physical capital, which fully shows that the space of material capital investment in Hainan region is relatively larger, especially in the western and central regions of Hainan. Talent agglomeration does not affect economic growth in a large scale because of the influence of material capital.

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References

[1] Yang Hongxiang, Yu Binbin. A study on the Evaluation of the effect of Talent agglomeration in the process of Regional Integration [J]. Journal of Shihezi University (philosophy and Social Sciences Edition), 2014(01):121-123.

[2] Suxi Chao. Theoretical Analysis and empirical study on Regional Talent agglomeration [D]. Yunnan normal University. 2008.

[3] Zhao Xiangge, Yang Pei. To promote the rapid development of the central and southern Hebei economic zone with the effect of talent gathering in colleges and universities [J]. Journal of Baoding University. 2014(01):53-56.

[4] Liu Lin, Guo Li, Li Jianbo. A study on the Conjugate driving effect of higher Education and Talent agglomeration on Regional Economic growth: a case study of Jiangsu and Zhejiang provinces [J]. Economic geography 2013(11): 76-79.

[5] Sun Jie, Jiang Xingkun. A study on the influence of Science and Technology talents on Regional Economic Development: a Comparative Analysis based on the Regional data of East, Middle and West [J]. Guangdong Social Sciences, 2014/02: 23-26.

[6] Kong Chaoli, Chang Shuhui. Development level of Peasants in Hainan "International Tourism Island" [J]. Journal of Shenyang normal University, 2012.(1):100-101.

[7] Chen Hao, Xue Shengjia. Econometric Analysis of the contribution of Educational Investment to China's Regional Economic growth [J]. Economics and Management, 2014/10: 5-7.

[8] Sun Jian, Youwen. Study on the interaction between Talent agglomeration and Industrial agglomeration [J]. Managing the World: 177-178.