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## Research on Contribution of Human Capital to Beijing's Economic Growth: The Perspective from Human Capital Structure Upgrading

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### Abstracts:

*Based on the perspective of human capital structure upgrading, this paper used the panel data from 1996 to 2017 to make an empirical study on the contribution of Beijing's human capital to economic growth, and by compared with relevant literature, got the following main conclusions: (1) From 1996 to 2017, the contribution rates of human capital and material capital to economic growth in Beijing were 27.6% and 67.6%, respectively. (2) The contribution rate of human capital to economic growth in Beijing has increased in the past 10 years. (3) The contribution of Beijing's human capital was superior to other regions in China, but there was still a gap compared with developed countries. (4) The contribution rate of China's human capital to economic growth had the obvious regional heterogeneities, and the regional disparity was large. And this article puts forward relevant policy suggestions based on the conclusions.*

**Keywords:** Human capital, structure upgrading, economic growth

### 1. Introduction

Since mankind entered the information age, the role of knowledge and innovation in economic development has become increasingly prominent, which also means that the contribution of human capital has become increasingly critical. As far as China is concerned, it is now in the 'new normal' of economic development, the downward pressure on the economy has increased, and the Sino-US trade friction has not ceased. How can we withstand the pressure and maintain steady economic growth is an important issue. As the 'source of modern economic growth', human capital is also the weakness of China, compared to developed countries. It occupies an important position in the game between countries and may become the key to solving this problem.

As the capital of China, Beijing has unique advantages in economics, culture, politics, international exchanges, and technological innovation. It has long attracted a large amount of human capital from all parts of the country and even the world. According to the data in the 'Beijing Statistical Yearbook', the number of permanent residents in Beijing in 1996 was approximately 12.594 million. In 2017, it had increased to 21.707 million, which was about 1.7 times the number in 1996. In 1996, the number of permanent residents in Beijing was 1.817 million. In 2017, it reached 7.943 million, which is about 4.4 times that of 1996. However, due to the depopulation policy of Beijing in recent years, the number of floating populations in Beijing has actually experienced two consecutive years of decline, and its peak was 8.226 million in 2015.

From the perspective of employment, according to the 'Beijing Statistical Yearbook' data, the total number of employees in Beijing in 1996 was 6.602 million. In 2017, it was 12.468 million, which is about 1.89 times that of 1996, slightly higher than the growth of permanent residents. And in terms of education level, the proportion of employees with a college degree or above has increased from 18.9% in 1996 to 64.4% in 2017, which is about 3.4 times that of 1996. These data show that Beijing's human capital not only has a huge increase in total amount, but its structural changes are worthier of attention.

Therefore, based on the perspective of Human Capital Structure Upgrading, this study analyzes the contribution of Beijing's human capital to economic growth and analyzes the role of human capital in economic growth. It can use human capital as the starting point to ease the pressure on economic development and stabilize growth, and put forward more targeted suggestions. At present, various countries and regions are introducing talent policies frequently. In this context, exploring the contribution of human capital to economic growth also has important practical significance for the formulation of Beijing's talent policy. In addition, through comparative analysis, it can also produce certain reference significance for other regions.

### 2. Literature Review

Since Schultz systematically explained the contribution of human capital to economic development in 1960, this field has always attracted the attention of many scholars. Barro (2001) used panel data of about 100 countries from 1965 to 1995 to conduct empirical analysis and verified the important role of human capital in promoting the economic development of a country. DelaFuente and Doménech (2006) estimated the average educational level of 21 Organizations

for Economic Cooperation and Development (OECD), and used it as an indicator of human capital to explore the relationship between human capital and economic growth, and pointed out which There is a significant positive relationship between. Vinod and Kaushik (2007) conducted an empirical study using panel data from 18 developing countries from 1982 to 2001. They pointed out that education and technical human capital have an important impact on economic growth, and suggested that developing countries should increase access to education and improve their education and technical attention. Du Wei et al. (2014) included the number of employees and the average years of education of the employed population into the economic growth model. They conducted an empirical study using panel data from 2002 to 2010 and pointed out that the role of human capital in promoting economic growth in China has obvious regional differences. Qualitative.

Hu and Liu (2004) divided human capital into three different types: general, skill, and innovation based on ability, and conducted empirical research on the relationship between these three types of human capital and economic growth. The impact of the two on economic growth tends to weaken, and the role of innovative human capital on economic growth is increasing. Chen (2007) constructed a similar human capital structure model based on Maslow's demand theory, and conducted an empirical analysis using China's provincial panel data from 1992 to 2003, and found that human capital structure has a significant effect on economic growth and can Effectively explain the differences in economic levels between regions. Zhang and Zhuang (2011) used the method of generalized moment estimation to study the impact of human capital composition on China's economic growth. The results show that the role of higher education is greater than that of primary and secondary education, and the role of human capital structure is related to regional economic differences. And elementary and middle school education has made greater contributions in developed and underdeveloped provinces respectively.

Liu et al. (2018) measured the structural changes of human capital by constructing a human capital Structure Upgrading index, and conducted empirical research based on dynamic panel models using panel data from 1987 to 2011, and pointed out that human capital Structure Upgrading is the important reason for the formation of economic gap between regions in China. Cheng et al. (2019) used the provincial panel data from 1996 to 2015 and used the instrumental variable method to confirm the promotion of the evolution of the human capital structure on economic growth, and analyzed its mechanism. It can be seen that in the research on the relationship between human capital and economic growth, the role of human capital quality and quantity has become a consensus, and structural factors have also attracted enough attention. However, studying the contribution of human capital from the dynamic perspective of Structure Upgrading is inthe infancy. Therefore, from the perspective of Human Capital Structure Upgrading, it is of practical significance to measure the contribution rate of human capital to economic growth.

### 3. Research Design

#### 3.1. Variable Setting

##### 3.1.1. Human Capital

Based on the human capital Structure Upgrading index proposed by Liu et al. (2018), this paper combines it with the quantitative index of human capital to construct the human capital index H. The human capital StructureUpgrading method is based on the inverse cosine function, which measures the angle of the space vector formed by human capital. This method can combine the quality and structure of human capital, and is more adaptable to the actual development situation. And it embodies the dynamic evolution process of the relative proportion of human capital at different levels, that is, the evolution process of the human capital structure.

Since Liu et al. (2018) proposed the human capital Structure Upgrading index, this method has been widely used in the measurement of human capital structure, and its reliability has been continuously verified in practice (Cheng et al., 2019; Geng and Bai, 2019; Li and Yang, 2019). The following article will briefly introduce the specific methods of measuring human capital Structure Upgrading:

First, according to indicators such as education level or skill level, the level of human capital is divided into n categories from low to high (in this paper, education level is used as the dividing index, and it is divided into 5 levels, from low to high to not high. Education, elementary school, junior high school, high school and technical secondary school, junior college and above, n=5). And set their proportions as the components of the space vector in order, and get a set of n-dimensional human capital space vectors  $X_0=(x_{0,1}, x_{0,2}, \dots, x_{0,n})$ .

Then, select the base unit vector group<sup>1</sup>, such as  $X_1=(1, \dots, 0)$ ,  $X_2=(0, 1, \dots, 0)$ , ...,  $X_n=(0, \dots, 0, 1)$ , as the reference vector, and calculate the angle between  $X_0$  and them  $\theta_j(j=1, \dots, n)$ :

$$\theta_j = \arccos\left(\frac{\sum_{i=1}^n x_{j,i} \cdot x_{0,i}}{(\sum_{i=1}^n x_{j,i}^2)^{1/2} \cdot (\sum_{i=1}^n x_{0,i}^2)^{1/2}}\right) \quad (1)$$

In formula (1),  $x_{j,i}$  is the  $i$ -st component vector in the reference unit vector group  $X_j(j=1, \dots, n)$ .

Finally, set the weight of the angle  $\theta_j$  when calculating, and then calculate the Human Capital Structure Upgrading index:

$$H_{struc} = \sum_{j=1}^n (W_j \cdot \theta_j), \quad W_j \text{ is the weight of } \theta_j \quad (2)$$

In this article, the weight is determined using the method of Liu et al. (2018), set the weights  $W_1, W_2, W_3, W_4, W_5$  of  $\theta_j(j=1, \dots, 5)$  to 5, 4, 3, 2, 1 in sequence. The reason why the coefficient of variation method is not used to determine the

<sup>1</sup>It is also possible to use a vector formed by a specific period of data as the basic unit vector group.

weight is firstly due to the insufficient economic significance of the coefficient of variation method, which will cause errors when measuring actual human capital, and secondly, to facilitate international comparison.

Combine the Human Capital Structure Upgrading index with its corresponding human capital quantity index  $H_{num}$ . In this study,  $H_{num}$  is the total number of laborers in Beijing. On this basis, calculate according to formula (3), to form the human capital index H of this article:

$$H = H_{struc} * H_{num} \quad (3)$$

Obviously, we can see that formula (1) is a calculation formula for the included angle based on the inverse cosine function, and combined with the monotonically decreasing nature of the inverse cosine function, we can draw the following inference: In the process of human capital structure change, take the level of education used as an example, and take the gradual decrease in the proportion of low-level human capital and the gradual increase in the proportion of high-level human capital as an example. The faster the proportion of low-level human capital (that is, groups with lower academic qualifications) decreases, the faster the proportion of high-level human capital (that is, the higher-educated group) increases. At the same time, the  $\theta_j$  is also bigger. So, the  $H_{struc}$  is bigger. This means that the Human Capital Structure Upgrading degree is greater. Combined with the  $H_{num}$ , the quantitative indicator of human capital in the measured region (Beijing, in this article), it also reflects its quantitative characteristics. Therefore, the human capital index H used in this article is a comprehensive result that combines the quality and quantity of human capital as well as structural characteristics. Therefore, the author believes that using this indicator as a measure of regional human capital can reflect the real human capital level of the region.

Before carrying out the calculation of Beijing's human capital, we first analyze the changing trend of Beijing's employees receiving education. From Figure 1, it can be seen that the proportion of employees with a college degree or above in Beijing has been on the rise, while those with a middle school degree have declined significantly, from 1996 to 2017. This may due to the continuous expansion of colleges and universities in recent years.

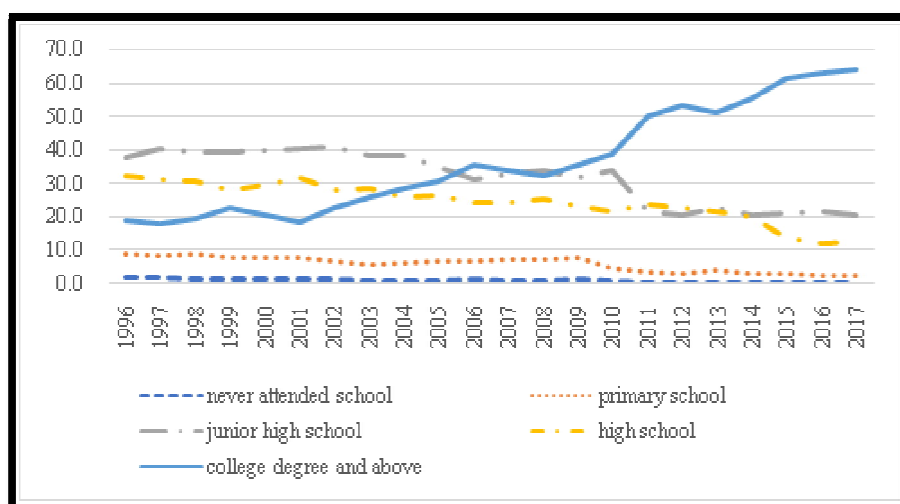


Figure 1: The Composition of the Education Level of Beijing Employees (1996-2017) (Unit: %)  
Note: Drawing Based on Data from Beijing Statistical Yearbook and China Labor Statistics Yearbook

Through calculation, we got the Human Capital Structure Upgrading index and human capital index of Beijing, as shown in Figure 2. It can be seen that the values of both are in a state of continuous growth. In addition, we can see the impact of university expansion on the structure of human capital from the changes in the human capital index. Since 2003, the rate of increase of the human capital index has accelerated significantly. This may due to the fact that the first batch of students who expanded the enrollment of colleges and universities in 1999 were just graduating, which also affected the educational structure of the employees in that year. Since then, the continued expansion of enrollment has also allowed the upward momentum of the human capital index to continue.

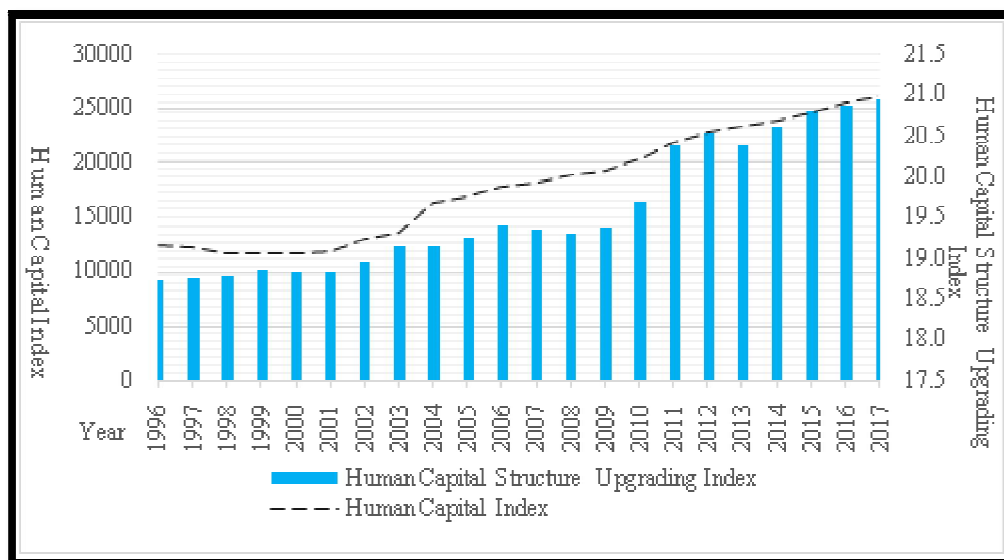


Figure 2: Beijing Human Capital Structure Upgrading Index and Human Capital Index (1996-2017)

Note: Draw Based on Calculated Data

### 3.1.2. Material Capital

There are usually two ways to measure material capital, one is the stock method, and the other is the flow method. Wang (2015) has conducted a systematic review of the relevant literature on China's material capital measurement, and listed the measurement methods and results of some representative literature. From a methodological point of view, the perpetual inventory method is the method that most researchers prefer, and not only in China, this method is also widely used in the research of scholars and institutions in the United States, Europe, Australia and so on. In the perpetual inventory method, the four basic indicators are base year, depreciation rate, material capital flow and price index. These are also the sources of the huge differences in the conclusions reached by many scholars. The following is a brief description of these four indicators by taking the relevant literature of Chinese capital stock measurement as an example.

In terms of base period years, the main ones are 1952 and 1978, and some scholars use 1900 and 1986 as the base period. For the treatment of the depreciation rate, the main methods include the use of official data, weighted average of the three industries, subjective setting, etc. to form a unified depreciation rate. Some scholars also calculate it into the relevant indicators of the material capital flow, but not in some studies. Explain in detail the depreciation rate. For material capital, the most common proxy indicator is total fixed capital formation, but many scholars also use new fixed assets, fixed asset investment, total capital formation and other indicators to measure. For the choice of price index, the fixed asset investment price index is the most common indicator. In addition, other types of price indexes such as retail price index are also used by some scholars.

Take Zhang et al. (2004) as an example. In this study, 1952 was set as the base year, and the perpetual inventory method was used to estimate the material capital stock of China's provinces (cities, autonomous regions) from 1952 to 2000. Through detailed comparison, the total fixed capital formation is finally selected as an indicator of investment flow. And by averaging the proportion of capital goods in the tertiary industries from 1952 to 2000 as the weights, combined with the average lifespan of the capital goods in the tertiary industries, they calculated that the depreciation rate of the total fixed capital formation in each province was 9.6%. For the data after 1995, the fixed asset investment price index is used as the price index, and the data before 1995 is replaced by the implicit deflator of investment. For the estimation of the material capital stock in the base period (1952), they directly used 10% of the total fixed capital formation in 1952 as the initial material capital stock. However, Zhang (2000) used the method of accumulating the annual net investment to measure Chinese material capital stock. He directly eliminated the price impact of the total material capital formation announced by the National Bureau of Statistics, and added up after depreciation calculations, and estimated Chinese material capital stock from 1953 to 1995.

This article chooses to measure material capital by means of stock, and adopts the most common material capital stock measurement method in the existing literature, namely the perpetual inventory method constructed by Goldsmith in 1951. The formula is:

$$K_t = I_t/p_t + (1 - a_t)K_{t-1} \quad (4)$$

In formula 4,  $K_t$  is the material capital stock in year  $t$ ,  $I_t$  and  $p_t$  represent the current investment volume and price index in year  $t$  respectively.  $a_t$  is the capital depreciation rate in year  $t$ .

Chen (2014) pointed out that when estimating the stock of material capital, total fixed capital formation is more advantageous than the fixed asset investment of the whole society. Therefore, in this article, I use the data of total fixed capital formation to serve as an indicator of the current investment volume  $I_t$ , and use the fixed asset investment price index as price index  $p_t$ .

According to Zhang et al. (2004), this paper calculates the material capital stock of Beijing in 1995 as 9.225 billion yuan. Combined with the conclusion of Chen (2014), determine the depreciation rate  $a_t$  as 5.65%. Based on them, the material capital stock of Beijing from 1996 to 2017 was estimated.

Through the calculation of formula (4), I have estimated the material capital stock of Beijing from 1996 to 2017. From 93.961 billion yuan in 1996 to 5003.931 billion yuan in 2017, the stock of material capital in Beijing has been steadily increasing. The average annual growth rate from 1996 to 2017 was about 20%, while the growth rate from 2016 to 2017 was about 9.7%. It has slowed down from the perspective of growth, however, as the base of material capital gradually increases, the real increment of material capital cannot be underestimated.

### 3.2. Data Source

The data used in this paper are the statistical data of Beijing from 1996 to 2017, the data came mainly from the official statistical yearbook. The data of GDP and the number of employees in each year were collected from the Beijing Statistical Yearbook. The educational level data of employees over the years were collected from China Labor Statistics Yearbook of each year, the data for the year 2000 are not available, therefore, I supplemented them with the average of data on the educational attainment of employees in 1999 and 2001. Total fixed capital formation data for 1996-2017 were collected from the National Bureau of Statistics. The data of Fixed Asset Investment Price Index from 1996 to 2012 were collected from China Price Yearbook. The fixed asset investment price index from 2013 to 2017 were selected from the Beijing Statistical Yearbook.

### 3.3. Model Building

The Cobb-Douglas production function has been widely used in the study of economic growth (Fan et al., 2011; Cai and Wang, 2016), the model in this paper is based on Cobb-Douglas production function, the specific form is as follows:

$$Y_t = A_t(K_t)^\alpha(H_t)^\beta e^\mu \quad (5)$$

In formula (5),  $Y_t$  is GDP,  $A_t$  is technology,  $K_t$  is material capital,  $H_t$  is human capital.  $\alpha$  and  $\beta$  represents the output elasticity of material capital and human capital respectively,  $t$  is a period,  $e$  is constants,  $\mu$  is residual items.

By taking the natural logarithm of both sides of Equation (5) and converting it into a linear form, we can get:

$$\ln Y_t = \ln A_t + \alpha \ln K_t + \beta \ln H_t + \mu \quad (6)$$

Formula (6) is the baseline regression model used in this study. The least square method will be used to regression this formula below, and estimate the elasticity of output of material capital  $\alpha$ , and the elasticity of output of human capital  $\beta$ , and the constant term  $\ln A_t$ .

And then I take the derivative with respect to time  $t$ , there is:

$$\frac{1}{Y} \frac{dY}{dt} = \frac{1}{A} \frac{dA}{dt} + \alpha \frac{1}{K} \frac{dK}{dt} + \beta \frac{1}{H} \frac{dH}{dt} \quad (7)$$

In formula (7),  $\frac{1}{Y} \frac{dY}{dt}$  is the rate of increase in output, and  $\frac{1}{A} \frac{dA}{dt}$ ,  $\frac{1}{K} \frac{dK}{dt}$ ,  $\frac{1}{H} \frac{dH}{dt}$  is the growth rate of technology, material capital and human capital respectively. Set the growth rates of output, technology, material capital and human capital are respectively as  $G_Y, G_A, G_K, G_H$ , thus, formula (7) can be translated into the following form:

$$G_Y = G_A + \alpha G_K + \beta G_H \quad (8)$$

Divide both sides of formula (8) by  $G_Y$ , there is:

$$1 = \frac{G_A}{G_Y} + \alpha \frac{G_K}{G_Y} + \beta \frac{G_H}{G_Y} \quad (9)$$

In formula (9), according to the Solow model, technology, material capital and human capital bring the growth of output. Therefore,  $\alpha \frac{G_K}{G_Y}$  represents the contribution of material capital,  $\beta \frac{G_H}{G_Y}$  is the contribution of human capital, and  $\frac{G_A}{G_Y}$  is the contribution of other elements.

## 4. Empirical Analysis

### 4.1. Estimation of Factor Elasticity

According to the above description of the research model, it is required to estimate the coefficients in the model to estimate the contribution of each element, that is, to estimate the element elasticity. According to the collected data, this article first uses the OLS method to estimate. But the DW test results show the serial correlation, so I used the method of Feasible Generalized Least Squares (FGLS) to estimate the output elasticity of material and human capital,  $\alpha$  and  $\beta$ , and the value of  $\ln A_t$ , the regression results are shown in the table below.

LN GDP	Coefficient	Standard Error	Tvalue	Pvalue	Significance
LN material capital	0.311	0.038	8.10	0.000	***
LN human capital	0.749	0.161	4.66	0.000	***
Constant	-1.684	1.452	-1.16	0.260	
R-square	0.987		N		22

Table 1: FGLS Estimation of Cobb-Douglas Production Function Coefficients

Note: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

According to Table 1, the output elasticity of material capital,  $\alpha$  is 0.311, the output elasticity of human capital,  $\beta$  is 0.749,  $\ln A$  is -1.684, so there is:

$$\ln Y_t = -1.684 + 0.311 \ln K_t + 0.749 \ln H_t + \mu \quad (10)$$

According to the estimation results, it can be seen that the goodness of fit of the model is good, and the coefficients of the elements are all positive and significant. In addition, combining the calculated value with the specific economic significance of the Cobb-Douglas production function, I found that  $\alpha + \beta = 0.311 + 0.749 = 1.06 > 1$ , this shows that Beijing is currently in the stage of increasing marginal returns to scale. Therefore, as far as Beijing is concerned, on the basis of a moderate expansion of production scale, it should also pay attention to rational adjustment of the structure. In this case, the optimization and adjustment of the human capital structure is particularly important for the development of Beijing.

#### 4.2. Measurement of Factor Contribution

Chinese scholars have conducted in-depth research on the measurement of factor contribution rate in many fields. Guo and Jia (2005) used three methods to estimate China's total factor productivity and measured the contribution of China's total factor productivity and factor input to economic development. They pointed out that the contribution of China's total factor productivity to economic growth is less than that of factor input. Feng et al. (2008) estimated the factor output elasticity of land by introducing the expanded Solow model that includes land elements, and based on this, measured the contribution of land elements in China to economic growth. Li (2013) used panel data from 1979 to 2010, using the pure factor productivity method and the Solow residual value method to measure the contribution rate of productivity changes to economic growth.

When measuring the contribution of human capital to economic growth, this study selected the most widely used method of measuring the contribution of production factors, namely the Solow Residual Value Method. According to formula (9), we can deduce the specific calculation formula as follows:

$$\text{Factor Contribution Rate} = \frac{\text{factor output elasticity of GDP} \times \text{annual growth rate of factor}}{\text{annual growth rate of GDP}} \quad (11)$$

By using the previously calculated actual GDP, actual material capital stock and human capital data, we can calculate that the average annual growth rate of Beijing's GDP is about 10.11%, the average annual growth rate of material capital is about 21.96%, and the average annual growth rate of human capital is about 3.73%.

The output elasticity of each factor is derived from the correlation coefficient in the Cobb-Douglas production function model. According to the above regression estimation results, we can get that the output elasticity of material capital  $\alpha$  is 0.311, the output elasticity of human capital  $\beta$  is 0.749. So, there are:

$$\text{Contribution Rate of Material Capital} = \frac{0.311 \times 21.96\%}{10.11\%} = 67.6\%$$

And,

$$\text{Contribution Rate of Human Capital} = \frac{0.749 \times 3.73\%}{10.11\%} = 27.6\%$$

So far, we have calculated that from 1996 to 2017, the contribution rate of Beijing's material and human capital to economic growth was 67.6% and 27.6%, respectively.

#### 5. Expansion Analysis

Considering that this study only measured the contribution rate of Beijing's human capital to economic growth, in this section, similar calculations were made using data from 1996 to 2017 in Shanghai. And this section compared the contribution rate of human capital to economic growth in Beijing and other regions, by combining previous studies. Although the articles including this research are different in methods and the use of specific indicators, this comparison can still help readers to further understand China's human capital and its contribution to economic growth.

In order to further test the applicability and rationality of this indicator of human capital index, this article measures the contribution of Shanghai's human capital and material capital to economic growth. The specific method is similar to that of Beijing. The data are taken from the 'Shanghai Statistical Yearbook' and 'China Labor Statistics Yearbook'. Similarly, since the data on the education status of employees in 2000 is not available, the values in 1999 and 2001 were used as an average to supplement. In the end, I conclude that the contribution rates of material and human capital to economic growth in Shanghai from 1996 to 2017 were 76.7% and 23.3%, respectively. Compared with Beijing, the contribution rate of human capital in Shanghai is slightly lower, while the contribution rate of material capital is higher. From Figure 3, we can see that the education level of employees in Shanghai is slightly lower than that of Beijing, which shows that our measurement results are in line with the reality and also confirms the rationality of this method.

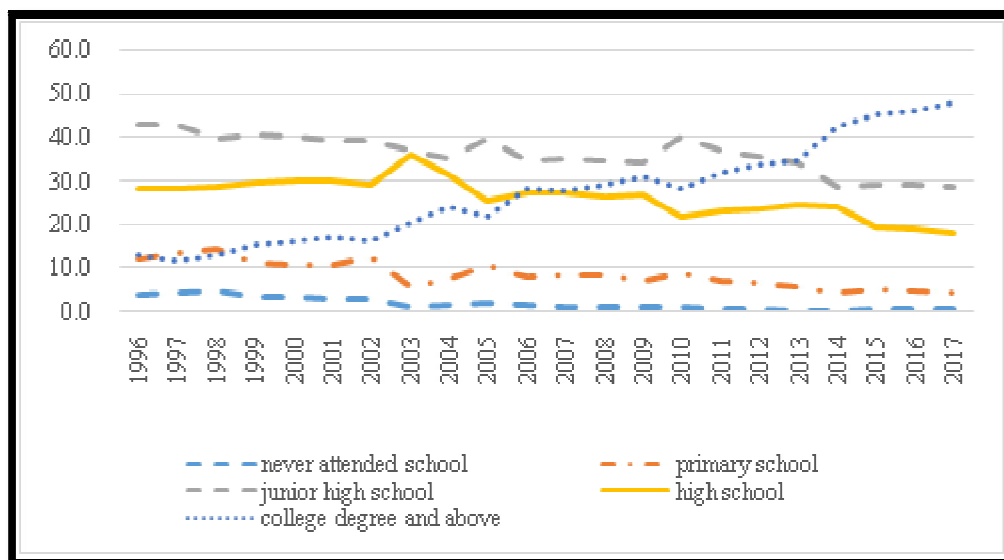


Figure 3: The Composition of the Education Level of Shanghai Employees (1996-2017) (Unit: %)  
 Note: Drawing Based on Data from Shanghai Statistical Yearbook and China Labor Statistics Yearbook

In addition, this article compared with the measurement results of other scholars. In the research of Ma et al. (2011), using data from 1978 to 2008, they estimated that Beijing's comprehensive human capital contribution rate was about 17.5%, it is lower than the calculation result of this article. But the calculated contribution rate of professional human capital is about 35.78%, it is close to the results of this article. This shows that after considering structural factors, the quality of human capital plays an important role in contribution. And their contribution rate of material capital is about 63.73%, which is close to the conclusion of this article. Through the analysis of their calculation process, I found that their estimated average annual growth rate of real GDP is 10.50%, and the average annual growth rates of material and human capital are 13.57% and 5.52% respectively. This is not much different from the calculation results in this article, but there is a big gap of the factor elasticity coefficient between theirs and mine, and they don't consider structural factors. The author believes that the difference in the data year used is also an important reason for this difference. Therefore, although there are some differences in research methods, it can still be considered that the contribution of Beijing's human capital to economic growth has actually increased.

Liu and Fang (2008) used an effective labor model and a human capital externality model to calculate the contribution of human capital to economic growth in Shandong Province in 1978 and 2006, and the results were 11.81% and 12.59%, respectively. Wang (2012) used the data from 1978 to 2010 to estimate the contribution of human capital to economic growth in Hebei Province, and concluded that the contribution rate of human capital in Hebei Province is about 15.6%, and the contribution rate of material capital is about 68.78%. Liao and Tang (2012) analyzed data from 1996 to 2008 in Beijing, Guangdong Province, and Hunan Province and estimated that the contribution of human capital to economic growth in these three places was 17.29%, 10.3%, and 6.34%, respectively. This shows that even if different methods are used, similar conclusions can be drawn, that is, although the contribution of human capital to economic growth in Beijing is lower than that of material capital, it is still in a relatively leading position in China. However, as pointed out by Ma et al. (2011), the human capital contribution rate of the United States, Austria, France and other countries is above 50%. Therefore, compared with developed countries, Beijing's human capital contribution rate needs to be improved.

## 6. Conclusions and Recommendations

### 6.1. Conclusions

Based on the perspective of Human Capital Structure Upgrading, this paper conducts an empirical study on the contribution of Beijing's human capital to economic growth, and draws the following main conclusions through analysis:

First of all, from the empirical results, in the economic growth of Beijing from 1996 to 2017, the contribution rate of human capital accounted for 27.6%, while the material capital accounted for 67.6%. This shows that from 1996 to 2017, the main driving force of Beijing's economic development is still material capital, but the contribution of human capital to economic growth has also accounted for a considerable proportion. Although the role of human capital in Beijing's economic growth is obvious, there are some gaps between the two and there is still room for improvement. From a practical point of view, the empirical results obtained are in line with the actual situation. As the capital of China, Beijing has attracted a large amount of capital investment in real estate and infrastructure construction. The contribution of material capital to economic growth cannot be underestimated. At the same time, Beijing also has the top educational resources and talent attraction of China, so, human capital is also of great significance to Beijing's economic growth.

Secondly, by comparing with previous studies, it is found that the contribution rate of Beijing's human capital to economic growth has increased in the past ten years. Beijing has long attached importance to the cultivation of talents and the introduction of domestic and foreign talents. With its own advantages in education resources and employment



opportunities, it has continued to expand. Beijing's human capital is constantly improving in terms of inventory, quality and structure. The role of Beijing's economic growth has become more and more significant.

Finally, compared with relevant research in Shanghai and other regions, it is found that Beijing's human capital contribution to economic growth has obvious advantages compared with other regions in China, but there is still a gap compared with developed countries. And by combining the conclusions of this article and related literature, it is found that the contribution rate of human capital to economic growth in China has obvious regional heterogeneity, and the gap between regions is large. Compared with other parts of the country, Beijing is undoubtedly attractive to talents by virtue of its advantages in politics, economy, education, medical and other resources, and Beijing can also be called a highland of talents nationwide. However, compared with some developed countries, China as a whole still has a gap in education investment, and there are obvious regional differences in the level of education in China. This may also be the reason for the large differences in the contribution of human capital in various regions.

## 6.2. Recommendations

As one of China's most advantageous areas for educational resources, Beijing has many high-quality institutions of higher learning, and due to its advantages in politics, economy, and culture, it has long attracted many talents to flow into Beijing. However, judging from the research conclusions of this article, compared with material capital, Beijing's human capital's contribution to economic growth is slightly lower, and it is also at a disadvantage compared to developed countries. This shows that Beijing's role in human capital still remains Room for improvement. In order to more effectively play the role of Beijing's human capital and improve its role in economic growth, the author made the following suggestions:

First of all, Beijing should improve the talent incentive mechanism, promote the role of human capital, improve the human capital competition mechanism, so that workers have a fair, healthy and stable environment, and form a good incentive and competition mechanism. A more effective assessment and evaluation system, reward and punishment system, etc. should be built, which is conducive to improving the enthusiasm and sense of responsibility of the workers at work, so as to create greater benefits, achieve a win-win situation between the enterprise or unit and the workers, and form a benign cycle. In addition, due to the concentration of many high-end talents in Beijing, the 'one person, one policy' may be implemented for outstanding talents with outstanding abilities, and corresponding incentives will be provided according to their needs, such as household registration indicators, paid vacations, tax relief, and children's enrollment, etc. At the same time, we must pay attention to the openness and transparency of the rules to ensure fairness.

Secondly, when formulating talent policies, we should combine the characteristics of Beijing's human capital needs, attract and train talents in a targeted manner, pay attention to the structural adjustment of human capital, and align the human capital structure with the industrial structure and Beijing's long-term strategic planning. adapt. Moreover, the key strategic objectives of the region should be clarified, and the autonomy of enterprises or units should be increased, so that the human structure of workers can be adapted to the industrial structure, and a good coupling relationship should be formed to form sustainable economic momentum and good development prospects. Each urban area in Beijing has formulated a relatively clear long-term development strategy. For example, the core urban area is mainly positioned as a political, cultural, international exchange center, and a historical and cultural protection area; the central urban area has functions such as pension, education, and convenience as its main development goals; The development strategy of the urban sub-center should focus on the depopulation of the central urban area and develop administrative, commercial, and tourist functions. The formulation of Beijing's talent policy should follow strategic goals, adapt measures to local conditions, and achieve coordination.

Finally, Beijing should give full play to its advantages as an international exchange center, actively learn from advanced international experience, and attract international talents. In the context of globalization, various countries are engaged in fierce international competition for talents. Globalized talents have become an important driving factor for the development of cities and even countries. We have formulated more attractive policies for various management talents, professionals, etc. A more international environment will play a positive role in long-term stability for Beijing's economic development. For example, by building an international talent community, building an international talent platform, etc. to create an 'overseas-like' environment; by holding large-scale international conferences, attract more international talents to come to Beijing and appreciate Beijing's vigorous vitality; provide international talent entrepreneurship support to attract more innovative entrepreneurial enterprises to Beijing.

Although there is still room for improvement in the contribution of Beijing's human capital to economic growth, in contrast, some other regions in China need to be further improved in this regard. Based on the limited comparative research in this article, it is found that although Shanghai's human capital contribution is not as good as that of Beijing, it is also at a relatively high level in China. As for other regions in China, the author suggests: First, more attention should be paid to the development of education to improve the overall quality of human capital and accelerate the process of human capital Structure Upgrading; secondly, an active and effective talent attraction policy should be formulated in accordance with the characteristics of regional development; and finally, it should be Learn the advanced experience of developed regions and countries to increase the contribution rate of human capital and ease regional differences.

## 7. References

- i. Barro R J. Human capital and growth [J]. American economic review, 2001, 91(2): 12-17.
- ii. Cai Fang, WangMeiyan. From Poor People's Economy to Scale Economy: Challenges to China's Agriculture from Changes in Development Stages [J]. Economic Research, 2016, 51(05):14-26.



- iii. Chen Changbing. Variable depreciation rate estimation and capital stock measurement[J]. *Economic Research*,2014,49(12):72-85.
- iv. Chen Hao. Structural Analysis of the impact of Human Capital on economic growth [J]. *Journal of Quantitative Economics and Technical Economics*, 2007(08):59-68.
- v. Cheng Rui, Ma Lili, Chen Xuan. Evolution of Human Capital Structure and China's Economic growth -- Empirical Evidence from the provincial level [J]. *Business Studies*, 2019(01):60-70.
- vi. De la Fuente A, Doménech R. Human capital in growth regressions: how much difference does data quality make? [J]. *Journal of the European Economic Association*, 2006, 4(1): 1-36.
- vii. Du make? [on the Mechanism of Human Capital Promoting Economic Growth][J]. *China Soft Science*, 2014(08):173-183.
- viii. Fan Gang, Wang Xiaolu, MaGuangrong. The contribution of China's marketization process to economic growth[J].*Economic Research*,2011,46(09):4-16.
- ix. Feng Lei, WeiLi, JiangYan. On the contribution of land elements to China's economic growth[J].*China Land Science*,2008,22(12):4-10.
- x. Gengyeqiang, Bai lifang. Human Capital structure Upgrading, r&d intensity and upgrading of global value chain of manufacturing industry [J]. *World economic research*, 2019(08):88-102 136.
- xi. Guo Qingwag, Jia Junxue. Estimation of China's total factor productivity:1979-2004[J].*Economic Research*,2005(06):51-60.
- xii. Hu Yongyuan, Liu Zhiyong. Analysis of the influence of different types of human capital on economic growth [J]. *Population and Economy*, 2004(02):55-58.
- xiii. Li Ping, Zhong Xueyi, WangHongwei, ZhengShilin. China's Productivity Change and the Source of Economic Growth:1978~2010[J].*Journal of Quantitative Economics and Technical Economics*,2013,30(01):3-21.
- xiv. Li Zhen, Yongchun Yang. The evolution of China's human capital Structure Upgrading pattern and its spatial differentiation mechanism [J]. *Economic Geography*, 2019,39(10):104-111.
- xv. Liao Yi,TangYufeng.An Empirical Study on the Contribution of Human Capital to Hunan's Economic Growth[J].*Economic Geography*,2012,32(01):41-45+95.
- xvi. Liu Wen, Fang Guangting.Human capital, externalities of human capital and Shandong's economic growth[J].*Dong Yue Cong*,2008(06):56-59.
- xvii. Liu Zhiyong, Li Haizheng, Hu Yongyong, Li Chenhua. Human Capital Structure Upgrading and Economic Growth — — Also on the formation and narrowing of the gap between the eastern, central and western regions [J]. *Economic Research*, 2018,53(03):50-63.
- xviii. Ma Ning, WangXuanhua, RaoXiaolong. Research on the Contribution Rate of Human Resources in Beijing's Economic Growth[J].*China Human Resources Development*,2011(04):5-12+23.
- xix. Vinod H D, Kaushik S K. Human capital and economic growth: evidence from developing countries[J]. *The American Economist*, 2007, 51(1): 29-39.
- xx. Wang Haibing. Human Capital, Material Capital and China's Total Factor Productivity [D]. Shandong University,2015.
- xxi. Wang Jianning. Research on the contribution of Hebei Province's talent capital to economic growth[D]. Capital University of Economics and Business, 2012.
- xxii. Zhang C, Zhuang L. The composition of human capital and economic growth: Evidence from China using dynamic panel data analysis[J]. *China Economic Review*, 2011, 22(1): 165-171.
- xxiii. Zhang Fan.China's material capital and human capital estimation[J].*Economic Research*,2000(08):65-71.
- xxiv. Zhang Jun, Wu Guiying, Zhang Jipeng. Estimation of provincial material capital stock in China: 1952-2000 [J]. *Economic Research*, 2004(10):35-44.