

Reflections on Regional Economic Convergence and Higher Education Funding in China

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Abstract: The improvement of the quality of labor is a fundamental element in promoting national economic development, and the value created by high-level human capital will continue to be demonstrated in the rapid development of society. According to the relevant provisions of human capital theory, the impact of human capital on regional economic growth is mainly considered from two aspects: the "quantity" and "quality" of human capital. According to relevant empirical results, there is a strong autocorrelation between higher education investment and advanced human capital in geographical space. The direct and indirect spillovers of technological innovation effects in advanced human capital can both promote economic growth. Therefore, many educators, economists, and others view the country's financial investment in education as an endogenous variable for regional or even national economic development. In the following research, the author takes the economic convergence of the eastern, central, and western regions of China as the starting point to explore the relationship between higher education investment, human capital structure, and regional economic growth, and to study the internal relationship between higher education and regional economy.

Keywords: Regional Economy; Convergence; Higher Education; Funding Investment; Human Resources

1. Introduction

By exploring the inherent relationship between higher education funding and economic development, and demonstrating the phenomenon of conditional convergence in China's regional economy, the positive role of higher education funding in promoting

regional economic development is determined. Finally, it can be seen that the economic development of various regions in China has a trend of conditional convergence. In this situation, local governments must pay attention to the investment in higher education funds to ensure the continuous growth of regional talents, which can provide more "engines" for achieving economic development. According to the research of some scholars in China, discussions on human capital thresholds and other aspects are the most common, and their research directions generally focus on innovation, FDI problem thinking, and other aspects. However, there is very little research literature on the threshold effect of human capital investment in higher education funding. Therefore, the author conducts a demonstration and analysis of the convergence phenomenon of China's regional economy by analyzing the relationship between higher education funding investment and economic convergence.

2. Introduction to the Concept of Regional Economic Convergence

Slow and Swan proposed the neoclassical economic growth model in the 1950s, which marked the beginning of research on regional economic convergence in the economic community. Later, Barro and Martin proposed an extended model for analyzing economic growth convergence based on the neoclassical economic model, namely σ Convergence and β Convergence model. These two models were later often used to analyze the state of regional economic convergence or divergence. σ Convergence methods are often used to measure whether the dispersion of per capita income or per capita output decreases over time, mainly examining the changes in dispersion of per capita income during the sample period. In practical calculations, the standard deviation of the logarithm of per

capita GDP is often used to calculate σ Value. *B.* Convergence specifically refers to the faster growth rate of areas with lower per capita output levels in the initial stage compared to areas with higher per capita output levels. It is mainly divided into β Absolute convergence sum β . There are two forms of conditional convergence.

Peru was the earliest to propose the growth pole theory. This theory suggests that economic growth does not occur in every place at the same time, but first appears at some growth poles with different intensities, and then acts on surrounding areas through the polarization and diffusion effects of these growth poles. In the initial stage of economic development, the polarization effect plays a major role, and production factors and resources such as capital and technology will converge towards the poles; After the growth pole develops to a certain extent, the diffusion effect increases, and various element resources at the pole will radiate energy to the surrounding areas. At this time, the growth pole will also continue to expand in spatial scope.

According to the relevant provisions of classical economic growth theory, it generally requires the assumption that the marginal output of material capital decreases. Under these conditions, some economically developed regions usually experience problems such as a decrease in marginal capital output in advance. However, due to the limited capital investment in economically underdeveloped regions, the occurrence of the problem of a decrease in marginal capital output is relatively delayed, resulting in a faster economic growth rate. The differences caused by this growth rate will continue to reduce the economic gap between developed and underdeveloped regions. Over time, the economies of underdeveloped regions will catch up with those of developed regions, promoting a relatively stable overall economy, which is known as regional economy.

If we refer to the prediction and analysis of classical economic growth theory, if the economic structural parameters of different constituent elements in a homogeneous economic system are completely consistent, it will inevitably occur: the higher the initial economic level, the slower the economic growth rate, which is the so-called

phenomenon“ β Absolute convergence ”.

According to the analysis of the growth pole theory, China should try its best to reduce the polarization effect, that is, to reduce the excessive aggregation of technology and capital, production factors and human resources to developed regions, in order to avoid excessive regional economic differences; At the same time, increasing the diffusion effect, that is, promoting the radiation of factor resources from developed regions in China to underdeveloped surrounding areas, in order to reduce regional economic differences and achieve economic convergence.

3. Exploration of the Relationship between Regional Economic Convergence and Higher Education Funding in China

3.1 Human Capital Theory Explains the Impact of Education on Regional Economic Convergence

The impact of human capital on regional economic growth is mainly considered from two aspects: the "quantity" and "quality" of human capita [1]. One is the relationship between the "quantity" of human capital and economic growth. Romer proposed that human capital investment will increase the accumulation of knowledge stock, and the accumulation of knowledge stock will stimulate investment, thereby improving a country's economy [2]; Aghion et al. believe that the growth rate of the economy is determined by the growth rate of human capital, which depends on the stock of human capital and not on the accumulation of human capital [3]. The second is the "quality" of human capital, which refers to the relationship between human capital structure and economic growth. Schultz believes that the core element in promoting economic growth is the "quality" of human capital, and infers that the structure of human capital is the reason that affects regional economic growth differences [4]; Yanping Huang et al. divided the human capital structure into advanced and primary human capital according to the population with different years of education. There are differences in the impact of the two types of human capital on regional economic growth in different regions [5]; Yu Liu et al. divided the structure of human capital into entrepreneurial human capital, professional human capital, and

ordinary human capital, and believed that entrepreneurs and professional human capital have the strongest impact on economic growth [6].

Essentially, regional economic convergence is only a superficial phenomenon, and there are also some reasons behind it that cannot be ignored. For example: education, human resources, etc. So why should we analyze human resources, education level, etc. in the experience of economic growth? This actually requires the introduction of some control variables. According to the research of many scholars, it can be found that human resources have a certain threshold effect. That is to say, if regional human capital exceeds a certain threshold, thresholds, barriers, etc. between different regions will gradually form. Each region will create independent convergence clubs, and the economic gap between them will continue to increase over time; Only by truly controlling human resource variables can strong convergence be demonstrated between different economic regions. In addition, many scholars in the process of studying the correlation between human resource investment, innovation, and economic development can see that there is a threshold effect of human resources in promoting economic innovation. Only when human resource investment is far greater than a certain positive threshold can regional economy achieve faster development speed, otherwise it will only maintain a relatively low development state.

If we approach it from the perspective of human capital theory, many economists generally point out that an individual's economic level is usually not innate, and the cultural education they receive in the future has a certain positive significance in improving their professional level. For example, European and American economist Samilson pointed out that there are four growth factors in the growth of modern social economy, namely human resources, natural resources, capital accumulation, technological reform, etc., all of which are closely related to education. From this perspective, the impact of education on regional economy is very obvious. According to the explanations of supporters of the new growth theory, they generally believe that mastering special skills such as education and training, as well as

obtaining specialized human capital, is a key factor in promoting economic growth and achieving economic convergence. It has a strong spillover effect, which means that human capital is the source of vitality for new knowledge creation, and the optimization of its structure can affect the upgrading of technological structure, It is a manifestation of technological innovation. Due to the spatial spillover effect of knowledge and technology, innovative human capital shifts from agglomeration to spillover. The externalities of this technology can be enjoyed by any other individual in society, and the flow of human capital is an important source of explaining spatial correlation. The cross regional flow of human capital creates connections between various geographical spaces, which is conducive to knowledge spillover and innovation spillover, improving the scale of factor supply, and thus generating spatial spillovers of human capital and technological innovation. Human capital drives the output efficiency of material capital, thereby driving the production efficiency of the whole society and promoting economic growth. Therefore, with increasing marginal productivity, It can maximize economic development and ultimately lead to economic convergence.

3.2 The Optimization Effect of Higher Education on Regional Human Resources

Since the impact of human capital on regional economic growth is mainly considered from the "quantity" and "quality" aspects of human capital, according to Schultz's human capital theory, there are three main ways to apply higher education investment to the human capital structure: firstly, referring to Lucas and Becker's viewpoint, the stock of human capital is an endogenous driving force that continuously promotes the development of the national economy, The increase in investment in higher education can promote the growth of human capital stock. Individuals who have received higher education have transformed their basic and general knowledge system into professional and solid scientific knowledge, forming specialized thinking, improving labor production efficiency, forming professional human capital, and thereby increasing the accumulation of human capital [7]. Secondly, Higher education is an important approach to optimize the structure of human capital's

investment, education investment is also a smooth development of education funding. Therefore, increase investment in higher education can increase the number of people affected by education, increasing the fixed number of year of the education, and improve the professional skills and knowledge workers. Thirdly, through increased investment in higher education, the government can attract talent gathered themselves together, and the promotion of the human capital structure of the region.

In addition, higher education can effectively enhance the quantity and quality of regional human resources, drive the agglomeration of service industries and improve the quality of talent, and promote the transformation and upgrading of regional industries. On the other hand, human capital can also drive economic growth, reduce regional differences, promote regional economic convergence, and narrow the development gap between regions by improving technological level. It can also achieve balanced regional development by improving labor productivity in underdeveloped areas. This is the promoting effect of high-level human resources and professional human resources on the regional economy. Moreover, the lower the initial income level of a region, the greater the positive promoting effect of high-quality human capital on economic growth.

3.3 Education Funding Investment and Regional Economic Growth

The theory of economic growth clearly states that if the phenomenon of labor mobility is completely ignored, the investment in education funds will inevitably promote the development of human capital levels in a certain region. The impact of increasing investment in education funds on regional economic growth is significant and shows an increasing trend, which also indicates that education funds can effectively promote economic growth. On the one hand, it can promote the formation of human resources, and on the other hand, education funds have a direct multiplier effect on driving economic growth [8]. For example, per capita education expenditure has a positive effect on regional economic growth. On the one hand, it can directly drive the development of the service industry, and on the other hand, it can promote

talent aggregation and industrial development through the radiation and diffusion effects of education. At the same time, human capital will also have a positive impact on economic output. For example, some scholars have evaluated through static indicator research that the contribution ratio of education investment to economic growth from 1978 to 1998 was 32.15%; Some scholars have also found that education investment has a certain contribution value to economic growth, with a contribution ratio of 25.61%, by integrating relevant data on education funds in the national fiscal budget from 1989 to 2019. Although education is regarded as a part of quasi public goods with strong characteristics such as self-interest and public welfare, which cannot be separated from the joint support of the government and the market, in most cases, its focus is on the allocation of financial education funds. Exploring its reasons is because both in terms of quantity and function, fiscal education funds are a key driving force for promoting the development of national education level. Of course, increasing investment in education funds for a certain region may not necessarily achieve its economic development unless the region truly breaks the threshold of human capital. For example, in provinces such as Shandong and Jiangsu in China, the impact of education investment on economic growth is very obvious. For every 1 yuan increase in per capita education investment, the per capita GDP of these two provinces will increase by 84.23 yuan and 60.23 yuan; However, education investment in Guizhou and other regions has limited impact on economic growth. For every 1 yuan increase in per capita education investment, its per capita GDP only increases by 7.16 yuan. From the perspective of this gap, it is due to the varying resource utilization rates of education units in relevant regions. Many scholars believe that in the current social development, due to the free flow of labor force, only when the average education time of labor force far exceeds the threshold of human resources, can the increase in education funding inevitably promote local economic development. Otherwise, there will be a phenomenon of "enclave" in education funding investment, specifically referring to the continuous transfer of talents from economically underdeveloped areas to

developed areas. Therefore, investing in education funding in underdeveloped areas may only be aimed at cultivating excellent talents in economically developed areas. This situation is consistent with some of the current realities in China.

The increase in investment in higher education can improve the stock and quality of human capital, cultivate more innovative talents for the country, enhance the ability of workers to innovate and create knowledge, improve the efficiency of innovative technology, and trigger direct spillovers of knowledge and innovation [9]. At the same time, the increase in investment in higher education is also conducive to the more convenient and complete construction of supporting infrastructure around the university town. The expansion of market demand around the university town will attract enterprise investment, coupled with a strong supply of innovative talents, which will attract more high-tech enterprises to build factories locally, thus forming a local market effect of high-tech industry agglomeration. This spatial spillover type of industrial agglomeration leads to a decrease in the number of high-tech products purchased by enterprises from outside the city, and the cost passed on to local consumers will also be reduced, thereby stimulating consumption. This reduces the gap between regional economies and achieves economic convergence.

4. Result Analysis

4.1 Understanding the Role of Higher Education Investment, Human Capital Structure, and Regional Economic Growth

The relationship between higher education investment and regional economic growth is not a simple cause-and-effect relationship. The increase in higher education investment only indirectly promotes economic growth, and it must be achieved through the channel of human capital structure to promote regional economic growth. The relationship between these three is a dynamic cycle, and its mechanism of action is as follows: firstly, education is a quasi public good with significant positive externalities. It not only enables workers to accumulate their own knowledge, but also enhances their skills. The government can through increased investment

in higher education funds to increase human capital stock; Secondly, an increase in the stock of human capital will obviously enhance the level of social and technological innovation, providing a new economic growth point for the country. That is to say, as analyzed by the growth pole theory, the emergence of new growth poles in relatively underdeveloped areas will drive the factor resources of developed areas in China to radiate towards underdeveloped surrounding areas, in order to reduce regional economic differences and achieve economic convergence; Thirdly, regional economic growth can provide more funding support for local higher education, thus launching a new round of dynamic cycles. So generally, even if higher education investment does not have a direct causal relationship with economic growth, the existence of human capital structure as an intermediate channel indirectly promotes regional economic growth. Therefore, higher education investment, human capital structure, and regional economic growth have formed a dynamic circular mechanism of action.

In short, education and economic development are highly correlated. In 2021, the two indicators of per capita GDP and the proportion of people with university degrees or above ranked in the top ten cities in China, such as Beijing, Shanghai, Nanjing, Wuhan, and Hangzhou, are all cities with strong innovation and high economic quality, fully demonstrating the two-way promotion relationship between education and economy.

4.2 Policy Recommendations

4.2.1 Enhance the inclination of investment in higher education in the central and western regions

In order to narrow the national regional economic gap and achieve regional economic convergence, the central and western regions of China should pay attention to creating a sound "soft environment" for development [10]. By increasing investment in higher education in the region, increasing investment in "high, precision, and cutting-edge" disciplines in universities, encouraging independent innovation in core technologies, focusing on the leading role of high-quality and high-quality talents, amplifying agglomeration and scale effects, and further releasing the "growth engine" function of

educational human capital, promoting economic growth, Establish a long-term mechanism of positive interaction to improve the quality of human capital in the region and increase the stock of high-level human capital, thereby upgrading and optimizing the industrial structure of the region. For example, improving the mechanism for local talent settlement and introduction, increasing policy support and attraction for high-level talents, and enabling excellent human capital to create greater output for local economic development.

4.2.2 It is necessary to grasp differentiated policies and make good plans for the development of higher education according to the development levels of different regions

The eastern and central regions should fully utilize a good education resources, We should continuously increase the input in higher education, adjust the professional structure of colleges and universities, adapt to the optimization and upgrading of high-tech industry, and provide intellectual support for economic development; In the western region surrounding infrastructure construction attaches great importance to colleges and universities, and has targeted policies to enhance high-quality talent training programs; With the rapid development of the economy and society, the Northeast region is facing a critical period of industrial structure upgrading and transformation. Attention should be paid to the optimization and adjustment of the professional structure of higher education, so as to match the structure of higher education with the industrial structure and coordinate higher education with economic development.

5. Conclusion

Finally, after the above research, we can find that if we want to use education funding to promote economic development in underdeveloped areas and shorten the economic gap between them and developed regions, we must break through the threshold of human capital. The content covered by this threshold is very extensive, such as human capital, regional infrastructure environment, market economy environment, legal environment, etc., which will limit the full utilization of the advantages of education funding investment. Therefore, we must

conduct in-depth research on it and further seek active and effective response strategies.

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