



The Effects of Economic Development on Higher Education in China Based on Ecologic System Theory

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Abstract. The impact of unbalanced economic development on higher education in China is mainly reflected on the availability of educational resources and quality. Comparisons between east and west of China, urban and rural areas demonstrate that an unbalanced economy is a principal factor causing these disparities, for the higher economic level is the basic guarantee to support the development of higher education in particular regions. The inadequate development of the economy results in the inadequate development of education. Although higher education in China has improved, there are still many imperfect aspects. In terms of technical and innovative ability, there is a far distance between that of developed countries such as the USA. Even domestically, the huge differences in economic development levels in different areas have caused gaps. The bi-directional relationship between education and economy makes them restricted mutually, as their achievements are serving each other, and one of them would be the stakeholder and beneficiary of the development of the other. Moving onto the micro level, the family's economic capability has played a dominant role in effect the education investment which decides the choice of majors, cities that universities are located in, employment status, and what are parents expecting from higher education.

Keywords: Economic development · Higher education · Family economic capability · Ecologic system theory

1 Introduction

Based on Bronfenbrenner's ecological system theory, the developments of individuals are nested within a series of environmental systems which interact with each other. As an indispensable issue in the development of a country, education has an extremely close relationship with economic development. While previous studies are mainly focused on one particular perspective and one aspect, this paper will take both macro and micro views to discuss how economic development has affected higher education in China at various levels.

Speaking of the macro level, this paper will focus on two main problems of the Chinese economy under the current condition, that is to say, the unbalanced and inadequate

economy. Apart from the impact of an unbalanced economy on education, in this paper, however, the mismatches of the outcomes of higher education and the practical demand of the social economy are included. In terms of the inadequate economy, this paper uses both domestic and international comparisons, which will reveal the deficiency of quality and quantity of higher education in less developed areas in China, and the gaps in the utilization of educational investment and academic achievement in China and several developed countries.

Moving onto the microsystem, this paper has an overall perspective, which will demonstrate the differentiation in general educational investment, outcomes and expectations according to different household economic capabilities, so the impact of the family economic capability on higher education will be illustrated from a more comprehensive perspective.

2 The Effect of Unbalanced Economic Development on Higher Education

The impact of unbalanced economic development on higher education in China is mainly reflected in the availability of educational resources and quality. Comparisons between east and west of China, urban and rural areas demonstrate that an unbalanced economy is a principal factor causing these disparities, for the higher economic level is the basic guarantee to support the development of higher education in particular regions. Moreover, the current economic condition is also a signal to indicate what kind of workforce is needed. However, mismatching of the practical social need and the actual education outcome exists, which ultimately leads to a waste of resources and talent.

2.1 The Differentiation of Higher Education Development Between East and West of China

In China, the development of higher education is affected by the economic level to a large extent. Enough capital investment could provide a strong foundation, where policies are supportive and recourse are available. In another hand, poor economic condition can impede the development of education. Because of the different degrees of the economy in eastern and western China, there is a great gap between the development of higher education in these two regions.

The first difference is the distribution of top universities. Although the total amount of higher education institutions in the east and west of China is in balance, there is a great gap in the first-class university. The number of 985 universities is 39, with 22 of them located in eastern areas and 7 of them located in the west. Refers to 211 universities, the total number is 155, among which 64 are in the east of China and 25 in the west. Besides, the majority of national key subjects are in eastern universities.

In terms of the number of undergraduates, in 2020, the figure of students in the whole country was 3285.3 million, with 1235.9 million in the east, accounting for 37.6% of the whole number. The number and proportion in the west were 872.9 million and 26.6%.

This disparity can be attributed to public education spending, which is related to the local economy's ability. Sufficient education appropriations are the guarantee to establish

Table 1. The General Public Budget for Educational Affairs for Per Student of Higher Education (Unit: yuan)

	2016	2017	2018	2019	2020
East of China	21644.13	24249.15	24832.56	26214.35	25942.15
West of China	18877.27	19579.08	20763.73	23159.74	23743.36
Difference	2766.86	4670.07	2068.83	3054.61	2190.79

both the key subject and university and different development in the local economy cause the different investments in higher education. What is more, the regional imbalance of education has caused the inequality of the opportunity for high-level education in areas with different levels of development, which ultimately affects the survival and development of people in undeveloped areas [1].

As can be seen from Table 1, although the public spending on education in the west enjoyed a greater increase, it has been far beyond that in the west. The unbalanced investment can not only cause the gap in regional talent cultivation but also affect the realization of the equality of education in China [1].

2.2 The Differentiation of Higher Education Development Between Urban and Rural Areas

Generally speaking, there is a positive correlation between income and the expectation for higher education. With the popularization of higher education, charging for education has become a consensus. An adequate deposit level is the material basis of higher education. The higher this level, the more powerful ability to enhance the demand for expanding tertiary education [2].

In 2020, the disposable income of urban residents was 43,833.8 yuan, and the expenditure was 27,007.4 yuan. Refers to rural residents, the income and expenditure were 17,131.5 yuan and 13,713.4 yuan respectively. The rate of the income gap between urban and rural citizens was 2.56: 1. Compulsory education has been accessible to a majority of students, but the economic advantage makes un-compulsory education more affordable to urban citizens.

In terms of higher education, the average tuition is roughly 5,000 yuan per year, which has surpassed 1/3 of the average expenditure for rural citizens. The heavy economic pressure could be the main factor hindering the receipts of tertiary education. Another point is, that the enrollment rate for high school has a direct impact on the enrollment rate for higher education. Due to the poor quality of the primary and junior schools, where lack of sufficient teachers with professional content and pedagogical knowledge, as well as other teaching resources such as laboratories, the rate of students who quit for further study in rural is higher than that of urban. What is worse, some poverty-stricken students could only receive compulsory education. In 2013, the enrollment rate for high school in urban was 93%, while that in rural areas was 37% (Scott Rozelle).

2.3 The Mismatching of the Need for Social Economy and the Outcomes of Higher Education

Since university enrollment began to expand, the number of graduates has also augmented. Up to 2022, there are already 107.6 million graduates, 167 million more than that in 2021, which would cause more fierce competition in the job market. The employment rate of graduates has dropped from 92.6% in 2014 to 91% in 2018, additionally, the mismatches of social need and the actual outcome of higher education have been strengthened/

According to The Report on The Skills Gap in China's Labour Market (2016), at that time, the number of skilled workers accounts for 19% of the total workforce in China, and the percentage of high-skilled talent was just 5%, which was completely insufficient for the demands of the society.

The main imbalanced supply and demand of higher education are reflected in the imbalanced ratio of structure and quantity. The education resources exclusive for academic research were oversupplied, while the vocational and technical education resources were undersupplied. The output of tertiary education has been unable to match the need of the social economy, which could be the main reason why it becomes more formidable for graduates to have an occupation, especially in the field that is consistent with their major [3].

In recent years, taking civil servant exams has become a trend. As the number of candidates has rocketed, the acceptance rates are getting lower. In 2020, the acceptance rate of a civil servant was 1.6%. Especially during the pandemic, the job steady and security have been attached more importance, and authorized strength (Bianzhi) has won more popularity. Under this circumstance, a large number of graduates and post-graduates from top universities compete for a position at the municipal or county level in a less developed city. The expertise from the campus becomes futile, and the diplomas mean a precondition for them to get stand out in this competition, which would cause waste in both talent and position.

3 The Effect of Inadequate Economic Development on Higher Education

The inadequate development of the economy results in the inadequate development of education. Although higher education in China has improved, there are still many imperfect aspects. In terms of technical and innovative ability, there is a far distance between that of developed countries such as the USA. Even domestically, the huge differences in economic development levels in different areas have caused gaps. Less developed regions are at disadvantage in terms of both quantity and quality of higher education due to the lack of financial support. The bi-directional relationship between education and economy makes them restricted mutually, as their achievements are serving each other, and one of them would be the stakeholder and beneficiary of the development of the other.

3.1 The Level of Economic Development Affects the Construction of World-Class Universities

The overall level of higher education in China has improved over decades, however, several gaps still exist in both the quantity and quality of inputs and outputs of education.

As can be seen in table 2 the government expenditure on tertiary education in the following seven industrial countries, the percentage that government expenditure on tertiary education in China has been considerable, even surpassing some developed countries. Although the figure was unstable, the amount has remained to exceed 1.30%. Despite this impressive investment, the outcome of higher education has not been satisfied.

Intellectual property work is an important part of technology work in university, and the quantity of patents is an essential measure of the technology of a particular nation and region, as well as a standard for measuring technical ability and innovative consciousness [4]. From Table 3 which illustrates the achievements of utility patents, among the universities in the top 20, there were 18 of them in the USA, and the only one in China was Tsinghua university, ranking 9, which indicates that there is still a huge difference in the technical ability of China with the technology-powerful country.

The reasons are worth pondering. First, the construction of Chinese universities started later. The first Chinese modern higher education institution was roughly 200 years later than that in the USA, and the educational modes and curriculum were imitated later to a large extent. Moving onto the contemporary era, higher education in China did not get effective development until 1978. In 2003, the education department of China set up a Leading Group on Science and Technology, which combined the development of higher education and technology as a whole for the first time. Refers to the USA, Bayh-Dole Act (1980) specified the permission of patents in American universities.

Second, the investment priorities were different. The centuries of developments and modifications made the quality of higher education in the USA able to reach the first-class level at an early time. As early as after the end of The Second World War, Bush, the scientific adviser of the federal government of the United States, put forward the importance of basic research for national development [6]. Because of the powerful

Table 2. Government expenditure on tertiary education as a percentage of GDP

Country	2015	2016	2017	2018	2019	2020
USA	1.37	1.21	1.46	1.27	*	*
Germany	1.26	1.26	1.24	1.27	*	*
France	*	*	1.23	1.23	*	*
Italy	0.76	0.73	0.75	0.77	*	*
Japan	*	0.62	0.63	0.63	*	*
United Kingdom of Great Britain and Northern Ireland	1.26	1.38	1.43	1.43	*	*
Canada	1.63	1.61	1.65	1.63	*	*
China	1.38	1.36	1.34	1.31	1.37	1.38

Table 3. Top 20 worldwide university granted US utility patents 2020 [5]

Rank	University	Quantity of Patents	Country
1	University of California, THE GERENTS OF	597	USA
2	Massachusetts of Technology	383	USA
3	Stanford University	229	USA
4	University of Texas	207	USA
5	Johns Hopkins University	185	USA
6	Purdue Research Foundation	175	USA
7	Wisconsin Alumni Research Foundation	162	USA
8	California Institute of technology	156	USA
9	Tsinghua university	155	China
10	Harvard college, president and fellows	154	USA
11	Arizona state university	140	USA
11	university of Florida research foundation incorporate	140	USA
13	university of Michigan	134	USA
14	King Fahd University of Petroleum and Minerals	127	Saudi Arabia
15	University of South Florida	123	USA
16	Northwestern University	122	USA
17	University of Pennsylvania	111	USA
18	University of Minnesota	110	USA
19	Columbia University	107	USA
20	University of Pittsburgh	106	USA

national economic capability and established foundation, technology and innovation in America could be improved more effectively. While in China, the primary task of higher education was to increase the quantity in both educational institutions and students, in another word, to expand the scale. A certain quantity is the premise of quality. Only when the quantity is enough to fulfill the basic need, there is a precondition to improving the quality.

3.2 The Difficulties of Higher Education in Less Developed Areas in China

The development of higher education in less developed areas has been constrained by economic, cultural and regional factors. The overall revitalization of higher education in western China has confronted multiple obstacles, including failures in the development of colleges and disciplines, imbalance in the supply structure of educational funds, and

disorder of talent introduction and flow [7]. Despite of series of policy support, dilemmas in resources and quality still exist. Even in the western, the disparity is still obvious. The university including the prestigious is mainly located in Sichuan and Shaanxi provinces, accounting for 31% of the total number of western universities and colleges, while Qinghai and Ningxia province are only accounting for 5% [7].

The factor that caused the large difference is mainly the economic development level. Government financial education allocation is the dominating resource of higher education funds. The scientific research funds of universities in the east take over 53.1% of the total amount, while the percentage of that in the west was 18.7%. In addition, the funds in Tibet and the northwest except Shaani were roughly 1/5 of that in Beijing. Such an inadequate investment has heavily impeded the development of technical and innovative universities in less developed areas.

Another factor that hinders the development of higher education in less developed areas is teaching resources and incentives. As the capital support has been a disadvantage in those areas, many teachers and professors were allured by the munificent environment in eastern universities, where the more powerful research base, higher remuneration and positions are provided. Sufficient education allocation and the complete construction of laboratories could support professions' projects and experiments, through which teachers' academic achievement and pedagogic ability can be taken fuller use.

When facing such powerful introduction policies, it is easy to put less developed areas at disadvantage. This embarrassing economic condition is unable to attract talents. However, without adequate investment and abundant teaching resources, the gap pf education outcomes and scientific research in less developed and developed areas would not be eliminated and ever get wider, which ultimately leads to a vicious circle and worsen the gloomy condition.

3.3 The Level of Economic Development and the Level of Educational Development are Mutually Restricted

When the model and quality of education activities are constantly improved, educational activities provide more and higher-quality labour force and scientific research results in economic activities [8]. Education is a tool serving for social economy, the outcome of education is to cultivate people with the professional knowledge and skills that are required by the social economy and carry out scientific research and academic achievements to fill the gap between social development and cognition. In this way, lagging in education development is a serious hindrance to economic development.

Economic activities exert pressure on demand for educational activities and lead to corresponding adjustment and change in the scale and structure of the output of educational activities [11]. The requirement and establishment of the level of economy determined the purpose and content of education. Under the current macro circumstance, the need for a workforce with professional knowledge in science is becoming more urgent. The role of science, technology and innovation has become more decisive. Effective economic construction relies on technical and innovative outcomes, and the importance of these aspects has been more dominant, so scientific ability has become an essential standard to measure the comprehensive strength of universities and colleges.

4 The Effect of Family Economic Statutes on Higher Education

Based on Coleman Report, the main factors that affect children's academic performance are not the school but the family. Children from families with higher cultural capital have an innate advantage in the chances of educational success (Pierre Bourdieu, 2004). The family's economic capability has played a dominant role in effect the education investment which decides the choice of majors, cities that universities are located in, employment status, and what are parents expecting from higher education.

4.1 Family Education Investment in Different Economic Capability

Family is the minimum epitome of society, and also the most basic activity that unites humans. The family with higher social and economic status has more capital to invest in the development of children which would have a large impact on their growth, minds, attitudes, education experience and future of them (Matthews & Gallo, 2011).

The impact of family investment on higher education does not happen when children enter universities but exist in the previous stages including in high school and choosing majors. Students who have a great interest in going to college will do their utmost to get into a coveted college. The surrounding environment also contributes a lot to the student's interest to continue to college [9]. Normally, the more education investment such as cram school that students received in high school, the higher possibility to accept tertiary education.

As for choices of major, students from better economic backgrounds preferred liberal arts and management, while their preference for engineering, science and economics remained relatively stable [10]. Compared with literature, history and philosophy, economic majors are the top choices of rural families [11]. Families with lower economic capability need and expect a faster return in the same period of investment. Talents majoring in science and engineering have been in larger demand, which means more job opportunities are available to graduates. When choosing majors, students from lower-income families would have more consideration about their development and employment prospects, while students from higher-income families would pay more attention to personal interests.

Besides, poor families would also choose majors with less miscellaneous fees so that the financial burden can be alleviated [11]. In addition, art is always refused by poorer families for the extra professional course fees, inaccessible training resources and exorbitant materials expenses. Expect tuition, students' living costs should also be considered, which is related to the economic level of the city they lived in. Living cost in developed areas is higher than that in a less developed one. Families who choose universities located in municipalities and coastal cities tend to have higher incomes, and those who choose hinterland and prefecture-level cities tend to have less powerful economic capability [11].

The purpose of education is to achieve the fulfillment of a person and based on Maslow's hierarchy of needs, self-actualization is the highest demand of humans. When students receive sufficient financial support from families, the less economic burden allows them to pay more attention to the pursuit of the true passion and sense of fulfillment

of the chosen majors, while poverty-stricken families are more struggling with the basic life, and a large amount of education investment would be more unaffordable to them.

4.2 The Relation Between Education Outcomes and the Economic Capability of Families

Family economic status has a significant positive impact not only on students' academic performance but their overall qualities. The probability of children from high-income families serving as school-level student cadres is significantly higher than that of children from low-income families [12]. The affluent family could provide children with more occasions to improve their eloquence, reaction and leadership capabilities, which can build their confidence and overall competencies, so high-quality resources are more accessible to those children of families of a higher social status [13]. Conversely, parents from families which enjoys lower economic status would be more reluctant to offer the same level of education resource and qualities.

Family economic capability is closely related to social status, which could cause a further impact on students' employment. Family social class has a positive effect on the tendency of employment dependence, the higher the social class of the family, the more likely the college students are to rely on their parents when choosing a career [14]. The reason is that wealthier parents tend to have more social resources and connections, what is called "guanxi" in China, which means these parents can access more job opportunities that can be recommended to their children. Besides, these parents also have a broader horizon and deeper understanding of the social economy, which can offer a more profound career planning to their children, so that the pressure of seeking a job for graduates from families with higher economic capability is lower than for students from poorer families.

The higher the family income is, the greater possibility that their children choose foreign joint ventures for employment. The students with average family income tend to choose Party and government organs, public institutions and state-owned enterprises [15]. Graduates from high-income families are more likely to find jobs with high satisfaction [16]. Government organs mean more job security and welfare including five social insurance and housing funds than private enterprises, which could bring more intangible benefits. What is more, because affluent families have more powerful economic capabilities, so they tend to provide more financial support for their children's lives, and the lighter family economic pressure would give graduates the confidence to pursue job satisfaction.

As suggested by Tilak (2007), in educated families, poverty almost does not exist. Education is negatively correlated with income poverty, and the incidence of poverty is significantly lower in families with certain education compared with those without any education. Especially in the current society, several decent occupations require talents with more professional knowledge and an advanced degree, and higher education has been linked with a position which enjoys a generous salary.

4.3 Parents' Educational Expectations in Different Economic Capability

Economic capability affects the educational expectation in external and internal aspects. As for the external environment, whether parents have enough capital to support children in higher education is the primary one. Moving onto the internal aspect, economic capability affects the environment and social bracket in that families can live, which would have an impact on the perception of education. Marshall argues that Economics discusses the part of human life that relates to how he gained opinions and how he used that opinion. In another word, parents' education expectations are effected shaped by the economic capability directly to a large extent.

Normally, students with an established background in their family's economic status will tend to continue their education at universities, as their parents attempt to direct them to a high level of education [9]. From the general opinion of Chinese society, higher education has been regarded as the way to move to a decent job which can bring higher social and economic statutes for a long time. Parents who are the beneficiaries of higher education tend to accentuate the necessity of education for their children.

A study suggests that economic poverty makes parents pessimistic about their children's access to college education (Crosnoe et al., 2002). Parents with more financial assets and income tend to have higher educational expectations for their children (Elliott & Wagner, 2008; Zhan & Sherraden, 2011). The pessimistic attitudes are not only due to current lower economic capability but more concern about future conditions. As education is a long-term investment with lagging returns, the outcome usually can be seen after decades. Compared with receiving higher education which would cost a large amount of household income at the risk of no return within years, being a basic builder would be more practical and can meet the needs of alleviating family financial pressure more effectively.

5 Conclusion

The economy has affected higher education to an extreme extent. Education enjoys the benefits of economic development, and the deficiency of the economy also impedes the outcome of education conversely. As for the impact on higher education from unbalanced economic levels, when maintaining sustainable development and continual financial investment in the developed areas, it is more significant to pay more attention to less developed areas. The central government should provide more supportive capital and policies, which can guarantee the foundation of higher education in these mentioned regions. Take both quantity and quality into consideration, making universities and colleges the source of the talent pool for the demand of the social economy.

As the aspect of the inadequate economy, it should be noticed both internationally and domestically. During the progress to establishing world-class higher education institutions, the disparity between Chinese universities and that in other developed countries cannot be ignored. Despite the successes which have been acquired, those deficiencies in qualities and abilities should become the indicator to stimulate more motivations and endeavours. Meanwhile, the construction of higher education in less developed areas in China should have more priority. More allocation should be received in teaching attachment, educational infrastructure, national laboratory and scientific research projects,

which can not only ensure the development of high-quality teaching activities but can allure more professional teaching staff. Apart from that, to make up for the inadequate economic levels, less developed areas could take advantage of local cultural and natural resources to improve the level of cultural exchange and scientific research capability.

The economic level of countries and areas decides the macroscopical trend, while families have the most directly on the microsystem. Economic capability affects the social status and setup of a family, which impact the education investment and ultimately lead to various education expectations, choices of majors and academic performance. The positive correlation between household economic capability and education outcome tends to generate higher-level pursuit of tertiary education, and when facing the difficulty of employment, students from affluent families would have more advantages and opportunities.

Despite the wider cover at both macro and micro levels, there are also many deficiencies. First, because of the more extensive coverage, the arguments for each point is still insufficiently elaborated and needed to be more profound. Second, the whole paper is from a general macro perspective, which means first-hand and more specific data and cases are not enough. What is more, a systematic review which sets forth the relationship of educational investment between the whole nation and the household, such as the public and private spending, and how the change of relationship has impact on higher education are expected.

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