The Influence of Local Economic Development Level on Higher Education

Le Feng [1, *, †], Ruixi Cheng [2, †] and Wenzhe Song[3, †]

[1] School of Foreign Languages, Tianjin University of Commerce, Tianjin, China
[2] Xspace Academy, British Columbia, Canada
[3] Lize High School, Beijing, China

[†]The authors contributed equally.

*20194024@stu.tjcu.edu.cn

Abstract. The relationship between the level of economic development and higher education has become a social issue worthy of study and discussion. The economy, the cornerstone of national and ethnic development, is relevant to every part of society; and education is a part of society that is of great concern to all parties and has a profound impact on the future of the country and the nation. This thesis examines the relationship between local industry, investment in education, and the number of general education institutions and graduates. The experimental methodology for this study was to collect and compose panel data and then use panel data analysis to build a model to further verify the relationship between local industry, investment in education, the number of higher education institutions, and the number of graduates. The results of this study show that from 2003 to 2012, the tertiary sector had the most significant impact on higher education, followed by the primary sector. The secondary sector had a non-significant or even negative impact on higher education. The primary sector has the most significant impact on higher education in 2013–2022, followed by the secondary sector. Based on the result of the study, presents that the impact of the primary, secondary, and tertiary sectors on education expenditure in higher education varies over time and therefore needs to be studied separately for different eras. In developing higher education, factors such as long-term planning, industrial restructuring, and the interplay of economic development must be taken into account.

Keywords：Local Industry, Higher Education, Regression Analysis.

1   Introduction

Both researchers and policymakers have shown tremendous care about the connection between the degree of economic development and higher education. The economy, which serves as the cornerstone of ethnic and national growth, is inextricably entwined with every facet of society, while education is a vital element that will have a significant

impact on the nation's destiny. There are intricate relationships between higher education and economic development, and higher education in particular plays a crucial role in shaping a nation's future talent pool and development momentum. It follows that it is not surprising that academics and decision-makers alike have been engaged in a thorough investigation of how the economy may further support the growth of higher education.

In general, there is a favorable association between economic growth and higher education. Economic growth encourages economic development, which in turn encourages more improvements in education. In particular, the economy is the foundation of educational development, and raising educational standards also encourages economic growth. The long-term, extensive, and possible effects of education on economic development include the provision of skilled labor and a range of specialized skills. The degree of national quality, the generation of human capital, and the amount of knowledge stock held by a nation's labor force are all closely correlated to the development of education, which also affects the rate and magnitude of a nation's economic growth.

Academics such as Wu Zhipan discovered that expanding higher education can foster regional economic growth through studies in Beijing. Using empirical research and worldwide comparative analysis [1]. Weiping and Bai Dongjie also found that education spending has a greater promotion effect on an intensive economy than on an extensive economy [2]. Sun Jie used the impulse response function to investigate the positive link between Shandong's higher education and economic growth and discovered that it has a large short-term influence and a minor long-term impact [3]. He Ying examined and evaluated economic and educational data from Heilongjiang and discovered that a fair distribution of educational resources can more effectively foster economic growth, which in turn can foster further redistribution of educational resources [4].

It is important to remember that there are considerable variances in economic development levels among various regions, which have an impact on each region's educational levels[5]. Due to the poor reference value of a single province's research for other provinces, it is difficult to conduct research and learn from other regions while doing so. To address this issue, this study will create a panel of data using information from the National Bureau of Statistics on the number of regular higher education institutions, including the number of undergraduate graduates over the previous 20 years, the added value of primary, secondary, and tertiary industries, and education expenditure. The study will investigate the association between regional industries and higher education.

2   Method

2.1   Data

The National Bureau of Statistics provided information for this study on the number of regular higher education institutions, the number of undergraduate graduates, and the added value of primary, secondary, and tertiary industries and education expenditure in 31 Chinese provinces from 2003 to 2022. The number of normal higher education in-

stitutions and the number of undergraduate graduates were utilized as dependent factors. The added value of primary, secondary, and tertiary industries and education expenditure were used as independent variables. To maintain data comparability, the added value of primary, secondary, and tertiary industries and education expenditure was adjusted for inflation. While the number of higher education institutions and undergraduate graduates can represent the development of local higher education, the added value of primary, secondary, and tertiary industries and education expenditure can more accurately reflect local economic development. These two variables interact, and changes in either of them can have an impact on other variables either directly or indirectly.

2.2   Model

Both data collection and panel data analysis will take place. The association between regional industries, education spending, the number of accredited higher education institutions, and the number of undergraduate graduates over two time periods will be further confirmed using a fixed effect model. The findings will then be further discussed to see if there is a need for supplements or if there are any factors that have not been taken into account.

$$Y_{it} = X'_{it}\boldsymbol{\beta} + \lambda_t + u_{it}, i = 1,2, \dots, N; t = 1,2, \dots, T \tag{1}$$

$$\tilde{Y}_{it} = Y_{it} - \bar{Y}_t, \tilde{X}_{it} = X_{it} - \bar{X}_t, \tilde{u}_t = u_{it} - \bar{u}_t \tag{2}$$

$$Y_{it} - \bar{Y}_t = (X_{it} - \bar{X}_t)'\boldsymbol{\beta} + (u_{it} - \bar{u}_t) \tag{3}$$

$$\begin{aligned} \hat{\boldsymbol{\beta}}^{within} &= (\tilde{X}'\tilde{X})^{-1}(\tilde{X}'\tilde{Y}) \\ OLS \qquad &= \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \tilde{X}_{it}\tilde{X}'_{it}\right)^{-1}\left(\sum_{i=1}^{N} \sum_{t=1}^{T} \tilde{X}_{it}\tilde{Y}\right) \\ &= \left(\sum_{i=1}^{N} \sum_{t=1}^{T} (X_{it} - \bar{X}_t)(X_{it} - \bar{X}_t)'\right)^{-1}\left(\sum_{i=1}^{N} \sum_{t=1}^{T} (X_{it} - \bar{X}_t)(Y_{it} - \bar{Y}_t)\right) \end{aligned} \tag{4}$$

2.3   Research Hypothesis

Based on the research focuses on the relationship between economic development and educational development, where economic development is mainly based on the primary, secondary and tertiary sectors and educational expenditure in each province, and educational development is measured by the number of higher education institutions and their corresponding number of graduates, this paper puts forward the following hypothesis.

H1. The number of undergraduate graduates in conventional higher education institutions is significantly influenced by the first, second, and third industries.

H2. The number of undergraduate graduates at conventional higher education institutions is not significantly impacted by the first, second, or third industries.

H3. The number of conventional higher education institutions is significantly influenced by the first, second, and third industries.

H4. The number of conventional higher education institutions is not significantly impacted by the first, second, or third industries.

3   Result

3.1   Economical Influence on Regional Higher Education Development (2003-2012)

The results in Table 1 show that in Model (1), the regression coefficient of the independent variable of the primary industry on the number of higher education institutions is 0.395, with a P-value less than 0.05, indicating that the primary industry can significantly and positively predict the dependent variable of the number of higher education institutions. Specifically, for every one-unit increase in the primary industry, the number of higher education institutions will increase by 0.395 units. The regression coefficient of the independent variable of the third industry on the number of higher education institutions is 0.454, with a P-value less than 0.01, indicating that the third industry can extremely significantly and positively predict the dependent variable of the number of higher education institutions. Specifically, for every one-unit increase in the third industry, the number of higher education institutions will increase by 0.454 units. The regression coefficient of the independent variable education expenditure on the number of universities is -0.128, and the p-value is less than 0.01, indicating that the independent variable education expenditure can significantly negatively predict the dependent variable number of universities; specifically, for every one unit decrease in education expenditure, the number of universities will increase by 0.128 units. The P-value of the independent variable of the second industry is greater than 0.05, indicating that the second industry has no significant impact on the number of higher education institutions.

Table 1. Regression analysis result

	Model (1)	Model (2)
	Number of colleges	Number of graduates
PI	0.395*	0. 291*
	(0.199)	(0.221)
SI	0.062	-0.218*
	(0.128)	(0.142)
TI	0.454**	0.709**
	(0.157)	(0.174)
education expenditure	-0. 128**	0.079
	(0.062)	(0.069)
_cons	-1.315	-3.900
	(1.003)	(1.112)
province	control	control
R2	0.575	0.808

In model (2), the regression coefficient of the independent variable of the primary industry on the number of graduates is 0.291, with a P-value less than 0.05, indicating that the primary industry can significantly and positively predict the dependent variable of the number of graduates. Specifically, for every one-unit increase in the primary industry, the number of graduates will increase by 0.291 units. The regression coefficient of the independent variable of the third industry on the number of graduates is 0.709, with a P-value less than 0.01, indicating that the third industry can extremely significantly and positively predict the dependent variable of the number of graduates; specifically, for every one unit increase in the third industry, the number of graduates will increase by 0.709 units. The regression coefficient of the independent variable of the second industry on the number of graduates is -0.218, with a P-value less than 0.05, indicating that the second industry can significantly and negatively predict the dependent variable of the number of graduates. Specifically, for every one unit decrease in the second industry, the number of graduates will increase by 0.218 units. The p-value of the independent variable, education expenditure, is greater than 0.05, indicating that education expenditure does not have a significant effect on the number of graduates.

3.2   Economical Influence on Regional Higher Education Development (2013-2022)

The results in Table 2 show that in Model (1), the regression coefficient of the independent variable of the primary industry on the number of higher education institutions is 0.211, with a P-value less than 0.01, indicating that the primary industry can extremely significantly and positively predict the dependent variable of the number of higher education institutions. Specifically, for every one unit increase in the primary industry, the number of higher education institutions will increase by 0.211 units. The regression coefficient of the independent variable, education expenditure, on the dependent variable, number of universities, is 0.129, and the P value is less than 0.01, indicating that the independent variable, education expenditure, can significantly and positively predict the dependent variable, number of universities. Specifically, for every one unit increase in education expenditure, the number of universities will increase by 0.129 units. The regression coefficient of the independent variable of the second industry on the number of higher education institutions is 0.107, with a P-value less than 0.05, indicating that the second industry can significantly and positively predict the dependent variable of the number of higher education institutions. Specifically, for every one unit increase in the second industry, the number of higher education institutions will increase by 0.107 units. The regression coefficient of the independent variable of the third industry on the number of higher education institutions is -0.938, with a P-value less than 0.05, indicating that the third industry can significantly and negatively predict the dependent variable of the number of higher education institutions. Specifically, for every one unit decrease in the third industry, the number of higher education institutions will increase by 0.938 units.

Table 2. Regression analysis result

	(1) Number of colleges	(2) Number of graduates
PI	0.211**	0.371**
	(0.326)	(0.062)
SI	0.107*	0.053
	(0.052)	(0.098)
TI	-0.938*	0.240**
	(0.041)	(0.077)
education expenditure	0.129**	0.029
	(0.035)	(0.065)
_cons	1.886**	-2.503**
	(0.158)	(0.297)
province	control	control
R2	0.647	0.713
Adj. R2	0.668	0.791
N	289	289

In model (2), the regression coefficient of the independent variable of the primary industry on the number of graduates is 0.371, with a P-value less than 0.01, indicating that the primary industry can extremely significantly and positively predict the dependent variable of the number of graduates; specifically, for every one unit increase in the primary industry, the number of graduates will increase by 0.371 units. The regression coefficient of the independent variable of the third industry on the number of graduates is 0.024, with a P-value less than 0.01, indicating that the third industry can extremely significantly and positively predict the dependent variable of the number of graduates; specifically, for every one unit increase in the third industry, the number of graduates will increase by 0.024 units. The P values of the independent variables of secondary industry and education expenditure are both greater than 0.05, indicating that neither of them has a significant impact on the number of graduates.

This panel analysis used a fixed-effects model, and through the F-test (P = 0) and Hausman test (P 0.05), the null hypothesis was rejected, indicating that the fixed-effects model is better.

The impact of the primary, secondary, and tertiary sectors of the economy, as well as educational spending, on the quantity of graduates and regular college and university students varies over time. There are effects, both positive or negative, as well as no effects. As a result, the link cannot be inferred from a single factor and must be taken into account separately from the duration. The first four hypotheses are therefore rejected. The tertiary industry had the greatest influence on higher education between 2003 and 2012, followed by the primary industry. The tertiary industry is also a new industry that draws more people to apply for relevant industries; in contrast, the secondary industry has accumulated for many years in China, but the demand for relevant

technological innovation is relatively limited, so the impact on higher education is smaller. As a result, relevant universities and majors started to be established. However, education expenditure has a negative or no impact in the early stages, and we speculate that this is because higher education is still in the accumulation stage and is a long-term investment process. During this period, there is temporarily no positive feedback, so education expenditure has a negative or no impact. The primary industry, followed by the secondary industry, had the greatest influence on higher education between 2013 and 2022. The number of colleges and universities as well as the number of graduates were more heavily influenced by the primary industry.

4   Discussion

The effects of primary, secondary, and tertiary industries on education expenditures in higher education is distinct due to variations in development status across time, necessitating independent examination of each from various eras. Higher education plays a crucial role in socioeconomic development and is a vital component of national development. Many elements, such as long-term planning, industry restructuring, and the interaction of economic development, must be taken into account in the process of developing higher education [6].

4.1   Long-term Planning is Essential for the Growth of Higher Education

To begin with, long-term planning is essential for the growth of higher education. The cost of education must be accumulated over time and cannot merely be centered on immediate returns. To make sure that investments in higher education can be sustained, future development demands for a number of years or even decades should be taken into account when creating education expenditure plans [7]. Second, there are important ramifications for the growth of higher education from industrial transformation.

4.2   The way the Industrial Organization Changes Significantly Affects Higher Education

The way industrial organization changes significantly affects higher education. To support local industry development while also encouraging higher education development, local higher education should be tailored to the local industrial structure. Engineering and technical majors that are pertinent can be formed, for instance, when manufacturing dominates the local industrial structure. For instance, relevant engineering and technical majors can be formed to give relevant technical personnel assistance when manufacturing dominates the local industrial structure [8]. To sum up, the interaction between higher education and economic development is unbreakable. As China's economy shifts from extensive to intensive, the industrial structure is likewise changing to reflect this change. Higher education must thus support the growth of the industrial sector, continuously adjust to the deepening and deepening of processing within the sector, support

technology intensification, and boost production efficiency. For instance, given the industry's rapid development, higher education funding in pertinent subjects can be increased to encourage the creation of qualified IT professionals.

4.3   Optimize Education Investment

First, local education development should be considered, and second, adjustments should be made based on the local industrial structure [9]. In areas where higher education development is relatively backward, education should be allocated according to demand to stimulate local education development in a reasonable manner. In areas where higher education development is more mature, education expenditure can be properly controlled, and more funds can be invested in relevant industries to stimulate higher education development. Government education expenditure is not just a financial investment; it also needs to guide higher education development from various aspects, such as relevant projects, public opinion, and various activities, and promote efficient development in multiple ways and angles.

In conclusion, a variety of elements, including long-term planning, industry restructuring, and interactions with economic development, must be taken into account while developing higher education. This research can only achieve the coordinated growth of higher education and the social economy and contribute to the prosperity and stability of our nation by carefully taking into account all of these aspects [10].

5   Conclusion

The impact of education expenditure alone on higher education needs to be accumulated over a long period of time, so the allocation of education expenditure cannot only focus on short-term investment but also need to be planned for a long period of time. The change in industrial structure has a great influence on higher education, so the development of local higher education should correspond to the local industrial structure in order to better stimulate the development of local industry and make the industry promote the development of higher education at the same time. China's economy has changed from rough to intensive, and the whole industrial structure has evolved from the dominant share of primary industry to the dominant share of secondary and tertiary industries step by step; it also includes the upgrading within the industry, that is, the degree of processing and reprocessing within the industry gradually develops to its depth, realizes the technology intensification, and continuously improves the production efficiency. Therefore, relevant higher education should also develop accordingly, complementing industrial development.

Group's conclusion is that the domestic economy needs to be modernized, and the conventional primary sector needs to transition from extensive to intensive. Also, as a result of pertinent national initiatives, more graduates are graduating from pertinent universities. Although the tertiary sector's influence on the number of universities has shifted from positive to negative, it continues to have a large impact on the number of

graduates. This research deduces that while the trend in relevant university development has improved, the need for relevant practitioners continues to rise, having a substantial impact on the number of graduates. Education expenditure has a positive impact on the number of universities but has no significant impact on the number of graduates. Group speculates that local governments have completed the accumulation of education investment in the early stages and have begun to give positive feedback, leading to an increase in the number of universities. However, the impact on the number of graduates is still mainly reflected in various industries, and education expenditure cannot directly affect the number of graduates.

Although group has done some analysis, the scope of our data and study prevents us from reaching valid findings. Consequently, in order to corroborate the contributing elements and regularities, expanding our research is necessary, improve the data, and apply more rigorous analysis techniques and models. To further assess the impact of this data on the research findings, group also need to think about whether there are other data components that may be incorporated into our research scope. In order to better comprehend the link and regularity, group need to perform more thorough and in-depth research on both the data and the methods in order to generate more trustworthy and accurate results.

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