



Research Article

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Empirical analysis on the relationship between human capital investment and economic growth in rural areas: Based on the data of Henan

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ABSTRACT

Human capital formation plays a striking role in economic development. Based on the data of human capital investment, material capital investment of Henan Rural areas from 1995 to 2012, the article analyses the relationship between human investment and economic growth using classical production function. The conclusion is the human investment plays more importance role to gross economic growth than the material capital investment, and also the contribution because of lower level of investment of human capital investment and the economic growth steered by material increasing. So, on the basis of results, it puts forward the advice on policy.

Key words: Human capital, Economic growth, Empirical analysis, Human capital investment, Henan

INTRODUCTION

In 1960's, Theodore.W. Schultz put forward the theory of human capital which means that human capital investment is the kind of investment for production, education, job training, health care and migration to improve the quality and quantity of labor indexes and ultimately makes the labor output increase. By estimating the reasons for USA postwar agricultural production growth, Schultz drew the conclusion that education, science and technology plays a 80% role to the rural economic growth, but only 20% was caused by the material capital. [1] From then, "human capital" theory was included in the category of mainstream economics and has been continuously enriched and developed. There are also many scholars using econometric tools to demonstrate the relationship between rural human capital and economic growth. For example, from the perspective of education, Zhang Yanhua adds human capital into the C-D production function, proves that the rural human capital has a positive relationship to output and analyzes the causes of the low contribution rate to economic growth. [2] Li Yongning verified the slow growth of rural human capital would affect the human capita utilization efficiency to promote economic growth. [3] Through the research on the relationship between China's rural human capital and economic growth Li Xunlai concluded that the material capital investment contributes more to economic growth, but the labor input and human capital relatively smaller. [4] So, there 's the positive relationship between human capital investment and economic growth in rural areas.

As a big and major agricultural province, the rural population arrived at 60.7 millions and the proportion of the total population was still 57.6% at the end of 2012. The quality of rural population has an important effects on the development of rural economy, but also plays a crucial role for the construction of the central plain urban cluster as well as the rise of the mid economy. At present, although many scholars have proposed to increase the human capital investment to improve the population quality in order to promote economic development, but there's fewer research on the combination of the actual research of Henan province rural human capital investment and economic growth. [5] So, based on the theory of human capital investment, taking advantage of the Douglas production function, using Eviews 6.0, the paper find out the problems in Henan rural human capital investment and provide some design thinking for human capital biased system.

2. Model construction, Variable selection, Data sources

2.1 Model construction

The Cobb-Douglas production function gives the labor and physical capital contribution output. If adding the human capital investment as a variable, the production function will take the form as following.

$$Y_t = AK_t^\alpha L_t^\beta H_t^\gamma e_t^\varepsilon$$

In the equation, Y_t is the output; K_t is the input of physical capital; L_t is the input of labor; H_t is the input of human capital. In order to avoid time-series data heteroscedasticity, the function takes the form:

$$\ln Y = \ln A + \alpha \ln K + \beta \ln L + \gamma \ln H + \varepsilon$$

In the equation, α , β , γ are material elasticity of output, labor elasticity of output and human capital elasticity of output; ε is stochastic error.

2.2 Variable selection

According to Schultz's theory, investment in human capital will be divided into four aspects as formal education, health care, training, investment in transportation and communications. But because the training expenditure mainly comes from government and business investment, it is difficult to obtain the concrete data, so neglected. So, the article analyses the rural human capital investment from the point of farmers themselves investment and chooses per capita expenditure in education, health care, transportation and communications as index, then adds up to and multiplied by the rural population to get the total amount of capital investment, denoted by H . Rural gross material capital investment (K) is made up of fixed capital investment by non-farmers and farmers, and the real data is obtained by deflated by GDP price index with 1995 as the base year. Because there's no relevant economic growth data in the Statistical Yearbook. According to Xiong Qilai (1999) GDP estimation, ultimately determines the rural per capita GDP as dependent variables.

The direct contribution rate of Human capital to GDP growth represents as direct inputs contribution rate to the GDP growth. [6]

So, the contribution rate of human capital to GDP = the annual growth rate of human capital ÷ the annual growth rate of GDP × β [7]

The contribution rate of material capital to GDP = the annual growth rate of material capital ÷ the annual growth rate of GDP × α

Table 1 The relevant data

Year	Real rural GDP (100 million yuan)	The input of physical (100 million yuan)	The input of labor (10 thousand person)	Per capita expenditure in education (yuan)	Per capita expenditure in health care (yuan)	Per capita expenditure in Transportation and Communications (Yuan)	Human capital investment (100 million Yuan)
1995	1369	204.8	3578	63.53	34.43	17.37	86.9
1996	1425.4	244.1	3657	82.6	43.6	19.6	108.4
1997	1382.9	280.1	3818	90.3	42.8	22.7	110.5
1998	1525.3	319.1	4067	102.1	44.9	26.7	111.4
1999	1518.4	317.8	4311	97.8	46.5	31.6	101.4
2000	1585.3	334.7	4712	124.1	59.3	52.6	128.6
2001	1645.4	333.9	4688	122.9	63.1	69.3	131.5
2002	1675.8	349.6	4691	123.5	68.3	71.5	128.4
2003	1826.8	397.1	4695	146.6	83.2	91.3	160.9
2004	2113.3	382.3	4718	145.1	82.2	104.6	142.2
2005	2214.6	455.2	4752	150.3	104.4	135.1	155.8
2006	2238.8	530.9	4777	165.9	117.4	184.5	178.5
2007	2389.2	673.5	4815	168.3	137.2	213.5	193.5
2008	2688.8	806.5	4859	158.5	159.3	215.4	199.8
2009	2664.9	982.3	4882	174.4	181	231.1	213.7
2010	2833.6	1109.7	4915	180.3	207.2	289	226.3
2011	2933.6	1183	4911	189.5	272.7	291.8	278.4
2012	3011.7	1202.5	4905	227.1	311.6	348.8	313.7

Source: "Henan Survey Yearbook" and "Statistical Year Book of Henan Province 1996-2013"

2.3 Data description

① Total human capital investment sustained growth

From the table, the actual total human capital investment of human capital has increased to 3137 million yuan from 1995 to 2012, which means an increase of nearly 4 times and the actual growth rate arrives 11.7% annually. Per capita human capital investment increases to 887.5 yuan in 2012 which means an increase of nearly 7 times, and also the percentage in the consumer expenditure increases from 12.38% in 1995 to 26.59% in 2012. So, with the strength of the rural economy, the investment level of human capital is also increased steadily.

② The unequal trend of Changes in the proportion of the investment

Judging from the table, per capita education, health care, transportation and communications are all increasing, but expenditures in transportation and communications growing faster than the other two after 2003. The reason lies in the inelasticity of demand and income of agricultural products, so lack of market price advantage comparing with industrial products. And it also lies in the marginal decline in benefits from farming which leads to the income obtaining from the same amount of land and funds in agriculture far less than other industries. So, attracting by high treatment in city, the numbers of farmers to cities increases and also the investment in transportation and communications.

We can also see that investment in health care is growing faster than investment in education which is probably because of the popularity of new rural cooperative medical care, but growth is relatively low is maybe the farmer health awareness is weak comparing with the desire for health after 2009.

3. Empirical Analysis

3.1 Model Estimation

① Unit root test sequence

In line with standard practice in time-series econometrics, the data was tested at the outset by using the Augmented Dickey-full (ADF) test method. The result shows only original data of K is smooth, other variables are unsmooth, but smooth after differential changes.

Table 2 Unit root test

Variable	conclusion	variable(d)	ADF value	P-value	Test type(c,t,k)	conclusion
LnL	unsmooth	LnL (2)	-6.71221	0.0015*	(-0.088715, 0.005928,3)	smooth
LnH	unsmooth	LnH (1)	-5.077499	0.0065*	(0.036191,0.09726,1)	smooth
LnY	unsmooth	LnY (1)	-4.084338	0.0293**	(0.078933,0.000503,1)	smooth

Note: (1) Test type(c,t,k) is a constant item in the ADF and time trend and lag rank separately;

(2) ADF test achieved through Eviews 6.0;

(3) d is the variable difference order;

(4) *Rejection of the null hypothesis at 1% level of significance, ** Rejection of the null hypothesis at 5% level of significance.

RESULTS

② Estimation results

Based on the data and results from above, setting LnK, LnL, LnH as explanatory variables, LnGDP as dependent variable, it establishes linear models and the regression results show in table 3.

Table 3 The result of regression

Model	Coefficient	t	Sig.	F	R ²
Constant	0.9307241	0.530978	0.6044	91.53927 (0.0000)	0.954801
The materia elasticity of output(α_0)	0.49216	2.498938	0.0266		
The labor elasticity of output (β)	0.440891	1.777912	0.0988		
The human capital elasticity of output (γ)	0.284177	1.494617	0.1589		
The contribution rate of material capital	71.88%				
The contribution rate of human capital	22.06%				

Through the analysis from table 3, R² is more than 0.95 indicating a good fitting to economic growth. From the factors elasticity of output, we can get the conclusions that an increasing in material capital 1% will lead to an increase in GDP 0.49%, an increasing in human capital 1% will lead to an increase in GDP 0.28%, an increasing in labor capital 1% will lead to an increase in GDP 0.44%. And the contribution rate of material capital to GDP arrives to 71.88% is far more than human capital. So, the rural economic growth in Henan province is mainly caused by the increase of material capital investment and labor stock while the human capital plays a little role to economic growth. Other Research also shows that, only when the human capital elasticity of output is greater than 0.45, the

investment in human capital can has a enormous pulling effect to economic growth. So it indicates that Henan province has a great potential to depend on human capital to promote economic growth.

CONCLUSION

Lin Yifu said, economic growth is always accompanied by the rapid increase in the per capita human capital stock. In the past 20 years, the institution of China over is a kind of capital biased system and has effectively cause the rural economic growth through overcoming the capital bottleneck. However, as relative changes of production factor endowments, the path to promote Henan rural economy is more and more far from sustainable growth when simply paying attention to the accumulation of material capital oriented material capital biased system. From Table 3, the results also show that the material capital role to economic growth is far higher than that of human capital. That is, in Henan rural areas, the economic growth is driven material capital and the manpower capital driven economic growth mode has not formed. The first reason maybe the lower agriculture coparative benefit leading to high outflow of high quality and talent famers which forms the bottleneck of agricultural development. Second, The implementation of family planning policy leads to low human capital stock in rural areas and human resources quantity decreases obviously. Thirdly, because of the long time for the education, medical returns appearing, the government invests in public goods for rural people's livelihood such as education, medical insurance, health and other areas is far below than that of city level which leads to the general level of rural human capital investment is too low. As a result, the positive external effect of population flow belongs to the city, and the cost is added to the countryside. [8]

ADVICES

From the results above, there's a positive relationship between the investment of human capital and rural economic growth, and also human capital investment can be seen as the "engine" to economic development. Therefore, in order to meet the needs of rural economic development in the new era, to achieve economic growth promoted by "human capital accumulation" to "material factor productivity", to prevent the diminishing marginal capital return stage premature, the article puts forward the following suggestions.

5.1 Increase the investment in human capital in rural areas to improve the quality of the population

The empirical regression equation shows that the income elasticity of personal education investment is 1.074, the income elasticity of health investment is 1.539, are more than 1 which means that improving population quality can greatly promote the economic growth. [9] While the growth of GDP and the increase of famers' income is security to the human capital expenditure. Just as presented in Eighteen "decision", there are some ways to promote the sustained and health development of rural economy. First, it is necessary for public finance, enterprise, personal to increase education investment in improving the community-level medical and health service system, perfecting the new rural social insurance adding up to the social relief, social welfare, public health system in rural areas to adapt to rural ageing population. Second, it is essential to improve the social endowment insurance policy, accelerate the construction of rural social endowment insurance service system. Third, it is needful to advocate engenics to promote the quality of rural population. Finally, system innovation on labor mobility plays an important role in boosting rural talent markets, promoting the rational flow of the rural labor force and realizing the combination and full usage of human capital investment.

5.2 Increase the rural education resources to promote the balanced allocation of public resources

Studies show that education funds accounts for the proportion of GDP to 6-7% in developed countries. While the funds of rural education in Henan province is far from that. So, in order to make rural education become the basis of human capital investment and accumulation to promote rural economic development, the article bring forward some methods. First, the governments should Increase public finance in rural infrastructure construction to expand the coverage, improve the structure of educational investment, balance the allocation of resources of compulsory education in urban and rural areas, establish diversified basic education mode, improve rural education conditions so to meet the needs of the development of rural productivity. Second, it is necessary to deepen reform of rural occupation education, actively develop the rural occupation education, train and promote talents in science and technology using a variety of ways and mechanisms. Finally, it also indispensable to increase the investment in training, construct the rural adult education system, cultivate talents for economy to grow, speed up the formation of human capital so to improve the value of human capital of workers and promote development of rural economy.

5.3 Reform household registration and population system to increase rural human capital accumulation

The existing registration management system of dual-structure household and the division of urban and rural employment system is fundamentally restricted the orderly flow of labor force and optimized allocation of human resources in rural areas. As a result, the phenomenon is appeared that there's rich in human resources and a serious shortage of manpower capital in rural areas. And there also are unable to form factors of production double direction

flow situation in urban and city.[10]So,the reform of household registration system can increase the participation rate of the labor force in the short term also raise their accumulation rate of human capital in the mudium term so as to advance the expected return of human capital investment and stimulate the migrant workers endogenous needs in education,training, health.

At the same time, open rural two-child birth policy is conducive to improving the rural long-term population structure, reducing the risk of aging so as to improve the long-term stock of the rural human resources which is crucial to ensure the succeeding force in rural development.

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