The Impact of Physical Capital Accumulation and Income Inequality on Private Education Investment:

Evidence from Rural China

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Introduction

Capital accumulation increases the rate of return on education, and then triggers investment in human capital. However, the education level of rural population was far lower than that of urban population in China. The improvement in capital-embodied productivity led to rising demand for equipment and, when equipment was complementary with skilled or well-educated labor, the rural-urban income gap rose.

In China, the income of urban households grew faster than that of rural households in the past 40 years, which has resulted in a slow accumulation of rural human capital. Besides, the soaring costs of education sometimes cause controversy. Rural residents have fewer opportunities to access quality education resources, and their ability to pay in the education market is lower than urban residents. Unlike Western countries, China has a large rural population, and manufacturing and urbanization still rely on the transfer of employment from rural labor.

The purpose of our paper is to explores the effects of physical capital accumulation and income inequality on education investment of rural households in China from 1978 to 2017, aiming to answer:
  (1) can capital accumulation contribute to promoting private education investment in rural areas when the income gap is widening?
  (2) Heterogeneity analysis of the influences.
  (3) By what mechanism?

Data

All the data used is available from the National Bureau of Statistics of China (NBSC). Our panel data cover 29 provinces of Chinese mainland for the period of 1978 ~ 2017, excluding Tibet and Chongqing (included in Sichuan Province). The dependent variable in the panel fixed effect regression, namely, household education investment, is measured by per capita education expenditure of rural households.

Method

Provincial FE Estimation:

$lnY_{it}=\alpha_0+\alpha_1 lnper\_capital_{it}+\alpha_2 lnper\_capital_{it}^2+\alpha_3 lnincome\_gap_{it}+\alpha_4 lncontrol\_variables_{it}+\varepsilon_{it}$

- Y_{it}: per capita education expenditure of rural households by year and province
- $per\_capital_{it}$: capital stock per capita by year and province
- $income\_gap_{it}$: ratio of urban and rural per capita disposable income by year and province
- $control\ variables_{it}$: rural per capita consumption expenditure, GDP per capita, public education expenditure by year and province etc.

All variables are calculated at constant prices in 1978.

Panel Threshold Model:

$$lnY_{it}=lnx_{it}^{'}\beta_1 \cdot 1(income\_gap_i \leq \gamma)+lnx_{it}^{'}\beta_2 \cdot 1(income\_gap_i > \gamma)+e_{it}$$

- γ is the threshold of the threshold variable *income_gap*.
- $x_{it}^{'}$ are the explanatory variables.
- If the expression in parentheses is true, then the indicative function $1(\cdot)$ takes the value 1; otherwise, it takes the value 0.

Results I

Table 1: Provincial FE Estimations （FGLS）

1978 - 2017	Full sample	Eastern provinces	Midwestern provinces
D(ln*per_capital*)	0.250***	0.241	0.329***
	(0.048)	(0.163)	(0.099)
D(ln *income_gap*)	0.081***	0.018	0.049
	(0.019)	(0.072)	(0.035)
D(ln*per_capital*)²	-0.037***	-0.016	-0.056***
	(0.006)	(0.017)	(0.014)
Other variables	yes	yes	yes
N	1,131	390	741

*Notes: In order to avoid the "pseudo-regression" problem caused by long-panel data, we test all variables by taking first-order differences after logarithm. We use three methods (LLC, IPS, and ADF Fisher) to examine sequence stationarity according to the AIC information criteria. The test result is that all variable sequences reject the assumption that there is a unit root, indicating that each variable is a stationary sequence after taking a logarithmic difference. The standard errors are in the parentheses, ***p<0.01,**p<0.05,*p<0.1.*

Results II

Table 2: Panel Threshold Estimations

1978 - 2017	Full sample	Eastern provinces	Midwestern provinces
[1]D(ln*per_capital*)	0.723***	0.682***	0.528***
	(0.135)	(0.210)	(0.189)
1st threshold value	2.054***	1.969***	2.684
p-value of LM test	(0.000)	(0.000)	(0.503)
[2]D(ln*per_capital*)	0.118	-0.209	0.233
	(0.148)	(0.232)	(0.210)
2nd threshold value	2.719**		
p-value of LM test	(0.003)		
[3]D(ln*per_capital*)	-0.198		
	(0.159)		

Notes: The results of Hansen threshold tests show that there are two thresholds (2.05 and 2.72) for the full sample model, one threshold (1.97) for the eastern region samples, and no significant threshold for the midwestern region samples. Other variables are controlled.

Conclusions

While the urban-rural income gap widens, rural households are still willing to invest in education because Capital-Skill Complementarity can bring wage premium.

However, there is a race between income gap and private education investment. On the national level, when the urban-rural income ratio exceeds 2.05, the growth rate of rural household education investment will lag behind that of capital accumulation. This means that excessive income inequality has negative influence on rural human capital formation. There are two mechanisms:
- Firstly, the price of educational resources rises with the income differentiation, because high-income families invest more in education.
- Secondly, rural households have less access to quality education resources, because well-trained teachers can obtain higher-paying job opportunities in urban areas.

Additionally, we may underestimate the impact of capital accumulation in eastern provinces on private education investment. There are over 180 million rural-urban migrant workers in China, and 44% of them work outside their home provinces. Meanwhile, many left-behind children receive education in midwestern provinces. The spatial spillover effects of physical capital accumulation on rural human capital need to be studied in the future.

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