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| Returns to Education in China | **Evidence from National Surveys** | Department of Agricultural and Resource Economics, UC Berkeley | ***Rosalie Fang and David Wells Roland-Holst*** |  |
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RETURNS TO EDUCATION IN CHINA

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[Abstract]

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# Introduction

Since the reforms of the late 1970’s, China’s industrial transformation has touched nearly every market, consumer, and producer around the world. At home this country’s unprecedented long term growth dynamic has lifted hundreds of millions of people out of poverty and made every city in the country a middle-class urban economy, including the three essential growth drivers of discretionary income, durable household assets, and inclusive public goods and services. At the heart of this sustained momentum has been a virtuous cycle of investment in physical and human capital, the former expanding productive capacity and employment, while the latter supported rising productivity and real wages. The macro impacts of these trends are apparent to all, with per capita incomes increasing tenfold over a few decades, conferring living standards on rural migrants and their children that would have been unimaginable to their ancestors.

In this paper, we assess more detailed characteristics of China’s progress in real income growth, using large household survey samples to elucidate the influence of education level, gender, and geography on individual real income growth over the last decade. Despite the egalitarian goals of public investment and other policies since the reforms began, we find patterns of returns to education are highly differentiated. Among other insights, our results indicate nearly universal gender differences in returns to education, suggesting potential discrimination and revealing different incentives for male and female workers (and their families) making decisions to invest in education. Our results also reveal robust and interesting differences in returns to education by location, suggesting both differential personal incentives to seek educations and underlying pressures for migration by those who do. Taken together, these findings indicate the existence of systemic mechanisms that contribute to inequality across the country. Although these may not be directly observable in our samples, the consistent and robust patterns observed in economic returns to investment in human capital suggest a need for more determined and targeted policies to realize China’s goals for common prosperity.

The next section places this work in the context of more recent published research on returns to education. Section three describes the data, estimation strategies, and our more detailed empirical findings. A final section offers conclusions and discusses extensions of this work.

# Literature Review

At the turn of this century, as part of a broad effort to decrease wage inequality in China, the Chinese central government embarked on an ambitious agenda to expand college education. Commonly known as the Higher Education Expansion Plan, this initiative featured a 40% increase in new college student admission beginning in 1999, and a quadruple increase in 2005, compared to 1998 (Li and Xing 2010). While increasing the number of people with a higher degree, this policy also increased the average qualification for high-skilled labor and created more competition. Since the beginning of this century, college-educated workers’ unemployment rate grew. However, researchers have conflicted opinions whether this surge can be associated with the Higher Education Expansion policy. A piece of research working with DID model suggest that the Expansion decreased probability of unemployment, attributing that to China’s consistently increasing demand for high-skilled labor, claiming that China’s demand to transition its economy from labor-intensive to skill-intensive outweighs the increase in high-skilled labor supply (Ou and Zhao, 2016). On the other hand, another research using a similar model found a negative effect on unemployment from the policy only in the first 5 years after graduating, then the decline in unemployment rate offset the negative effects (Xing, Yang, Li 2018).

More interesting is the potential effects this policy might have on the returns to education. As China seeks to rapidly increase the average education level of its citizens, in most other industrialized countries like the US, UK, and Germany, there is overwhelming evidence that an inflated supply of college-educated labor causes an “overeducated worker” problem (Hu and Hibel). After years of stable increase in educated workers’ labor participation, the US is seeing relatively higher returns to education in denser-populated areas. That is, in urban areas, the ratio of returns to education for high-skilled workers to low-skilled workers has been steadily increasing over the years (Autor 2019). This rise in wage inequality has an especially large effect on low-skilled workers in the city, as high-skilled workers earn more, therefore heightening rent prices. Low-skilled workers experience the same increase in housing cost, while not experiencing the same increase in wage. With no end to price inflation, when residents start spending, on average, over a third of their income on housing, the homelessness problem emerges and accelerates, as can be seen in virtually every major American city (Dougherty 2021). Another result is the expansion of suburban areas outside cities, as workers flee to these areas with lower housing prices, while commuting to the city to provide essential work. Instead of raising real wages for everyone, the growing supply and productivity of college-educated workers has insignificant, or negative effects on their low-skilled counterparts not only in the US, but also in Germany, the UK, and other industrialized countries (Autor 2019). In fact, China is also starting to see this effect in its major cities. Although there is not yet a homelessness problem, China has seen skyrocketing real estate prices over the past two decades or so, to a point where some workers in major cities (e.g., Beijing and Shanghai) are finding it more beneficial to live in surrounding cities and suffer through the long commute into the cities to work, in some ways resembling the onset of the housing crisis in the US.

Despite inconsistent findings on the effect on unemployment, researchers seem to have arrived at a consensus in terms of the effect of education on inequality. Research done using Propensity Score Matching with Logistics model examined college attainment and economic returns in year 2003 to 2010, and found that there is a surge in average wages for college-educated workers, attributing that to China’s growing demand to transition from a labor-intensive economy to a skill- and technology-intensive economy (Hu and Hibel 2014). The same study found that there is no significant increase in egalitarian educational opportunities. That is, the likelihood of obtaining a college education is still significantly linked to parent’s education levels and social-economic status. Combined with growing wages for college-educated workers, this implies the intensification of wage inequality, causing more damage to those from disadvantaged backgrounds. In regards to the difference between rural and urban returns to education, in accordance with Autor’s study done in the US, China also exhibits a significantly higher return to education in urban than in rural areas (Xing, Yang, Li 2018), with Li, Yu, and Wang’s study in 2018 finding the returns to college education in urban areas being almost double that of rural areas (70% in urban, and 36% in rural). While some studies concluded decreasing overall returns to education over time (Liu and Wang, 2017, Ou and Zhou, 2016), almost all research show an increase of wage inequality (Hu and Hibel, 2014).

Another common point of study is the effect of education on different groups, particularly different gender groups. Result is overwhelmingly negative. For studies that computed a fit to the mincer equation, most found around a 20% wage decrease for being female (Fang and Huang 2017, Chen and Pastore 2021). A study done with the DID model suggests that the Higher Education Expansion benefited males and high school graduates, while decreasing the hourly wage of female high-skilled workers (Ou, Zhao, 2016). Xing, Yang, and Li (2018) also found an insignificant effect of the policy on female workers, as well as a decrease in female labor participation, despite the Expansion having significant positive impacts on male workers. The authors attributed this decrease in wage to the fact that females are more prone to becoming homemakers or accepting lower wages for the same high-skilled white-collar jobs, even after receiving a higher education. Despite a negative premium, with respect to returns to education, females’ education premium has an optimistic trend. Using an OLS model on the mincer equation, Liu and Wang (2017) found that in every year from 1988 to 2013, females consistently experience higher returns to education. The authors attributed this effect to less gender discrimination in the high-skilled labor market than in low-skilled, and less opportunities cost for females to attend school.

# Data, Estimation Strategy, and Results

## Overview of the CFPS Database

Our empirical results were obtained using the China Family Panel Studies (CFPS) survey, a nationally representative, annual longitudinal survey of Chinese communities, families, and individuals launched in 2010 by the Institute of Social Science Survey (ISSS) of Peking University, China. The CFPS is designed to collect individual-, family-, and community-level longitudinal data in contemporary China. The studies focus on the economic, as well as the non-economic, wellbeing of the Chinese population, with a wealth of information covering such topics as economic activities, education outcomes, family dynamics and relationships, migration, and health. Conducted every two years, the survey comprises more than 30,000 observations tracking about 1500 variables.[[1]](#footnote-1)

## General Estimation Strategy

## Results

Today’s

Table 1: Regression 1 - Combined Rural and Urban Samples

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Coefficients: | Estimate | Std. Error | t-statistic | P(>#) |  |
| (Intercept) | 8.797265 | 0.024534 | 358.578 | 2.00E-16 | \*\*\* |
| postsecondary | 1.732932 | 0.024212 | 71.574 | 2.00E-16 | \*\*\* |
| seniorsecondary | 1.265809 | 0.021949 | 57.67 | 2.00E-16 | \*\*\* |
| juniorsecondary | 1.050874 | 0.018734 | 56.093 | 2.00E-16 | \*\*\* |
| primary | 0.618875 | 0.020639 | 29.985 | 2.00E-16 | \*\*\* |
| gender | 0.283885 | 0.009443 | 30.064 | 2.00E-16 | \*\*\* |
| urban | 0.019081 | 0.00593 | 3.217 | 1.29E-03 | \*\* |
| y10 | -1.089056 | 0.021248 | -51.255 | 2.00E-16 | \*\*\* |
| y12 | -0.446978 | 0.022283 | -20.059 | 2.00E-16 | \*\*\* |
| y14 | -1.361638 | 0.054684 | -24.9 | 2.00E-16 | \*\*\* |
|  |  |  |  |  |  |
| Residual SE: | 1.383 | DOF: | 46144 |  |  |
| R-Squared: | 0.2391 | Adjusted: | 0.239 |  |  |
| F-statistic: | 1611 | P-value: | 2.20E-16 |  |  |

Table 2: Combined Urban Sample

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Coefficients: | Estimate | Std. Error | t-statistic | P(>#) |  |
| postsecondary | 1.49882 | 0.02997 | 50.02 | <2e-16 | \*\*\* |
| seniorsecondary | 1.05557 | 0.02905 | 36.33 | <2e-16 | \*\*\* |
| juniorsecondary | 0.88624 | 0.02711 | 32.7 | <2e-16 | \*\*\* |
| primary | 0.55341 | 0.03122 | 17.73 | <2e-16 | \*\*\* |
| gender | 0.24503 | 0.01227 | 19.96 | <2e-16 | \*\*\* |
| y10 | -0.80633 | 0.02533 | -31.84 | <2e-16 | \*\*\* |
| y12 | -0.26977 | 0.02643 | -10.21 | <2e-16 | \*\*\* |
| y14 | -1.71081 | 0.07923 | -21.59 | <2e-16 | \*\*\* |
|  |  |  |  |  |  |
| Residual SE: | 1.242 | DOF: | 23150 |  |  |
| R-Squared: | 0.1986 | Adjusted: | 0.1983 |  |  |
| F-statistic: | 717.1 | P-value: | 2.20E-16 |  |  |

Table 3: Regression 3 - Combined Rural Sample

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Coefficients: | Estimate | Std. Error | t-statistic | P(>#) |  |
| (Intercept) | 8.85449 | 0.0369 | 239.93 | t | value |
| postsecondary | 1.33277 | 0.05009 | 26.61 | <2e-16 | \*\*\* |
| seniorsecondary | 1.04356 | 0.03552 | 29.38 | <2e-16 | \*\*\* |
| juniorsecondary | 0.94789 | 0.02609 | 36.33 | <2e-16 | \*\*\* |
| primary | 0.5698 | 0.02716 | 20.98 | <2e-16 | \*\*\* |
| gender | 0.38078 | 0.01434 | 26.55 | <2e-16 | \*\*\* |
| y10 | -1.40198 | 0.03401 | -41.23 | <2e-16 | \*\*\* |
| y12 | -0.66265 | 0.03585 | -18.48 | <2e-16 | \*\*\* |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Residual SE: | 1.448 | DOF: | 22284 |  |  |
| R-Squared: | 0.2376 | Adjusted: | 0.2373 |  |  |
| F-statistic: | 867.9 | P-value: | 2.20E-16 |  |  |

Table 4: Urban Females

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Coefficients: | Estimate | Std. Error | t-statistic | P(>#) |  |
| (Intercept) | 9.48845 | 0.04226 | 224.499 | t | value |
| postsecondary | 1.25608 | 0.04057 | 30.958 | <2e-16 | \*\*\* |
| seniorsecondary | 0.81127 | 0.03938 | 20.601 | <2e-16 | \*\*\* |
| juniorsecondary | 0.7265 | 0.0371 | 19.58 | <2e-16 | \*\*\* |
| primary | 0.35789 | 0.04175 | 8.572 | <2e-16 | \*\*\* |
| y10 | -0.73316 | 0.03114 | -23.543 | <2e-16 | \*\*\* |
| y12 | -0.3025 | 0.03248 | -9.314 | <2e-16 | \*\*\* |
| y14 | -1.33373 | 0.09561 | -13.95 | <2e-16 | \*\*\* |
|  |  |  |  |  |  |
| Residual SE: | 1.132 | DOF: | 12387 |  |  |
| R-Squared: | 0.1498 | Adjusted: | 0.1493 |  |  |
| F-statistic: | 311.8 | P-value: | 2.20E-16 |  |  |

Table 5: Rural Females

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Coefficients: | Estimate | Std. Error | t-statistic | P(>#) |  |
| (Intercept) | 9.36113 | 0.04409 | 212.31 | <2e-16 | \*\*\* |
| postsecondary | 1.14427 | 0.06011 | 19.04 | <2e-16 | \*\*\* |
| seniorsecondary | 0.94628 | 0.04176 | 22.66 | <2e-16 | \*\*\* |
| juniorsecondary | 0.8513 | 0.03236 | 26.3 | <2e-16 | \*\*\* |
| primary | 0.48013 | 0.03405 | 14.1 | <2e-16 | \*\*\* |
| y10 | -1.31387 | 0.03962 | -33.16 | <2e-16 | \*\*\* |
| y12 | -0.61447 | 0.04153 | -14.8 | <2e-16 | \*\*\* |
| y14 | -2.29392 | 0.11752 | -19.52 | <2e-16 | \*\*\* |
|  |  |  |  |  |  |
| Residual SE: | 1.303 | DOF: | 12909 |  |  |
| R-Squared: | 0.1981 | Adjusted: | 0.1977 |  |  |
| F-statistic: | 455.6 | P-value: | 2.20E-16 |  |  |

Table 6: Urban Males

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Coefficients: | Estimate | Std. Error | t-statistic | P(>#) |  |
| (Intercept) | 8.84775 | 0.04812 | 183.863 | <2.0E-16 | \*\*\* |
| postsecondary | 1.6339 | 0.04424 | 36.936 | <2.0E-16 | \*\*\* |
| seniorsecondary | 1.18685 | 0.04296 | 27.625 | <2.0E-16 | \*\*\* |
| juniorsecondary | 0.89749 | 0.03975 | 22.577 | <2.0E-16 | \*\*\* |
| primary | 0.62488 | 0.04677 | 13.361 | <2.0E-16 | \*\*\* |
| y10 | -0.87725 | 0.04052 | -21.649 | <2.0E-16 | \*\*\* |
| y12 | -0.2628 | 0.04234 | -6.207 | <5.6E-10 | \*\*\* |
| y14 | -2.19469 | 0.12995 | -16.888 | <2.0E-16 | \*\*\* |
|  |  |  |  |  |  |
| Residual SE: | 1.332 | DOF: | 10693 |  |  |
| R-Squared: | 0.2153 | Adjusted: | 0.2148 |  |  |
| F-statistic: | 419.1 | P-value: | 2.20E-16 |  |  |

Table 7: Rural Males

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Coefficients: | Estimate | Std. Error | t-statistic | P(>#) |  |
| (Intercept) | 8.81971 | 0.0614 | 143.65 | <2e-16 | \*\*\* |
| postsecondary | 1.48068 | 0.08454 | 17.52 | <2e-16 | \*\*\* |
| seniorsecondary | 0.98258 | 0.06398 | 15.36 | <2e-16 | \*\*\* |
| juniorsecondary | 0.89573 | 0.04347 | 20.6 | <2e-16 | \*\*\* |
| primary | 0.53316 | 0.04422 | 12.06 | <2e-16 | \*\*\* |
| y10 | -1.52397 | 0.05906 | -25.8 | <2e-16 | \*\*\* |
| y12 | -0.8317 | 0.06301 | -13.2 | <2e-16 | \*\*\* |
| y14 | -3.00963 | 0.14965 | -20.11 | <2e-16 | \*\*\* |
|  |  |  |  |  |  |
| Residual SE: | 1.593 | DOF: | 9300 |  |  |
| R-Squared: | 0.1971 | Adjusted: | 0.1965 |  |  |
| F-statistic: | 326.2 | P-value: | 2.20E-16 |  |  |

### Spatial Results Interpretation

Analysis of large/small coefficients

• Shanghai 0.724

o Accounts for 3.9% of China’s gross GDP while having 1.78% of China’s population o Excluding Taiwan, Hong Kong, Macau, Shanghai has the second highest GDP per

capita, after Beijing. Shanghai is a center for foreign investment and is known for

being a large finance center. • Zhejiang 0.696

o o

• Jiangsu o

o

• Jilin o

o

• Gansu o

o

Zhejiang has the 5th highest GDP per capita, and 4th highest GDP overall. In addition to being a coastal province, Zhejiang also contains the end of the grand canal, which makes trade, both domestic and international, very convenient. Zhejiang is among the provinces that benefited the most from the Chinese economic reform, aimed to increase privatization and de-collectivize agriculture. The annual real growth rate of GDP per capital is ~9%, signaling the fast growth of the province.

0.478

Jiangsu has 3rd highest GDP per capita just after Shanghai. As a province located by the coast, Jiangsu has been a center for economic development since hundreds of years ago. It is very dense in population, despite being the third smallest province in China. In addition, Jiangsu is China’s largest recipient of foreign direct investment, leading exports in electronic equipment, chemicals and textiles.

Jiangsu, like Zhejiang, is also a large beneficiary of the economic reform starting in the 1990s

-0.412

Jilin underwent early period of industrialization, but most of its industries are heavy industries, and it has been facing problems of privatization.

The region contains large deposits of oil shales and a large mineral reserve. This makes it easy to develop state-owned energy companies, while discouraging privatization and foreign invesetment.

-0.299

Gansu has the lowest GDP per capita in the entire country. It has a very large wealth gap between urban vs. rural areas. The industrial sector, e.g. machinery and petrochemicals, used to contribute a lot to Gansu’s growth. However, in recent years, there have been more environmental protection policies, which greatly restricted the growth of the manufacturing industries in Gansu.

A large part of Gansu’s economy is extracting minerals. Tourism is also a sector that’s gaining increasing importance in Gansu. Both industries, traditionally, are not ones that are fast growing in a modern society and may not increase the GDP that much.

• Guangxi Zhuang Autonomous Region -0.289

o The area has very expansive mountains and terrains, it also contains the largest portion of China’s ethnic minorities (Zhuang people make up ~32% of the population)

o The weather is fitting to grow rice, so there’re large rice terraces. Agriculture contributes more to their GDP than other provinces. The region also has low population density.

# Conclusions and Extensions

A final perspective

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1. For more detailed documentation and access to the survey, contact the soure institution at this link: [www.isss.pku.edu.cn/cfps/en](http://www.isss.pku.edu.cn/cfps/en) [↑](#footnote-ref-1)