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AN EMPIRICAL STUDY ON RETURN TO EDUCATION IN URBAN CHINA

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AN EMPIRICAL STUDY ON RETURN TO EDUCATION IN URBAN CHINA

A Thesis
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
Economics

by
Jin Han
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ABSTRACT

This study uses the most recent household survey data from 2007 to estimate return to education in urban China. Most existing literature are based on the data from 1990s and early 2000s and find that the rate of return to education in urban China has experienced a rapid increase. This study investigates whether the return to education is still in an increasing trend in later 2000s and how the return to education changed in recent years. The estimates of return in this study are lower than the findings in early 2000s. The higher education expansion started in 1999 made unbalance supply and demand in labor market, leading to unemployment for college graduates. This will reduce the over all return to education. Based on the survey data from 2007, the return to education for male and female do not show a significant difference. The return to education will be underestimated when using annual earning instead of hourly wage, especially for workers in private ownership sector, since the working hour bias the result. Finally, the return to education in province with advantage in education is higher than poor education province. Inequality of education is one of the factor influence the return to education and income distribution.

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SECTION 1

INTRODUCTION

Since economy reform began in 1978, China has experienced more than three decades of rapidly development. Its economy started to transform institutionally and structurally. China has moved from a socialist planed economy with fixed wage scales and virtually no labor mobility to a market-based system featuring a dynamic non-state sector and an increasingly open labor market. The economic transformation has stimulated rapid economic growth in both GDP and personal incomes. From 1978 to 2007 the annual growth of GDP averaged close to 10 percent and that of household per capita income more than 7 percent. The rate of economic growth was even more impressive in later years, including the period under study in this paper. From 2002 to 2007 annual GDP growth was 11.6 percent, and 9.6 percent in urban household income per capita.(Brandt & Holz, 2006)China's largely successful rapid economic and social transformation make changes in China's wage inequality over this period of particular interest, especially given the tension between widening disparities and the government's consistent espousal of a socialist ideology. By the year of 2007 the level of inequality in China was moderately high by international standards. With Gini index of approximately 0.5, China has the same situation like the countries in South and Central America like Mexico (0.51) and Peru (0.48), although the Gini index is still lower than these high-inequality countries such as Brazil (0.56) (Khan & Riskin, 2005). The Gini coefficient is a measure of income inequality, ranging from 0 to 1. 0 is for complete income equality, and 1 is for complete

income inequality. 0.4 is a warning line. It means the gap between poor people and rich people are too large. The Gini coefficient over 0.4 can cause a lot of social problems. The dispute between poor class and rich class will increase and rate of crime may increase. Because China accounts for approximately 20 percent of the world population, understanding of nature and cause of China's recent growth in wage inequality is critical for understanding of the changes in world inequality. To explain the wage inequality, I will find the return to education in China recently by using the human capital theory.

This study seeks to answer three questions using released data: first, whether the return to education is under estimated or over estimated in recent study; and second, what is the trend of return to education in later 2000s and what is the factor influencing this trend; and third, does the inequality situation of education in different provinces influence the return to education. The data are from the newest wave of the Chinese Household Income Project (CHIP-2007). The Mincer equation is used to estimate the return to education. Furthermore, some other variables are added to the model to explore more.

The major findings are as follows. First, comparing using annual earnings and hourly wages to estimate the return to education in urban China, the return to education is under estimated when using annual earnings, especially for workers in private ownership sectors. Second, differently from precious study, the return to education for male and female does not show a significant difference. Then the data from CHIP-1995 and CHIP-2002 are used to estimate to trend of return to education. Unlike the previous study

finding the rapid increasing trend, the return to education is in a decreasing trend after 2002 to 2007, from 9.2% to 6.9%. For the graduate from college and above, this decreasing trend is more obvious. Thirdly, the higher education expansion from 1999 should contribute to the recent downward trend of return to education by causing the unbalance supply and demand in labor market. At last, the return to education for the province with advantage in education is much higher than the province with poor education. The rate of return is 9.1% for Shanghai and 2.3% for Henan province.

The rest of the paper is organized as follows. The next section discusses the background of labor market institution and high education expansion. Previous study on return to education and high education expansion is discussed in section 3. Section 4 is about the methodology, the empirical model and data is discussed in this section. The empirical result is showed in section 5. Section 6 concludes and summaries.

SECTION 2
BACKGROUND OF LABOR MARKET AND HIGHER EDUCATION
EXPANSION

State-directed labor allocation was an integral part of system of economic planning instituted in the mid-1950s. To achieve industrialization rapidly, the government set the wage of worker at relatively low level to reduce the labor cost. The labor allocation decisions were centralized into the economic planners. Under this system, all the workers and employers were matched to jobs by government labor bureaus. Lifetime employment was guaranteed, but almost no labor mobility was permitted.

From 1950s to the later 1970s, a grade system was issued to determine and control the wages of all workers in urban area. This system was conducted by the bureau of labor and personnel. Eight distinct grade level for factory workers and technicians and twenty-four levels for administrative and managerial workers were specified. The wage rate was based on seniority rather than productivity. At that period, the wage difference firstly caused by schooling but in a very small scale. The government effectively eliminated most of the private cost of education by waiving all tuition and fees for college student.

By the end of 1970s, the planning system led to poor effort incentives, depressed productivity, and smothered innovation. This situation caused widespread resource

misallocation. To change this dire situation, the new leader Deng Xiaoping promoted new policies to reform the economy beginning in the early 1980s. The policy of returning land to individual households to manage led to rapid productivity and income growth in the rural area. However, the urban reform did not proceed until the middle and late 1980s. The Communist Party passed the “Resolution on Economic Institutional Reform” in October 1984, which changed the total wage quota system allowing profitable firms to pay higher salaries and letting employers pay bonuses to more productive workers. The system of permanent employment also ended by the reform. The State Council issued “Temporary Regulations on the Use of Labor Contracts in State-Run Enterprises” in 1986, and formally introduced labor contracts to the labor market. Contract workers accounted for only 4 percent of total employment in 1985, but this number increased to 39 percent in 1995. (Meng, 2000)

To compete with the public-owned enterprises, non-state enterprises, including private, foreign and mixed ownership enterprise, have emerged as prominent players in the labor market. These firms have rejuvenated the labor market and provided an impetus for state-sector restructuring. The question I want to answer in this paper is how the labor policy influence the education return and the return of education return recently.

China’s higher education is in transition at the same time as the economy transition, and is stilling transforming. The scale of higher education in terms of new accepted college students and graduates kept increasing after the beginning of open and reform policy.

However, the increasing scale is not large until late 1990s. The China's government decided to enlarge the scale of high education at 1999. As a consequence, the amount of new accepted students to college increased by 40% in 1999 comparing to 1998. By the end of 2005, the number over quadrupled.(Wan, 2006) This unexpected expansion is called great leap forward in higher education. In this paper, I want to find the influence of this radical policy on the education return to college student.

SECTION 3

LITERATURE REVIEW

There are many methods to explore the income distribution. Human capital theory is one of the most used theories. Jacob Mincer (1974) found that the distribution of labor incomes is a function of schooling and experience. What he developed is called human capital earnings function. The equation has been examined by using many datasets worldwide. The logarithm of earnings is modeled as the sum of years of schooling and a quadratic function of years of experience. The common opinion about the wage inequality is that the increasing of return to higher education is the most reasonable factor to explain the wage inequality in U.S recent decades.

Most existing studies find very low returns of income to education in China. Byron and Manaloto (1990) found the education return is less than 4% by using a sample of 800 adults from 1986. Knight and Song (1991) reported that the effect of education on earnings is extremely slight by using education dummy variables based on a sample of 3600 observations. They are firstly using education level dummy variables to see the different education return to different education level. At the same time, Johnson and Chow (1997) and Liu (1999) used the data from the 1988 Chinese Household Income Project (CHIP-88) to estimate a 3-4% education return. And Liu (1998) concluded that the education return is 37.5% for college graduate, 19.1% for high school and 7.5% for primary school. Because of the rapid development of China attracted more and more

attentions the education return in China was explored by more scholars. The estimating of education return is a complicated process, so the estimating result may differ a lot even though using the same data. Zhang&Zhao (2002) analyzed the education return from 1988 to 1999, and they found there is a huge increasing education return from 4.7% in 1988 to 11.5% in 1999. At the same time, they claimed the return to physical capital decreasing from 12% to 6.5%. Based on their research, they concluded China had a shortage of human capital investment. Li and Ding (2004), using a sample of more than 9000 observations from 2002 Chinese Income Project (CHIP-2002), reported an increasing trend of education return from 1988 to 2002.

Despite the estimated return by Zhang&Zhao, most of the estimated returns are considerably lower than the 10.1% world average and the 9.6% Asian average, as well as the 11.2-11.7% range for low and middle-income countries (Psacharopoulos, 1994). Gannicott (1984) estimated the education return in Taiwan reporting a return of 16.1% for female and 8.4% for male, much higher than that in Mainland China. In the previous studies, because of the data limitation, the estimated results were based on monthly or annual wage rate. And the monthly or annual wage rates clearly depended on the working hours. This omitted working hour variables may bias the result. Li and Zax (2000) found that the most educated tend to work for the fewest hours on average. For example, the working hour per week for college graduates and above is about three hours lower than graduates from middle school.

Most of the countries have experienced the high education expansion or still is experiencing the high education expansion. Because of some historical factor, the high education expansion is much later than western countries. So the study on high education expansion in western countries is earlier. In 1976, Freeman explored how the high education expansion influences the income of college graduates. He found that the education return to college graduates in U.S is decreasing from 1960s to mid 1970s, relative to the education return to high school graduates. He thought the decreasing education return was caused by over educated from the high education expansion. Bishop (1995) reported most of the European college graduates experienced a lower rate of wage increasing than non-college graduates from 1960s to 1970s. The education return to college graduates in U.S was also in a decreasing trend in 1970s. To explain this lowering trend of education return to college in U.S, Mincer (1991) claimed the reason was “baby boom” effect. The amount of college graduates comparing to the amount of low education worker increased rapidly in 1970s. Jeff Grogger Eric Eide (1995) replaced the education level to SAT result and high school grade, found that return to SAT result and high school grade did not change a lot in 1980s, although the return to education experienced a rapid increasing in 1980s. Taber (2001) also explained the education return by comparing the difference skill earned in college and the demand of skills by employers. Ian Walker and Yu Zhu (2008) analyzed the return to education in U.K between 1994 and 2006, the high education expansion period in U.K. They found the supply of college graduate exceeded the demand of labor market and caused the decreasing trend of return to education.

According to the historical reason, the high education expansion started relatively late in China. The high education expansion started from early 1990s, but relatively slow before 1999. In 1999, the central government issued some policy to push the high education expansion. Because the expansion started late, the study about high education expansion effect started very late. Thus in recent years, scholars have paid more attention to the relation between high education expansion and labor market. Those studies focused on high education and employment rate, high education expansion and income distribution, and return to education.

He and Zhang (2005) analyzed the situation and trend of college graduate in job seeking, the factors influencing graduates to choose a job, the preference of the college graduates, based on their own survey to college students. Lai (2003) concluded unemployment was the certain consequence of high education expansion. For example, the employment rate of college graduates students declined in India and South Korea, at the same time as the expansion of high education. Yu (2001) developed the macro data covering 29 provinces to analyze the impact of high education expansion on income distribution. The conclusion was that the high education expansion would improve the equality of income distribution.

He Yiming (2009), using the data of China Health and Nutrition Survey (CHNS), analyzed the change in return to education to explore the impact of high education

expansion. Based on the regression of Mincer equation, the conclusion was reported as the return to education for college graduates experienced a rapid increase in 1990s, and then decreased in 2004-2006. It showed a reducing effect on return to education by high education expansion.

As a transition economy, there are many questions for the rapid developing economy. One of the core questions is whether the labor market in China has totally transferred to a labor market in market economy, so those firms of different ownership can compete in a perfect competitive market. Lardy (1998) suggested that the transition of labor market in China did not complete. Some studies concluded the factors influencing the income in different ownership are different. The mobility of labor in different ownership and region was bad. (Dong and Bowles, 2002; Knight and Song, 2003) Chen (2005) claimed the reason why the labor in public ownership did not want to move out was the average wage in state-own enterprise was higher than the average in whole market. Zhao (2010) found the main factor causing the wage inequality was the difference between different industries, and the different ownership only contributed a little to the wage inequality.

Xing (2005) based on the data of Chinese Health and Nutrition Survey (CHNS) from 1989 to 1997, estimated the difference in return to education for the workers in public versus private sector employment. He found the education return was highest in private-own enterprise, and much higher than other ownership. The model used to estimate is the multiple logit model. This analysis provided some experience for my research. However,

the data used is long time ago and the education to different education level was not considered in that research.

SECTION 4

METHODOLOGY

4.1 Data

According to my literature review, the dataset used to estimate the education return in China always comes from 4 national surveys. These four relatively reliable surveys are Chinese Household Income Project (CHIP) conducted by Ford Foundation, Chinese Health and Nutrition Survey (CHNS) conducted by Carolina Population Center at the University of North Carolina at Chapel Hill and the National Institute of Nutrition and Food Safety at the Chinese Center, Chinese General Social Survey conducted by social science department Remin University of China and annual Urban Household Survey (UHS) conducted by the National Bureau of Statistics (NBS).

In this paper, I used the data of Chinese Household Income Project (CHIP). To track the dynamics of income distribution in China, the Chinese Household Income Project (CHIP) has conducted four waves of household surveys, in 1988, 1995, 2002, and lastly 2007. These surveys were carried out as part of a collaborative research project on incomes and inequality in China organized by Chinese and international researchers, with assistance from the National Bureau of Statistics (NBS). The CHIP-2007 is mainly used in my paper to estimate the return to education recently. This project was initiated by a group of researchers at the Australian National University and Beijing Normal University, and was supported by the China National Bureau of Statistics (NBS) and the Institute for the

Study of Labor (IZA). CHIP survey consists of three parts: the Urban Household Survey, the Rural Household Survey and the Migrant Household Survey. In this paper, I am only concerned with the Urban Household Survey. For the surveys of urban local households, a total of more than 5000 households and 12,000 individuals were selected from nine provinces. The CHIP-2007 was not released to public until February 2014, the scholars and students could apply the dataset online to do research.

To explore the trend of the return to education in China recently, CHIP-1995 and CHIP-2002 will be used to do the regression. These CHIP surveys did not necessarily cover the same household, so they are not panel data. The sample is selected based on individuals aged 18-60. It only contains workers with positive monthly working hour and wage. Owners of enterprises were excluded, since their wage cannot be separated from profit earning.

4.2 Empirical model

The most widely used form for statistical wage function is the following Mincer type equation (Mincer, 1974),

$$\ln Y_i = \beta_0 + \beta_1 S_i + \beta_2 X_i + \beta_3 X_i^2 + \varepsilon_i,$$

In the equation, Y_i is the wage rate, S_i is years of schooling, and X_i is years of labor market experience. Wages are determined by investment in human capital, according to

human capital theory. Schooling and job training are main types of investment. In general, experience is used as a proxy for job-training investment. Because wages will reach their peak when human capital is in biggest level. As years of experience increasing, human capital depreciation will eventually dominate accumulation and wage rates will decrease. Then the wage–experience profile should follow a parabolic shape in experience. In the equation, β_1 represents the return of an individual from the school education, ignoring the cost of education. β_2 and β_3 represent the return of an individual from the job experience.

Since the S_i in the equation is a continuous variable, the coefficient of β_1 represents the average return to education. Under this education system, most people received the education in different level, like primary school education, high school education and college education. For people graduated from different level of education will have different return to education. To estimate the return to education for different education background, the Mincer equation can be adjusted as follow:

$$\ln Y_i = \beta_0 + \beta_1 S_1 + \beta_2 S_2 + \beta_3 S_3 + \beta_4 S_4 + \beta_5 S_5 + \beta_6 X_i + \beta_7 X_i^2 + \varepsilon_i,$$

In this equation, S_1, S_2, S_3, S_4, S_5 represent graduating from primary school, middle school, high school, professional school and college gradates.

There are some additional factors that could influence the income level and education level of individual, and their omission would bias the result. To solve this problem, factors like gender, ethnicity, ownership of employment and industries should be

considered in the model. Thus some dummy variables are added in the Mincer model.

4.3 Variables

Based on the previous literature review, the return to education may be overestimated by annual earning, because the most educated tend to work for the fewest hours on average. To make sure the estimation is reliable, the both of annual earning and hourly wage are used as dependent variables.

The standard Mincer equation contains three independent variables, the year of schooling, the year of job experience and squared job experience. In my extended Mincer equation, the independent variable years of schooling is replaced by five different education variables. These five dummy variables are college graduate and above, professional school graduate, high school graduate, middle school graduate and primary school graduate and below.

To control the other factors may bias the model, the dummy variables gender and ethnic are added to the model. Different industries have different features, so dummy variables agriculture, manufacturing and finance are added to the model to see whether the return to education have different patterns. Similar to industries, dummy variable civil servant, public ownership, private ownership and foreign ownership are added to the equation. Furthermore, to see the education return in different province, I used province dummy

variable to estimate the difference. The overall definition and descriptive statistics of these variables could be seen in the Table 1.

Comparing the previous CHIP, the earning measure in CHIP-2007 survey is very comprehensive and clear. To get the data of wage rate, the question about earning only from the current job payment was asked. This wage item is in annual term. Yet, there always comes a question of the reliability of data from China. The CHIP was conducted by western institution, and CHIP-2007 is the third wave of CHIP survey. It was built on the experience of CHIP-1988, CHIP-1995 and CHIP-2002. I hope the reliability of this data set is higher than other available data from China.

In another question, the survey asked the number of working hours per week. Using the annual earning and the number of working hours per week, I can calculate the hourly wage. Based on the data, using annual earnings, the wage difference between different educational groups. For example, the annual earning of the college graduates and above is 42% higher than those who has middle school diploma. However, in terms of hourly wage rate, those who have college diploma earn 57% higher. Obviously, the middle school graduates work more hours to reduce the annual income gap.

The CHIP-2007 provides information on years of schooling by ask a direct question: how many years of formal education have you had (excluding skipping or failing a grade)? To get the information of years of job experience, I used a question on the survey, which

when you started to work. The year of job experience was calculated by using the year of 2008 minus the year of starting to work.

The education measure in the survey includes nine categories based on degrees. To estimate the returns to different education level, I combined these nine categories into five categories following other previous study. The categories never been to school, literacy class and elementary school are combined to primary school and below when assigning education dummy. The categories junior middle school and senior middle school are defined as dummy variable middle school and high school. The dummy professional school is combined from specialized secondary school and polytechnic college. The last dummy college is combined from undergraduate and graduate. We can see from the Table 1, the proportion of five categories from primary school to college is 2.7%, 18.9%, 25.4%, 34.4% and 18.2%. The proportion of the different education level changed a lot in one decade. These proportions in 1995 survey are 5.4%, 30%, 24%, 17% and 15%. Although the proportion of college graduate did not change a lot, the lower education level professional school doubled from 17% to 34.4%.

The dummy variables agriculture, manufacturing and finance are come from the question asked about the working industry. The ownership dummy variables are combined from the question asked about the ownership. The four dummies I used in the estimating are from 15 categories in the survey. I conducted these categories to civil servant, public ownership, private enterprise and foreign enterprise.

SECTION 5

EMPIRICAL RESULT

5.1 Return to schooling and education degrees in 2007

The Mincer equation is used to estimate the return to education for annual earnings and hourly wage rates. The wages can also be affected by market conditions like supply-side and demand-side interaction, according to human capital theory. Thus industry dummies and ownership dummies added to control the differences in wage determination. Based on the previous literature, gender and ethnic dummies are added to control the extension of wage differences.

According to previous discussion in literature review, annual earnings will be directly related to working hours, and working hours is correlated to education. The estimation based on annual earnings will be biased if the working hours are not controlled well. The education may be underestimated using annual earnings. The estimation results from annual earnings and hourly wage are shown in Table 2. Two measures of schooling are used: years of schooling and degree dummies.

The regression results clearly shows that the return to education is underestimated using the annual earning, but the return to experience is over estimated. In general, the return to education is lowered by 0.65 percent, and this difference is statistically significant by chow-test. The overall estimations of return to education will be about 12% higher if

hourly wage rates are used. If I do the regression based on education dummies, the underestimation effect is more obvious. For each education level above primary school, the returns are about 20%-90% higher when using the hourly wage. We can see that when education level lowered, the difference between annual earning return and hourly wage return becomes larger. Because the less-educated worker will work more hours to get payment, the gap between earning difference and hour wage. The overestimation of the return to experience is not sizable. There is a 0.2 percent gap between experience return to annual earning and hourly wage. It is not statistically significant.

There is a very interesting comparison between return to education based on annual earning and hourly wage. In my regression, ownership dummies are added to see whether return to education is influenced by ownership. Four categories are generated, civil servant, public ownership, private ownership and foreign ownership. I omitted the public ownership dummy in the regression. The difference between return to education based on earning and wage for civil servant and foreign ownership is not significant. However, the return to education using annual earning for private ownership is 5.3% higher than public ownership. When using hourly wage, the positive 5.3% turns to a negative 4.9%. Obviously, the workers in private sector work more hours than the workers in public sector. Private ownership workers get good annual earning, because of over working time. This result is very reasonable, since overtime work is common for private enterprise employees.

When education level dummy variables are used, the group graduated from primary school and below is omitted as base group. The graduates from college and above earn 147% more than those graduates from primary school; the graduates from professional school earn 82% more; the high school graduates earn 37% more and those graduated from middle school earn 18% more (for dummy variables, the percentage change in wage d_i for group i relative to the base group can be calculated by $e^{\beta_i - 1}$, where β_i is coefficient for the dummy variable for group i).

There is one method to calculating what the return to each education category based on the regression with years of education. It will be very meaningful to comparing the return to each education level with the coefficient of regression with different education level dummies. To using this method I need to define how many years does a individual need to get a degree of college, professional school, high school, middle school or primary school. However, there are some difficulties to define the years. For example, in the questionnaire, the bachelor degree, master degree and doctoral degree are combined in college and above. It may takes 16-24 years in this category. Also, for some students, they may stay in high school for more than 3 years to get admission to college. For talent students, it is very easy to finish primary school less than 6 years. This phenomenon will cause errors in estimating the years of schools. So I do not use this method to calculate the return to each education level.

According to the previous study, the return to education for females is higher than for males, because fewer women than men attain higher education and thus the reward is larger. However, the difference of return to education between female and male in this analysis is only 0.15%, and it is not statistically significant. Also when I run the regression with different education levels for females and males, the estimation result proved the same conclusion. The return to college graduates for females and males are 8.7% and 8.9%, they are not significantly different. The changing of female higher education may be the main reason. The proportion of graduate from college and above is 19.2% and 16.7% for male and female in 2007. These proportions in 2002 are 12.9% and 7.9%. We can see that more and more female get high education, the education inequality for female is reducing based on the lack of a significant difference of return to education.

Based on human capital theory, the wage-experience profile follows a parabolic shape. The wage peak occurs at about 60 years of experience. It means if a person starts to work at 20 years old, the wage is highest at his 80 years old. This result is much higher than the result from the previous studies, 41 years of job experience from Johnson and Chow (1997). This finding is not so reasonable, but we can see the job experience becomes more important.

5.2 The trend of the return to education from 1995 to 2007

As discussed earlier, previous studies about the return to education in China found the return to education was increasing as the economy developed and reformed. The changing labor policy contributed a lot to the return to education. Before 1990s, the wage rates in China were largely set by the central administration, and seniority was the core factor that determines an individual's wage. Under this egalitarian regime, the difference of wages is very small and so as the return to education. After 1990s, the labor market transformed to market-oriented wage system. Wage differentials were allowed and wage flexibility increased. During this period, the return to education increased rapidly. However, the trend of education after 2000 is not clear, because the limitation of data and the labor policy becomes stable.

Using the wage rate, years of schooling and years of experience from CHIP-1995, 2002 and 2007, based on standard Mincer equation, I get the return to education in 1995, 2002 and 2007. The regression result can be seen in Table 3. The return to education is 4.7%, 9.2% and 6.9% in year of 1995, 2002 and 2007. The trend of the return to education is shown in a figure 2 in appendix. First, a rapidly increasing of return can be seen in 1990s, the education return increased form 4.7% to 9.2%. Second, the return of education is not a straightly upward trend. The return to education in 2007 is lower than in 2002. The reason behind the downward trend in 2000s will be discussed in next section.

5.3 The effect of the high education expansion

According to the result from previous section, the trend of return to education from 2002 to 2007 is downward. The higher education expansion may contribute to this reducing in return to education. In the literature review, I have reviewed the development of higher education expansion in China. In 1999, the central government issued some policy to push the high education expansion. The college enlarged their scale and more and more students got the chance to have high education. We can also see this expansion from data, the proportion of college graduate and above is 18.2%. This proportion in 2002 is 10.7%. In 5 years, the proportion of college graduates increased 70%. The college graduates increased rapidly, but the market need some time to adjust to the expansion of higher education. We can follow this situation in figure 4. The supply of the labor market increases and the higher education expansion shift the supply curve moves to the right., however, the demand of the labor has no change. So this moving of supply curve will decrease the wage rate of the labor. And the skills learned in college may not be needed in labor market, the college graduates have to do some job unrelated to their major. Even more, the college graduates have to compete with low-educated labor to get unskilled jobs. All these reasons contributed to decreasing of return to education. From Table 4, we can analyze this in detail. Using the extended Mincer equation, I do the regression for different education level. The education level dummies replaced the years of schooling in the model. In 1995, the college graduates and above earned 84% more than the graduates from primary school and below. The method of calculation is same as previous sector.

This earning gap was as large as 228% in 2002. We can see the education to higher education increased rapidly. However, this gap decreased to 166% in 2007. The college graduates and above did not get return as high as in 2002. For these graduates from middle school, this rate in 1995, 2002 and 2007 is 16.5%, 28% and 20%. The downward trend is not as sharp as for college graduates. Under this comparison, we can see the significant effect of the higher education expansion for the changing of return to education.

5.4 The return to education in different province

The last part I want to talk about the high education inequality in different province. There is a grading system for universities in China. They are graded to 3 major classes, A-class, B-class and C- class. A-class universities are best in China. Most of them are state-own universities and public universities. Those well-know universities like Peking Universities or Tsinghua University are in this class. B-class and C-class are not as good as A-class. The grade of the college entrance exam is the only reference for a student to get into universities. However, the students from different province get the different chance to join the college, because different universities give different quota for different province. For example, Peking University gave a quota of 180 to students from Beijing, but this quota for Shandong province was 70. The total student had college entrance exam was 700 thousand, much higher than the total number of 100 thousand in Beijing in 2007. In overall, the A-class universities acceptance rate for different province in 2007

ranged from 3.5% to 20.1%, lowest for Henan province and highest for Beijing and Shanghai. These data is from Yearbook of 2007 by national bureau of statistics.

In CHIP-2007, there is a question asked about province of attended the college entrance exam. I chose the individuals attended the exam in Shanghai and Henan province to see if the return to education is different. The result can be seen in Table 5. The average return to education for individuals who attended college entrance exam in Shanghai is 9.1%, but this rate for those had exam in Henan province is only 2.3%. This return to education for whole country is 6.1%, seen in Table 1. This difference is really huge. The return to education for Shanghai is almost 4 times than this rate for Henan. The students in Henan cannot have equal chance to go to A-class universities, especially to those famous universities. However, the degree of good universities is the most important condition to get a good-paid job. This inequality in different province leads to huge difference of return to education. This may contribute to the inequality of income distribution in different provinces.

SECTION 6

SUMMARY AND CONCLUSION

Most of existing studies on returns to education in China are based on data from 1990s and early 2000s, and find that the rates of return increased rapidly. This study uses the most recent data to estimate returns to education in urban China. The objective is to investigate whether the returns in previous studies have been underestimated or overestimated, and whether the return to education is still in an upward trend in later 2000s. The effects of higher education expansion and education inequality are also explored in this study.

This study finds that the overall return to education in 2007 is about 6.08% lower than this rate in 2002. The rate is 6.07% for male and 6.16% for female. This difference is not statistically significant. Comparing the higher education rate for female in previous studies, the unequal status for female improved recently and more and female get higher education. By using annual earning and hourly wage to regress Mincer equation, this study finds that the return to education will be underestimated by using annual earning, since the lower education worker will work more hours to increase annual earnings. This underestimation is also very obvious for private-ownership workers, which the return to education for private-ownership worker is higher than public-ownership workers using annual earning. With the extended of Mincer education, the return to different education level is found. The return to college graduates and above is about 147% higher than

graduates from primary school and below. This large difference shows that the education is still a significant reason to wage inequality.

Secondly, in effort to see whether the return to education is still trending up, the data from CHIP-1995 and CHIP-2002 are used to analysis. This study finds that the rate of return is increasing from 1995 to 2002, but a downward trend is found from 2002 to 2007. The return to education did not increase continually. From 2002 to 2007, the overall return to education decreased from 9.2% to 6.9%. Higher education expansion is likely the main reason for this trending down. More and more individuals get the chance to have high education, and graduated from college. However, the labor market cannot adjust to this expansion immediately. This imbalance between supply side and demand side of labor market leads to unemployment and results in some college graduates to taking low pay jobs. The lower overall wage rates for college graduates reduce the return to education. With the regression result of extended Mincer equation, we can see the rate of return to different education levels. In 2002, the college graduates earn 228% more than primary school graduates. However, this number in 2007 is only 166%. The higher education expansion cause less return to college graduates.

Whether the unequal condition of high education in different provinces influences the return to education was explored in previous studies. In this study, I compare the return to education for those taking college entrance exams in Shanghai and in Henan province. The result shows a great gap between these two groups of people. The return for

Shanghai is 4 times larger than this return for Henan. Although I cannot control all variables that could bias the result, to some extent this large difference result from the effect of high education inequality. The students in Shanghai get more chance to get into better university. Thus better university means higher wage rates, this inequality leads to huge return gap between Shanghai and Henan.

At last, the return to education in China is still in a low level, comparing to western countries. The higher education expansion leads to an imbalance supply and demand in labor market, make the return to high education to decrease. It means the education reform is not done yet, and the high education should pay more attention to the demand of the market. Also the status of education inequality should be improved to narrow the wage inequality in different provinces.

Like other existing studies based on the available data and the OLS estimation, it is not very clear that how reliable the data is and if omitted variables significantly bias the results. For example, some previous study found the member of communist party get special treatment for wage. However, this question is not asked in the CHIP-2007 survey. I cannot add this dummy variable to control the influence of communist party member. It will be of interest to investigate these above issues in detail make more reliable suggestions in future studies.

APPENDICES

Appendix A

Tables

Table 1
Variable definition and descriptive statistics

Variable	Definition	Mean	Obs	Std.Dev
Schooling	Years of school	12.22	6402	3.35
College	College or above	0.182	6402	0.386
Professional school	Professional school and technical school	0.344	6402	0.475
High school	High school	0.254	6402	0.435
Middle school	Middle school	0.189	6402	0.390
Elementary	Elementary school and below	0.027	6402	0.161
Experience	Years	11.55	6402	10.41
Experience squared		241.78	6402	353.18
Gender	1 for male, 0 for female	0.578	6402	0.493
Ethnic	1 for majority, 0 for minority	0.989	6402	0.101
Agriculture	1 for agricultural industry, 0 for other	0.011	6402	0.104
Manufacturing	1 for manufacturing industry, 0 for other	0.183	6402	0.387
Finance	1 for finance industry, 0 for other	0.037	6402	0.189
Civil	1 for civil servant, 0 for other	0.0796	6402	0.27
Public	1 for public owned, 0 for other	0.243	6402	0.499
Private	1 for private owned, 0 for other	0.311	6402	0.479
Foreign	1 for foreign owned, 0 for other	0.045	6402	0.207
Earning	Annual earning	28258.8	6402	29437
Wage	Hourly wage	14.74	6402	22.15

Table 2
Return to education in 2007

Variable	Earning	Wage	Earning	Wage	Wage (male)	Wage (female)	Wage (male)	Wage (female)
Schooling	.054*** (.002)	.061*** (.002)			.060*** (.003)	.061*** (.006)		
College			.741*** (.048)	.911*** (.053)			.892*** (.071)	.875*** (.079)
Professional school			.447*** (.046)	.593*** (.0509)			.581*** (.069)	.552*** (.074)
High school			.192*** (.046)	.318*** (.051)			.360*** (.069)	.226*** (.075)
Middle school			.086* (.047)	.162** (.052)			.186** (.071)	.105*** (.077)
Experience	.031*** (.0022)	.030*** (.002)	.031*** (.002)	.029*** (.0024)	.029*** (.0032)	.035*** (.004)	.027*** (.0032)	.032*** (.004)
Experience squared	-.0006*** (.00006)	-.0005** (.00007)	-.0005*** (.00006)	-.0004*** (.00007)	- (.00009)	- (.00014)	- (.00008)	- (.0001)
Gender	.255*** (.016)	.221*** (.0180)	.256*** (.016)	.222*** (.017)				
Ethnic	.123* (.078)	.172* (.086)	.156** (.077)	.209* (.085)	.258* (.116)	.044 (.129)	.294 (.114)	.075 (.127)
Agriculture	.013 (.076)	.030 (.084)	-.0126 (.075)	-.0013 (.083)	.050 (.112)	.015 (.128)	.036 (.110)	-.020 (.125)
Manufacturing	-.099*** (.021)	-.092*** (.023)	-.075*** (-.020)	-.067** (.022)	-.037 (.030)	-.185*** (.037)	-.03* (.029)	-.142 (.036)
Finance	.240*** (.042)	.27*** (.046)	.192*** (.041)	.218** (.045)	.281*** (.071)	.257*** (.061)	.234** (.069)	.181** (.059)
Civil	.206*** (.030)	.225*** (.033)	.157*** (.0303)	.170*** (.034)	.234*** (.0432)	.226*** (.055)	.456*** (.084)	.37** (.083)
Private	.053** (.018)	-.049** (.020)	.088*** (.018)	-.0069* (.020)	-.014 (.028)	-.089*** (.029)	.295** (.077)	.144*** (.068)
Foreign	.472*** (.039)	.462*** (.043)	.431*** (.039)	.419*** (.043)	.415*** (.061)	.522*** (.062)	.649*** (.094)	.66*** (.087)
Summary	R-squared = 0.1794	R-squared = 0.1805	R-squared = 0.2120	R-squared = 0.2184	R- squared = 0.1429	R- squared = 0.1847	R- squared = 0.1811	R- squared = 0.2328
Statistics	F=125.52 N= 6402	F=125.98 N=6402	F=122.10 N=6402	F=126.29 N=6402	F=60.44 N=3637	F=60.13 N=2665	F=57.64 N=3637	F=57.78 N=2665

Table 3
Trend of return to education

Variable	1995	2002	2007
Schooling	.0466*** (.002)	.0924*** (.002)	.0692*** (.003)
Experience	.0489*** (.002)	.0224*** (.0007)	.0311*** (.002)
Experience squared	-.0006*** (.00005)	-.00001*** (.000003)	-.0004*** (.00007)
Summary Statistics	R-squared = 0.1921 F=803.59 N=10141	R-squared = 0.1893 F=729.92 N=9380	R-squared = 0.1519 F=319.05 N=6302

Table 4
Trend of return to different education level

Variable	1995	2002	2007
College	.612*** (.031)	1.194*** (.043)	.982** (.053)
Professional school	.430*** (.026)	.821*** (.039)	.621*** (.0517)
High school	.274*** (.027)	.543*** (.039)	.326*** (.052)
Middle school	.156*** (.026)	.293*** (.040)	.196*** (.053)
Experience	.0497*** (.002)	.022*** (.0007)	.028*** (.0024)
Experience squared	-.0006*** (.00005)	-.000011*** (3.52e-07)	-.0004193*** (.00007)
Summary Statistics	R-squared = 0.2066 F=444.05 N=10240	R-squared = 0.2097 F=414.53 N=9380	R-squared = 0.1807 F=232.91 N=6344

Table 5
Different return to education in different province

Variable	Shanghai	Henan
Schooling	.0908*** (.015)	.022** (.0108)
Experience	.0707*** (.014)	.053*** (.016)
Experience squared	-.0021*** (.0005)	-.0014 (.0005)
Gender	.3493*** (.071)	.157** (.087)
Ethnic	-.110 (.531)	-.131 (.339)
Agriculture	Omitted	.268 (.352)
Manufacturing	.076** (.053)	.076** (.0518)
Finance	.046* (.463)	.561*** (.209)
Civil	.153* (.142)	.21* (.13)
Private	-.028*** (.009)	-.126 (.116)
Foreign	.585*** (.097)	1.07*** (.405)
Summary Statistics	R-squared = 0.4154 F=14.57 N=216	R-squared = 0.1802 F=4.54 N=239

Appendix B

Figures

Figure 1

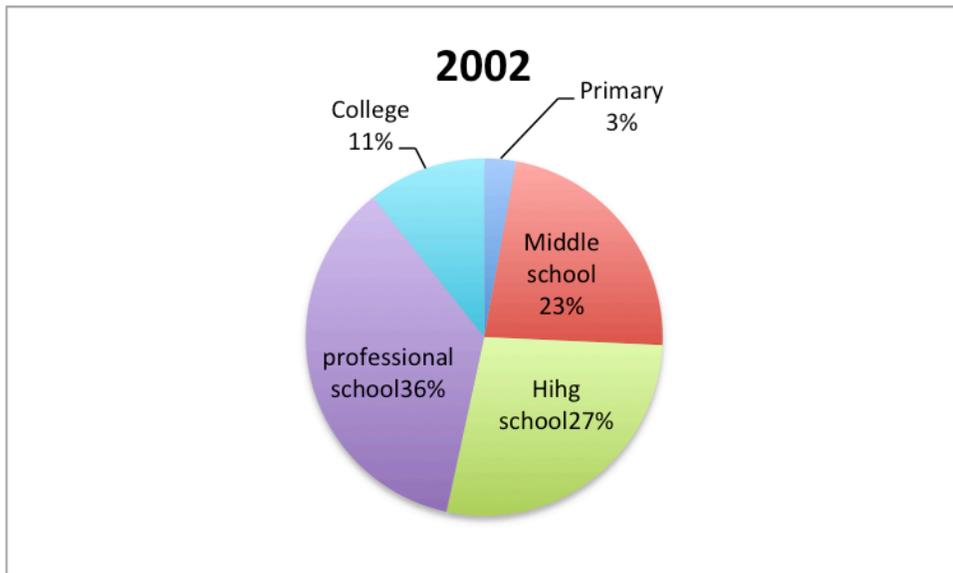
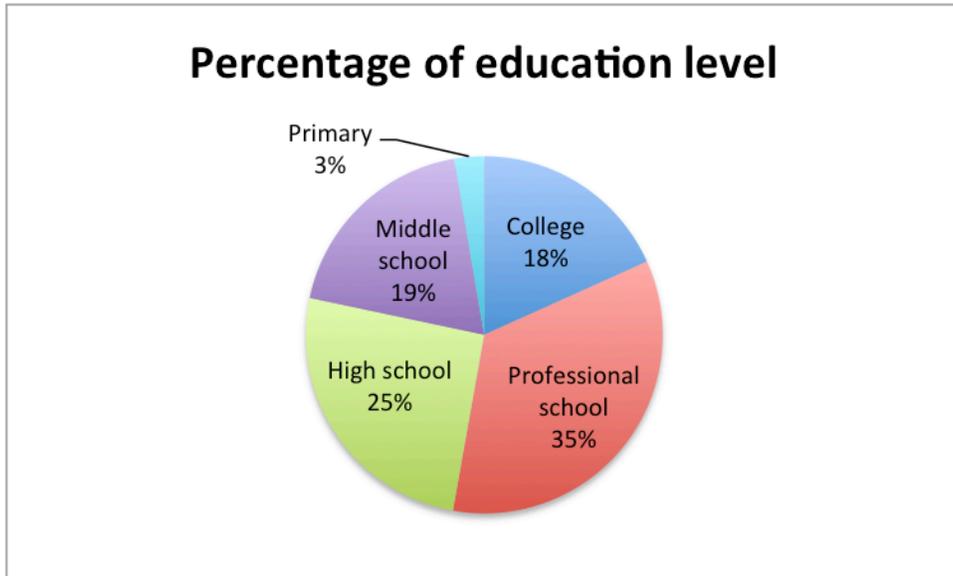


Figure 2

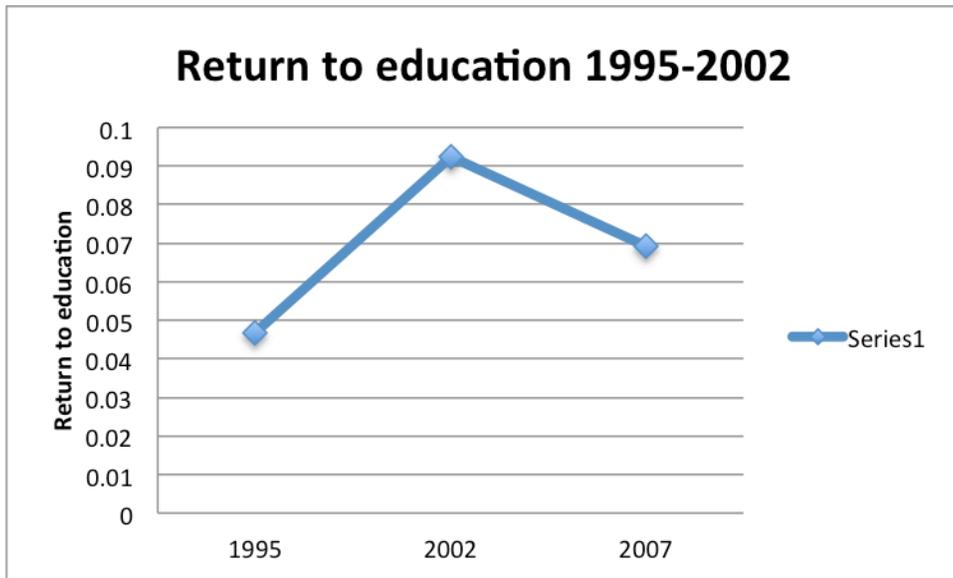


Figure 3

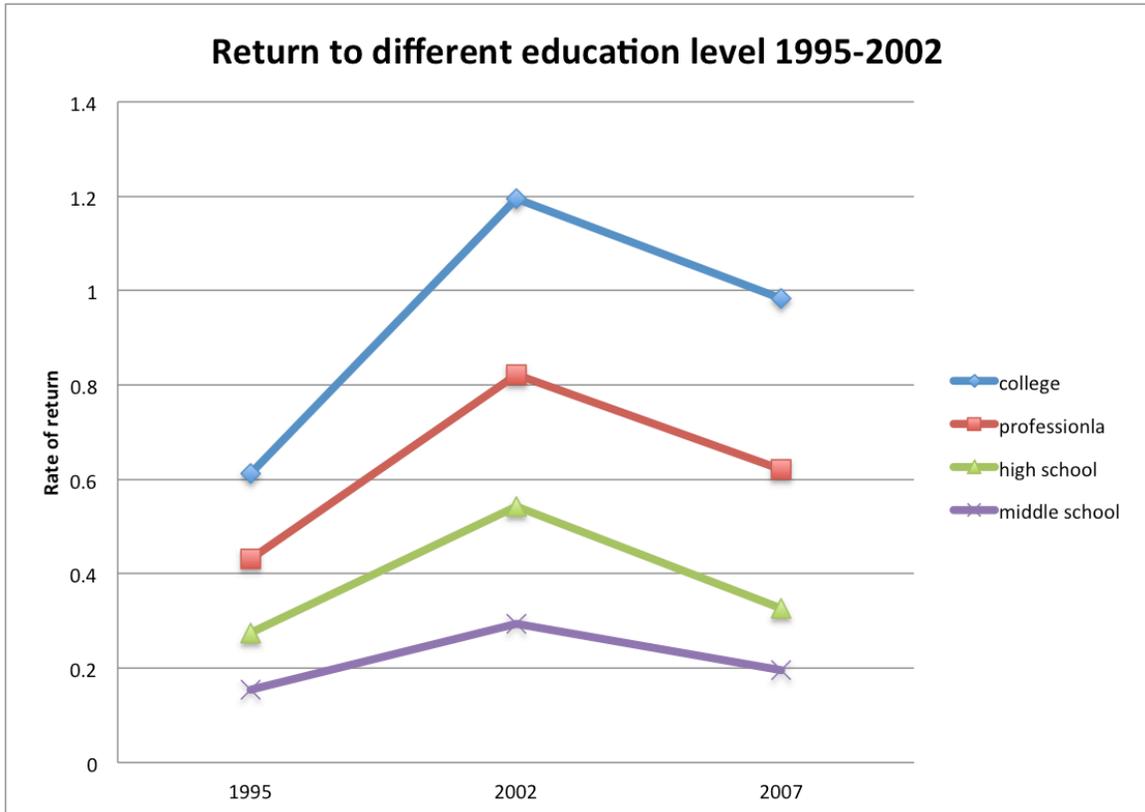
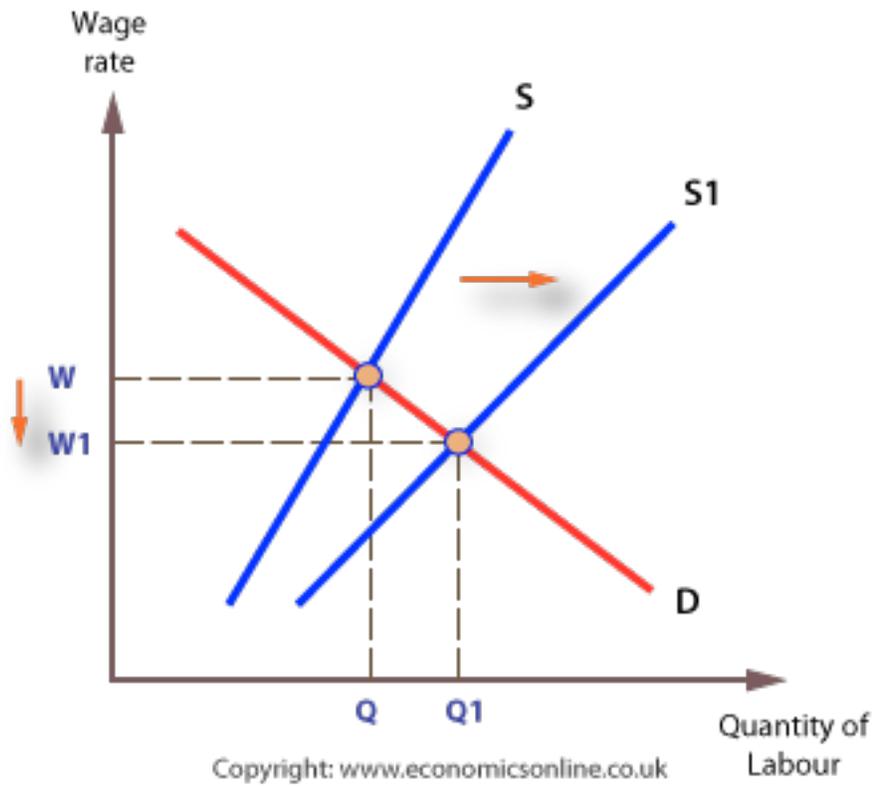


Figure 4

Demand and supply curve of higher education expansion



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