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Oaxaca-Blinder Decomposition of Rural Junior Middle School Students` Human Capital

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ABSTRACT. *I measure the expected human capital of rural junior middle school students in different regions and schools, and use the Oaxaca-Blinder method to analyses the contribution of various factors to the difference. Based on the J-F lifetime income method and the existing data of the "duo-teacher program", this paper traces and collects the probabilities of junior middle school students` choices of receiving senior high school education, secondary vocational education and no more education. I estimate the return rate of education and work experience using Mincer equation and micro-database of Urban Household Survey (UHS), Chinese Health and Nutrition Survey (CHNS), Chinese Household Income Project (CHIP), China Household Finance Survey (CHFS) and China Family Panel Studies (CFPS). Oaxaca-Blinder decomposition results show that local school quality, local labor market and individual characteristics contribute the majority of these human capital differences.*

KEYWORDS: *Human Capital; Junior Middle School Education; Secondary Vocational Education; Oaxaca-Blinder decomposition method*

1. Introduction

Measuring individual expected human capital of students in different regions and schools can help us analyze which factors will lead to the difference of expected human capital between regions and schools, such as the factors of teachers, schools and regions, and further study the contribution of these factors to the difference. Using J-F lifetime income method to estimate the expected human capital of junior high school graduates after nine-year compulsory education, the choice that junior high school students face after graduation mainly includes three aspects: employment, secondary vocational education and general high school education. Secondary vocational education includes secondary vocational schools, secondary technical schools, vocational and technical high schools, technical schools and so on. After students finish their general high school education, they can choose to go to university, college or work. These future choices will affect the subsequent human

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capital investment of junior high school students.

When students enter secondary vocational schools, high schools or universities, their mobility of urban and rural areas needs to be considered when calculating micro-individual human capital. The research plan uses the school-level probability of junior high school students entering general high school and secondary vocational education from the China Educational Statistics Yearbook. Oaxaca-Blinder decomposition is used to analyze the causes of the differences in human capital in different regions, such as the rate of enrollment, the rate of return on education, the rate of return on experience and the rate of return on experience in the local labor market. The paper is arranged as follows: the second part shows the methodology, the third part is the result discussion, and the last part is the conclusion.

2. Methodology

I use the J-F lifelong income method to estimate the expected human capital of junior high school graduates after nine years of compulsory education. Define $mi_{y,g,a,e}$ as human capital, i.e. the expected lifelong labor income, in which*y*, *g*, *a* and *e*are used to represent year, gender, age and education level respectively. Because there are differences in educational returns and experience returns between urban and rural areas, *r* is used to represent rural areas and *u* is used to represent urban areas. The advantage of J-F lifetime income method is directly estimating the human capital $mi_{y,g,a,j-w,r}$ corresponding to junior middle school graduates' choices. The discounted value of the individual`s after-tax labor income during his future work period is used as the measure of his human capital, and $ymi_{y,g,a,j-w,r}$ is used as the labor income of rural junior middle school graduates who directly choose employment in the *y-th* year. An individual`s labor income is equal to the product of working time and wage rate, which is expressed as $li_{y,g,a,j-w,r}$. Considering the risk of unemployment in the labor market, the expected value of labor income is the product of $ymi_{y,g,a,j-w,r}$ and $e_{y,g,a,j-w,r}$. The corresponding annual labor income $ymi_{y,g,a,j-w,r}$ can be expressed as follows:

$$ymi_{y,g,a,j-w,r} = li_{y,g,a,j-w,r} * e_{y,g,a,j-w,r} \quad (1)$$

Due to the lack of specific labor income data of all ages and educational levels in China, this paper uses the Mincer (1974) income regression equation, combined with the domestic micro-survey database, to estimate the labor income. The basic Mincer regression equation is:

$$In(w) = \beta_0 + \beta_1 Sch + \beta_2 Exp + \beta_3 Exp\hat{}2 + u \quad (2)$$

Through Mincer regression, I can get the return rate of education and experience. When bringing it back to Mincer equation, I can get the value of ln(w). As the expectation of exponential function is not equal to the power of the expected natural

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base:

$$E(w) = E\left[e^{In(w)}\right] \neq e^{E[In(w)]} \tag{3}$$

When predicting personal income, I need to consider the rate of adding adjustment factors, which can be calculated through regression without intercept between the real income value *w* and regression estimate value:

$$w = \alpha e^{In(w)} \tag{4}$$

Based on the above estimation, I can get the expected labor income of individuals with different gender, urban and rural areas, different education levels and working years:

$$w = \alpha * e^{\beta_0} * e^{\beta_1 Sch} * e^{\beta_2 Exp + \beta_3 Exp\hat{}2} \tag{5}$$

Rural junior middle school graduates`s lifetime income $mi_{y,u,g,a,v}$ who choose to receive secondary vocational education is equal to their discount value of human capital $mi_{y+3,u,g,a+3,v}$ after three years of secondary vocational education:

$$mi_{y,g,a,v,u} = mi_{y+3,g,a+3,v,u} * (\frac{1}{1+R})^3 \tag{6}$$

Because $mi_{y+3,u,g,a+3,v,u}$ can not be obtained directly, it is replaced by the lifetime income of an individual who has the same urban and rural u(i), gender g(i) and education level as the individual but whose age is a(i)+3 years old in the *y-th* year considering the average annual growth rate of income (1+G)^ 3. So the lifetime income of rural junior middle school graduates who choose to receive secondary vocational education can be expressed as follows:

$$mi_{y,g,a,v,u} = mi_{y,g,a+3,v,u} * \left(\frac{1+G}{1+R}\right)^3 \tag{7}$$

Unlike secondary vocational education, junior middle school graduates face three choices: employment, university education and college education. The formula for calculating the lifetime income of rural junior middle school graduates who choose to receive general high school education is:

$$mi_{y,g,a,j-h,u=My,g,a,j-h,u} * P_{y,g,a,j-h,u}' \tag{8}$$

Where P_i' denotes the transposition of vector P.

$$M_{y,g,a,j-h,u} = [mi_{y,g,a,j-h-uni,u}, mi_{y,g,a,j-h-col,u}, mi_{y,g,a,j-h-w,u}] \tag{9}$$

They are replaced by the income of people with the same educational background from that year to your graduation age after considering growth and discount:

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$$mi_{y,g,a,j-h-uni,u} = mi_{y,g,a+7,uni,u} * \left(\frac{1+G}{1+R}\right)' \quad (10)$$

$$mi_{y,g,a,j-h-col,u} = mi_{y,g,a+6,col,u} * \left(\frac{1+G}{1+R}\right)^6 \quad (11)$$

$$mi_{y,g,a,j-h-w,u} = mi_{y,g,a+3,high,u} * \left(\frac{1+G}{1+R}\right)^3 \quad (12)$$

$$P_{y,g,a,j-h,u} = [\mathrm{Pr}_{y,g,a,j-h-uni,u}, \mathrm{Pr}_{y,g,a,j-h-col,u}, \mathrm{Pr}_{y,g,a,j-h-work,u}] \quad (13)$$

$mi_{y,g,a,j-h-uni,u}$ represents an individual`s expected human capital corresponding to a bachelor`s degree, $Py_{y,g,a,j-h-uni,u}$ represents the probability of an individual going from high school to university. The probability of an individual going from high school to college or college is related to the quality of education in the high school that the student attends.

Vector $P_{y,g,a,j,r} = [P_{y,g,a,j-w,r}, P_{y,g,a,j-v,r}, P_{y,g,a,j-h,r}]$ denotes the probability of choosing direct employment, secondary vocational education and general high school education. Vector $M_{y,g,a,j} = [mi_{y,g,a,j-w,r}, mi_{y,g,a,j-v,u}, mi_{y,g,a,j-h,u}]$ means the lifelong income corresponding to choosing direct employment, secondary vocational education and general high school education.

The expected human capital of rural junior middle school graduates $HC_{y,g,a,j,r}$ can be expressed using vectors:

$$HC_{y,g,a,j,r} = M_{y,g,a,j} * P_{y,g,a,j,r}' \quad (14)$$

The difference of expected human capital between graduates from junior middle school *b* and *c* can be expressed as

$$HC^b_{y,g,a,j,r} - HC^c_{y,g,a,j,r} = M^b_{y,g,a,j} * P^b_{y,g,a,j,r}' - M^c_{y,g,a,j} * P^c_{y,g,a,j,r}' \quad (15)$$

Here $HC^b_{y,g,a,j,r}$ and $HC^c_{y,g,a,j,r}$ represent the expected human capital of graduates from junior middle school *b* and *c* with the gender of *g* and the age of *a* in the *y-th* year respectively. Oaxaca-Blinder decomposition method:

$$HC^b_{y,g,a,j,r} - HC^c_{y,g,a,j,r} = P^b_{y,g,a,j,r}'(M^b_{y,g,a,j} - M^c_{y,g,a,j}) + M^c_{y,g,a,j}(P^b_{y,g,a,j,r}' - P^c_{y,g,a,j,r}') \quad (16)$$

In equation (16), $P^b_{y,g,a,j,r}'(M^b_{y,g,a,j} - M^c_{y,g,a,j})$ represents the difference in human capital caused by the difference in lifetime income after the different admission rates between regions *b* and *c*. $(M^b_{y,g,a,j} - M^c_{y,g,a,j})$ represents the difference in human capital with junior high school education because the age of Y is a gender g in area

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B and C:

$$(M^{b}_{y,g,a,j} - M^{c}_{y,g,a,j}) = [m^{b}_{y,g,a,j-h} - m^{c}_{y,g,a,j-h}, m^{b}_{y,g,a,j-v} - m^{c}_{y,g,a,j-v}, m^{b}_{y,g,a,j-w} - m^{c}_{y,g,a,j-w}] \quad (17)$$

In formula (17), represents the difference in human capital of junior high school students who choose to enter ordinary high school. The Oaxaca-Blinder decomposition method to decompose the difference into:

$$m^{b}_{y,g,a,j-h} - m^{c}_{y,g,a,j-h} = M^{b}_{y,g,a,j-h,u} * P^{b}_{y,g,a,j-h,u} - M^{c}_{y,g,a,j-h,u} * P^{c}_{y,g,a,j-h,u} \quad (14)$$

$$m^{b}_{y,g,a,j-h} - m^{c}_{y,g,a,j-h} = P^{b}_{y,g,a,j-h,u}'(M^{b}_{y,g,a,j-h,u} - M^{c}_{y,g,a,j-h,u}) + M^{c}_{y,g,a,j-h,u}(P^{b}_{y,g,a,j-h,u}' - P^{c}_{y,g,a,j-h,u}') \quad (15)$$

Formula $P^{b}_{y,g,a,j-h,u}'(M^{b}_{y,g,a,j-h,u} - M^{c}_{y,g,a,j-h,u})$ (15), in formula (15) represents the difference in the expected lifetime income of junior middle school students in area B and C who choose to enter ordinary high school due to the economic factors in B and C regions. $M^{c}_{y,g,a,j-h,u}(P^{b}_{y,g,a,j-h,u}' - P^{c}_{y,g,a,j-h,u}')$ represents the difference in human capital caused by the difference in the enrollment rate of senior high schools in B and C regions, which is caused by the difference in the level of local senior high school education.

3. Result Discussion

The nominal and actual human capital value of 15-year-old junior middle school graduates in each junior middle school. According to the nominal price in 2016, the human capital of S3 junior middle school boys is the largest, about 422.49 million yuan, while S1 is the smallest, about 210.92 million yuan. Girls` human capital of S2 is the largest, about 178.79 million yuan, while S1 is the smallest, about 106.94 million yuan. The Oaxaca-Blinder decomposition results of nominal human capital shows that the gap between S4, S9 and S10 from three schools in Hebei is smaller than that of Yunnan`s schools. This may be due to the large differences between the enrollment rates. The Oaxaca-Blinder decomposition results of real human capital shows that after eliminating the impact of the cost of living, the different proportion of contribution from the enrollment rate increases, which indicates that the cost of living is higher in areas with higher returns on the labor market.

4. Conclusion

From the above results from the perspectives of nominal value and real value adjusted by living cost index, there is a large difference of human capital among rural junior middle school students in different provinces. Economic development levels and labor market performance return rates are the main factors causing the

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human capital gap. After graduation, rural junior middle school students are faced with the difference between vocational education and general education. The entrance rate of different schools has a great influence on the difference of students` human capital, while the difference of college entrance rate between different regions is small.

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