

# Theoretical Innovation of Human Capital Investment and Education Choice

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**ABSTRACT.** Nine-year compulsory education policy is implemented in China. Students' human capital investment after the completion of compulsory education is of great significance. Students will face many kinds of choices for further study or employment, such as general high school education, secondary vocational education (including secondary school, vocational high school and technical school), or direct entry into work, etc after graduating from junior high school, especially the students from rural areas. Different choices correspond to different human capital investment methods. This paper can provide valuable policy suggestions for the promotion of vocational education, poverty alleviation through education and the development of rural human capital.

**KEYWORDS:** Human capital, Education, Expected return on education, Lifetime income method

## 1. Introduction

In 1960, Theodore W. Schultz gave a speech entitled "human capital investment" as president at the annual meeting of the American Economic Association. At that time, Schultz expounded many economic growth problems that can't be explained by traditional economic theory, clearly proposed that human capital is the main reason for promoting national economic growth, and believed that "population quality and knowledge investment determine the future prospects of human beings to a large extent". Since the theory of human capital was put forward, it has been widely discussed in the academic circle. Many scholars have discussed this theory from macro and micro perspectives. At the same time, many empirical studies have tested this theory, or put forward amendments to the theory, so as to promote the further development of the theory. Up to now, human capital theory has developed for nearly 60 years.

This paper explores the influencing factors of human capital investment choice of rural junior middle school graduates. The first feature of this study is that in addition to the perspective of family background, education mode and its own heterogeneity, we include the corresponding return of the expected investment choice into the influencing factors for analysis. Specifically, this paper uses the J-F life-long income method to calculate the average expected life-long human capital corresponding to different choices of rural junior high school graduates and incorporate it into the personal choice model. The second feature of this study is to analyze the data collected directly and the national representative "China Family Panel Studies" (CFPS) public data. Our survey data contains more detailed information about students, which can be used in complementary empirical research with CFPS. In this paper, mixed logit model is used for regression analysis. It is found that the expected return on investment has a significant effect on the choice of rural junior high school graduates. For example, the improvement of local education quality will lead to the improvement of college entrance examination results, which will motivate rural junior high school graduates to choose ordinary senior high school. If the quality of vocational education and the income return increased, students will choose vocational education. In addition, family background and education mode also have a significant impact on the choice of rural junior high school graduates; at the same time, the choice of human capital investment of rural junior high school graduates is also related to gender and nationality.

## 2. Methodology

When an individual is faced with multiple choices, under the assumption of independence of independent alternatives, multiple logit model, conditional logit model and mixed logit model are selected according to the explanatory variables. Because the explanatory variables in this study include the explanatory variables (gender, nationality, etc.) that do not change with the scheme, and also the explanatory variables (expected lifetime

income) that change with the individual and also with the scheme, the mixed logic model should be used in this study.

The proportion of the probability of choosing  $j$  and  $m$  only depends on the coefficient vector group  $\beta_j$  and  $\beta_m$  and the explanatory variable  $x_i$  meets the Independent of alternative alternatives (IIA). Adding or deleting a choice must be independent of the proportion of the probability of choosing  $j$  and  $m$ :

$$\frac{\Pr(y_i=j|x_i)}{\Pr(y_i=m|x_i)} = \frac{\exp(x_i\beta_j)}{\exp(x_i\beta_m)} = \exp[x_i(\beta_j - \beta_m)]. \quad (1)$$

The individual choice for entrance to higher education is independent of other choices, meeting the IIA conditions. (Liu, 2004; Sun, 2012; Wu, 2012, etc.).

If the individual  $i$  chooses  $j$ , then the utility  $U_i^j$  can be expressed as:

$$U_i^j = V_i^j + \varepsilon_i^j, \quad (2)$$

where  $V_i^j$  represents the deterministic part that determines the individual random utility and  $\varepsilon_i^j$  is an unobservable random term that affects the individual utility.

$$U_i^j = x_i'\beta_j + z_i^j\gamma + \varepsilon_i^j \quad (i = 1, \dots, n; j \in \Omega), \quad (3)$$

where  $z_i^j$  is a vector of choice-specific attributes;  $x_i'$  is a vector of individual characteristics.  $\beta$  and  $\gamma$  are parameters. Additionally, Cheng and Long (2007) argue that the mlogit is based on the assumption of independence of irrelevant alternatives (IIA): all else being equal, a person's choice between two alternative outcomes is unaffected by what other choices are available.

Assuming that it is impossible to observe that the random error term  $\{\varepsilon_i^j\}$  is independent and identically distributed, and conforms to the Weibull distribution, assuming that  $n$  represents the choice of no further study after graduation of junior high school as the reference group, the probability of individual  $i$  choosing  $j$  can be expressed as follows:

$$P(y_i = j|x_i) = \begin{cases} \frac{1}{\sum_{k \in \Omega} \exp\{x_i'\beta_k + z_i^k\gamma\}} & (j = n) \\ \frac{\exp\{x_i'\beta_j + z_i^j\gamma\}}{\sum_{k \in \Omega} \exp\{x_i'\beta_k + z_i^k\gamma\}} & (j = v, h) \end{cases}. \quad (4)$$

The likelihood function of individual  $i$  is

$$L_i(\beta_{k=n}, \beta_{k=v}, \beta_{k=h}, \gamma) = \prod_{j \in \Omega} [P(y_i = j|x_i)]^{1(y_i=j)}, \quad (5)$$

Where  $1(y_i = j)$  is an indicator function. The coefficients of the hybrid logic model vary based on the choice of base category. Its meaning can be expressed as follows:

$$\frac{P(y_i=j)}{P(y_i=n)} = \exp(x_i'\beta_j + z_i^j\gamma), \quad (6)$$

So the log odds ratio is

$$x_i'\beta_j + z_i^j\gamma = \ln\left[\frac{P(y_i=j)}{P(y_i=n)}\right]. \quad (7)$$

#### 4. Result Discussion

In this study, the data of "China Family Panel Studies" (CFPS) is firstly used, which is investigated and released by the China Social Science Survey Center of Peking University. The survey is carried out in 25 provinces in China. The population of the surveyed areas accounts for about 95% of the total population of the country. The implicit stratified, multi-stage, multi-level probability sampling method is adopted, which is proportional to the population size. Therefore, CFPS can be regarded as a national representative sample. The project tracks the information of individuals, families and communities at three levels. At present, the data of five surveys are published, respectively in 2010, 2012, 2014, 2016 and 2018. In CFPS, there are relatively few samples of junior high school entrance, and there is no accurate data of the entrance rate of the individual location. Therefore, the corresponding human capital of each entrance decision is based on the average level of the province. In order to more accurately estimate the impact of the expected human capital on the entrance choice of students, this paper also uses the self-surveyed micro database to estimate.

Before the estimation results, the independence test of independent alternatives is carried out first, and Hausman test is used to compare whether there is significant difference between the coefficients estimated by the complete model and the coefficients re estimated by randomly removing an alternative. The CFPS and databases used in this paper pass the independence test of independent alternatives.

From the regression results of mixed logic model using CFPS database, it can be seen that the influence coefficient of the logarithm of the expected human capital on the selection of general high school and secondary vocational education is significantly positive and the same. The same coefficient is due to the expected human capital of the explained variable will change with individual and individual selection, so the coefficient is relative in the two choices Same as reference datum group. Because the coefficient of the mixed logic model represents the logarithmic probability ratio, rather than the editing utility of the explanatory variable for the explained variable, the coefficient of the expected human capital is significantly positive, which indicates that a higher expectation of human capital will affect the individual's choice of entering school and will not enter school compared with the reference standard group.

The regression results of the mixed logic model using the survey database, which are significantly different from those using the CFPS database. The reason for the difference is that the samples are different, and the expected human capital is calculated. The survey data uses the school level enrollment rate data, which is more than the provincial enrollment rate data Finally, it controls the fixed effect of school, because the difference of school education quality may have an impact on students' choice of entering school.

## 5. Conclusion

The human capital investment decision of rural junior high school graduates is important for the formation of human capital, because human capital directly affects the future development of rural areas, but currently there are few studies focusing on the human capital investment choice of rural junior high school graduates. Existing domestic literature focuses on the impact of intergenerational transmission of family resources and education on students' choice of further studies, and there is a lack of research on the impact of expected human capital on further studies. Based on complementary empirical research on national representative samples from the CFPS and the local detailed data, the mixed logic model results shows a significantly positive impact of human capital expectation that is calculated using J-F life-time income method on rural junior high school graduates' choice of receiving higher-level education.

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