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# How Does Opportunity Inequality Affect Education Inequality and Income Distribution?
## —an Empirical Analysis on China

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**ABSTRACT**
Based on the data of Chinese General Social Survey (CGSS) in 2015, this research analyses how environmental factors influence educational inequality and income distribution in China through logit model and other models quantitatively. The results show that there is a significant opportunity inequality in China's education, which is mainly reflected in the differences between urban and rural areas, family culture and political background. Through Shapley decomposition, this research can conclude the result that the factor of rural-urban difference contributes to more than 50% of whether people can get higher education, which indicates that there is a significant difference between urban and rural education level; the role of family culture and political factors has also grown from 36.82% for people born in 60s to 47.68% for people born in post-90s, revealing that education has obvious intergenerational transmission characteristics. Moreover, we get from the regression model that environmental factors have a great impact on individual's income, and effort factor can weaken the income opportunity inequality result. Finally, this paper also puts forward the corresponding policy recommendations according to the research conclusions.

***Keywords:*** *Educational inequality, Logit model, Shapley decomposition*

## 1. INTRODUCTION

Since the reform and opening up, China's economy has developed dramatically, along with the residents' living qualities and educated level being significantly improved. Although the "cake" of economy and education is constantly expanding, there are some problems of unbalanced distribution within it. From the 'left-behind children' with high dropout rate to the 'school district housing' phenomenon, the problem of educational inequality is increasingly prominent. In the report to the 19th National Congress of the Communist Party of China, it was clearly proposed to 'give high priority to education', 'promote equality in education, narrow the development gap, and stop the intergenerational transmission of poverty'. Therefore, promoting education equity is the urgent demand of the government and the people, which has special significance in the new era.

From the macro perspective, education is usually regarded as an important part of human capital, which, together with capital and labor force, influences output and thus relates to the development of a country [1]. From the micro level, education is regarded as an important way for individuals to acquire knowledge and change their life circumstances, that is, "knowledge changes fate". Education is increasingly important for individual survival and development [2-3]. Therefore, education has a strong realistic and social significance for the overall development of society and individuals, and educational equity is an important indicator reflecting the educational situation, to which the state attaches great importance. However, due to regional, living environment, family background and other factors, the quality and quantity of education received by residents are not the same, that is, there is an unequal opportunity phenomenon in the access to education.

According to Roemer, any result is caused by two factors: environment and effort [4]. Among them, environmental factors refer to some congenital factors that are not subject to individual changes, such as family background and place of birth, etc. Similarly, the differences in education mainly come from two aspects. One is the opportunity inequality brought by the differences in family background, economic status, parents' occupation and educated level. Second, it is due

 

to the effort inequality brought about by individuals' own efforts during learning. Educational fairness does not mean that the outcome of an individual's education is absolutely the same, but that the process for education should be similar. Therefore, this paper mainly focuses on the educational inequality caused by birthplace, family background and other reasons, as well as the extent to which environmental factors affect educational inequality.

Education influences individual ability, cognition, thought and other aspects through learning knowledge, among which the most direct influence is the income. Many studies have shown that the higher the education level is, the higher the income [5]. Therefore, this paper attempts to analyze the role of opportunity inequality on education and gap of income distribution, and to what extent it affects income inequality.

Based on the above analysis, the main research contents of this paper are as follows: (1) Define the Gini coefficient of education and analyze the current situation of education inequality in China; (2) Measure the extent to which environmental factors affect educational inequality, and correspondingly, to put forward suggestions to reduce or even eliminate the impact of opportunity inequality on education; (3) Estimate the income impact caused by opportunity inequalities.

## 2. LITERATURE REVIEW

Educational inequality has always been a research hotspot in the fields of economics and sociology. Most scholars analyze the inequality of educational opportunities from the perspective of environmental factors.

First, the problem of education inequality under the urban-rural dual system really differs a lot. For a long time, children from the advantaged class are concentrated in cities, while children from the bottom class are concentrated in rural areas. There is a serious imbalance in the distribution of educational resources between urban and rural areas, which directly affects the quality of students' education [6]. The core reason for the educational inequality between urban and rural areas lies in the economic difference. Comparatively speaking, rural areas is difficult to attract excellent teachers and lack of educational resources [7]. In addition, policy factors also affect the differences between urban and rural education. The nine-year enrolment policy implemented in recent years artificially impedes the mobility of students, helps to narrow the educational differences between regions, but at the same time promotes the concentration of elite class and makes it more difficult for rural students to receive high-quality education [8]. Some scholars quantified that the contribution of urban and rural differences to educational opportunity inequality was about 30% based on the data of China's comprehensive social survey through Shapley decomposition method [9].

Second, there is the problem of educational opportunity inequality in different family backgrounds. Many studies have shown that families with a certain economic and social background will invest more resources in their children's education, thus improving their children's possibility of receiving higher education [6]. Families with higher family wealth can buy houses to let their children enter key schools to receive high-quality education in an early age, which increases the probability of their children being admitted to key universities at home and abroad and causes some problems of unequal educational opportunities [10]. Besides, parents' beliefs about education can influence their children's involvement and initiative, which in turn can influence school performance [11]; Moreover, there is intergenerational mobility in education, that is, highly educated parents are more likely to teach their children their own learning experiences and behaviors, thus their offspring are more likely to receive higher education [9-11]; Education has the function of promoting social class mobility, but in recent years, the case analysis shows that the function of education in promoting social class mobility is gradually weakening [12].

Finally, opportunity inequality also affects income distribution to some extent. As for the impact of opportunity inequality on individual development, it can directly affect individual income, and affect income through education [9]. The study found that the income of those with a college degree is higher than that of those without a college degree, and the income gap is constantly widening [5]. However, after removing the influence of some individual factors, education level can only explain about 20% of income inequality [13]. Income can also be affected by individual efforts. A study constructed a counterfactual reference group to analyze that when residents' efforts reach the highest level, the opportunity inequality caused by environmental factors can be improved [14]. However, the improvement degree of groups in different years is different.

A review of some domestic and foreign studies shows that they focus on the impact of opportunity inequality on education access and income, but fail to analyze the relationship among opportunity inequality, education access and income distribution gap as a whole. This paper focuses on the issue of opportunity inequality in education, quantifies the contribution of various environmental factors to the educational difference, and analyzes the impact of opportunity inequality and education access on the income distribution gap.

## 3. VARIABLES AND MODEL DESIGN

### *3.1. Variable Definition*

This paper classifies the environmental variables that affect the quality of education into three levels (macro environment, family environment and individual characteristics), and specifically divides them into five aspects: region, urban and rural areas, individual characteristics, family culture and politics, and family economic strength.

In this study, whether to receive higher education (specifically including college degree or above) is taken as the variable to measure the educational difference. Interviewees with adult junior college or adult undergraduate college degree are regarded as the secondary education in this paper.

As for the regional variables, they are related to the unbalanced distribution of educational resources caused by economic differences between regions [15]. This paper combines the survey location, whether the respondents have been in the local area since their birth and where they moved to the local area as their school age. According to the level of economic development, the eastern region mainly includes 10 provinces: Shanghai, Beijing, Tianjin, Zhejiang, Guangdong, Jiangsu, Shandong, Fujian, Hainan, Hebei, and the rest are the central and western regions.

As for the urban and rural variables, this paper analyzes the differences between urban and rural areas through the household registration types of interviewees. The household registration given in the questionnaire is the current household registration type.

In terms of personal characteristics, respondents are divided into several groups according to their gender (male and female), ethnic group (Han and minority).

As for the cultural and political factors of the family, the main factors are the educational level of the parents and whether the parents had administrative positions at the age of 14. And the parents' education level is divided into three types: both two received junior middle school education or less, at least one received high school education (not including higher education) and at least one received higher education. In addition, parents with administrative duties obviously influence their children's education.

As for the economic strength, this part uses parents' employment status and family level as proxy variables of economic strength. Parents with jobs in children's school-age can enrich their children's education and economic resources, which will have a positive impact on their children's education level compared with laid-off workers [9]. In this paper, the economic strength of the family is represented by whether the parents are employed at the age of 14 and the level of the family at the age of 14. The level of the family is divided into the bottom (option 1), the middle and lower (option 2-4), the middle and upper (option 5-7) and the upper (option 8-10).

Specific variables descriptions and definitions are shown as follows：

**Table 1** Descriptions and definitions of variables

| Variables | Notations | | Variable descriptions |
|---|---|---|---|
| Macro factors | District | *Province* | 0: Middle or West, 1: East |
| | Urban or rural area | *Rural_area* | 0: City, 1: Rural area |
| Characteristics | Gender | *Gender* | 0: Female, 1: Male |
| | Nationality | *Nation* | 0: Minority, 1: Han |
| Family culture | Education of parents 1 | $Edu_1$ | 1: Both receive junior high education or less, 0: Otherwise |
| | Education of parents 2 | $Edu_2$ | 1: Only one receive high school education, 0: Otherwise |
| | Education of parents 3 | $Edu_3$ | 1: At least one receive higher education, 0: Otherwise |
| | Does father have administrative position? | *Admin_fa* | 1: Yes, 0: Otherwise |
| | Does mother have administrative position? | *Admin_mo* | 1:Yes, 0: Otherwise |
| | Occupation of father | *Job_fa* | 1: Yes, 0: Otherwise |

| | | | |
|---|---|---|---|
| Family economic status | Occupation of mother | *Job_mo* | 1: Yes, 0: Otherwise |
| | Bottom layer or not? | $Class_1$ | 1: Yes, 0: Otherwise |
| | Middle and lower layer or not? | $Class_2$ | 1: Yes, 0: Otherwise |
| | Middle and upper layer or not | $Class_3$ | 1: Yes, 0: Otherwise |
| | Up layer or not? | $Class_4$ | 1: Yes, 0: Otherwise |

## *3.2. Model Design*

### *3.2.1. Educational Gini coefficient*

Gini coefficient is used to measure the income gap of residents, the greater the value of income distribution is more unfair. Similarly, this paper defines the gini coefficient of education as the indicator of the gap of residents' education level：

$$G=\frac{\Delta}{2\mu},\ Where\ \Delta=\frac{\sum_{i=1}^{n}\sum_{j=1}^{n}\left|Y_i-Y_j\right|}{n^2} \quad (1)$$

$Y_i$ represents the educated level of $i$, $|Y_i$-$Y_j|$ denotes the absolute difference between $i$ and $j$, $\mu$ means the mean value of educated degree, $\triangle$ means the average educational difference. Using the above method, the Gini coefficient of education in the sample in recent years can be calculated to assess the education inequality. In addition, the sample can be divided into urban and rural areas for analysis to calculate the degree of educational differences between urban and rural areas.

### *3.2.2. Measurement for educational opportunity inequality*

Since the dependent variable is a binary variable, logit model is adopted for estimation in this paper. The log-likelihood function form of logit is:

$$\ln L=\sum_{i=1}^{n} p_i \ln F(X_i B)+(1-p_i)\ln(1-F(X_i B)) \quad (2)$$

$F$ is the distribution function. By derivatives, we could get the estimates of parameters affecting education, shown as:

$$\hat{P}_i=E(P_i\mid C_i) \quad (3)$$

Given the environmental conditions, $\hat{P}_i$ represents the probability for an individual to obtain higher eduation. The mean value $\mu$ denotes the probability to obtain higher education under the averge enviromental conditions. Hence, big difference means highly educational opportunity inequality. Referred to Gini coefficient calculation, we can get the educational opportunity index:

$$G=\frac{\sum_{i=1}^{N}|\hat{P}_i-\mu|}{2N\mu} \quad (4)$$

### *3.2.3. Manual interactive assumption generation*

The most direct impact of education on individuals is the threshold conditions for providing knowledge and skills to enter enterprises and public institutions. Therefore, education will directly affect individual income [6]. However, it is obvious that an individual's education level is related to his/her resources and environment, but it is also affected by his/her own efforts. Therefore, taking the impact of education into account, the influencing factors of individual income are shown as follows:

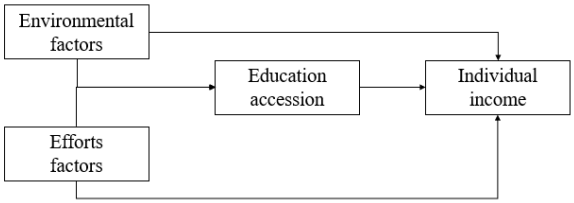


**Figure 1** Mechanisms for individual income

Since the overall distribution of income is skewed to the right, it is necessary to log the income data. The logarithmic model is as follows:

$$\ln W_i=\boldsymbol{\alpha}C_i+\boldsymbol{\beta}E_i+\varepsilon_i \quad (5)$$

In this formula, $C$ denotes objective environment variable, and $\boldsymbol{\alpha}$ is the coefficient vector. $E$ denotes effort, which mainly means education level in this paper. $\boldsymbol{\beta}$ is the coefficient vector, and $\varepsilon$ means residual, uncorrelated with the explaining variables.

Many studies have shown that the environment also affects efforts to a certain extent, that is, the effort variable E is also affected by the objective environment. For example, the education level of an individual here is affected by both the environment and efforts [3]. When the effort variable is influenced by the environment, the relationship is shown below:

$$E_i=\boldsymbol{\varphi}C_i+\eta_i \quad (6)$$

Here $\boldsymbol{\varphi}$ represents the coefficient matrix of environmental factors on efforts, $\eta_i$ is the part not affected by environmental factors. For some efforts variables not affected by environmental factors (such as career choice, etc.), $\eta_i$ represents efforts factors. The

above two expressions can be combined to obtain the personal income model. The relationship is as follows:

$$\ln W_i = \boldsymbol{\alpha} C_i + \boldsymbol{\beta} \cdot (\boldsymbol{\varphi} C_i + \eta_i) + \varepsilon_i = (\boldsymbol{\alpha} + \boldsymbol{\beta}\boldsymbol{\varphi}) \cdot C_i + \boldsymbol{\beta} \cdot \eta_i + \varepsilon_i \quad (7)$$

In the above model, $\boldsymbol{\alpha}$ is the direct impact of objective environmental factors on income, and $\boldsymbol{\beta}\boldsymbol{\varphi}$ can be seen as the indirect impact of effort differences on income due to the influence of objective environmental factors. For the above equations, regression can be conducted directly. But it is difficult to obtain information about the impact of education on income. Therefore, the income opportunity inequality can be calculated by a two-step method. The first step is the same as the measurement of educational opportunity inequality. The logit model is used to estimate the equation (6), and the probability of receiving higher education under a given environment can be obtained as $\hat{P}_i = E(P_i|C_i)$. The part of education that is not affected by the environment can be expressed as $\hat{\eta}_i = P_i - \hat{P}_i$. Hence, given the same environmental factors (taking the average), the logarithmic income can be expressed as:

$$\ln W_i^* = (\hat{\boldsymbol{\alpha}} + \hat{\boldsymbol{\beta}}\hat{\boldsymbol{\varphi}}) \cdot \overline{C} + \hat{\boldsymbol{\beta}} \cdot \hat{\eta}_i \quad (8)$$

For each individual, due to the different effort factors, the income is different under the given average environmental factors. Referring to the educational opportunity inequality index, the income opportunity inequality index is defined in this paper：

$$G = \frac{\sum_{i=1}^{N} |\hat{W}_i - W_i^*|}{2N \cdot E(W_i \mid \overline{C}, \backslash \eta_i)} \quad (9)$$

$\hat{W}_i$ represents the individual income under the given environment and effort factor, $E(W_i \mid \overline{C}, \backslash \eta_i)$ represents the expected value of the individual income under a given average environment factor, regardless of the effort factor. Through the above equation, the income opportunity inequality index of different groups can be obtained.

### *3.2.4. Shapley decomposition*

In order to analyze the impact of different environmental factors on educational inequality intuitively and quantitatively, this paper uses Shapley decomposition method to decompose the impact of various environmental factors on educational inequality [16]. The order of variable appearance will have impacts on the estimation. Hence, Shapley decomposition tries all kinds of possibilities, and measures the influence of environmental factors under these possibilities. Then the impact of various environmental factors can be analyzed.

## 4. EMPIRICAL RESULTS

This paper uses the 2015 China Comprehensive Social Survey (CGSS) data, which takes households as the unit and includes 478 villages in 28 provincial-level administrative regions. Due to the war, different education system and other reasons, the group born before 1950 is not representative. In this paper, only individuals born after 1950 are selected. After the invalid questionnaire of "unanswerable" education level is removed, there are 8,713 valid questionnaires left.

### *4.1. Descriptive Analysis*

According to the educational Gini coefficient formula, the educational Gini coefficient of the survey samples can be programmed by Python, and the educational Gini coefficient of the survey samples can be divided into urban and rural areas and age groups. The results are shown in the table below:

**Table 2** Educational Gini coefficient for different areas

| Urban or rural | Total | Urban | Rural |
|---|---|---|---|
| Received higher education or not? | 0.895 | 0.784 | 0.957 |
| Educated years | 0.250 | 0.157 | 0.277 |

**Table 3** Educational Gini coefficient for different age groups

| | 50s | 60s | 70s | 80s | 90s |
|---|---|---|---|---|---|
| Received higher education or not? | 0.983 | 0.963 | 0.896 | 0.786 | 0.695 |
| Educated years | 0.341 | 0.243 | 0.215 | 0.164 | 0.130 |

It can be seen by education Gini coefficient, the number in urban and rural areas is over 0.75. On the education inequality, the inner educational difference of the rural area is larger than the difference in town. And there exist significant differences on higher education for urban and rural areas. Based on the analysis of the educational Gini coefficient of different age groups, the younger the age group is, the smaller the educational difference. Educational Gini coefficient reduces from 0.983 in post-50s to 0.695 in post-90s, which reflects the higher education expansion efforts in China. Taking the years of schooling as an indicator, the difference in Gini coefficient of education is even smaller, from 0.341 for those born in the 1950s to 0.130 for those born in the 1990s, which indicates that China has achieved great success in popularizing knowledge and promoting primary and secondary education.

### *4.2. Educational Opportunity Inequality*

Through Eviews software, the data is regressed using logit model, and the results are shown in the following table：

**Table 4** Regression result of logit model

| Variable | Coefficient | Std. Error | z-Statistic | Prob. |
|---|---|---|---|---|
| Province | 0.164150** | 0.079653 | 2.060816 | 0.0393 |
| Households | -1.365786*** | 0.086714 | -15.75040 | 0.0000 |
| Nation | -0.141036 | 0.153196 | -0.920627 | 0.3572 |
| Gender | 0.101610 | 0.076492 | 1.328369 | 0.1841 |
| $Class_2$ | 0.579237*** | 0.095455 | 6.068144 | 0.0000 |
| $Class_3$ | 0.656461*** | 0.101266 | 6.482541 | 0.0000 |
| Job_fa | 0.048959 | 0.168237 | 0.291010 | 0.7710 |
| Job_mo | 0.106389 | 0.098857 | 1.076190 | 0.2818 |
| Admin_fa | 0.128661 | 0.161100 | 0.798639 | 0.4245 |
| Admin_mo | 0.487704 | 0.339841 | 1.435092 | 0.1513 |
| Edu2 | 1.360390*** | 0.088465 | 15.37766 | 0.0000 |
| Edu3 | 2.008702*** | 0.162660 | 12.34911 | 0.0000 |
| C | -2.380189*** | 0.233291 | -10.20268 | 0.0000 |

Note：***, **, * represent the result is significant at 1%, 5%, 10% significance level

The table shows that (1) the area before the variable coefficient is positive, suggesting that the eastern region respondents are more likely to accept the higher education comparatively. This may be related to the highly development level of eastern regions, resulting in higher spending on education. Thus, people have more opportunities to receive higher education. But the result is not significant at the 10% significance level. It may be correlated with the narrowing gap in education investment between the western and easter. (2) The coefficient before urban and rural variable is negative and significant at the significance level of 1%. This indicates that, compared with the regional differences, there is a great difference in education between urban and rural areas in China. Rural students are far less likely to receive higher education than urban residence students. And there is a great disparity in educational opportunities between urban and rural areas. (3) The gender before the coefficient is positive, compared to the group of women, and men are more likely to receive higher education. (4) Compared with the lower layer families, the higher the level of the families are, the greater the opportunity for individuals receive higher education. This result is significant at the 1% significance level. When analyzing the level of the family at the age of 14, the results shows that the higher the level of the family at the age of 14, the more likely the respondents to receive higher education. The layer of the family represents the socioeconomic status of the family, including the family property, the family- owned social network and so on. (5) The higher the educational level of parents, the greater the chance of their children to receive higher education, which is significant at the significance level of 1%. This result may be related to the fact that highly educated parents can impart learning experience, ways of thinking, and develop hobbies and interests to their children. In a word, the access to higher education has intergenerational transfer effects, and parents' education level has a positive impact on their children's access to higher education.

**Table 5** Educational opportunity inequality in different age groups

| Age | Total | 50s | 60s | 70s | 80s | 90s |
|---|---|---|---|---|---|---|
| Inequ -ality | 0.406 7 | 0.36 36 | 0.38 65 | 0.41 86 | 0.40 15 | 0.41 28 |

It can be seen from the table above, educational opportunity inequality caused by environmental factors index falls after rising first, then keep the rising trend. Educational opportunity inequality index rises from 0.3636 in 50s to 0.4186 in 70s. This stage may be associated with cultural revolution (valuing family composition more), resulting in different groups entrance differences in receiving higher education; Then, the index of educational opportunity inequality of the post-80s group shows a temporary decline. During this period, the college entrance examination was booming and the gap between the rich and the poor was low, leading to a

temporary decline in the index of educational opportunity inequality.

### *4.3. Shapley Decomposition*

Through Shapley model, the environmental factors that affect the respondents' possibility of receiving higher education are decomposed, and the relative contributions of each factor can be obtained. The results are shown in the following table:

**Table 6** Shapley decomposition result

| Factor | Shapley contribution value | Relative proportion ( % ) |
|---|---|---|
| District | 0.00514 | 2.81 |
| Urban or rural | 0.06875 | 37.57 |
| Personal characteristic | 0.00065 | 0.36 |
| Family culture and politic | 0.10303 | 56.29 |
| Family economic status | 0.01951 | 10.66 |
| Total | 0.18302 | 100 |

Family cultural and political factors contribute the most to the probability of receiving higher education, accounting for a relative proportion of 56.29%. There is an obvious phenomenon of intergenerational mobility in education. The contribution of urban and rural differences to higher education is the second, accounting for 37.57%, which indicates that there is an obvious gap between urban and rural education in China, and the gap between urban and rural education is wide. The contribution of family economic strength is relatively small, accounting for 10.66%, indicating that family economy has a certain influence on the possibility of receiving higher education. Regional and individual characteristics account for very little. Considering the time characteristics of the samples, this paper decomposed the environmental factors affecting higher education acquisition by age, and the results were shown in the following table:

**Table 7** Shapley decomposition results in different age groups

| | 50s | | 60s | | 70s | | 80s | | 90s | |
|---|---|---|---|---|---|---|---|---|---|---|
| Factor | Con | RP(%) | Con | RP(%) | Con | RP(%) | Con | RP(%) | Con | RP(%) |
| Area | 0.0174 | 9.39 | 0.0096 | 5.36 | 0.0268 | 11.98 | 0.0137 | 5.64 | 0.0027 | 2.49 |
| Urban-rural | 0.1000 | 54.12 | 0.0998 | 55.68 | 0.1135 | 50.65 | 0.1115 | 46.06 | 0.0567 | 51.40 |
| Personal feature | 0.0153 | 8.28 | 0.0078 | 4.35 | 0.0044 | 1.96 | 0.0015 | 0.62 | 0.0024 | 2.2 |
| Family culture | 0.0142 | 7.66 | 0.066 | 36.82 | 0.0791 | 35.29 | 0.1114 | 46.03 | 0.0526 | 47.68 |
| Economic status | 0.0378 | 20.44 | 0.0103 | 5.75 | 0.0085 | 3.78 | 0.0187 | 7.71 | 0.003 | 2.75 |
| Total | 0.1849 | 100 | 0.1792 | 100 | 0.2241 | 100 | 0.2421 | 100 | 0.1102 | 100 |

Note: Con represents contribution, RP relative proportion.

As can be seen from the table, the contributions of environmental factors in different age groups vary a lot. (1) The contribution of urban and rural factors to higher education is high, accounting for more than 50% except the post-80s, which indicates that there is a serious gap between urban and rural education in China. Therefore, increasing the preference of educational resources to rural areas and improving the educational conditions will have a far-reaching significance for promoting educational equity. (2) The contribution of family culture and politics to higher education has been gradually improved. The contribution of family cultural and political factors to the post-50s higher education is significantly lower than the normal level, which may be related to the era of parents. (3) The influence of individual characteristics and family economic strength is weak. This shows that China's investment in education has reduced the cost of going to school, and families can afford to educate their children.

### *4.4. Income Distribution Difference*

Environmental factors in this part are the same as those in the previous section. The variables of efforts include education level and whether to submit application for Party membership. Obviously, education level is not only affected by environmental factors, but also correlated with self-effort factors. Therefore, according to equation (3-6), environmental impact in education level is eliminated through the logit model. And $\hat{\eta}_i = P_i - \hat{P}_i$ means the self-effort part. Let the variable name '*Try*' denote self-effort. The regression result is shown as follows:

**Table 8** Logit regression result

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| Province | 0.445452*** | 0.027491 | 16.20373 | 0.0000 |
| Households | -0.565774*** | 0.028268 | -20.01480 | 0.0000 |
| Nation | 0.350615*** | 0.046412 | 7.554377 | 0.0000 |
| Gender | 0.455169*** | 0.024922 | 18.26347 | 0.0000 |
| Edu2 | 0.304656*** | 0.040723 | 7.481185 | 0.0000 |
| Edu3 | 0.358530*** | 0.087665 | 4.089795 | 0.0000 |
| Admin_fa | 0.127621* | 0.071534 | 1.784075 | 0.0745 |
| Admin_mo | 0.272159* | 0.164069 | 1.658809 | 0.0972 |
| $Class_2$ | 0.232199*** | 0.028657 | 8.102807 | 0.0000 |
| $Class_3$ | 0.281781*** | 0.033814 | 8.333312 | 0.0000 |
| Job_fa | 0.052893 | 0.055572 | 0.951780 | 0.3412 |
| Job_mo | -0.084022** | 0.034589 | -2.429176 | 0.0152 |
| Party | 0.034564** | 0.016457 | 2.100289 | 0.0357 |
| Try | 0.588465*** | 0.044708 | 13.16232 | 0.0000 |
| C | 9.376744 | 0.074581 | 125.7250 | 0.0000 |

Note：***, **, * represent the result is significant at 1%, 5%, 10% significance level

It can be seen from the above table that :(1) regional, urban-rural factors have significant impacts on the income level of interviewees, which indicates that China's development level is not balanced, resulting in a large income gap between regions and between urban and rural areas; (2) Women earn less than men. The result is significant at the 1% significance level. Due to job discrimination, maternity leave, family care and other reasons, women's income level is significantly lower than that of men; (3) Family cultural and political factors will have a positive impact on children's income. From the point of view of the results, the higher the educational level of the parents, the positive influences of the income of the children with administrative positions are. And the result is significant at the significance level of 1%, which indicates that the cultural and political background of the parents will directly reflect the income of the children. (4) The effort factor in education also has a positive impact on individual income, which is significant at the 1% significance level. This shows that, even if environmental factors are different, individuals' efforts will improve their probability of receiving higher education, thus increasing their income.

According to (Eq 3-9), the indicator of opportunity inequality in income can be calculated, and the indicator of opportunity inequality in overall income is 0.256, which is divided by age. The figure is shown as below:

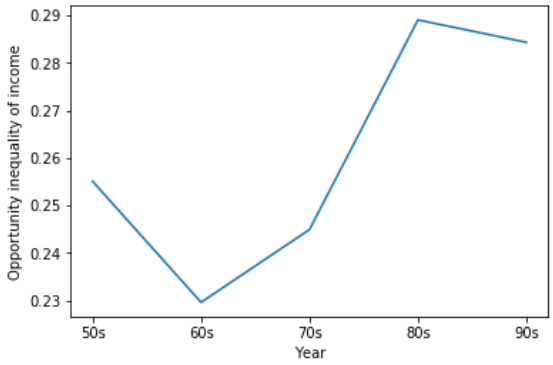


**Figure 2** Income opportunity inequality index in different ages

Income opportunity inequality index in different age groups shows upward trend after falling. This indicates, income opportunity inequality is increasing due to environmental differences, which implicit a certain mobility curing. Hence, government should make efforts to narrow differences between regions, promote harmonious balanced development and cultivate social atmosphere of respecting the effort.

## 5. CONCLUSIONS

By analyzing the impact of environmental factors on individual income through regression analysis, the main conclusions of this paper are shown as follows: first, there are huge differences in higher education attainment between urban and rural areas. According to the logit model, the coefficient before the urban and rural variables is negative and significant at the 1% significance level. The distribution of educational

resources between urban and rural areas in China is extremely unbalanced. Through Shapley decomposition, it can be seen that the difference between urban and rural areas is the most important factor that causes the inequality of educational opportunities in China, of which the contribution ratio of other ages is more than 50%. Second, education has obvious characteristics of intergenerational transmission, and the trend is gradually strengthened. According to the logit model, factors of family culture and politics have significant impacts on the access to higher education. If parents were highly educated, interviewees are more likely to receive higher education, which indicates the education has obvious characteristics of intergenerational transmission. When Shapley model is used to analyze the contribution of environmental factors in different ages, the influence of family cultural and political factors on higher education is increasingly deepened, rising from 36.82% of the post-60s group to 47.68% of the post-90s group. Third, environmental factors significantly affect the income level of individuals, which is an important cause of income distribution gap. The income gap between regions and urban and rural areas is large. In addition, family cultural and political factors also have a significant impact on the level of individual education. Fourth, China's primary and secondary education are more equal compared to the highly inequality in higher education. In terms of whether they have received higher education or not, only a small number of respondents have received higher education. The educational disparity is even greater in rural areas. However, if we take the years of schooling as an indicator, the educational Gini coefficient difference is even smaller, from 0.341 for the generation born in the 1950s to 0.130 for the generation born in the 1990s, which indicates that China has achieved great success in popularizing knowledge and promoting primary and secondary education.

Based on the results, the policy recommendations are as follows: first, increase the investment in rural education, improve the level of rural teachers. As the income level in rural areas is generally low, it is extremely impossible to rely on enterprises to run schools. Therefore, the government should increase the investment in rural education, expand the resource preference, and raise the salary of rural teachers. Second, communicate more with parents and actively exchange correct and appropriate educational concepts. It can be seen from the results that the education level of parents significantly affects their children. Therefore, the government and schools should communicate more with parents, pass on the experience and practices of educating children, and make up for the shortage of family cultural capital. Third, we should spread positive energy and encourage young people to work hard. From the regression results, the effort factor can make up the innate environmental gap, which is helpful to improve the possibility of receiving higher education and has a significant positive impact on income. Therefore, it is of great significance to strive hard.

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