Measurement of Labor Utility Value of Vocational Education and Academic Education from the Perspective of Big Data ——1778051 Individual Samples Based on CHARLS Database

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Abstract: Human capital investment is an important research topic in labor economics. Adam Smith first came out with the concept of "human capital investment". He wrote in *The Wealth of Nations* that the capital spent on learning would be fixed on the learner and became part of his personal property and individuals could get repayment and profits after learning. Formal education at all stages of humanity is seen as the main source of human capital investment. Based on the baseline data of the China Health and Retirement Longitudinal Study (CHARLS) 2011, this research compared the differences in future income, health and cognitive status of three different types of people who graduated from middle school, high school and secondary vocational schools. Also, it showed the long-term returns on different human capital investments. The study found that after using the propensity score matching method to eliminate the “Selection Bias” which caused by ability bias in different education groups, the three-year academic education from middle school to high school can increase the individual's annual income by about 20.8%. Accepting a vocational high schools education compared to an ordinary high school can increase the individual's annual income by about 46.0%. In the analysis of cognition and health, this research by using Logit regression found that the age or type of education has little effect on health. However, for cognitive status, academic education and vocational education that accept more years can improve the cognitive status of people in the middle and old age, and vocational education is more effective than the academic education of more years. The above considered that developing vocational education and cultivating skilled talents can not only increase the income of individuals, but also help the country to alleviate the shortage of skilled talents in the labor market, thus providing sufficient human resources for the industrial upgrading.

1. Introduction

Today the investment in human capital has been a hot research topic of the labor economics. In China, the contradictions of labor market structure has been very prominent. Many people start to focus on the average return rate of education. Therefore, this article, based on the baseline data of the Chinese family health and the old-age care tracking survey in 2010, compared three different groups of people in middle and old age who were graduated from middle school, high school and secondary vocational school. Through the data, we analyzed the impacts of the middle and old age people’s income, health and cognition by different years and types of education.

The research finds that in average the annual income of people who graduated from vocational high school are higher than the annual income of people who graduated from ordinary high school. By Logit model, we notice that the influence of different years and types of education is less in people’s health. But as for the cognition, we find that both of vocational education and academic education can improve people’s cognitive level in middle-aged period with more years education, and the effect of vocational education are more than academic education.

Many experts and scholars such as Mincer (1974) verified that personal income was relative to the years of education, but at present there are not any strong evidences can prove that the income relate to the different types of education. Vocational education has more advantages in labor-related occupational skills which can help people get jobs faster. Academic education has more advantages in general knowledge which can help people adapt to the changes in demand of labor market. Guanghui Song (2012) and others believe that for most developing countries, vocational education

is an effective way to rise levels of economic development and increase employment rate.

Today, in China, most people are widely believing that the people who receive academic education will have higher income and social status than those who receive vocational education. So, most people reject vocational education and that brings many difficulties to the development of society and economy.

2. Data Description and Measurement Model Construction

2.1 Data Description

This article uses the 2017 China Health and Pension Tracking Survey (CHARLS) data. The survey was conducted for middle-aged and elderly people in China. The survey was conducted by randomly selected families aged 45 and over. The baseline survey of CHARLS covered 4,505 villages and residences in 150 counties and districts across the country, and 1,770,511 people who visited 10,257,13 households, representing the Chinese middle-aged and elderly population as a whole.

In order to study the change of income, this paper selects the income of the past year as the individual who is not 0 and does not apply for retirement. In addition, variables such as academic qualifications and household registration are selected as explanatory variables. The specific variables involved are as follows:

Table 1: Sample Characteristics

Variable	Meaning of Variable	Mean Value	Standard Deviation
edu	Individual's level of education. Didn't finish primary school = 0, Primary school = 1, Middle school = 2, High school = 3, Vocational high school = 4,University and above =5	1.1	1.27
gender	Individual's gender. Male = 1, Female = 0	0.48	0.5
father_edu	Father's level of education. Didn't finish primary school = 0, Primary school =1, Middle school and above = 2	0.43	0.7
mother_edu	Mother's level of education. Didn't finish primary school = 0, Primary school =1, Middle school and above = 2	0.15	0.47
edu_period	Period of education. Finish high school before 1977 = 1, Finish high school after 1977 = 0	0.71	0.46
ii_total	Individual annual income.	24345.9	994007.4
shscore	Self-evaluation of health. Good = 0, Bad = 1	0.76	0.43
adl	Activities of daily living. Good = 0, Bad = 1	0.07	0.26
word	Degree of long-term memory. Good = 0, Bad = 1	0.61	0.49
exp	Years of work.	40.71	12.93
age	Age.	53.05	10.15
urban_nbs	Where individual lives. Urban = 1, Rural = 0	0.41	0.49
matrial	Marital status. Married = 1, Signal = 0	0.88	0.33
num_siblings	Number of sisters and brothers.	3.05	1.95
workornot	Work or not. Have work = 1, no work =0	0.72	0.45

The sample characteristics of this paper can be obtained from Table 2-1. First of all, in terms of income, the monthly income of people participating in vocational education is generally higher than those who do not participate in vocational education. Secondly, since the CHARLS data is for middle-aged and older people aged 45 and older, the average age and working years of the sample are large, the average age is around 53 years, and the average working life is about 40 years.

Table 2: Comparison of education levels and T test results					
Variable	Middle school	High school	Vocational high school	Middle school - High school	Vocational high school - High school
Gender	1.39	1.40	1.33	0.01	-0.07***
Father's level of education	0.53	0.65	0.70	0.12***	0.05
Mother's level of education	0.19	0.31	0.26	0.12***	-0.05
Period of education	0.53	0.45	0.73	-0.08***	0.28***
Individual annual income	5859.15	8449.58	137387.5	2590.44***	128937.90***
Self-evaluation of health	0.72	0.67	0.66	-0.05***	-0.00
Activities of daily living	0.03	0.02	0.04	-0.01***	0.02**
Degree of long-term memory	0.47	0.36	0.34	-0.11***	-0.02***
Years of work	39.44	38.24	48.09	-1.20***	9.84***
Age	54.68	53.13	60.55	-1.55***	7.43***
Where individual lives	0.49	0.62	0.78	0.13***	0.17***
Marital status	0.94	0.94	0.94	-0.00	0.00
Number of sisters and brothers	3.33	3.53	2.96	0.20***	-0.57***
Rate of retire	0.17	0.20	0.55	0.04***	0.35
Number	3652	1388	429		
*p<0.1, **p<0.05, ***p<0.01					

According to the results of the t-test after the comparison of the two pairs according to Table 2-2, it can be concluded that for the individual's annual income, the most

The high education level for ordinary high school can be significantly higher than the junior high school by 2,590 yuan, while the highest education is higher than the ordinary high school, which can be significantly higher than 128,937 yuan. For the individual's health status, the highest level of education for ordinary high school education is worse than that of junior high school education, while the highest education level for vocational high school education is better than that of ordinary high school education. For cognitive status, whether it is long-term cognitive situation or short-term cognitive situation, the highest education level for ordinary high school education is worse than that for junior high school education. The highest education level for vocational high school education is worse than that of ordinary high school. . However, the t-test does not indicate the impact on the income, health and cognition of the type of education or years of schooling, because in the sample, the highest level of education is the level of education of the parents, the number of siblings in the vocational high school, the general high school and the junior high school. There are significant differences in regions, ages, years of work, and retirement rates. In the absence of control variables, it is not possible to use the t-test to determine the impact of the type of education and years of schooling on individuals.

2.2 Research methods

This paper first considers the Mincer salary equation model estimation results when there is no heterogeneity in educational returns, as follows:

$$In\, Y_i = \alpha + \beta edu_i + \gamma X_i + u_i$$

Where i denotes different individuals (i=1, 2, ⋯, n), ln Y_i is the logarithm of monthly income, edu_i represents the type of education, and X_i is a variety of explanatory variables (including marital status, area, father's education level, The mother's education level, working years, square of working years, gender, and education generation), U_i is a random error term with zero expectation,

β is the educational return rate, and γ is the coefficient of the explanatory variable. In addition to comparing the income gap, this paper will also compare the employment gap between secondary and general high school, secondary school and college. The research method used is the logit model (hereinafter referred to as logit), which is set as follows:

$$P_i = \alpha + \beta edu_i + \gamma X_i + u_i$$

Similarly, formula (2) can be used to estimate health and memory conditions. When using Logit to estimate equation (2), the sample used was the highest level of education for ordinary high school and secondary school and the highest level of education for middle and high school. Pi is a dummy variable indicating employment status, P_i=1 indicates that health and cognitive status are good, and Pi=0 indicates poor health and cognitive status. X_i is a vector containing a series of control variables such as age, gender, marital status, and region. β represents the health and cognitive gap between the experimental group and the control group. Due to endogenous problems caused by individual ability deviations, the direct use of OLS and Logit estimates is biased. Taking ordinary high schools and vocational high schools as examples, due to the policy orientation of the era in which the sample is located, students with strong ability are more inclined to attend vocational schools because secondary school graduates can assign jobs at that time. Therefore, the OLS regression results cannot be used to judge this income gap because of the type of education or ability.

Caused by different. In order to exclude the influence of personal ability deviation, this paper adopts the propensity score matching (PSM) method, finds the matching objects of various aspects in the experimental group and the control group for further research, artificially constructs the counterfactual state. The OLS and Logit estimates after PSM can determine the causal effect of the education category on income.

The following steps are required to use the PSM method. First, use Logit regression to estimate the probability of a secondary school for each observation, that is, the propensity score for each observation. The Logit model is set as follows:

$$\Pr(edu_i = 0|X_i) = \frac{1}{1 + \exp(\beta X_i)}$$

$$\Pr(edu_i = 1|X_i) = \frac{1}{1 + \exp(\beta X_i)}$$

Xi is a vector that represents a series of characteristic variables that affect an individual's educational choices, including gender, number of siblings, parental education, and regional variables, and β_i is the corresponding coefficient. Edu_i=1 indicates the experimental group, and edu_i=0 indicates that the control group was selected. After estimating β_i, the tendency scores of each observation are estimated by (3) and (4). Second, the samples with the same or similar propensity scores are matched, and the groups with similar propensity scores are used as the counterfactual state. Third, an OLS or Logit regression analysis is performed on the samples that have been matched.

3. Empirical results

3.1 propensity score matching

First, the PSM nearest neighbor matching method is used to solve the capability deviation problem. Figure 1 shows the distribution of the nuclear density curve of the propensity scores before and after the matching of different samples. Table 3 shows the results of the balance test of the control variables in the model.

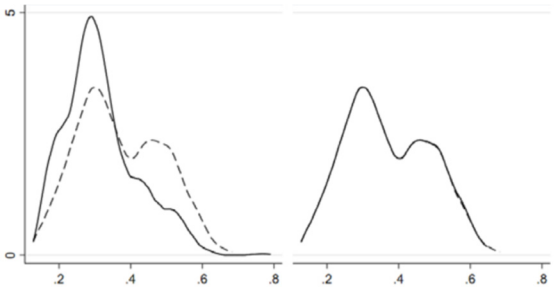

Figure 3-1: Pre- and post-nuclear density function maps for each group's propensity score
Note: the solid line represents junior high school and the dotted line represents high school.

As can be seen from Figure 3-1, there is a significant difference between the two groups before the match, and the difference between the two groups is significantly reduced after the match. It can also be seen from the sample balance test results in Table 3-1 that the gap between the individual high school and the secondary school group, the secondary school and the junior college group's personal characteristic variables after the matching is reduced and is no longer significant.

Table 3: Balance test after propensity score matching

Variable		Middle School and High School			High School and Vocational High School		
		Mean Value		T-test	Mean Value		T-test
		Middle School	High School	p>|t|	High School	Vocational High School	p>|t|
		(Control group)	(Experimental Group)		(Control Group)	(Experimental Group)	
gender	U	0.4890	0.5971	0.001	0.4890	0.6404	0.001
	M	0.4890	0.4858	0.937	0.6348	0.6404	0.913
father_edu	U	0.6959	0.5529	0.004	0.6959	0.6741	0.764
	M	0.6959	0.5956	0.095	0.6292	0.6741	0.579
mother_edu	U	0.3166	0.2085	0.005	0.3166	0.2359	0.157
	M	0.3166	0.2445	0.132	0.1966	0.2359	0.503
edu_period	U	0.5548	0.7346	0.000	0.5548	0.8202	0.000
	M	0.5548	0.5768	0.577	0.8089	0.8202	0.786
urban_nbs	U	0.8275	0.7314	0.001	0.8275	0.8089	0.605
	M	0.8275	0.8213	0.835	0.7977	0.8089	0.790
num_siblings	U	3.3793	3.1469	0.066	3.3793	3.0281	0.033
	M	3.3793	3.1438	0.802	3.1517	3.0281	0.498

According to Figure 3-1, before the trend score matching, whether it is the comparison between junior high school and high school, or the comparison between high school and vocational high school, there is a significant difference between the experimental group and the control group. After the propensity score matching, the difference between the experimental group and the control group was reduced and no longer had a significant difference. And according to the balance test results of Table 3-1, each control variable passed the t test after the propensity score matching, and these variables can be regarded as no difference in the control group and the control group.

3.2 OLS estimation results of annual income logarithm

In this section, the full sample was screened and analyzed using only samples that were not retired and whose wages were not missing. The ordinary least squares regression (OLS) analysis of the logarithm of the individual's annual income is shown in Table 3. The second and third columns of Table 3 are the OLS regression results of the junior high school and the ordinary high school secondary school group before and after the propensity score matching. At this time, t_edu=0 means that the education level is junior high school, t_edu=1 means that the education level is ordinary high school, and the influence of the years of education (ordinary junior high school/ordinary high school) on the individual's annual income is measured. The fourth and fifth columns are the OLS

regression results of the two groups of ordinary high school and vocational high school before and after matching the propensity scores. At this time, t_edu=0 means that the education level is ordinary high school, t_edu=1 means that the education level is vocational high school, and the influence of the education type (ordinary high school/vocational high school) on the individual's annual income is measured. In addition, in the regression equation, the individual's gender, urban, educated generation (edu_period), number of brothers and sisters (num_siblings), mother's education (mother_edu), father's education (father_edu), The salary period (exp), the square of the working years (exp2).

Table 4: OLS Estimation Results for Individual Annual Income

Ln(ii_total)	Middle School and High School		High School and Vocational High School	
	Match before	Match after	Match before	Match after
t_edu	0.208***	0.208**	0.407***	0.460***
	(0.472)	(0.500)	(0.480)	(0.501)
gender	0.254***	0.317***	0.193**	0.137
	(0.497)	(0.500)	(0.499)	(0.481)
urban	1.040***	0.928***	0.477***	0.503***
	(0.425)	(0.381)	(0.384)	(0.398)
edu_period	-0.307***	-0.236***	-0.171*	-0.148
	(0.469)	(0.496)	(0.477)	(0.389)
num_siblings	0.016	0.005	-0.005	-0.014
	(1.841)	(1.733)	(1.761)	(1.717)
mother_edu	0.119**	0.059	0.051	0.041
	(0.560)	(0.605)	(0.609)	(0.552)
father_edu	0.000	0.013	0.082	0.046
	(0.733)	(0.758)	(0.773)	(0.763)
exp	-0.012	0.000	0.027	0.043*
	(12.74)	(12.84)	(13.49)	(13.20)
exp2	0.000	0.000	-0.000	-0.000
	(1,231)	(1,218)	(1,330)	(1,356)
Constant	8.579***	8.407***	8.346***	7.909***
N	952	638	497	356
R^2	0.156	0.130	0.103	0.120
numbers in () are stardard deviation, *p<0.1, **p<0.05, ***p<0.01				

Note: Standard deviation in parentheses, *p<0.1, **p<0.05, ***p<0.01

It can be seen in Table 3-2 that for groups with non-missing income, the duration and type of education have a significant impact on the individual's annual income, but the degree of impact is different. For the samples after the propensity score matching, the individual ability deviation was controlled, and the educational variable coefficient was 0.208 and was significant at the statistical level of 5%. This means that under the 5% level of significance, after controlling for other variables, the three-year academic education from junior high school to high school can increase the individual's annual income by about 20.8%. In the same way, under the 1% significance level, after controlling other variables, the annual income of the individual can be higher than that of the ordinary high school by about 46.0%. The comparison between the two shows that the rate of return to vocational education is higher than that of three years of academic education.

This conclusion is consistent with the domestic research conclusions in the literature review. Zhu Jianfang et al (1995), Chen Xiaoyu and Wei Weifang (1998), Ge Yuhao (2007) and Liet.al (2012) all tend to think that secondary vocational education has at least positive in high income compared to high school graduates.

3.3 Logit estimation results for cognition and health

As mentioned above, the current research on the rate of return on secondary vocational education focuses on the study of employment and income in high school and vocational high school students,

and lacks comparisons in health and cognition. However, it is generally believed that engaging in technical work will have a negative impact on people's psychological and physiological functions, thus resulting in higher income compensation. Therefore, the analysis of vocational education is crucial to the health and cognitive status of workers in addition to income. Next, the logit regression analysis of the individual's ADL health and cognitive status was performed. The results are shown in Table 3-3 (health) and Table 3-4 (cognition).

Cognitive status and ADL health are two major factors in measuring psychological and physiological functions in addition to income, so they are selected for regression analysis. Cognitive status measures the ability of people to accept outside information and process it. In the Chinese Family Health and Pension Tracking Survey Database (CHARLS) selected in this paper, the measurement of cognitive status is an objective indicator of the long-term memory ability of the respondent, by allowing the respondent to recollect the memory for an hour later. Vocabulary to detect. For health, this article chooses the objective health indicator of ADL. ADL (activities ofdailyliving) is the ability of rehabilitation medicine to reflect people's basic activities in the family or community. It is a more objective indicator of people's health status than self-evaluation.

The second and third columns in Table 5 are the logit regression results of the junior high school and the ordinary high school secondary school group before and after matching the propensity score. At this time, t_edu=0 means that the education level is junior high school, t_edu=1 means that the education level is ordinary high school, and the influence of the years of education (general junior high school/ordinary high school) on the health of personal ADL is measured. The fourth and fifth columns are the Logit regression results of the two groups of ordinary high school and vocational high school before and after matching the propensity scores. At this time, t_edu=0 means that the education level is ordinary high school, t_edu=1 means that the education level is vocational high school, and the influence of the education type (ordinary high school/vocational high school) on the health of personal ADL is measured. In addition, in the regression equation, the gender, the urban, the age, the number of brothers and sisters (num_siblings), the mother's education (mother_edu), and the father's education (father_edu) are controlled).

Table 5: Logit Estimation Results of ADL Health

ADL	Middle School and High School		High School and Vocational High School	
	Match before	Match after	Match before	Match after
t_edu	-0.27	-0.26	0.03	0.05
	(0.33)	(0.33)	(0.53)	(0.59)
gender	-0.52**	-0.52*	-0.50	-0.66
	(0.27)	(0.29)	(0.52)	(0.57)
urban	-0.42	-0.30	0.39	0.18
	(0.28)	(0.28)	(0.61)	(0.63)
age	0.05***	0.04***	0.06**	0.06**
	(0.01)	(0.02)	(0.03)	(0.03)
num_siblings	-0.05	-0.04	-0.19	-0.21
	(0.07)	(0.08)	(0.14)	(0.16)
mother_edu	-0.45	-0.48	0.05	-0.65
	(0.39)	(0.39)	(0.56)	(0.95)
father_edu	-0.06	-0.01	-0.61	-0.63
	(0.21)	(0.21)	(0.43)	(0.49)
Constant	-5.75***	-5.80***	-7.46***	-6.88***
	(1.10)	(1.21)	(2.11)	(2.27)
N	2848	2468	959	855
R^1	0.04	0.04	0.09	0.04
numbers in () are stardard deviation, *p<0.1, **p<0.05, ***p<0.02				

Note: Standard deviation in parentheses, *p<0.1, **p<0.05, ***p<0.01

As can be seen from Table 3-3, after controlling for other variables, the education of the age and category will not affect the individual's health. The factors that affect health are age and gender.

The second and third columns in Table 3-4 are the logit regression results of the junior high

school and the ordinary high school secondary school group before and after matching the propensity score. At this time, t_edu=0 means that the education level is junior high school, t_edu=1 means that the education level is ordinary high school, and the influence of the years of education (general junior high school/ordinary high school) on the cognitive status of the individual is measured. The fourth and fifth columns are the Logit regression results of the two groups of ordinary high school and vocational high school before and after matching the propensity scores. At this time, t_edu=0 means that the education level is ordinary high school, t_edu=1 means that the education level is vocational high school, and the influence of the education type (ordinary high school/vocational high school) on the individual's cognitive status is measured. In addition, in the regression equation, the gender, the urban, the age, the number of brothers and sisters (num_siblings), the mother's education (mother_edu), and the father's education (father_edu) are controlled.).

Table 6: Logit estimation results of cognitive status

Cognitive Status	Middle School and High School		High School and Vocational High School	
	Match before	Match after	Match before	Match after
t_edu	-0.36***	-0.32***	-0.65***	0.65***
	(0.10)	(0.10)	(0.19)	(0.19)
gender	0.24***	0.26***	0.43***	0.44***
	(0.09)	(0.91)	(0.16)	(0.16)
urban	-0.24***	-0.21**	-0.12	-0.11
	(0.09)	(0.09)	(0.16)	(0.16)
age	0.02***	0.02	0.03***	0.03***
	(0.00)	(0.01)	(0.01)	(0.01)
num_siblings	-0.00	0.01	-0.00	-0.00
	(0.02)	(0.02)	(0.04)	(0.04)
mother_edu	-0.20	-0.20**	-0.04	-0.03
	(0.09)	(0.09)	(0.14)	(0.14)
father_edu	-0.02	-0.02	0.06	0.05
	(0.06)	(0.07)	(0.11)	(0.11)
Constant	-1.11***	-0.94**	-2.29***	-2.27***
	(0.37)	(0.39)	(0.67)	(0.67)
N	2430	2294	889	882
R^1	0.03	0.02	0.03	0.03
numbers in () are stardard deviation, *p<0.1, **p<0.05, ***p<0.02				

Note: Standard deviation in parentheses, *p<0.1, **p<0.05, ***p<0.01

It can be seen from Table 3-4 that after controlling other variables and solving the ability deviation, at 1% of the level of significance, people who receive ordinary high school education have better cognitive status than those who receive ordinary junior high school education; People who receive vocational high school education have better cognitive status than those who receive ordinary high school education. Moreover, the acceptance of vocational education has a greater positive impact on personal cognition than the three years of education.

This may be due to the special policy background at the time. The sample selected in this paper is 53 years old, that is, the high school population in the early 1970s. At that time, since the reform and opening up in 1978, China's economic construction has developed rapidly, which has triggered a strong demand for skilled talents. The state has also introduced favorable policies for the development of secondary vocational education. 3 Under the combined effect of the two, secondary vocational education ushered in the “golden period” of development. This situation continued until the “expansion of colleges and universities” in 1999, which led to a sudden increase in the number of applicants for ordinary high schools (Xing Chunbing, 2013), the source of secondary vocational education. Only then began to drastically reduce. From the perspective of students, the students who choose vocational highs at this time have better grades in the senior high school entrance examinations, because the college admission rate is not high and the vocational high school “packages” and can reduce the family burden as soon as possible (75% of secondary school

students, 100% of technical school students enjoy bursaries)) and chose a vocational high school. From the perspective of social recognition, vocational high schools have a good reputation in the society, and graduates of secondary schools can also enjoy the status of “cadres” (Zhou Zheng, 2008). It can be seen that for the students at that time, choosing secondary vocational education can bring a better graduation path than academic education, which may lead to better cognitive ability of individuals in the late career.

4. Conclusion

Human capital investment is a classic research topic in labor economics. Today, the structural contradictions in the labor market are becoming more and more prominent in China. Therefore, this research analyzes the income, health, and cognitive impacts of different ages and categories of education on middle-aged and old-aged people by comparing the three types of people who graduated form middle school, high school, and secondary vocational schools.

This research eliminated the “Selection Bias” which caused by ability bias in different education groups by using the Propensity Score Matching (PSM) method. Then, it analyzed the regression of individual income by using the ordinary least squares method. The study found that under the 5% significance level, after controlling other variables, the three-year academic education from middle school to high school can increase the individual's annual income by about 20.8%. In the same way, under the 1% significance level, after controlling other variables, the annual income of the individual who graduated from vocational high school can be higher than that of the people who graduated from ordinary high school by about 46.0%. It means that from the perspective of income, even in the middle-aged, receiving vocational education is more profitable than three-year academic education. Finally, in the analysis of cognition and health status, this research used Logit regression and found out that the age or type of education has little effect on health. Age and gender are the main factors that affecting health status. For cognitive status, accepting more years academic education and vocational education can improve the cognitive status of people in the middle and old age, and vocational education is more effective than the academic education of more years. This is closely related to the period of education that mentioned in the previous paper. For the students who graduated from middle school around 1980, the vocational education was accepted due to the preferential policies of “provide allocation”, “free tuition” and “elite status”. Those students were more decent and satisfied after graduation because the vocational education brought high income and good cognitive ability. Although the preferential policies at that time were no longer, it showed that with the encouragement of national policies, the vocational education population could bring long-term and better labor market performance.

Those conclusions above further confirm the need of the professional talents in the labor market and the necessity of developing vocational education. Improving the development of vocational education and cultivating skilled talents can not only increase the income of individuals, but also help the country to alleviate the shortage of skilled talents in the labor market, thus providing sufficient human resources for the industrial upgrading.

Finally, there are three problems in this research due to data availability issues. Firstly, the propensity score matching method used in this study cannot completely eliminate the selection bias effect. When the data allows, the conclusions above can be cross-validated by means of the fixed effect model or the instrumental variable method. Secondly, this paper only considers the impact of education on income, health, and cognition. In fact, education will bring many non-monetized benefits. For example, if people choose a secondary vocational school, it will be difficult to continue his/her studies and get a higher degree. On the contrary, if he/she chooses an ordinary high school, then more possibilities for further study in the future will be the hidden education benefits of ordinary high school education. If he/she does not consider the non-monetary benefits of education, the return on education in ordinary high schools will be underestimated. Thirdly, this study only considers the benefits of education and ignores the cost of education. In fact, for good vocational education, especially for today's private education institutions, the cost of choosing vocational education is higher than that ordinary academic education, which will also overestimate

the rate of return of vocational education.

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