

# Can Graduating from a Key University Really Increase People's Market Returns? Evidence from China's Urban Formal Labor Market (1993-2010)

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## Abstract

As the continuous increasing of the total number of workers with the undergraduate degree, it is not going to university but going to what kind of university becomes increasingly important on affecting the returns of labor market. Using the adult data from the China Family Panel Studies in 2010 and based on the OLS regression model, this paper analyzes the market returns variation of workers graduated from universities of “project 211” and non-“project 211”. The result shows that the market returns of workers who graduated from “project 211” universities are significantly higher than those of workers who graduated from non-“project 211” universities. Although the estimation coefficient based on the propensity score matching method is slightly less than the partial regression coefficient of OLS regression results, the result is still significant. Therefore, the result once again supports the human capital theory, and rejects the screening theory.

## Keywords

“Project 211” University, Formal Labor Market, Career Cycle, Market Returns

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## 1. Introduction

Since 1990, especially since the higher education expansion, both the number of higher educational institutions and the number of university students or graduates in China have increased tremendously. According to relevant data from *China Education Statistical Yearbook (1994-2010)*, from 1994 to 2010, the number of China's regular institutions of higher education increased from 1080 to

2358, an increase of 118.3%. At the same time, the enrollment scale of undergraduates and junior college students increased from 6.23 millions in 1999 to 32.21 millions in 2010 (China Education Statistical Yearbook in 2010), and the gross enrollment rate of higher education reached 26.5% in 2010 (Bie, 2016), far exceeding Martin's (1973) standard for the popularization stage of higher education 15%.

With the increasing popularization of higher education, the influence of university attendance on improving people's marginal income is bound to decrease (Freeman 1976; Groot & Brink 2000). Therefore, according to Lucas's (2001) theory, some families from the advantageous social level turn to send their children to higher quality schools, which is not only in the hope that their children can obtain higher occupational income, but also in order to maintain the comparative advantage of their own class. However, in China, people attend schools with pursuit of more dimensions like bringing economic benefits, family reputation and so on. Under the situation of unable effective realization to these utilitarian purposes, not only the advantageous social level, even families from the working class and peasant class strongly hope their children to be admitted to a good university.

Therefore, with the increase of the total number of workers with the undergraduate degree, it is not going to university but going to what kind of university has a more important impact on people's income. However, the current researches focus on the influence of family background in the pre-employment stage on education stratification (Li, 2003; Yang, 2005; Wu, 2013; Ye, 2015; Pang Shengmin 2016, 2017), and the impact of going to university on the returns of people's labor market (Wu & Zhao, 2010; Deng & Ding, 2013; Liu, 2015; Chen & Hu, 2015; Chen & Hamori 2009). While attention to the micro-economic consequences of the stratification of universities on the laborers is far from being desired. Based on this, this paper will examine the market returns of workers graduated from different types of universities.

## 2. Literature Review

It has long been a classic issue in education economics and education sociology that whether education or the inherent ability has improved people's market returns. According to the human capital theory, education directly improves people's productivity by strengthening their cognitive ability and action ability, as well as cultivating a more positive psychological state (Mincer, 1974; Becker, 1975; Tsamadias & Chanis, 2013). However, the screening theory opposes the view of human capital theory. It holds that people's productive capacity is innate, while education cannot change but only plays a role in confirming or allocating it (Akerlof, 1970; Spender 1973). Around this debate, scholars from different research fields have conducted a large number of studies based on different empirical materials, but no conclusions have been reached (Riley, 2001; Spence, 2002; Heywood & Wei, 2004; Miller, Mulvey, & Martin, 2004; Miller,

2009; Li et al., 2009). There are two reasons for this: First, they failed to isolate or control the effect of the ability to market returns; Second, they also cannot distinguish the role of education in the allocation of workers' productive capacity and possible improvement.

With the development of cognitive ability and non-cognitive ability measurement techniques in the field of psychology in recent years, and the new definition to the connotation of ability in human capital theory, more and more scholars tried to directly control cognitive and non-cognitive ability in order to recognize the influence of higher education to market returns (Wu & Li, 2017; Huang & Xie, 2017; Xu, 2017; Le & Hu, 2017). On the other hand, there are more and more data that provides the applications of respondents when they applied for college or chose majors. Thus researchers can better distinguish the improvement and allocation effects of education on production capacity (Hastings, Neilson, & Zimmerman, 2013; Kirkeboen, Leuven, & Magne, 2016; He, 2018). However, the above studies regarded the workers with the same education years as a homogenous group, and completely ignored the differences in education quality among workers from different universities.

Although some scholars have investigated the influence of education quality on people's market returns (Black & Smith, 2004, 2006; Long, 2008, 2010), most of these studies regarded the universities stratification as a continuous variable, with index like laborer's high school test scores (SAT), college tuitions and loan fees, professors' average salary, the number of professors versus students, and the proportion of graduate students among the freshman, to measure the universities stratification. Actually, this is not suitable for the discontinuous differences of China's universities. Though studies of Zeyun Liu and Muyuan Qiu (2011) and Lingli Xu and Chunrong Ai (2016) have noticed the non-continuous variation situation of China's universities, their researches are not only lacking of some dialogues to main theories, which directly leads to the serious empiricism, and also their analysis is not effective to control the main confounding variables in universities stratification and market returns, that is, cognitive ability and cognitive ability. Based on this, this paper will analyze the influence of the stratification of China's universities on the returns of the labor market in terms of more systematic theory dialogue, more rigorous measurement and more representative data.

### 3. Research Hypothesis

In Europe and the United States, most universities are naturally stratified based on their long-term academic reputation and differences in the quality of employment among graduates. While in China, the stratification of universities is largely due to the intervention of the China government. As a matter of fact, shortly after the founding of the People's Republic of China, the central government established two national exemplary universities, namely Renmin University of China and Harbin Institute of Technology, and carried out the key con-

struction to these two universities (Chen Chao 2009). Then on May 17, 1959, the central government promulgated *the Decision of the CPC Central Committee on the Designation of a batch of Key Universities in Institutions of Higher Learning*, which officially established the system of key universities in China (Chen Chao 2009) and has been affecting the stratification pattern of Chinese universities till today.

Due to the change of policies, the Chinese government has implemented different construction plans for key universities at different times since 1949. However, in a series of key university construction projects, the most extensive and far-reaching one is the “project 211” universities construction project, which is generally accepted and recognized by students, universities, employers and the society. The “project 211” began on February 13, 1993. At that time, the CPC Central Committee and the State Council jointly issued *the Outline of Chinese Education Reform and Development*, which point out: “In order to meet the challenge of the world new technology revolution, the efforts of central and local governments in various fields will be concentrated on so as to run about 100 key universities and a group of key disciplines and specialties, so as to form a group of institutions of higher learning and the disciplines and specialties, which can achieve a rather high level in the word early in the next century in terms of education quality, scientific research and management”. According to this outline, the former State Development Planning Commission, the State Education Commission and the Ministry of Finance jointly issued *the General Construction Plan for “Project 211”*, which was listed into the medium-long term plan for national economic and social development and the ninth five-year plan. By 2010, 112 universities had been brought into the “project 211”, accounting for 4.78% of the total amount of universities in China. Compared with other universities, “project 211” universities are superior to non-“project 211” universities in almost all indicators, such as research and development funds, scientific and technological manpower, scientific and technological achievements, international exchanges, and transfer of scientific research achievements. See **Table 1** for the detailed information.

It can be seen that compared with other universities, “211 project” universities not only have more excellent faculties, but also have stronger research abilities and more opportunities for external exchanges, which can provide better education services for students studying in these universities. Therefore, according to the logic of human capital theory, the workers who graduated from “211 project” universities will get higher human capital due to higher education quality accepted by them, and thus obtain higher market returns. In contrast, according to the screening theory, graduates from “project 211” universities are merely sheepskin, which cannot improve the productivity of individuals better than non-“project 211” universities. The difference in market returns between the two types of workers may only be due to the innate ability differences of individuals, rather than the education differences in schools.

**Table 1.** Some indicators compared between “project 211” universities and non-“project 211” universities.

Time	financial allocations/Millions of Yuan/School		Dispatch and acceptance of international scientific and technological exchanges/School		International science and technology awards/School		Professor proportion/School	
	“211 project” universities	General universities	“211 project” universities	General universities	“211 project” universities	General universities	“211 project” universities	General universities
2002	260.786	17.847	111.947	15.736	0.882	0.136	0.211	0.117
2003	319.517	23.557	151.640	17.885	1.147	0.059	0.221	0.124
2004	377.814	25.840	254.645	24.538	1.526	0.109	0.225	0.127
2005	471.469	33.748	298.234	40.235	1.766	0.105	0.240	0.131
2006	572.311	41.711	288.267	36.856	2.187	0.097	0.243	0.134
2007	515.247	41.786	321.760	38.162	1.270	0.061	0.231	0.134
2008	603.724	47.599	289.248	39.334	1.876	0.136	0.118	0.135
2009	709.052	57.298	354.132	44.780	1.934	0.132	0.233	0.143
2010	794.501	58.406	394.907	45.334	1.944	0.179	0.240	0.144
2011	1078.608	74.591	410.330	48.781	2.387	0.138	0.241	0.147
2012	1138.989	87.642	468.257	49.448	2.314	0.169	0.243	0.150
2013	1262.082	96.613	422.417	49.465	2.093	0.108	0.247	0.152
2014	1309.545	99.692	416.120	52.333	2.000	0.096	0.251	0.151
2015	1311.163	98.394	445.872	49.894	1.908	0.106	0.255	0.151
2016	1427.127	84.748	439.477	42.081	2.092	0.087	0.256	0.149
2017	1544.663	86.597	473.527	36.619	2.082	0.058	0.275	0.151

As a consequence, the hypothesis of this research is put forward: after controlling individual ability variables, the market returns of these two types of workers will not be different.

#### 4. Research Design

##### 1) Data

The data used in this paper is from the China Family Panel Studies (CFPS) of 2010 conducted by the China Social Science Survey Center of Peking University. CFPS 2010 was chosen for two reasons. First, CFPS 2010 covers abundant personal and family background information like respondents’ education years, graduation time, types of undergraduate schools, occupational income, parents’ education degree, gender, cognitive ability, personality traits and so on, which basically meets the needs of this study. Secondly, it is a national survey data based on random sampling, and the conclusions obtained have high external validity.

Samples of CFPS covered 25 provinces/cities/autonomous regions, and the target sample size was 16,000 households. The respondents covered all family members in the sample households. In this paper, the author defines the study

population as workers who got a job after 1993 with the undergraduate degree and belongs to the urban formal labor market rather than all workers. The year of 1993 was regarded as the boundary of time, because implementation of the system of “autonomous employment” of Chinese universities graduates and the establishment of “211 project” university planning both took place in 1993<sup>1</sup>.

Only the workers who work in the urban formal labor market are analyzed here. On the one hand, owing to the similar structure and stable source of their wage income, on the other hand, because their income has a uniform tax scope, better guarantee to the reliability of data collection is possible. Based on it, this paper also removed all those working institutions belonging to the rural household operators, the unfit users, the unrecognizers and others, and finally obtained the effective sample size of 523.

## 2) Measurement

### *Dependent Variable*

Labor market returns. That is, income earned through the labor market, excluding transfer income and wealth income. This paper follows the general measurement method (Mincer 1974; Becker 1964) in academic circle, namely the monthly wage income is used to measure the labor market returns. In CFPS 2010, several measures of personal wage income are provided, including the average basic monthly salary, monthly floating salary, overtime pay, subsidies and bonuses, and annual gross income. Therefore, this study not only can obtain an accurate monthly salary by adding the previous four items together, but also get a rough monthly salary by dividing annual gross income by 12. However, through the preliminary trial analysis of this study, it was found that there were a large number of missing values in the four indicators of wage income (k101 - k104), and the loss rate of effective sample size based on these four indicators (it has and merely has these four indicators here) reached 20.96% to 26.11%. In contrast, the maximum loss rate of effective sample size based on annual gross income (K601) was only 7.73%. Based on this, the monthly mean of annual gross

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<sup>1</sup>In 1993, the CPC Central Committee and the State Council jointly issued *the Outline Chinese Education Reform and Development*, which clearly put forward: To reform the “unified assignment” and “guarantee to be cadres” employment system of universities, and implement a new employment system that the minority graduates will be arranged by the state while the majority of the students are to be self-employed. In the near future, students in national planned admission are still be arranged a job by the state within a certain range in principle, to implement “supply and demand meeting” between schools and employers, to put the graduate employment program in place, to gradually promote “two-way choice” between graduates and employers. In addition, students of specialist tailor-made and commissioned training take up an occupation according to the contracts, and self-supported students choose their jobs independently. With the establishment of the socialist market economic system and the reform of personnel system, only graduates from education disciplines and some painstaking industries and remote areas can obtain the chance of orientated employment within certain limits, while most graduates practice “self-choice” through the labor market under the guidance of national policies. With this, to establish social intermediary organizations providing employment service like talent demand information, employment guidance, job introduction and so on (Tian Yongpo 2016). This outline also put forward that in order to meet the challenge of the world new technology revolution, the efforts of central and local governments in various fields will be concentrated on so as to run about 100 key university and a group of key disciplines and specialties.

income (do logarithm processing) was selected as the dependent variable.

#### *Independent Variables*

Types of universities is a dichotomous variable. The problem (Topic Number C306) in the original questionnaire is “In which kind of university you completed your undergraduate degree?” According to respondents’ graduate schools whether belong to the “211 project” universities and whether they have the enrolment qualification of the first and second batches of undergraduate, the CFPS 2010 item divided all universities into national key universities, general key universities, first-tier universities, second-tier universities, overseas universities, military universities, arts and sports universities, self-taught higher education, radio and television universities, night universities, correspondence, online education schools, party schools and so on. Considering the samples also included arts and sports universities as well as military universities, which have different policies when recruit students, so it is difficult to precisely judge whether it is a key university under the view of undergraduate batch. While the “211 project” universities cover all kinds of universities enclosing arts and sports universities and the military schools. And compared to dividing standard that whether has the enrolment qualification of the first and second batches of undergraduate, it is an indicator that can be better distinguished and be more generally accepted by the academic community and society. Based on this, whether the respondents are enrolled in “project 211” universities during their undergraduate study is taken as the criterion to determine whether they graduated from key universities.”Project 211” universities equates key universities (overseas university graduates are equivalent to “project 211” graduates), and the code is 1. Non-“project 211” universities are regarded as general universities, and the code is 0.

#### *Control Variable*

*Cognitive ability*, that is, the ability of the human brain to process, store and extract information, is a concentrated reflection of the inherent ability of human beings (Huang & Xie, 2017; Zhou et al., 2018). The CFPS 2010 provides multiple indicators measuring individual cognitive ability, including these respondents’ math test scores, words test scores, their intellectual level, language and comprehensive ability. Among these indicators, the last three indicators are measured based on respondents’ subjective judgement, and their values are limited from 1 to 5, which causing a very small variation. While the first two indicators are based on two groups of international general test problems, and the value range is from 0 to 24, leading to a greater variation. Therefore, the last three indicators are not as good as the first two in terms of scientific and standardized subject setting and accuracy of follow-up research results. Based on this, this paper uses the math test scores and words test scores to measure an individual’s cognitive ability (Li, 2016; Chen & Wu, 2016; Huang and Xie, 2017).

*Personality traits*, which is also an important variable influencing the returns of the labor market, are also defined as the non-cognitive abilities by some scholars (Huang & Xie, 2017; Xu, 2017). At present, there are four commonly used

measurement methods of personality traits: five-factor personality model (Seibert & Kraimer, 2001; Jakobwitz & Egan, 2006; Heckman & Kautz, 2012), the self-esteem scale (Drago, 2011; Xie & Zhang, 2016; Xu, 2017; Wu & Li, 2017), locus of control (Groves, 2005), and the depression scale (Chen et al., 2009; Zhang et al., 2010; Yue Junjie and Hu Bowen 2017). The CFPS 2010 provides two scales measuring individual spirit or psychological state, that is, the self-esteem scale and depression scale<sup>2</sup>. However, the former is only used to measure the teenagers and children, so in the adult database of the CFPS 2010, this study can only obtain respectively based on aggregation and the factor analysis method to get the depression scores. Nevertheless, by comparing the test problems of the five-factor personality model (Komarraju, Karau, & Schmeck, 2011) and the problems of depression measurement and self-esteem measurement of the CFPS 2010, this study finds that there is a large coincident content among the three different measures of personality traits. Therefore, this article follows the measurement methods of Junjie Le and Bowen Hu (2017), and uses the depression scores based on the aggregation method to measure individual personality traits. The higher the score is, the worse the psychological state is.

*The highest education levels of parents.* The CFPS asked the respondent's father and mother for their highest education diploma in detail. This paper chose the higher education level between the respondent's father and mother as the control variable (if there was any deficiency, the education level of the other party was substituted). The original data about the education diploma provided is an ordered variable, while it is converted to education years in this study.

*Father's occupation.* The CFPS provides a number of indicators for measuring fathers' occupations, including those based on the national standard codes and those based on the ISCO codes. Considering that the missing value of occupations based on the ISCO88 is much higher than those based on the national standard codes, this article decides to use the latter classification system. In the prophase of tentative test analysis, it is found that there's no statistical significance between the two samples when delete the missing values and not delete the missing values. The two samples recode the fathers' occupations into four professional categories, that is, unit leaders, professionals, commercial service people, processing and operating personnels, and the mean differences (t values) of the four categories are all less than 1.96. Therefore, this paper reserves the non-occupation classification, inconvenient classification and missing persons on the father's occupation (national standard), and uniformly codes for others.

*Cohort effect.* On the one hand, due to the changes in enrollment policies and population policies, people who graduated and entered the labor market in different ages often had different chances to be admitted into universities. On the other hand, due to the progress of the times, the education content accepted by

<sup>2</sup>See Technical Report of the CFPS 2010: education level & the Depression Scale.  
Technical Report of the CFPS 2010: Metal Health Scale:

workers in different ages in schools may also change. Generally speaking, the next generation has more knowledge than the previous generation. In addition, because of the adjustment of wage system and employment system by the government or enterprises in different period, workers in different ages have different probability of entering enterprises and different wage levels. So, this is an important confounding variable must be controlled.

Moreover, this paper also controls variables such as age, gender, household registration, number of siblings and economic area. The operationalization of variables is shown in **Table 2**.

### 3) Model specification

Because the basic assumption of the Mincer equation (Mincer 1974) is that the rate of return to schooling is the same for all market workers at all education levels. This assumption completely ignored the variations of return to schooling caused by the different structure of education. Although some scholars tried to overcome this problem, they mostly measured the quality of education by introducing some continuous indicators like per capita education spending or student and teacher ratio. While this method still cannot well explain the discontinuous variation of universities stratification in China. Based on this, a university stratification variable  $q_i$  is added in the Mincer model to represent the above characteristics. In addition, considering that Mincer model is too idealistic to assume the continuity and uniformity of the labor market, a series of control variables will be added to the original model. The final model is as follows:

$$\ln w_i = \alpha_{0i} + \eta_{q_i} q_i + \psi q_i * t_i + \delta_i c_i + \varepsilon_i$$

Among them,  $w_i$  represents the average monthly wage of workers, and  $\alpha_{0i}$  represents the immediate income of workers before they receive education;  $q_i$  stands for the universities stratification,  $\eta_{q_i}$  is its coefficient;  $c_i$  is a vector representing the control variables (including gender, age, household registration, etc., and the constant term is incorporated into  $c_i$ ), and  $\delta_i$  is its coefficient.

## 5. Research Findings

### 1) Descriptive statistical analysis

**Table 3** is the descriptive statistics of the main labor market characteristics of the workers who respectively graduated from “project 211” universities and non-“project 211” universities. It can be seen from the table that both the monthly income of workers who graduated from “211 project” universities and the highest education levels of their parents are significantly higher than those who graduated from non-“211 project” universities, with the absolute difference of 845.78 yuan ( $\exp^{7.972} - \exp^{7.627}$ ,  $P = 0.000$ ) and 0.69 years ( $P = 0.015$ ). However, the average age and the number of siblings of the former are much smaller than those of the latter, with an absolute difference of 8.64 years ( $P = 0.001$ ) and 0.43 ( $P = 0.000$ ) respectively.

**Table 2.** Operationalization of variables.

Observed Variables	Definition or Encoding	Measurement
Returns of Labor Market	Annual Income/12 months	K601 What is your total income?
Types of Universities	“211 Project” & overseas colleges and universities = 1; first-tier universities, second-tier universities, third-tier universities, military universities, arts and sports universities, night universities, correspondence, studio and television universities, online education school, party school and others = 0.	C306 Which school were you studying for your undergraduate degree?
Age	Age data in the CFPS 2010.	A1 What’s your date of birth?
Age Square	Age data in the CFPS 2010.	A1 What’s your date of birth?
Gender	Female = 0, Male = 1.	Y1 The interviewer recorded the gender of the interviewee.
Household Registration	Agricultural household = 0, Non-agricultural household = 1.	A402 What is your household registration status at the age of 12?
Cognitive ability	Data in CFPS 2010, 0 - 24 points.	Mathematical module in part X of the questionnaire.
Personality traits	Data in CFPS 2010, 0 - 24 points.	Words module in part X of the questionnaire.
Number of Siblings	Data in CFPS 2010, 8 - 30 points.	the six question about behavior and mental health in part Q of the questionnaire.
The Highest Education Levels of Parents	Number of Siblings.	B1 How many brothers and sisters do you have?
Father’s Occupation	Convert the degree to education years.  Main codes of father’s occupation (International standards): [50,000, 70,000] = 0, Production, processing and operating personnels; [10,000, 20,000] = 1, Unit Leaders; [20,000, 30,000] = 2, Professionals; [30,000, 50,000] = 3, Clerks and service people; [70,000, 9999] = 4, Else.	B4/D5 Upload names of family members, and the highest degree they completed?  B5/D6 Upload the name of immediate family living apart and his occupation.
Employment Area	Middle Area = 1; Including Jilin, Heilongjiang, Shanxi, Anhui, Henan, Hubei and Hunan. East Area = 1; Including Tianjin, Beijing, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong and Guangdong. West Area = 0; Including Sichuan, Chongqing, Guizhou, Yunnan, Shannxi, Gansu; Guangxi.	The province the respondents currently live in (source from the CFPS adult database provcd).

**Table 3.** Descriptive statistics of variables.

Variables	Non-“211 project” universities		“211 project” universities		Mean Difference $\chi^2$
	Mean	Standard Deviation	Mean	Standard Deviation	
Logarithm of Monthly Income	7.627	0.903	7.972	0.856	0.000
Age	32.344	6.748	30.982	5.735	0.001
Age Square	1091.538	477.829	992.548	385.193	0.001
Male	0.553	0.498	0.616	0.488	0.804
Non-agricultural household	0.922	0.269	0.898	0.304	0.547
Number of Siblings	1.604	1.539	1.174	1.431	0.000
Math Test Scores	19.838	2.398	19.862	2.346	0.094
Words Test Scores	30.175	3.057	30.300	3.278	0.093
Depression Scores	27.673	2.438	27.387	3.493	0.572
Cohort Effect					
Entered the Labor Market during 1993-1998	0.079	0.270	0.128	0.335	0.001
Entered the Labor Market during 1999-2004	0.277	0.448	0.246	0.432	
Entered the Labor Market during 2005-2010	0.644	0.480	0.627	0.486	
Highest Education Levels of Parents	9.865	3.886	10.551	3.812	0.015
Father’s Occupation					
Else	0.212	0.409	0.228	0.421	0.708
Unit Leaders	0.158	0.365	0.082	0.276	
Professionals	0.107	0.309	0.107	0.311	
Clerks and Service People	0.136	0.343	0.149	0.357	
Production, processing and operating personnels	0.387	0.488	0.434	0.497	
Employment Area					
West Area	0.148	0.355	0.094	0.293	0.001
Middle Area	0.397	0.490	0.375	0.486	
East Area	0.455	0.499	0.532	0.501	
Sample Size	388		135		

In addition, there are significant differences between the two types of workers in the employment area and the time they entered the labor market. There are respectively 53.2 percent and 9.4 percent of workers who graduated from “211 project” universities are currently employed in the eastern and western regions, but the corresponding proportion of workers who graduated from “211 project” universities is 45.5 percent and 14.8 percent respectively. Moreover, 12.8 percent

of workers who graduated from “project 211” universities entered the labor market at an early age, while the percentage is only 7.9 among those who graduated from general universities.

Finally, the two types of workers also have significant differences in the two indexes of measuring cognitive ability, but there was no significant difference in non-cognitive ability, household registration distribution, personality traits and father’s occupation.

### 2) Regression analysis

**Table 4** shows the OLS regression results about the returns of labor market influenced by the types of graduate school. The Model1 corresponds to the simplest Mincer equation (Mincer 1974). To observe this model, it shows that the monthly income of workers who graduated from “project 211” universities is significantly higher than that of workers who graduated from non-“project 211” universities, which is about 49.33% higher than the latter ( $e^{0.401}-1$ ). The Model 2 is introduced three further variables to measure individual’s cognitive ability and personality traits on the basis of the Model 1, but all of the three variables were not significant. The partial regression coefficient of variable about university types is still significant despite of its decline, which shows that in terms of workers who have the undergraduate degree, their market returns difference mainly comes from the difference of the school they graduated from rather than their abilities. Thus the finding here rejects the screening theory. On the basis of the Model 2, the Model 3 further controls variables such as household registration, number of siblings and cohort effect. Whether the variable on types of universities or the three variables measuring individuals’ cognitive ability and personality traits, their statistical significance has not changed. Overall, the findings here ultimately support the human capital theory.

### 3) Re-estimation based on propensity score matching

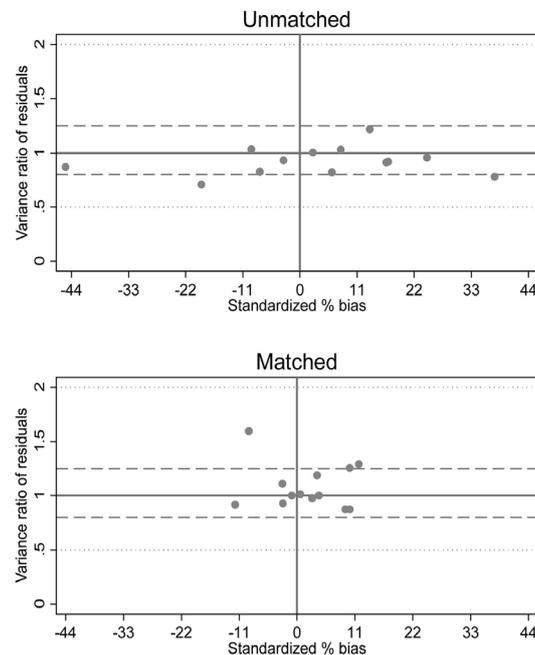
This paper actually presupposes that the samples are randomly distributed in **Table 4**. However, in practice, people tend to have strong selectivity in choosing normal higher education or adult higher education. As shown in **Table 3**, there is a statistically significant correlation in the types of graduate schools and many control variables. Take the number of siblings as an example. The average number of siblings among workers who graduated from non-“project 211” universities is 1.6, while that number is 1.2 among workers who graduated from “project 211” universities, with a difference of 0.4, which is statistically significant ( $P = 0.001$ ). Therefore, workers are highly selective in the types of graduate school. If without control, the estimate will be biased. However, the method of propensity score matching provides a more efficient method to control the selectivity of this kind of sample than OLS regression. Based on this, this paper will also use the propensity score matching method for further analysis.

Before the formal analysis, this paper firstly examines two hypotheses that the propensity score matching method needs to be satisfied. It can be seen from **Figure 1** that before the matching, the difference of most control variables between workers graduated from “project 211” universities and those graduated

**Table 4.** OLS regression estimation results of graduated university influencing market returns.

Variable	Model 1	Model 2	Model 3
“211 project” universities	0.401*** (0.105)	0.393*** (0.105)	0.352*** (0.097)
Age	0.215*** (0.056)	0.218*** (0.058)	0.179** (0.061)
Age Square	-0.002** (0.001)	-0.002** (0.001)	-0.002* (0.001)
Male			0.039 (0.100)
Non-agricultural household			-0.009 (0.223)
Number of Siblings			-0.005 (0.032)
Math Test Scores		0.011 (0.022)	0.004 (0.020)
Words Test Scores		0.000 (0.015)	-0.007 (0.015)
Depression Scores		-0.029 (0.016)	-0.027 (0.015)
Entered the Labor Market during 1999-2004			0.124 (0.151)
Entered the Labor Market during 2005-2010			-0.180 (0.145)
Highest Education Levels of Parents			-0.008 (0.013)
<b>Father's Occupation</b>			
Else			0.330** (0.122)
Unit Leaders			0.052 (0.193)
Professionals			0.166 (0.140)
Clerks and Service People			0.133 (0.138)
Middle Area			0.096 (0.155)
East Area			0.397** (0.150)
Constant	3.294** (1.040)	3.783*** (1.068)	4.764*** (1.056)
Observed Value	523	523	523
R <sup>2</sup>	0.170	0.178	0.257

Figures in parentheses denote t statistics: \*Significant at 10%; \*\*Significant at 10%; \*\*\*Significant at 10%.



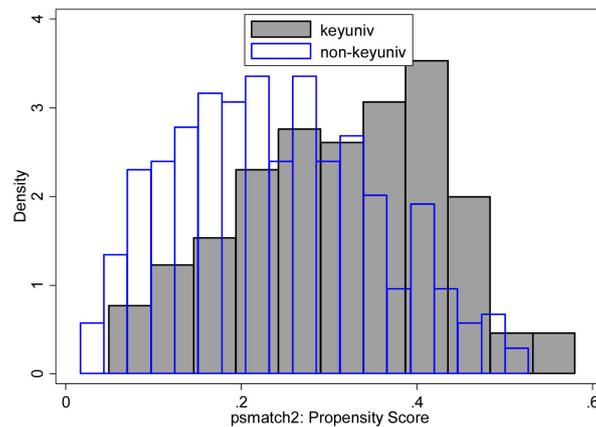
**Figure 1.** Standardized deviation scatter plots before and after matching.

from non-“project 211” universities is more than 10%, indicating that both the workers graduated from “project 211” university and those graduated from non-“project 211” universities have very strong selectivity. After the matching, the deviation of the two samples is mostly less than 5%, and only a small amount of deviation is around 11%, which indicates that the propensity score matching can better overcome the problem of sample selection. Therefore, in general, after scoring two samples with logistic model, the two samples were basically balanced on all the control variables. **Figure 2** shows that after matching two samples, a large number of samples are still distributed within the range of propensity scores between 0.05 and 0.55, which satisfies the requirements of further analysis.

**Table 5** shows the estimation results based on the propensity score matching method. It can be seen from the table that the estimated results of the four matching methods always show that the market returns of workers who graduated from “project 211” universities are significantly higher than those of workers who graduated from non-“project 211” universities, and the partial regression coefficient is between 0.307 - 0.319. Therefore, the findings here are consistent with the findings of OLS regression results, which supports the human capital hypothesis again.

## 6. Discussion and Conclusion

The increasing popularity of higher education has greatly reduced the marginal economic return brought by going to universities, so people are more eager to go to “good” universities, which becomes a basic background after the expansion of university enrollment. However, for a long time, people have been focusing on



**Figure 2.** Common support domains for the intervention group and the control group.

**Table 5.** Estimation results of propensity score matching.

Matching Method	Sample Size		ATT	
	Control Group	Intervention Group	Mean	Standard Deviation
Closest Matching	388	132	0.307*	0.130
Stratification Matching	388	132	0.307*	0.133
Kernel Matching	388	132	0.319**	0.102
Radius Matching (0.01)	388	132	0.319**	0.113

\*Significant at 10%; \*\*Significant at 10%; \*\*\*Significant at 10%.

the impact of going to university on the market returns, little attention has been paid to the micro-economic consequences of going to what kind of university.

This paper takes the debate around the human capital theory and the screening theory as the basis of research, and deduces two hypotheses. Using the adult data from CFPS 2010 and based on OLS regression model, this paper analyzes the influence of universities stratification on labor market returns. The result shows that, in general, studying in “211 project” universities can obviously improve people’s returns in the labor market, which is similar to the finding of Zhong (2011), Zeyun Liu & Muyuan Qiu (2011) and Lingli Xu & Chunrong Ai (2016), that is, graduating from a key university can significantly increase people’s market returns. In order to better overcome the problem of sample selection in graduate universities, this paper uses the method of propensity score matching to carry out further estimation, and the results once again support the discovery of OLS regression results.

In addition, this paper finds that the individual ability variables measured by math test scores, words test scores and depression scores are not significant in all models. This shows that for workers with the undergraduate degree, it’s not their ability to influence their market returns. Because after the screening of the university entrance examination, there’s little difference among these workers’ abilities. As a result, the influence of abilities on the market returns is very small. On the contrary, the graduate universities, employment area and work experience

are important influencing factors. It was concluded that in China's labor market, both graduate university and qualifications are important factors for employers to determine workers' wages, and the economic level of different employment areas has also a direct impact on workers' wages. Predictably, the competition to get into a good university will become increasingly fierce.

There are some shortcomings in this paper. First, it is failed to overcome the problem of self-selection. Although the main confounding variables, such as cognitive abilities and personality traits, were controlled in this paper, the randomness of the sample was not solved because the respondents themselves applied for universities based on the difference of their own wishes (such as they were admitted by the first volunteer or the second volunteer). Second, China's labor division is not taken into account. As a matter of fact, China's different labor market sectors (including the public sectors, the state and collective sectors, and the private sectors) have very different market return mechanisms. For example, the motive force for workers in private sectors is far bigger than that in public sectors. However, due to the limitation of the sample size, no detailed analysis has been conducted in this paper. Even so, these shortcomings just right indicate the future direction of the next research paper.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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