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An Introduction of the Special Issue on the Economics of Education in China

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The history of Teachers College's involvement with China and Chinese education dates back to its early founding years in the late 19th and early 20th centuries. Over the past century, many TC faculty and students have been engaged in shaping education policy and research in modern China. John Dewey and Paul Monroe led a long-held tradition of faculty interest in teaching and conducting research about China. Samuel Sung Young (M.A., 1905') and Kuo Ping Wen (Ph.D., 1914'), the first master's and doctoral TC graduates from China, set examples for later generations to advance the modern Chinese education system (see Zhou, 2001; Allen and Liu, 2016). At the turn of the 21st century, TC established the Center on Chinese Education, which has become an active hub for hosting academic dialogues on education issues in China and an important advocate for educational exchange between the United States and China. Given this unique institutional history and broader scholarly interest on China and Chinese education, Current Issues in Comparative Education is delighted to collaborate with the Center on Chinese Education to publish this special-themed issue. With this opportunity, the CICE Editorial Board hopes to honor and celebrate the historically strong connection between TC and China, and also introduce timely economics of education research to the larger comparative and international education research community.

This special issue of Current Issues in Comparative Education marks the first occasion in this journal's 20-year history that we present a collection of new research that focuses on timely education topics in China and employs an economics of education perspective. Economics of education is an interdisciplinary field of study that is concerned with the economic dimensions of education and with using economic theories and methods in the study of education problems and policies. The early development of economics of education in China can be traced to a major shift in perspectives about the role of education in national development in the post-1978 reform and opening-up period.

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Education is not only seen to have a key role in shaping ideology and as an arena of political contestation; it is also a key input to economic production. Spending on education is not only consumption but also an investment with economic returns such as increased productivity and higher output. In the early 1980s, Chinese scholars began exploring the economic role of education in national development under socialist principles. At the same time, they were also eager to understand western perspectives in economics of education, such as human capital theory, education signaling, and labor-market segmentation. As China moved into the development of a socialist market economy with Chinese characteristics in a global context since the 1990s, economics of education has matured as a recognized field of study in China. The intellectual and analytical gaps between the west and China in this field have also narrowed considerably. Today, economics of education in China is a vibrant field of study with many competent scholars, high-quality academic programs and research centers, and well established professional organizations and journals. Along with increasing funding and the development of an infrastructure in support of research in general, research in economics of education is a significant contributor to informed analysis and policymaking in education in China.

The seven authors/first co-authors of the seven articles in this special issue are all doctoral graduates of the Economics and Education Program at Teachers College Columbia University and they are all from China. This program is not only endowed with faculty with both U.S. and international expertise in various areas of economics of education, it is also affiliated with several research centers that provide intellectual and financial support to students, such as the Center on Chinese Education, the Center for Benefit-Cost Studies in Education, the National Center for the Study of Privatization in Education, and the Community College Research Center. The program is one of the largest degree programs in Teachers College in terms of Chinese-students enrollment. The majority of students in this program are international students and Chinese students constitute the largest geographical group among international students. The study of economics of Chinese education at Teachers College is strengthened by the strong interest of the faculty in China, the support of the affiliated research centers, the academic relationship between Teachers College and universities in China, and the historical relationship between Teachers College and modern Chinese education. Most of the Chinese doctoral graduates of the program have returned to work in China after graduation and are mostly engaged in teaching and research in the university. They are active members of the scholarly community of economics of education in China; they are also bridges between U.S. and Chinese education.

The seven studies provide a good representation of the variety and characteristics of the research on economics of Chinese education undertaken by the Chinese graduates of the Economics and Education Program at Teachers College. They are predominately quantitative empirical studies guided by some theoretical framework in economics of education. They cover research on different levels of education in China, including early childhood education, basic education, and higher education. They encompass analyses in different areas within the field of economics of education, such as the economic benefits of education, education costs and financing, education production process, education and labor-market, and economic factors in educational decision-making. Data used in the analyses come from two main sources: data collected from a single city or region by the researchers themselves, and data for secondary analysis from periodic national surveys. The following is a brief summary of each of the seven studies.

Following an education production function framework, **Yu Zhang and Xuehan Zhou** explore the influence of household educational expenditure on student achievement on the national college entrance examination. The authors take advantage of the detailed consumption information collected from a household survey administered in Shandong Province, and find evidence for heterogeneous effects of household education spending across the achievement distribution. While household educational expenditure, on average, does not seem to have a statistically significant impact on student scores on the national college entrance examination, quantile regression results show household education spending can have positive, significant impacts at the high end of the ability distribution. The authors interpret this finding in the context of school fees and private tutoring, and argue that such spending are often inefficient inputs in education production.

Haogen Yao presents an impact evaluation of a 1-month-long intensive socio-emotional support intervention program, "Lighthouse," that was implemented in rural Guangdong Province, to boost lower secondary students' post-compulsory education decisions (PCED). Using an original survey, Yao utilizes propensity score matching to assess the treatment effect on program participants. The results indicate that although there are many potential channels through which socio-emotional support may affect PCED, the main effect of "Lighthouse" occurs through elevating participant educational aspirations. The author also discusses findings from interviewing program implementers, participants and their family, and patterns from analyzing participant program records.

Given the broader policy context of promoting entrepreneurship education, **You You, Feifei Zhu, and Xiaohao Ding** seek to understand institutional factors influencing

entrepreneurship development in Chinese universities. The authors use data from a nationwide institutional survey on directors of career services at various colleges and universities, and find that while college students in China demonstrate a high level of interest in entrepreneurship, actual participation rates are low. In addition, directors of career services at highly-selective universities are more likely to report favorably on institutional policies and practices that provide guidance and support for entrepreneurship.

Xin Gong and Pengcheng Wang review how preservice teachers are trained in different contexts by comparing pre-primary teacher education systems in China and the United States. The authors discuss the within-country teacher qualification variations in terms of entry and certification requirements, and identify examples of different program features that are common across contexts. Throughout the study, the authors juxtapose the teacher preparation system in China and the United States. Findings indicate that while each system has its unique challenges, they offer useful policy insights, such as the emphasis of practicum in the early childhood teacher education programs in the United States and the unified teacher certification standards in China.

Connecting to the global student mobility literature, **Jing Li, Fei Guo, and You You** utilize data from two national surveys, the Chinese College Student Survey (CCSS) in China and the National Survey of Student Engagement (NSSE) in the United States, and employ propensity score matching to identify the underlying relationship between individual's decision to study abroad and college academic performance. The authors first compare access to study abroad programs, and find that in the United States, ethnicity, gender, and program discipline are more influential determinants of study abroad participation. Whereas in China, the participation rates differ between students from urban and rural areas. Finally, propensity score matching results suggest that studying abroad positively impacts academic performance in both the American and Chinese samples.

Fei Guo investigates the incidence of engagement in part-time work during academic terms (term-time working) among college students in China. Guo's study utilizes data from the 2011 wave of College Students Labor Market (CSLM) survey. Results indicate that term-time working is prevalent among Chinese college students; while they are relatively short in duration, many term-time working are intense in terms of workload, and participation is mainly determined by soft-skills, financial need, and number of peers who work.

Situated in the debate on rapid tertiary education development, **Li Yu** estimates the impact of college quality on early labor market outcomes in China and discusses the implications of social stratification through tertiary education. Yu's study utilizes propensity score matching based on data from the 2011 wave of College Students Labor Market (CSLM) survey, and finds that students who attend highly-selective institutions (such as "985 Project" and "211 Project" universities) are more likely to experience smoother transition to the labor market, such as finding employment immediately after degree completion and entering the public sector.

Finally, this special issue of CICE cannot be made possible without the dedication of our reviewers, editors, and contributing authors. We hope this special issue on Economics of Education in China will not only contribute to the long-held tradition of TC's engagement with Chinese education, but also create a productive space for comparative education researchers to discuss emerging topics related to the economics of education

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Can Higher Household Education Expenditure Improve the National College Entrance Exam Performance? Empirical Evidence from Jinan, China

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The purpose of this study was to examine the effect of household education expenditure on National College Entrance Exam (NCEE) performance in China. Using a comprehensive dataset with a sample size of 5840 students collected in Jinan, China, this study found that the average effect of household education expenditure on NCEE performance is not significant, but it may have a significant and positive effect on those with higher test scores. There is a significantly positive effect on Chinese scores for students at the 0.75th quantile and on English scores for those at the 0.5th quantile.

Introduction

Among all types of educational inputs available for research, educational expenditure is one of the most important (Zhou & Zhang (authors, 2015)). It plays an important role in the accumulation of human capital and the economic growth of one country (Kaganovich & Zilcha, 1999; Shi, 2006). Evaluating the effects of educational expenditure on student achievement is, therefore, a crucial issue for both researchers and stakeholders in education systems. Although public expenditure has been extensively researched in the context of debates on school effectiveness and government accountability (Tsang 1994; Tsang and Ding 2005), very limited data for household education expenditure has been provided, primarily due to data constraints. A better understanding of household education expenditure is very important, for it would play an important role in family, school and policy decisions towards resource allocation in China. For one thing, it can help to improve educational quality. Household education expenditures are private resources that augment public resources to education. It can be used as interventions to

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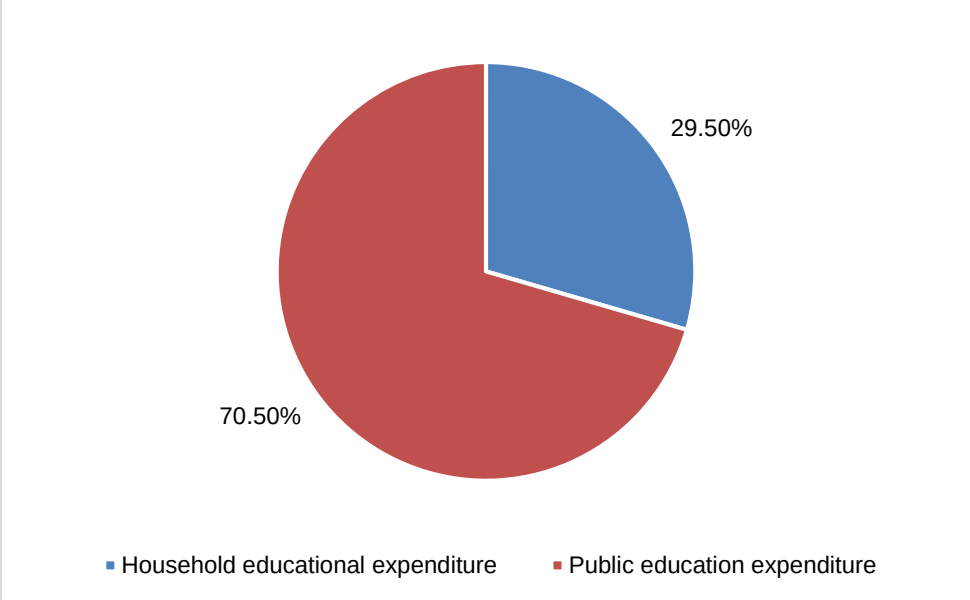
enhance education quality. Furthermore, household education expenditure can also help to address the educational inequality issues. Disparities in household education expenditure among social groups may exacerbate educational inequalities among social groups. It may help policymakers to design policies to mitigate educational inequality if there is a good understanding of variation in household investment to education (Tsang & Kidchanapanish, 1992; Shi, 2006).

Household educational expenditure, or monetary spending, contributed by families for their children's education, constitutes an important part of total education expenditures (Li & Tsang, 2003; Tsang, 2002). According to national statistics in China, the scale of household educational expenditure was 8959.05 billion RMB (1298.41 billion US$) in 2013, accounting for 29.5% of total education spending (public education expenditure totaled 21405.67 billion RMB, or 3102.27 billion US$) (Figure 1).

Figure 1. The scale of household and public education expenditure.



Source: Yearbook of China Education Statistics (2013)

Household educational expenditure constitutes a significant proportion of household spending. In urban families, household educational expenditure accounted for 35.1% of total household expenditure, and it accounted for 30.1% of total family income in 2013.[1] In addition, household educational expenditure is strongly correlated with household income and wealth; high household income often predicts high household education

[1] Statistic Report on National Education Expenditure in 2013, published by the Ministry of Education, National Statistics Bureau, and the Ministry of Public Finance.

expenditure (West, 1995; Foko, Tiyab & Husson, 2012; Zhou & Zhang (authors, 2015)). With the increasing attention on improving student achievement, a growing number of parents spend more on education with the hope that it will help their children get better grades and scores relatively than their peers on exams. Examining the effectiveness of household education expenditure would help families make optimal decisions towards investment on education.

One of the most serious difficulties in China's development of economy and society is the dualistic structure system of urban and rural. Getting access to higher education is the best way for the students from poor or rural families flow from lower class to higher class in society (Zhou, 2001; Xu & Yi, 2014). Therefore, exam-oriented education (the fairest competition mechanism so far in China) is powerful for narrowing the urban-rural gap, and rich-poor gap. In China, senior high school is not only the first stage of non-compulsory education but also the most crucial stage connecting basic education to higher education. If household education expenditure can significantly improve student achievement as far as the National College Entrance Exam (NCEE), and, therefore, college admission probability, it may enhance the role of the education system in stratifying social classes ensuring social equity, and maintaining social stability of Chinese society. Thus, it is crucial to evaluate the influence of household educational expenditure on student achievement using solid empirical evidence.

Among the first ones to investigate the impact of household education expenditure on student NCEE performance in China, this study sheds light on household education investment and also on education policy reforms. The findings are helpful for parents to decide how much they will invest education expenditure on their children. According to the different effects across groups, policy makers can decide how much they will invest public education expenditure on students with different backgrounds, which could help to mitigate educational inequality.

Literature Review

Although many prior studies have examined the determinants of household educational expenditure (e.g., Tsang & Kidchanapanish, 1992; Tansel, 2002; Glick & Sahn, 2000; Brown & Park, 2002; Lokshin & Sawada, 1999; Zhou & Zhang (authors, 2015)), relatively few studies have attempted to evaluate the effect of household educational expenditure on student academic achievement. None of them have focused specifically on China. Tansel (2002) used an ordered probit model and a well-designed dataset that covered 26256 families in Turkey to find household education expenditure has a positive correlation with school enrolment at primary, middle, and high school levels. This was not a causal

inference, however, and the study did not use test scores as an education outcome. Using ordinary least square (OLS) regression and data from the National Education Longitudinal Survey (NELS), Israel, Beaulieu & Hartless (2001) found a positive effect of household education expenditure on math test scores, reading scores, and staying in school. However, the sample used only included 8th-grade students, and may not apply to students at all levels. On the contrary, Liu & Xie (2015) use the 2010 China Family Panel Studies (CFPS) data and OLS regression, and find that family education expenses have no effect on students' verbal ability in China. Using data from more than 2000 families in five areas in China, Liang (2012) found household education investment, especially the out-of-school investment, has a significant positive impact on the changes in student test scores. However, this study used the 2010 fall semester test scores as the post-test scores and 2010 spring semester test scores as the pre-test scores. The tests are not standardized which cannot reflect student academic performance. The time between the two tests was short and the results might be biased.

The existing results are mixed, and only two studies are in China. This study aims to identify the effects of household educational expenditure on NCEE achievement using individual-level data in China. The significance of this study lies in four aspects. First, this study is among the first to evaluate the achievement effect of household education expenditure on NCEE performance in China, and this study is the first to report detailed information of household education expenditure in China. Second, this study employed the NCEE score as a measure of student achievement, i.e. the outcome variable. High School Entrance Exam (HSEE) as prior test scores are also included. NCEE and HSEE are the most representative exams in China, and it can truly reflect student academic achievement. Third, this study took subject difference into consideration. Fourth, this study estimated the heterogeneous effects of household education expenditure among female and male students, urban and rural students, and students with different academic achievement levels.

According to theories and previous study, household education expenditure is determined by student academic achievement (Tansel, 2002; Israel, Beaulieu & Hartless, 2001), such as High School Entrance Exam (HSEE) scores for high school students, annual family income, academic track, gender, urban-rural status, and socioeconomic status (SES) (Tsang & Kidchanapanish, 1992; Zhou & Zhang (authors, 2015)), some of which might also affect student NCEE scores (Zhang, 2013). If this kind of mutual determinants of NCEE score and household educational spending were omitted in the Education Production Function regression, the estimated coefficient for household educational

spending would be biased. Therefore, this study collected data on all the major factors, and they are all controlled in the regression.

The above section discussed the motivation behind this research and reviewed literature on the achievement effect of household education expenditure. The remainder of the paper is organized as follows: Section 2 discusses methodology, Section 3 describes the data collection and descriptive statistics related to this study, Section 4 reports the empirical results, and Section 5 provides a brief summary and conclusions.

Methodology

Model Setup The empirical model and data collection are based on Education Production Function. An Education Production Function is a mathematical relation showing the maximum education outputs that can be produced with the given educational resources under a given education technology (Cohn & Geske, 1990). According to the Education Production Function, the formation of academic achievement as the educational output will be affected by the personal and school inputs. As a kind of educational input, household education expenditure is regarded as the key variable affecting educational output here; several other variables are controlled in the regression. The regression model used in this study can be expressed as follows:

$$NCEE = \alpha + \beta \cdot household\ education\ spending + \delta \cdot X + \varepsilon$$

where NCEE refers to a student's comprehensive NCEE score, which includes Chinese, English, and mathematics scores. In Shandong Province, there are five subjects in NCEE: all students must take Chinese, English, math, and comprehensive capability exams and the tests for science track and humanity track students are different. Science track students must take comprehensive science tests (physics, chemistry, and biology), and humanity track students must take comprehensive humanities tests (politics, history, and geography).

Household education spending is the key variable of interest in this study. Monthly household education expenditure data was obtained through a multiple-choice questionnaire used in the survey (to be explained later), with spending level choices including fifteen categories.[2] We converted this categorical variable into a continuous

[2] i.e. below 200 RMB, 201-500 RMB, 501-800 RMB, 801-1000 RMB, 1001-1500 RMB, 1501-2000 RMB, 2001-3000 RMB, 3001-5000 RMB, 5001-7000 RMB, 7001-9000 RMB, 9001-11000 RMB, 11001-13000 RMB, 13001-15000 RMB, 15001-20000 RMB, and above 20000 RMB.

variable, and the upper limit of each level was used as the real value of self-reported expenditure. In fact, the empirical results are consistent using the lower limit value, median value, or the upper limit of each category as the real value (see Appendix Table A4). X is a vector of control variables including annual family income, gender, urban-rural status, socioeconomic status (SES), academic track, corresponding High School Entrance Exam (HSEE) score, and high school admission line (which measures the general school quality). Table 1 details how each control variable was measured. ε is the error term.

Table 1: Measurement of control variables.

Variables	Variable types	Measurement or comments
Annual Family Income	Continuous variable	Converted from categorical variable using the upper limit of each option as the real value.
Female	Dummy variable	Female=1 if the student is female; =0 if male
Rural	Dummy variable	Rural=1 if the student comes from a rural family; =0 if from an urban family.
SES	Continuous variable	Index constructed through principal component analysis using four variables: father and mother's respective education level, and father and mother's respective occupation (which relates to social status).
Science track	Dummy variable	Science track =1 if the student is in science track; =0 if humanity track.
HSEE admission line	Discrete variable	HSEE score of admission line for high schools.
HSEE	Continuous variable	Standardized scores with mean of zero and standard deviation of one.

According to Zhou & Zhang (authors, 2015), the factors that can influence household education spending include annual family income, gender, urban-rural status, SES, and HSEE score. All these factors were controlled carefully, resulting in estimated effects of household education spending that are demonstrably unbiased.

Measurement of Household Education Expenditures In empirical social science studies, exact measurement of the variables of interest is often difficult to secure and can consequently cause bias in the regression. Special focus was placed on this concern to ensure accurate results; information for household income or household education expenditure collected through survey methods may not be precise due to respondents'

difficulty in recalling exact figures, for example. The potential bias generated by measurement error can be interpreted by the following equations:

$$y_t = \alpha + \beta x_t^* + \varepsilon_t$$
$$x_t = x_t^* + \eta_t$$

where x* denotes the true but unobserved value, which can be called a latent variable. x is observed value of x*. ε and η are model errors and measurement errors respectively, and measurement error η is assumed to be independent from the true value x*. If y is simply regressed on x, the coefficient of the slope is as follows:

$$\hat{\beta} = \frac{\sum_{t=1}^{n}(x_t - \bar{x})(y_t - \bar{y})}{\sum_{t=1}^{n}(x_t - \bar{x})^2}$$

$$\hat{\beta} \rightarrow \frac{Cov[x_t, y_t]}{Var[x_t]} = \frac{\beta\sigma_{x^*}^2}{\sigma_{x^*}^2 + \sigma_\eta^2} = \frac{\beta}{1 + \sigma_\eta^2/\sigma_{x^*}^2}$$

where $\hat{\beta}$ is smaller than the true value of β, and it biases toward zero. That is to say, the regression coefficient is diluted by the measurement error. We did take this potential bias into account.

Endogeneity and Omitted Variable Bias (OVB) In any statistical model, endogeneity is a problem that occurs when the independent variable is correlated with the error term in a regression. Omitted variables are one of the common sources of endogeneity. If an independent variable is correlated with the key variable of interest and is omitted in the regression (i.e., left in the residual term,) the key variable of interest will be correlated with the residual and the OLS estimation will be biased. This problem is called "omitted variable bias" (OVB).

In this study, the potential for OVB was avoided by including the most likely major control variables in the regression according to theories and previous research. According to Zhou & Zhang (2015), the factors that can influence household education spending include annual family income, gender, urban-rural status, SES, and HSEE score. All these factors were controlled carefully to prevent OVB, resulting in estimated effects of household education spending that are demonstrably unbiased.

Data Collection and Descriptive Statistics

Data Collection The data used in this study was collected from Jinan, the capital of Shandong Province in China. A non-proportional, stratified cluster sampling strategy was utilized. Twenty-five senior high schools were randomly selected out of 34 public regular high schools from 9 districts in Jinan, including 15 urban schools, 8 county schools, and two rural schools. Within each high school, 3-5 classes in Grade 12 were randomly chosen and all students in the selected classes were sampled. The sample size in this study was 5840 students in total.

There was a large proportion of missing data in the financial variables, around 44%. It is common because financial data is difficult to recall. It is assumed that the data is missing at random. Table 2 reports the disparities of NCEE scores and HSEE scores between students in the missing subsample and non-missing subsample. The missing subsample is the subsample containing a large proportion of missing data in the financial variables. The differences of these scores between the two subsamples are not significant. Therefore, it is reasonable to rely on this data.

Table 2. Descriptive Statistics for missing and non-missing subsamples

Variables	Missing subsample	Non-missing subsample
NCEE total score	468.71	472.28
NCEE Chinese score	98.64	98.86
NCEE Math score	94.84	94.01
NCEE English score	92.00	92.56
HSEE total score	552.23	551.43
HSEE Chinese score	88.47	87.90
HSEE Math score	104.47	104.17
HSEE English score	101.90	101.14

Note: *p<0.05, ** p<0.01.

In order to make full use of all the data gathered and improve its statistical power, the multiple imputation (MI) method was applied. MI is a flexible, simulation-based statistical technique for handling missing data which consists of three steps:[3]

[3] Stata multiple-imputation reference manual. Release 13. http://www.stata.com/manuals13/mi.pdf. Table A1 shows the procedure of multiple imputation.

(1) Introduce random variation into the imputation process, and generate several data sets, each with slightly different imputed values.
(2) Perform an analysis on each of the data sets.
(3) Combine the results into a single set of parameter estimates, standard errors, and test statistics.

Descriptive Statistics

Table 3 shows the mean values of education spending on various items. Self-reported education spending is the spending reported by parents, and it is an average expenditure for each year across Grade 10-12. Calculated education spending is the spending calculated by the authors according to detailed expenditure items, including school choice fee (1 year), tuition fee, boarding fee, private tutoring expenditure, computer purchases, and other education-related expenditures. Spending on school related items includes a school choice fee, a tuition fee, and a boarding fee. The "school choice fee" is paid by parents who choose to enroll their child in high-performing schools if the child's HSEE score is a few points lower than that school's HSEE admission line. The school choice fee is a one-time donation that covers the child's entire high school education, so one-third of the school choice fee is considered annual household spending.[4]

The mean of self-reported education spending is 6875 RMB (996.38 US$), while calculated education spending has a mean of 5817 (843.04 US$). Due to the potential omitted items in the calculated education expenditure, this study took self-reported education spending as an independent variable (Private tutoring fee, computer purchases, and other education-related expenditures are the average expenditures for each year across Grade 10-12.).

[4] This policy was supervised by the local education authority, but was abolished from 2015.

Table 3. Mean values of various education expenditures.

Variables		Mean
Self-reported education spending		6875.19 (996.40 US$)
Calculated education spending		5817.05 (843.05 US$)
Spending on school-related items	Tuition fee	1485.75 (215.33 US$)
	Boarding fee	298.00 (43.19 US$)
	School choice fee (3 years)	2931.00 (424.78 US$)
Expenditure on academic-oriented private tutoring		630.81 (91.42 US$)
Expenditure on art/music/sport tutoring		222.92 (32.31 US$)
Computer purchases		1529.85 (221.72 US$)
Other education-related expenditures		687.06 (99.57 US$)

Note: Units in RMB.

According to Zhou & Zhang (authors, 2015), family income, socioeconomic status, high school entrance exam score, and gender are the main influencing factors of household education expenditure. Annual family income has a positive effect on household education expenditure, but the impact of household income on school-related spending is not significant. This is mainly due to little variation in tuition or boarding fees. SES has a significant positive impact on household education expenditure, and the higher a student's HSEE scores, the lower their household's education expenditure. The household education expenditure of female students is significantly higher than that of male students, and the household education burden on rural students is higher than that on urban students; therefore, we selected these variables as covariates.

Table 4. Covariates on NCEE achievement.

Variables	Observations	Mean	Std. Dev.	Min	Max
Annual family income	4470	47428.38 (6873.68 US$)	39729.47	6000	240000
Female	5839	.53	.50	0	1
Rural	5839	.49	.50	0	1
Science track	5722	.57	.50	0	1

The covariates in the analyses include yearly household income, HSEE score, gender composition, percentage of rural students, SES, academic track (science or humanities), and high school admission line. As Table 4 shows, average annual family income is 47428 RMB (6873.62 US$). The proportion of female students is 53.3%, 48.6% of the students come from rural families, and 57.2% of the students are on the science track. SES and HSEE scores are standardized, with a mean of zero and standard deviation of one.

In China, the *hukou* registration system divides the student population by residence into "rural" and "urban" categories. Students who come from rural families have lower education expenditure and lower education quality than their urban counterparts. Rural students can attend urban high schools if they show high academic performance. Table 5 compares the mean of household education expenditures on various items for both urban and rural students. There is not much difference between the two categories as far as tuition and boarding fees. Concerning school choice fee, urban students spend about two times as much as rural students. The total expenditure on private tutoring for urban students is 2489.384 RMB (360.780 US$) on average, while the private tutoring expenditure for rural students is only 319.034 RMB (46.237 US$). Computer purchases and other education-related expenditures for urban students are much greater than those for rural students.

Table 5. Household education expenditures on various items.

Main components of household education expenditure	**Mean**	
	Rural students	**Urban students**
Tuition	1364.55 (197.76 US$)	1645.33 (238.45 US$)
School choice fee	2406.09 (348.71 US$)	4140.86 (600.12 US$)
Boarding	315.44 (45.72 US$)	261.22 (37.86 US$)
Expenditure on academic-oriented private tutoring	160.76 (23.30 US$)	1635.25 (236.99 US$)
Expenditure on art/music/sport private tutoring	158.27 (22.94 US$)	854.13 (123.79 US$)
Computer purchases	903.21 (130.90 US$)	2126.41 (308.18 US$)
Other education-related expenditures	538.81 (78.09 US$)	1145.71 (166.04 US$)

Note: Units in RMB.

Figure 2 compares the total NCEE scores of urban and rural students. In the top 50%, the total proportion of rural students is higher than urban students. This result is consistent

with the fact that only outstanding rural students are accepted by high schools, currently at only a 10% proportion of the total high school student population. Technically, 80% of urban students can be accepted to urban high schools, but between 2007 and 2010 the proportion reached as high as 90% (Figure 3).

Figure 2. NCEE distribution of urban and rural students.

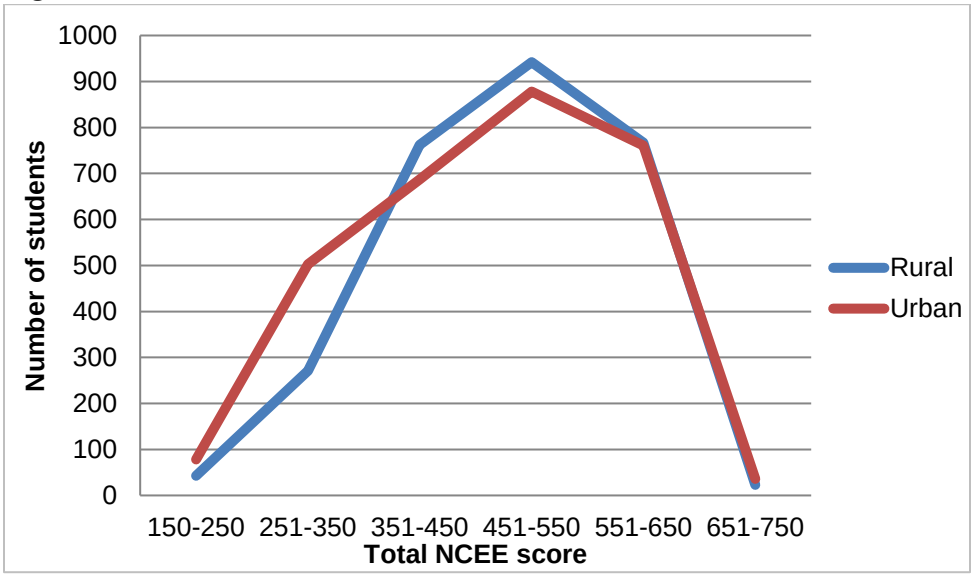
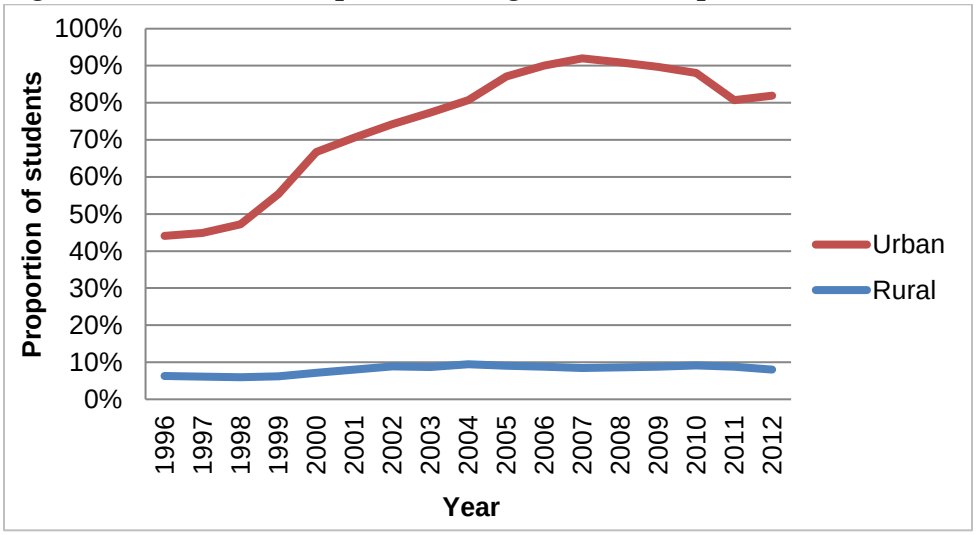


Figure 3. Urban-rural disparities in high school acceptance rate.



Source: Yearbooks of China Education Statistics (2000-2013)

Empirical Results

This section discusses the effects of household education expenditure on student NCEE achievement by subject. Table 6 lists the effects of household education expenditure on

NCEE achievement for urban and rural students, female and male students according to the total score, Chinese score, math score, and English score. There is no effect of household education expenditure on NCEE score for the whole sample or subsamples. For robustness check, Table A2 shows the effect of calculated household education expenditure in the appendix. The results reported in Table A2 are consistent with those in Table 6.

Table 6. Effects of household education expenditure on NCEE achievement.

Sample	Total score	Chinese	Math	English
All	0.018	0.003	0.010	0.021
	(0.015)	(0.021)	(0.017)	(0.019)
Female	0.002	-0.015	-0.004	0.018
	(0.015)	(0.025)	(0.021)	(0.023)
Male	0.033	0.020	0.023	0.025
	(0.020)	(0.025)	(0.023)	(0.019)
Urban	0.014	0.008	-0.021	0.011
	(0.023)	(0.027)	(0.026)	(0.026)
Rural	0.012	-0.007	0.036	0.025
	(0.019)	(0.030)	(0.021)	(0.025)

Note: Standard errors in parentheses. * $p<0.05$, ** $p<0.01$.

This study also examines the effect of specific types of expenditure, i.e. spending on school-related items, private tutoring fees, and computer purchases on student NCEE performance. Table 7 reports the effects of each specific household education expenditure on student NCEE achievement. For school-related expenditure, it has no impact on student total score, but it has a significantly negative impact on student Chinese, Math and English achievement respectively. With regard to academic-oriented private tutoring expenditure, it has no effect on student total score, Chinese score or English score, while it has a significantly negative effect on Math score. Art/music/sports tutoring expenditure and computer purchases have no impact on student NCEE achievement according to the total score, Chinese score, math score, or English score.

Table 7. Achievement effects of specific household education expenditure.

Specific expenditures	Total	Chinese	Math	English
	(1)	(2)	(3)	(4)
Spending on school-related items	-0.034	-0.090	-0.083	-0.086*
	(0.042)	(0.055)	(0.049)	(0.034)
Expenditure on academic-oriented private tutoring	-0.042	-0.058	-0.031*	-0.026
	(0.024)	(0.032)	(0.019)	(0.014)
Expenditure on art/music/sport tutoring	-0.042	-0.048	-0.039	-0.058*
	(0.021)	(0.026)	(0.023)	(0.017)
Computer purchases	-0.019	-0.016	-0.029	-0.009
	(0.023)	(0.028)	(0.031)	(0.025)

Note: Standard errors in parentheses. * $p<0.05$, ** $p<0.01$.

The model found that the average effect of household education expenditure on NCEE performance is not significant. However, the reasons for the results are not clear. To get more detailed information, we also used quantile regression to more closely examine the heterogeneous effect of household expenditure on students with different levels of academic achievement. Quantile regression aims at estimating either the median or other quantiles of the dependent variable. Relative to the ordinary least squares regression, the quantile regression estimates are more robust (Koenker & Bassett, 1978).

Column (1) of Table 8 shows the effect of household education expenditure on total NCEE score, and Columns (2), (3), and (4) show the results for Chinese, math, and English, respectively. Regarding total NCEE score, household education expenditure has a significantly positive effect on the students whose NCEE total score is at 0.9^{th} quantile, while there is no effect on those whose scores are at the 0.75^{th}, 0.5^{th}, 0.25^{th}, or 0.1^{st} quantiles. For Chinese scores, household education expenditure has a significant and positive effect on students whose scores are at the 0.75^{th} quantile. There is no effect of household education expenditure on math scores at any quantile. In terms of English scores, there is a significantly positive correlation at the 0.5^{th} quantile of the distribution. For the robustness check, the results reported in Table A3 shows there is no effect of calculated household education expenditure on the students with different levels of academic achievement.

Table 8: Achievement effects of household education expenditure, by quantile.

Quantile	Total score	Chinese	Math	English
	(1)	(2)	(3)	(4)
0.9	0.040**	0.023	0.024	0.006
	(0.014)	(0.023)	(0.017)	(0.011)
0.75	0.016	0.044*	0.009	0.004
	(0.014)	(0.020)	(0.019)	(0.015)
0.5	-0.004	-0.000	0.004	0.040**
	(0.014)	(0.021)	(0.015)	(0.015)
0.25	-0.013	0.014	-0.006	0.015
	(0.013)	(0.025)	(0.019)	(0.017)
0.1	0.014	0.017	-0.004	0.038
	(0.019)	(0.026)	(0.026)	(0.020)

Note: Standard errors in parentheses. * p<0.05, ** p<0.01.

Figure 4 presents the heterogeneous effects of household education expenditure on NCEE score by subject. The solid lines represent the estimated coefficient of household education expenditure, and the gray areas are 95% confidence intervals. There is no significant effect at any quantile for math score, but a significantly positive effect on Chinese scores for students at the 0.75th quantile and on English scores for those at the 0.5th quantile. There is a significant and positive effect on total NCEE score for higher-achieving students.

Table 9 reports the effects of all the control variables. Annual family income has no effect on total NCEE score or scores in any of the three subjects. HSEE score is, however, a significant and positive determinant of the NCEE score across all subjects. There is no gender disparity in total NCEE score, Chinese score, or math score, but a gap favoring girls in English score. Rural students perform better than urban students on the NCEE across all subjects. SES has a positive effect on total NCEE score as well as math and English, but no effect on Chinese score. Because NCEE tests are different for science and humanity track students, NCEE achievements between these two groups differ significantly.

Figure 4. Heterogeneous effects of household education expenditure on NCEE scores

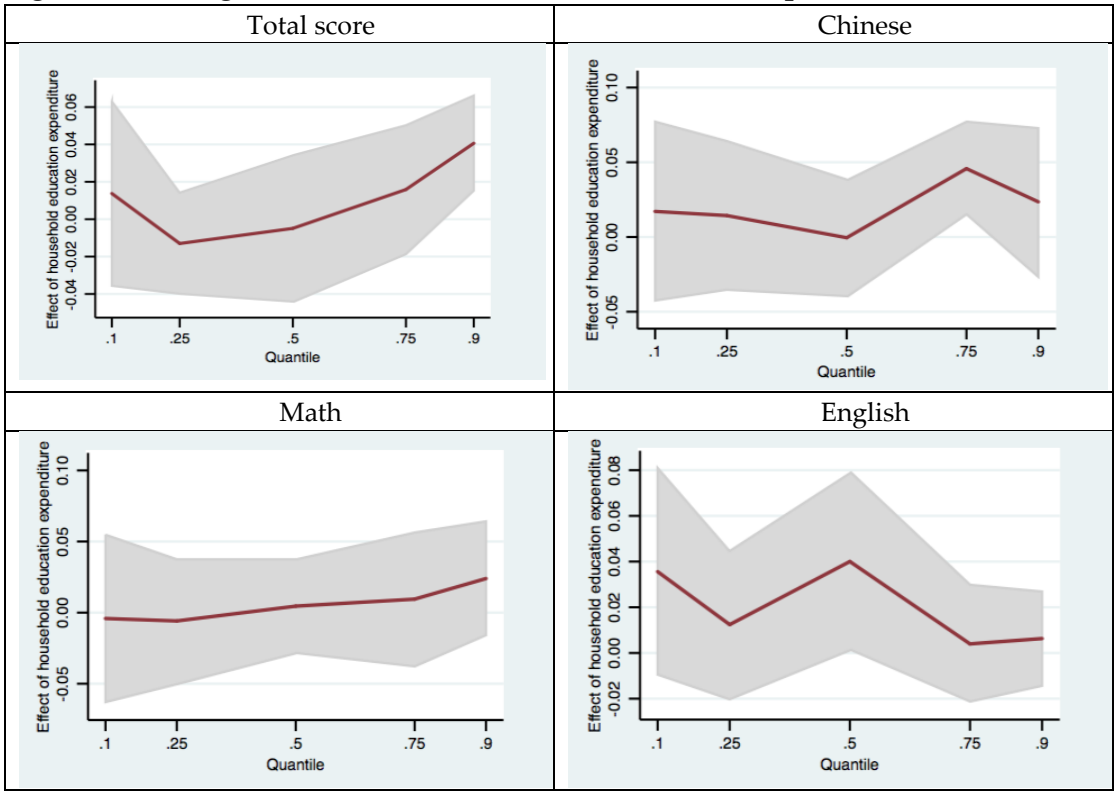


Table 9. Estimated coefficients of control variables.

	Total score	Chinese	Math	English
Annual family income	-0.019	-0.029	-0.028	-0.011
	(0.016)	(0.022)	(0.022)	(0.018)
HSEE	0.687**	0.460**	0.590**	0.600**
	(0.045)	(0.035)	(0.044)	(0.046)
Female	-0.010	0.068	0.001	0.012**
	(0.026)	(0.033)	(0.033)	(0.022)
Rural	0.205**	0.227**	0.238**	0.014*
	(0.056)	(0.045)	(0.055)	(0.054)
SES	0.014	0.004	0.016	0.037**
	(0.011)	(0.014)	(0.013)	(0.010)
Science track	-0.340**	0.049	-0.321**	0.118*
	(0.052)	(0.044)	(0.049)	(0.045)

HSEE admission line	0.246**	0.030**	0.265**	0.280**
	(0.047)	(0.062)	(0.064)	(0.049)
N	4335	4343	4343	4343
F	103.72	85.14	101.74	153.52
Prob>F	0.000	0.000	0.000	0.000

Note: Standard errors in parentheses. * p<0.05, ** p<0.01.

In summary, the average achievement effect of household education expenditure is not significant overall but may have some positive effect on high achievers. More specifically, household education expenditure may be effective for students whose Chinese scores are at the 0.75th quantile and for those with English scores at the 0.5th quantile.

Conclusions and Discussion

Generally speaking, the average effect of household education expenditure on student NCEE achievement is not significant. This result is consistent with Liu & Xie (2015)'s finding on verbal test. There are several plausible reasons for this observation. Household education expenditure includes tuition fee, boarding fee, school choice fee, private tutoring spending, and other expenditures; among these, tuition fee is a cost that every student's family must pay except for those well below the poverty line. The range of tuition cost was 1100-2000 RMB (159.42-289.86 US$) for one year in 2013 in Shandong province.[5] There is not much difference in student boarding fees, either. Therefore, neither variable contributes significantly to variations in NCEE performance.

School choice fee is another portion of household education expenditure. The empirical results show that school-related expenditures have no impact on student total scores. However, it has a significantly negative impact on student Chinese, Math and English scores. Since there are not much variation in the tuition fee and boarding fee, the negative effect may all come from school choice fee. According to Chen, Ding, and Ye (2014), Zhang, Chen & Wang (2014) and Zhang, Liu & Li (2015), high-performing schools may not effectively improve test scores for students who are already high performing through physical inputs, teacher effect, or peer effect. Therefore, those who have high scores but are just below the admission line for high-performing schools pay school choice fee to enroll, but may not benefit from this investment. The "key & non-key school system" has resulted in a severe competition in terms of school choice in China. Thus causing parents to pay a large number of household expenditures for their children to get into key schools

[5] See Yearbook of China Education Statistics (2013).

(Zhang, 2013; Zhang, Chen & Wang, 2014). Since school choice cannot improve student academic performance, parents should invest less money on school choice. Governments should also make efforts to forbid school choice and to achieve educational equity and quality by reducing the achievement gap between high performing schools and low performing schools.

Private tutoring fees are also included in total household education expenditure. According to Zhang (2013), the average effect of private tutoring on NCEE score is not significant; therefore, this portion of household expenditure is also not significant. Furthermore, the effect of computer purchases is also not significant.
In summary, because the majority of the individual portions of household spending on education are not effective, it is reasonable to assume that the average effect of total household spending is not significant. It may be effective on certain subgroups, however, according to the quantile regression results.

This study is among the first to evaluate the achievement effect of household education expenditure on NCEE performance in China. Besides estimating the average effect of household education expenditure on student academic performance for the whole sample, urban subsample and rural subsample, female subsample and male subsample, this study also examined the heterogeneous effect of household expenditure on students with different levels of academic achievement. According to the different effect across groups, families could make better decisions on the educational investment according to the empirical results.

There are several limitations of this study. First, this study only estimates the effect on Grade 12 student performance in Jinan, China, which may undermine the external validity of the results. In order to improve the external validity of the results, it is necessary to collect data from different regions in China or worldwide and at different educational levels. Secondly, the exact measurement of the variables is often difficult to obtain and consequently causes bias in the regression. The information of students collected through survey might not be accurate because of the difficulty in recalling memory and so on. Finally, although the potential for endogeneity was avoided by including most possible major control variables in the regression, better identification strategies should be employed in the future.

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Appendix

Table A1. The Procedure of Multiple Imputation

Variables	Observation	Proportion of data missing	Filled-in	Total
Self-reported education spending	4479	23.30%	1361	5840
Calculated education spending	3305	43.41%	2535	5840
Spending on school-related items	4514	22.71%	1326	5840
Tuition fee	4843	17.07%	997	5840
Boarding fee	4521	22.59%	1319	5840
Expenditure on academic-oriented private tutoring	5256	10.00%	584	5840
Expenditure on art/music/sport tutoring	5163	11.59%	677	5840
School choice fee (3 years)	5055	13.44%	785	5840
Computer purchases	5212	10.75%	628	5840
Other education-related expenditures	4360	25.34%	1480	5840

Note: Observations + Filled-in observations = Total.

Table A2. Effects of calculated household education expenditure on NCEE

Sample	Total score	Chinese	Math	English
All	-0.021	-0.024	-0.023	-0.021
	(0.011)	(0.013)	(0.012)	(0.011)
Female	-0.013	-0.018	-0.007	-0.011
	(0.013)	(0.015)	(0.015)	(0.012)
Male	-0.033	-0.031	-0.043	-0.034
	(0.018)	(0.017)	(0.024)	(0.028)
Urban	-0.030	-0.032	-0.032	-0.025
	(0.019)	(0.019)	(0.017)	(0.013)
Rural	-0.015	-0.015	-0.015	-0.017
	(0.013)	(0.012)	(0.013)	(0.011)

Note: Standard errors in parentheses. * $p<0.05$, ** $p<0.01$.

Table A3. Effects of calculated household education expenditure by quantile

Quantile	Total score	Chinese	Math	English
0.9	0.009	-0.008	-0.014	-0.014
	(0.010)	(0.015)	(0.010)	(0.008)
0.75	0.014	-0.020	-0.017	-0.015
	(0.009)	(0.012)	(0.010)	(0.010)
0.5	-0.026	-0.022	-0.017	0.023
	(0.015)	(0.013)	(0.010)	(0.014)
0.25	-0.032	-0.031	-0.032	-0.026
	(0.017)	(0.018)	(0.017)	(0.012)
0.1	-0.022	-0.034	-0.037	-0.023
	(0.013)	(0.018)	(0.019)	(0.016)

Note: Standard errors in parentheses. * $p<0.05$, ** $p<0.01$.

Table A4. Effects of household education expenditure on NCEE achievement.

		Total score			Chinese			Math			English		
	Sample	Upper limit	Lower limit	Median	Upper limit	Lower limit	Median	Upper limit	Lower limit	Median	Upper limit	Lower limit	Median
Self-reported education spending	All	0.018	0.019	0.016	0.003	0.004	0.003	0.010	0012	0.010	0.021	0.022	0.019
		(0.015)	(0.015)	(0.014)	(0.021)	(0.022)	(0.020)	(0.017)	(0.017)	(0.016)	(0.019)	(0.019)	(0.018)
	Female	0.002	0.004	0.001	-0.015	-0.014	-0.016	-0.004	-0.002	-0.005	0.018	0.021	0.015
		(0.015)	(0.015)	(0.014)	(0.025)	(0.025)	(0.023)	(0.021)	(0.021)	(0.020)	(0.023)	(0.023)	(0.022)
	Male	0.033	0.035	0.031	0.020	0.021	0.020	0.023	0.025	0.023	0.025	0.026	0.024
		(0.020)	(0.020)	(0.018)	(0.025)	(0.025)	(0.023)	(0.023)	(0.023)	(0.022)	(0.019)	(0.019)	(0.018)
	Urban	0.014	0.014	0.012	0.008	-0.009	0.009	-0.021	0.039	-0.019	0.011	0.026	0.010
		(0.023)	(0.019)	(0.021)	(0.027)	(0.030)	(0.025)	(0.026)	(0.021)	(0.024)	(0.026)	(0.025)	(0.024)
	Rural	0.012	0.014	0.011	-0.007	-0.009	-0.008	0.036	0.039	0.034	0.025	0.026	0.022
		(0.019)	(0.019)	(0.018)	(0.030)	(0.030)	(0.028)	(0.021)	(0.020)	(0.020)	(0.025)	(0.025)	(0.024)

Note: Standard errors in parentheses. * p<0.05, ** p<0.01.

How Socio-Emotional Support Affects Post-Compulsory Education Decisions in Rural China

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This study develops a sequential mixed model of Delphi-Propensity Score Matching to discuss how an NGO's socio-emotional support affects the decisions of dropout, work, and two types of upper secondary schooling in rural China. Data were collected from 6,298 students in 2012 after a subgroup of them were treated. The analysis shows that socio-emotional support affects education decisions by boosting educational aspiration, though the impact fades gradually if there is no follow-up service. It also confirms that educational aspiration beats more traditional or intuitive factors like wealth and academic performance in the decision process. Further data exploration points out that such an impact may result from the students' attempts at copying the tracks of service providers, who are mostly college or graduate students, once trust has been built.

Introduction

Since 2008, both statistics and literature have suggested that traditional policy incentives are lacking momentum in influencing education in rural China. People have started to look at socio-emotional supports, such as the promotion of self-discipline and positive emotions. However, existing literature provides very limited information on the topic. Given this context, this study applies a sequential method of Delphi-Propensity Score Matching to identify how socio-emotional support conducted by a non-governmental organization affects education decisions in rural China.

The study makes three major contributions to the existing literature. It tests a socio-emotional intervention, while previous literature about China only tests the impact of socio-emotional status. It also suggests the value of, or at least the required improvement towards, China's educational grassroots nongovernmental organizations (GNGOs), which are young and remain confined by regulations. Finally, it is a showcase of how to use qualitative-quantitative sequential design to enable an exploratory analysis.

 Current Issues in Comparative Education 19(2), 33-63.

This paper firstly explains the context and the research problem with an introduction of the treatment. It then briefly reviews literature connecting socio-emotional support and rural education decisions in Section Two, followed by the introduction of methodology and data in Sections Three and Four. Section Five presents the empirical findings, and Section Six explores the causal mechanism. The paper concludes with a summary of key findings and corresponding policy implications.

Context and Statement of the Problem

In 2014, China had 138 million students enrolled in its nine-year compulsory education system, with nearly half living in rural regions.[1] Most of these students need to make decisions based on four alternatives when approaching the end of their compulsory schooling. These can be called "post-compulsory education decisions" (PCEDs).

They are:

A. Drop out before compulsory schooling is finished (Dropout);
B. Work right after finishing compulsory education (Work);
C. Further their education in academic high schools (AHS);
D. Further their education in vocational high schools (VHS).

Thanks to strong policies that lower the economic burdens of further education, the proportion of children choosing AHS or VHS has grown for many years. Figure 1 shows that the PCED distribution changed at an accelerated rate from 2006 to 2008 as an increasing percentage of students chose high schools. Two major catalysts of this include the 2005 policy of the Promotion of Vocational Education, which subsidizes VHS attendance (China, The State Council, 2005), and the 2006 Amendment of Compulsory Education Law, which made compulsory education free of tuition and fees (China, The Standing Committee of the National People's Congress, 2006). Both policies place emphasis on the rural population.

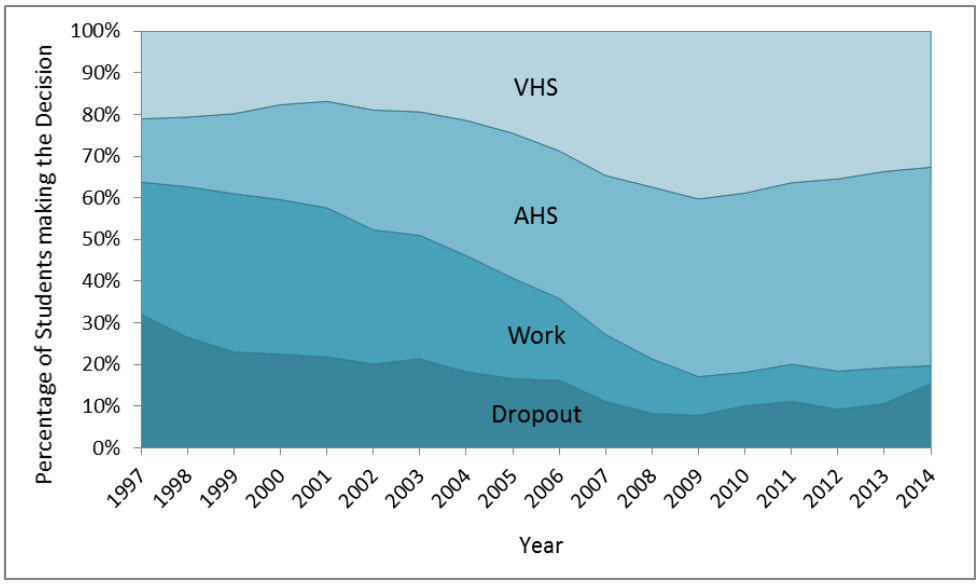
However, the change stagnated and somewhat reversed after 2008, with the percentage of dropouts[2] increasing and the percentage of VHS attendance shrinking back. While there is no official statistics about how the rural population contributes to this new trend, it is known that both VHS and dropout prevention policies have targeted the rural group. For AHS, although its share has increased slightly after 2008, absolute enrolment was about

[1] All data presented in Section 1 are calculated from the Educational Statistics Yearbook of China, 1998-2015.
[2] Statistically, this group also includes students who entered primary school in the mainland, but transferred outside of the mainland before finishing their nine-year schooling. However, the number of this group is too small to change the trend.

95% of the 2008 level. In other words, the education system has the capacity of extra AHS supply, but the students are not taking them.

If both economic supports and additional provisions lose momentum in affecting rural PCED, one possible measure to regain the pre-2008 trend is to look at those less traditional supports targeting socio-emotional factors, such as attitude, self-discipline, self-affirmation, and educational aspiration. Such an idea is not ungrounded as it is hinted in existing surveys. For example, in a 2003 survey covering nine Chinese provinces, 53% of rural households selected "school-weary" as the main reason for their children's dropout, while only 29% selected "tuition and fees" (Jiang & Dai, 2005). In another example, a 2004 survey held by the China Youth & Children Research Center uncovered that "only bad students go there" is one of the top reasons hampering the VHS decision.[3] Moreover, the fact that middle school students are old enough to make their own decisions implies the importance of a closer look at their inner world.

Figure 1. Post-Compulsory Education Decisions in China (1997-2014).



Source: China Educational Statistics Yearbooks, 1998-2015.

Notes: I assume the four alternatives to be the only PCEDs, although there are other alternatives, such as studying abroad and getting married. VHS enrolment is the sum of new enrolment in specialized secondary, vocational, and skilled workers' schools. AHS enrolment was obtained directly. The number for work was obtained by subtracting the new enrolment in VHSs/AHSs from the number of lower-secondary graduates. The number for dropout was calculated by subtracting the new enrolment in elementary schools nine years ago from the present number of lower-secondary graduates. Data does not allow for rural-urban disaggregation.

[3] Source: http://news.xinhuanet.com/edu/2005-11/07/content_3742896.htm

Currently, it is the GNGOs that are taking the lead in socio-emotional intervention, but GNGOs are still a weak sector in China. Many GNGOs fail to register with the Civil Affairs Bureau due to harsh governmental regulations, and of those registered, the majority have managerial problems, such as unstable personnel and budget deficits (Xie, 2004). GNGOs may have a role in affecting PCED, but there has not yet been a rigorous evaluation of this role.

Accordingly, this study examines how an NGO's socio-emotional support affects PCEDs in rural China. More specifically, it evaluates the intervention conducted by the Lighthouse Project (Lighthouse), which is one of the longest surviving rural education GNGOs in China. It was established in 2001 in Guangdong, the southern province with a large rural-urban gap. Each year, Lighthouse trains and sends college volunteers to six to eight rural schools for a one-month summer camp for current or soon-to-be lower secondary students. Each volunteer team is given a standard operation procedure from the organization plus a school-specific brochure written by former volunteers of the same site. The program cost is extremely low as the volunteers live at school for free, and local consumption level is much lower when compared to the cities'. Participation in the program is voluntary. Schools assist in the publicity right before summer, and in some cases, the volunteers go straight to local communities for recruitment. Activities in the Lighthouse program include, but are not limited to, the following: informal courses, psychological counselling, household visits, team building, the cultivation of local student organizations, and specific projects such as "Model Mayor Election" and "Life Auction." Most Lighthouse activities aim to change student attitudes towards life, such as making them more confident, ambitious, social, and optimistic (Lighthouse, 2009). Appendix A gives an example of a typical Lighthouse operation.

The Lighthouse program can be considered as a socio-emotional support that may alter certain kinds of personality or perception, namely the subjective factor. And the subjective factor is a potential PCED determinant that remains under-researched. The following section briefly reviews the concepts of and relationships between socio-emotional support, the subjective factor, and PCED.

Literature Review

A socio-emotional process consists of variations that occur in an individual's personality, emotions, and relationships with others during his or her lifetime (Santrock, 2007). Among the social-emotional elements, personality has received more attention in the economics-of-education literature. It is defined as the relatively enduring patterns of thoughts, feelings, and behaviors that reflect the tendency to respond in certain ways

under certain circumstances (Roberts, 2009). Almlund, Duckworth, Heckman, & Kautz (2011) concluded that conscientiousness (e.g. self-discipline and ambition) best predicts overall attainment and achievement in education, followed by emotional stability (e.g. depression levels and confidence).

In the case of rural China, the evidence is less straightforward. Some evaluations have been done on the links between personality and education. Wang, He, & Qiu (1999) found that most personalities affect academic performance, however, these tests were conducted mainly with urban students. In another study, Lee and Park (2010) found that a father's migration was linked with externalizing problems such as destructive behavior, impulsivity, aggression, and over-activity, but not with internalizing problems such as anxiety, depression, and withdrawal. Since the authors also found a negative correlation between a father's migration and children's enrollment, the adjusted personality traits serve as potential mediators. It is also notable that socio-emotional interventions can alter personality traits and can have a lasting effect on education (Almlund et al., 2011; Yeager & Walton, 2011), however; so far no quantitative study has focused on China's rural students.

Other than personality, perceptions such as how capable a child is or how rewarding a school degree is might also affect PCED. Since it is impossible to have a purely rational decision based on an accurate estimate of future return, an education decision relies not only on calculations but also on belief, which can be reinforced by socio-emotional support. In the case of rural China, there have been studies connecting the decision of additional education (Hannum & Adams, 2007, 2008; Hannum & Park, 2007; Hannum, Kong, & Zhang, 2009; Jiang & Dai, 2005; Wang, 2005) or the high school track (Dong & Shen, 1997; Fang, 2007; Zhang, 2009) with students', parents', or teachers' perceptions of certain PCEDs' future benefits. Like personality, perception can be very subjective and does not rely on rational calculation of benefit and cost. So far, no discussion has been made in the field of rural education on how perceptions can be altered by socio-emotional support. This study will be the first impact evaluation of a specific intervention.

Methodology

The hypothesis held by this study is that socio-emotional support, i.e. the Lighthouse program, can affect PCEDs through altering subjective factors like personality and perceptions. It is, however, difficult to evaluate Lighthouse's intervention. Firstly, its impact(s) are not as explicit as that of material support; neither can it be easily predicted by a neoclassical framework in family economics. Secondly, recalling that participation with Lighthouse is voluntary, it is hard to tell whether the obtained effect comes from its

support or just from characteristics determining the attendance of that support; i.e., that there is a possibility of selection bias.

Accordingly, this study employs a sequential mixed model of "Delphi-Propensity Score Matching (PSM)." The qualitative part of Delphi helps figure out what are the possible Lighthouse impacts and what can be the determinants of Lighthouse participation, and then the quantitative part of PSM measures those impacts and confirms if they can affect PCED.

Delphi is an iterative process used to collect and distil the judgments of experts using a series of questionnaires interspersed with feedback (Skulmoski, Hartman, & Krahn, 2007). I gathered a panel of 17 members on the research topic. They lived in 14 cities of three countries (China, the UK, and the USA), with diverse backgrounds regarding career, knowledge structure, and PCED preference.[4] From July to September 2011, the panel members had been surveyed over email three times. The survey started from opening questions like, "What are the top five contributions of Lighthouse intervention?" in the first round, to more structured questions like, "From 1 to 10, please rate the realization of each Lighthouse impact raised by other panel members in the previous round."

The Delphi process identifies 25 potential impacts, which are displayed in Figure 2 with the x-axis for the rating on importance, the y-axis for the level of realization, and the size of bubbles for the divergence of the rating among panel members. Personality-related characteristics such as confidence and courage are uniformly believed to be important and well realized in the programs (being small circles in the upper right of the diagram). The Delphi process also suggests characteristics of program participants, including academic performance, distance to the schools, attitudes towards/burdens of housework, and so forth.

While Delphi suggests what may lead to treatment and what could be the impacts, PSM measures those suggested impacts by comparing the treated and untreated units that have similar propensities of treatment participation (D_i). By doing this, the researcher can largely control for selection bias without facing the limitation of matching many observed variables. Supposing the conditional independence assumption holds, then:

[4] The Delphi members were asked to rate their familiarity with the relevant social issues, knowledge by academic field, identity, and PCED preference. Overall, the panel members tend to identify themselves as NGO activists or rural educators knowing about rural education/PCED.

$$p(X_i) = E[D_i \mid X_i] = p[D_i = 1 \mid X_i]$$

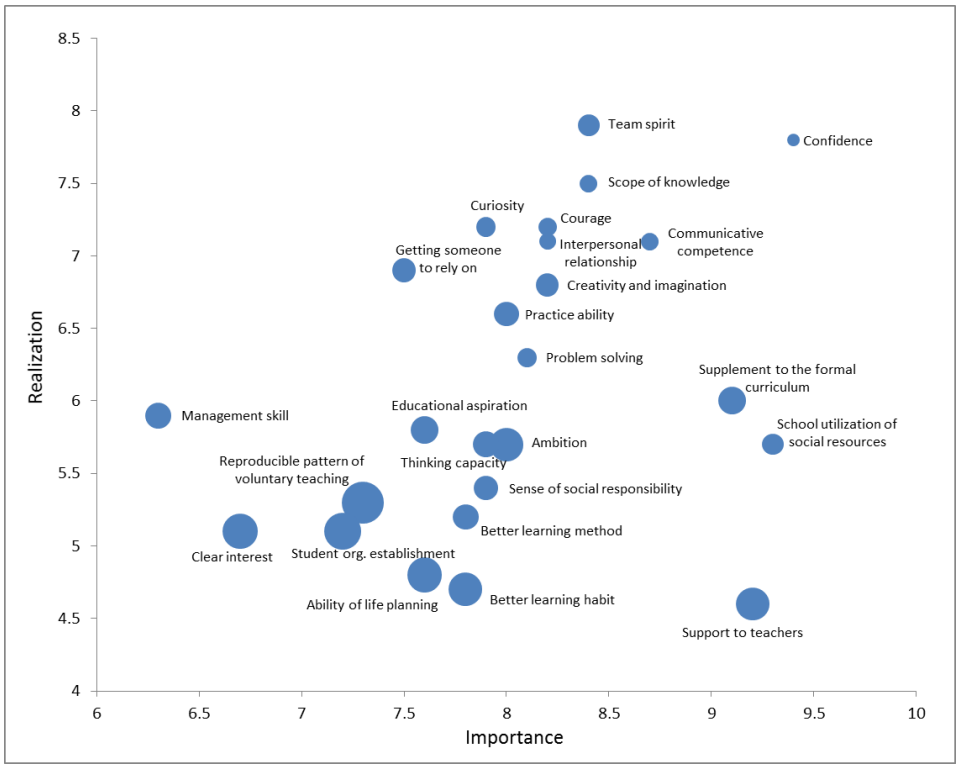
The application of PSM runs as follows: To begin with, run a probit regression using a dummy variable for participation (1 = participation, 0 = otherwise) as a dependent variable, and potential participation determinants as independent variables (X_i). For the selection of these determinants, I started with a conservative method — combining both potential PCED determinants and participation determinants. A long list of possible PCED determinants has been documented in the literature about education decisions in rural China (Sun, 2004). This includes basic personal characteristics (gender/age/ethnicity), parental background, number of siblings and birth order, peer/school/community factors, household economic status and credit constraint, subjective factors (e.g. personalities and perceptions towards different PCEDs), health status, etc. Information has been collected through field surveys. I then substituted the value of each variable for each student to the obtained equation. The result is the propensity score measuring an individual's propensity of participation. The impacts selected for evaluation include categorized indexes of confidence, ambition, courage, curiosity, extraversion, affiliation need, career ambition, and educational aspiration, as displayed in Figure 2.

There are various ways to use the propensity score, and this study practices the three matchings of Nearest Neighborhood (NN), Kernel, and Radius. For the most common NN matching, a student in the control group (non-Lighthouse student) is matched to a treated student (Lighthouse student) based on the closest propensity score. More specifically, I apply the single NN with replacement, in which a control case can be matched to multiple treated cases as long as it has the nearest propensity score. Kernel Matching uses the weighted averages of all students in the control group to estimate counterfactual outcomes (Heckman, Ichimura, & Todd, 1998). The weight is calculated by the propensity score distance between a treatment case and all control cases. I use a narrow bandwidth of .03 for Epanechnikov Kernel matching. Smaller bandwidth gives smaller bias but larger variance, and vice versa. Finally, radius matching allows a tolerance level in the maximum propensity score distance, the caliper, and matches all the individuals in the control group within that caliper (Cochran & Rubin, 1973). In this study, I use a caliper of .08.

To confirm the hypothesis of how Lighthouse's socio-emotional support affects educational decisions, I also conduct multinomial logit (MNL) using PCED as a dependent variable, with the selection of AHS as base-outcome. PCED determinants that were suggested by either the Delphi survey or the literature serve as the independent

variables. If one finds subjective factors not only influential on PECD but also impacted by the intervention, the hypothesis is proved.

Figure 2. Suggested Impacts of the Lighthouse Program.



Source: Author's compilation.

Notes: Data is calculated from the Delphi ratings made by 10 panel members (out of 17) who considered themselves knowledgeable in Lighthouse's operations. The bounds for the x and y-axes are adjusted to better disperse the bubbles. For both importance and realization, the ratings range from 1 to 10 for "totally disagree" to "totally agree." Bubble diameter indicates the divergence of views, which is calculated as the mean of the coefficients of variation for importance and realization. Smaller bubbles means better consensus.

It is worth mentioning that, by applying MNL, this study does not treat PCED with an "order." It is debatable to claim that more education must be better for all students, especially when it comes to the comparison between AHS and VHS tracks. AHS is usually one year longer than VHS, and it is easier to be connected to a college education, but it may not be a reasonable option for those needing to work earlier to feed their family or those not interested in academy. Recognizing the reality that not all students knew their PCED by the time of being surveyed, the students were also given an option of "undecided" in addition to the four options when answering the PCED question.

Data Collection

Questionnaire Design Based on literature and the Delphi results, this research produces separate questionnaires for students, teachers, principals, and student households (presumably parents or guardians). There were also questionnaires for the Lighthouse volunteers when they were approaching the end of the 2012 summer program.

The majority of data collected were PCED determinants. Gansu Survey of Children and Families (GSCF) and Zhang's dissertation on the determinants of National College Entrance Exam performance in China (Zhang, 2011) were the major references for questionnaire design. GSCF is the most frequently cited project in rural PCED studies (e.g. Hannum & Adams, 2007; Hannum et al., 2009; Park & Hannum, 2002; etc.).[5] And Zhang's study has a data collection process similar to that of this study. Since the questionnaires from these two sources do not touch on the topic of schooling tracks, i.e., AHS vs. VHS, I also refer to track-related questionnaires used in existing Chinese studies, including Fang (2007), Zhang (2009), and Zhu (2006).

The biggest challenge for questionnaire design involves the subjective factors, especially those related to personality. Literature has recommended the Big Five personality traits and Duckworth's Grit Scale for measurement (Muller, 2015), but with the tension between accuracy and answering time, I adopted the questions on the psycho-social state from GSCF. They measure the student's mental health such as confidence, courage, and gregariousness. The similar questionnaire has proven reliability and validity after tests on over 20000 Chinese middle school students (Wang, Li, & He, 1997). It is neither too long nor too short, and much more localized and rural-specific than other available tests. As suggested by the Delphi result (Figure 2), the Lighthouse impacts that are consistently considered important and well realized are mostly socio-emotional, and therefore the change in some subjective factors could be attributed to Lighthouse participation. This study covers only eight of the 25 suggested impacts, as some are for the long term, and some are difficult to measure. More importantly, it was necessary to limit the time required to answer, to ensure answer quality.

Finally, in schools with Lighthouse interventions, there was also a questionnaire for volunteers asking about their engagement with, and perceptions of, the program. The questionnaire was designed with suggestions from the Delphi panel.

[5] For details, please refer to http://china.pop.upenn.edu/

Data The major data collection took place at middle schools in six towns of Zhaoqing City and two towns of Qingyuan City in September 2012, which is one month after the Lighthouse intervention. This area's Gross Domestic Product per-capita was only one-third of the provincial level (Sheng & Yan, 2012). The full valid sample size is 6,298 students[6] from eight surveyed schools (each town has only one middle school), among which the treated sample size is 678 for Lighthouse students from six schools. The school names, which are exactly the same as the town names, are kept anonymous as requested by the local official. In both the full sample (Lighthouse and non-Lighthouse combined) and the Lighthouse sample, more than one third of students chose VHS as PCED; similar numbers of children chose Work, AHS or Undecided; and only 2% chose dropout (the survey were held in school so it did not covered those already dropped out). Among the 678 Lighthouse students, 211 attended the Lighthouse program right before the data collection in summer 2012.

Since the Lighthouse treatment was not randomized, numerous questions were asked to ensure enough variables (see Appendix B) could be generated to proxy the randomization. As a result, missing data is inevitable. Most variables have a missing data rate smaller than 10%.[7] Multiple imputations by chained equations are used to deal with missing data. The number of imputations to add is five, a classic number that can guarantee the efficiency of estimates (Rubin, 1987).[8]

Multicollinearity is another problem that could result from the large number of variables. For the sample built for this study, paired correlations that barely exceed 0.1, the mean variance inflation factors of 1.68, and the no-intercept condition index of 6.5 all suggest that the collinearity is within an acceptable manner. Furthermore, the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) have been calculated for all regressions to make sure that the model specifications yield lower AIC/BIC, or, in other words, do not bear over-fitting.

[6] Given the length of the student questionnaire, it is quite likely that some students lost their patience and provided random answers, generating systematic missing data that cannot be solved statistically. My solution to this kind of missing data is to insert a question asking how much they lost their patience in about 4/5 of the student questionnaire. If that question was left blank, the student is assumed to be totally impatient, and the whole observation will be removed before the imputation. This operation removes 1693 students (860 boys, 833 girls). By checking the answers given by this group, it co

[7] There are three Lighthouse-related variables with a 20% missing data rate. They are the level of engagement with other activities such as household chores, farm work, city visits, and summer jobs; the household rating on their support of the child's participation in summer camp or their respect of the children's own preference in PCED; and student performance. The missing data cases are concentrated in two schools

[8] I also tried a larger number of imputations, but little difference was found in the results. An important reason to keep the number small is to maintain conciseness when reporting PSM results.

In addition to the quantitative data set, there are 50 pages of anonymous opinions and debates generated from the Delphi process, plus interview records and student diaries obtained from the fields. This document will be used to assist causal interpretation after the PSM.

Empirical Results

The empirical findings confirm a Lighthouse impact on PCED, which is concentrated in the boost of educational aspiration, but not in many other subjective factors suggested by Delphi results. By-group summary statistics suggests that Lighthouse students are different from the general population. More specifically, at a significance level of 0.05, Lighthouse participants are more likely to be girls[9]; have parents that are communist league or party members; live with more siblings; grow in a less-educated community of more access to migrant worker opportunities; be taught by teachers of lower pay; live closer to the school; come from a household of higher income; rank high in terms of educational aspiration, emotional attachment to school and curiosity; be taught by teachers of stronger preference for AHS/VHS when compared to Dropout/Work; have better health; score higher in exams; know more about vocational training and urban life; have more classmates who were Lighthouse participants; and to have household members who support summer camp or respect the students' own choices.[10] All of these comparisons justify the need for applying careful research design to identify the real Lighthouse impact. Given the enormous amount of variables generated for this study, the detailed descriptive analysis is omitted, but is available upon request. Even with the most rigorous specification using all available variables for propensity score calculations, the Lighthouse and non-Lighthouse students still have a common overlap of propensity scores. It is however a little disappointing that, while the Delphi suggests various program impacts, the PSM confirms only the boost of educational aspiration.

For the rest of the outcome variables, there is no impact on confidence, ambition, or courage even when the propensities are unmatched. There are statistically significant impacts on curiosity, extraversion, affiliation need, and career ambition, but those impacts become statistically insignificant after the matching. It is noticeable that confidence was considered as the number one outcome by Delphi. This reveals the risk of being over-subjective when purely relying on qualitative investigation. All t-scores for the average

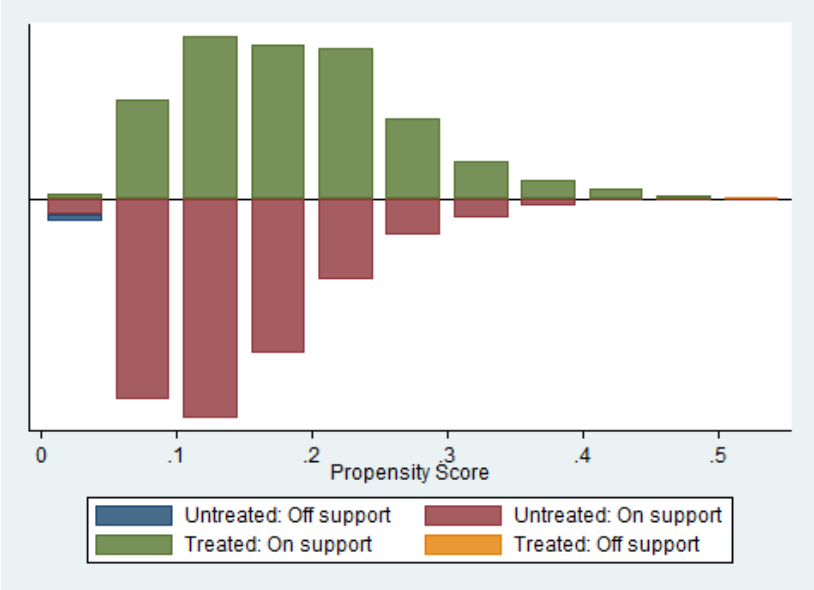
[9] There are 61% of girls in the full sample and 66% of girls in the Lighthouse sample. It had been mentioned several times by the Delphi panel members that there are more girls during the semester. Comparing to boys, girls are less likely to live in cities with their migrant parents. There are even larger share of girls in town during the summer because girls are also less likely to visit their parents in cities during the vacation.

[10] The two non-Lighthouse schools are excluded from this comparison.

treatment effect on the treated (ATT) in NN are presented in Table 1. In most cases, the t-scores for matched comparisons are much smaller, indicating a large selection bias in Lighthouse participation.

As the only expected outcome that survives the PSM, educational aspiration is a categorical variable ranging from 1 = dropout to 5 = graduate school. Figure 3 shows more targeting propensity scores calculated from variables correlated to educational aspiration ($p < 0.05$) and not totally unrelated to participation ($p < 0.6$), plus school and grade dummies.[11] There is a satisfactory overlap of the treatment propensities between Lighthouse and non-Lighthouse students.

Figure 3. Overlap of Propensity Scores, by Lighthouse participation.



Notes: The y-axis is proportional by group – the treated and untreated are not necessarily on the same scale. This is from one of the imputations with an adjusted list of treatment determinants (see Appendix B). Graphs made from all five imputations are almost identical. "Treated group" refers to those participating in any of the Lighthouse programs in the past three years.

[11] This follows the rule set by Brookhart et al. (2006). This adjusted specification makes a small difference from those based on the more conservative specification including all available variables.

Table 1. Nearest Neighborhood Matching Results (t-Scores)

	Most Recent Participation									
	Imputation_1		Imputation_2		Imputation_3		Imputation_4		Imputation_5	
	Unmatched	Matched	Unmatched	Matched	Unmatched	Matched	Unmatched	Matched	Unmatched	Matched
Confidence	0.55	-0.05	0.53	-0.24	0.54	0.42	0.56	0.18	0.55	2.3
Courage	1.23	0.03	1.2	-0.7	1.2	0.29	1.22	0.18	1.22	0.9
Curiosity	2.2	0.46	2.23	0.72	2.22	2.46	2.2	1.14	2.18	0.93
Ambition	-0.17	-0.16	-0.18	-0.59	-0.15	-0.72	-0.15	-0.26	-0.15	0.45
Extraversion	1.83	0.14	1.82	-1.18	1.83	-0.05	1.83	-0.42	1.83	0.7
Affiliation need	2	1.88	2.2	1.06	1.97	0.68	1.96	0.89	1.95	1.76
Educational aspiration	4.81	3.01	4.81	2.19	4.45	2.56	4.78	1.09	4.7	2.35
Expect normal career	-2.21	-1.66	-1.4	-0.24	-1.3	-1.01	-1.46	-0.33	-0.57	0
On support _Untreated #	4,085		4,200		4,160		4,180		3,992	
On support _Treated #	205		204		208		208		209	
	Any Participation									
	Imputation_1		Imputation_2		Imputation_3		Imputation_4		Imputation_5	
	Unmatched	Matched	Unmatched	Matched	Unmatched	Matched	Unmatched	Matched	Unmatched	Matched
Confidence	2.13	1.72	2.09	1.63	2.1	1.15	2.2	1.34	2.14	1.23
Courage	0.55	0.48	0.55	1.88	0.57	1.84	0.6	0.72	0.57	1.06
Curiosity	2.58	0.56	2.64	0.87	2.61	0.69	2.57	0.29	2.54	0.54
Ambition	0.31	-0.29	0.26	1.01	0.33	-0.19	0.29	-0.33	0.32	0.19
Extraversion	-0.27	0.04	-0.28	1.36	-0.27	0.81	-0.27	-0.07	-0.27	0.82
Affiliation need	0.82	0.44	0.88	0.24	0.78	-0.38	0.77	-0.25	0.8	0.25
Educational aspiration	5.12	3.02	4.05	2.13	4.14	0.72	3.79	2.98	3.82	1.51
Expect normal career	-0.43	-0.77	-0.13	-0.83	0.22	0.89	0	-0.41	0.31	-0.41
On support _Untreated #	3,743		3,747		3,742		3,742		3,748	
On support _Treated #	678		678		677		677		678	

Notes: The calculation is based on the list of t-scores for the average treatment effect on the treated (ATT). The two non-Lighthouse schools are excluded from this comparison. A detailed explanation of the expected outcome variables can be found in Appendix B, where affiliation need is shortened as "*affiliationneed*," educational aspiration as "*stueduaspiration*" and expect normal career as "*expect norm*."

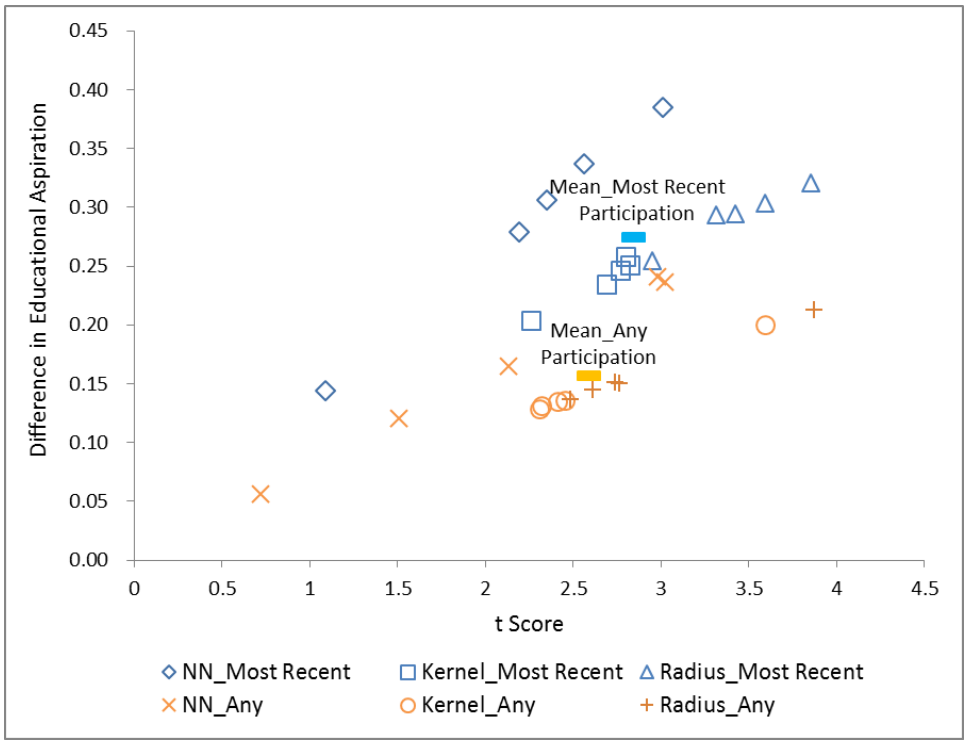
Figure 4 presents the matching results as a scatter graph, in which the y-axis is the effect size and the x-axis is the corresponding t-scores. Because five imputations were conducted, for each specification there are five results. The balancing property for PSM is not perfectly kept. On average, each imputation has three variables diagnosed as unbalanced, which is a small proportion. These variables are unbalanced in either the first or the last score block, where the treatment sample tends to be too small to secure statistical power. Particularly in the last block, the sample sizes range from 13 to 21 in the five imputations. Thus, despite an imperfect balance, it is acceptable to process the PSM without extra adjustment on specification (Stuart, 2010).[12]

The most important discovery from pooled matching results is the diminishing Lighthouse impact. The blue symbols (rhombus, square, and triangle) for the most recent summer 2012 participation are generally closer to the upper right than the orange symbols (cross symbols and circle) for any participation. The mean of blue symbols shows an average ATT almost double the mean of the orange symbols with a higher t-score. In other words, Lighthouse's short-term impact on educational aspiration is stronger in both magnitude and statistical significance when compared to its longer-term impact. Lighthouse does have follow-up services such as one-week revisits, student organization creation, and communication by letter. These seem to be insufficient for sustaining the impact, and it is possible that those follow-ups mainly benefit active students who have maintained a better connection with the volunteers.

Two types of data exploration are applied to disaggregate the aspiration boost. By-background analyses show that such an aspiration increase applies mainly to students with higher academic performance with the impact significant for both children of any participation and children with the summer 2012 participation, which is encouraging since it is reasonable for high-performance students to pursue more schooling. The aspiration increase may also be more evident among male students—boost acquired from the most recent participation is marginally significant at the 10% level. Finally, by-wealth matching gives a clear message that the increase in educational aspiration does not vary between the poor and the rich.

[12] Stuart (2010) also suggested Mahalanobis Matching under a minor imbalance. I have practiced it. For all imputations, both ATTs and corresponding t scores appear to be much larger with Mahalanobis Matching. This study proceeds with the more stringent results of NN, Kernel, and Radius.

Figure 4. Propensity Score Matching Results for Educational Aspiration.



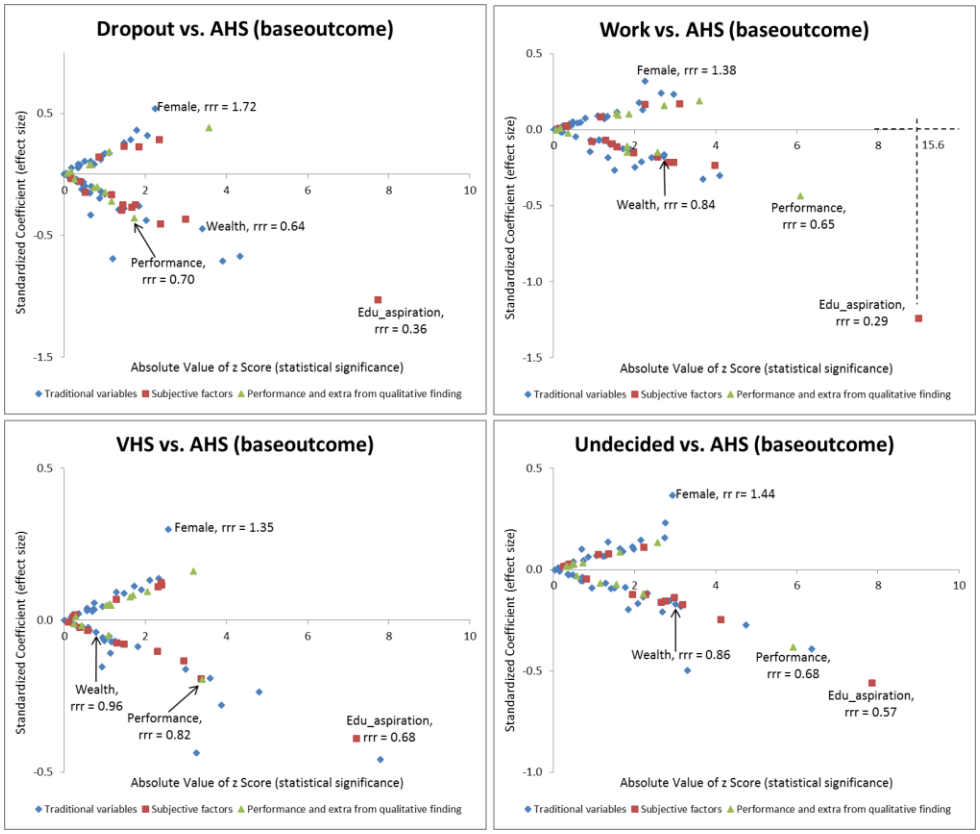
Notes: There are five data points for different groups because there are five imputations. Variables used to estimate the propensity scores for these PSMs are those correlated to educational aspiration ($p < .05$) and not totally unrelated to participation ($p < .6$), plus school and grade dummies.

In addition to background analyses, by-site analyses provide possible explanations of why some sites perform better. Three typical sites of different Lighthouse engagements are selected for comparison. School A had paused their Lighthouse program and then restarted it in 2012 (31 most recent participation, 83 any participation out of 805 students surveyed); School B was a first-year Lighthouse school, although it also had some transferred former Lighthouse students (75 latest, 94 any out of 479); and School C had been a long-time Lighthouse school (56 latest, 225 any out of 1,600). It turns out the boost does not apply to the long-engagement School C. The novelty for local people may help in greater program effect since newer Lighthouse schools (Schools A and B) see a larger aspiration boost. Also, according to the volunteer survey, volunteers in School C rate lower in terms of passion, confidence, and acceptance of Lighthouse training content when compared to Schools A and B. Thus, it is possible volunteer quality also explains part of the variance in aspiration boost.

Though the Delphi-PSM approach confirms only the aspiration boost as Lighthouse impact, the good news is the following MNL suggests educational aspiration as a crucial PCED determinant, holding numerous other factors constant. The four panels of Figure 5

report standardized coefficients and the absolute values of t-scores from the MNL. Dots in the upper or lower right of each panel stand for PECD determinants that are both influential and statistically significant—educational aspiration apparently beats more traditional or intuitive determinants like wealth and academic performance, especially when it comes to the decisions of dropout or work, where the children holding higher educational aspiration have a relative-risk ratio (rrr) that is less than half of the rrr for children of richer families or better test performance. The results also show children with higher education aspiration are less likely to choose VHS or remain undecided, with standardized effect sizes that are larger than the ones for wealth or performance. In the regression, wealth is categorized from 1 to 4 based on the availability of a cement house,[13] computer/internet/car, and motorcycle; performance refers to the quantiles of the student's test ranking at their school.

Figure 5. Standardized Effect Size and Statistical Significance of PCED Determinants.



Notes: rrr = relative risk ratio. The labels for other variables and the full table of regression results are omitted but available upon request. The MNL passes the seemingly unrelated estimation (SUE)-based Hausman test for the independence of irrelevant alternatives (IIA) assumption. Collinearity is acceptable according to the tests of paired correlations, variance inflation factors, and the no-intercept condition index.

[13] A cement house is not a traditional component of the wealth index, but it was highly recommended by one of the Delphi panel members who used to live in the surveyed area.

Connecting the results for PSM and MNL, the hypothesis held by this study is confirmed — socio-emotional support (here the Lighthouse) does affect PCED through altering the subjective factor (here educational aspiration). Some may question that the PCEDs in this study are just what the students wish to do, while in the end it will be their High School Entrance Exam (HSEE) score deciding where they go. I managed to collect HSEE scores and final PCEDs of 140 graduating students in two of the surveyed schools. Interestingly, although it is true that children of higher test scores are more likely to register in AHS, there is no real HSEE cut-off, as there are many students who scored at the bottom but entered AHS. It is also noticeable that China's population of lower secondary graduates has declined since 2005,[14] which means less competition of post-compulsory opportunities. In other words, PCED today is more about the children's willingness than the restriction of test performance or the availability of opportunities.

Why Socio-Emotional Support Boosts (Only) Educational Aspiration It is true that educational aspiration itself can be altered by many factors, but these are mostly controlled, like the wealth and performance factors or the level of other subjective factors in the MNL (e.g. confidence and curiosity). Delphi findings, on-site interviews, and student diaries jointly suggest the model effect to be a source of increasing aspiration, as these volunteers are mostly college or graduate school students. The true causal mechanism could be much more complicated than just a model effect, but it is the one hard to be challenged.

Based on the opinions collected from the Delphi panel, if there is an impact on educational aspiration, then it is mainly attributable to "the power of role models." When a student develops trust in a volunteer, he or she will subconsciously start to copy the volunteer's behavior, including the schooling decisions of that volunteer. One panel member provided a more specific theory of direct and indirect effect. Directly, once a student participates in Lighthouse, they forgo the chance of summer migrant work, receive the opportunity of talking to volunteers about education decisions, and thus have a higher possibility of returning to school after the vacation. Indirectly, it is admitted that Lighthouse volunteers who finish the training and go to the sites have more optimistic attitudes and social responsibility than their peers, which gives local students a positive picture of college life, making them want to be part of this group in the future. In addition, there have been increasing reports of former Lighthouse students applying to be Lighthouse volunteers, another form of the model effect.

[14] Calculated from the Educational Statistics Yearbook of China, 1998-2015.

The Delphi responses also touch on educational aspiration from two other angles. Firstly, while Lighthouse has clear instructions that the volunteers should not impose on the students their perceptions regarding what to do after finishing the compulsory education, the organization opposes dropout in its standard operation procedure, and its follow-up activities includes channels to financially support those at risk of dropout. Students are also willing to talk to the volunteers about their decisions. Secondly, some panel members have suggested that the Lighthouse program may affect a household's perception of college, but they are not confident about how strong this effect could be. After all, many parents are either busy with farm work or still working in cities during the summer.

My research team stayed with and talked to volunteers, teachers, students, and households. We obtained approval for scanning 99 diaries from eight Lighthouse students. These messages could be subjective, and the students willing to offer their diaries might have been active students who had a very positive view of Lighthouse. Nevertheless, interviews and diaries are better than Delphi documents in terms of giving detailed examples. We found interesting examples of how the volunteers and students got closer to each other. One case in point is a discussion about Jay Chou, an iconic pop singer from Taiwan. One student said he did not like Jay Chou, so a volunteer began to tell him stories of how Jay Chou grew to be a famous singer by overcoming many challenges. That volunteer was the first person from a different generation to talk with the student about such a non-school topic in an inspiring way. There are several records describing the students' gratitude for home visits, as many of these students live in remote villages. They felt they were being cared for. Such examples share one feature: the students and volunteers build strong connections outside the class.

Since the PSM already uncovered that the Lighthouse impact is concentrated only on educational aspiration, there must be some negative effects to offset the other anticipated outcomes. One member of my research team was assigned to collect negative views, which can be categorized into four groups. First, some students came to Lighthouse just because they wanted to accompany their friends, or because their parents needed someone to "babysit" their children during the summer. While some said they did enjoy the time, some said the participation was just a boring task. Second, some students felt isolated by other students. In one activity, the research assistant saw a student crying because the student had been ignored by other students. Third, some students thought the program was not intellectual. This is particularly evident for higher-grade students, as they sometimes took courses with younger students on subjects that were too easy for them. And lastly, some students felt they did not get enough attention from the volunteers. Not all volunteers are capable of treating every student equally. Introverted students

found it hard to get as much attention as outgoing students, yet these introverted students probably needed more help. The coexistence of positive and negative experiences could be a reason why quantitative results reject many anticipated Lighthouse impacts.

Conclusion and Discussion

Socio-emotional support, or at least the Lighthouse program, does affect PCED in rural China. The Delphi-PSM results suggest educational aspiration is the only measurable outcome that is statistically significant, and PCED can be altered with boosted aspiration. Affiliation need, confidence, curiosity, and extraversion are treatment determinants that could be misrecognized as impacts if matching is not conducted. Courage, ambition, and career expectation turn out to be neither treatment effects nor determinants.

The aspiration boost can however decrease over time, suggesting that more follow-ups are needed to maintain the impact. Such an aspiration boost applies mainly to students with higher academic performance, which is encouraging since it is absolutely right for these students to pursue more schooling. In Lighthouse sites that are relatively new, the novelty for local people may help in greater program effect. The passion, confidence, and acceptance of training content by volunteer teams can also be important to program quality.

One likely explanation of aspiration boost is that students tried to copy the volunteers' schooling decisions after trust was built. Trust can be easily built through personal interaction that is common in Lighthouse-type interventions, but rare in formal schooling. On the other hand, individual cases show a mixed picture of how the students reacted to the program for personal reasons or the capacity of volunteers. This helps explain why only one effect survives the matching. A relevant recommendation of this study is the promotion of Lighthouse-like socio-emotional support programs. As a typical rural GNGO program that operates at very low cost, an impact on a key PCED determinant is sufficient to justify its contribution.

This study also implies three possible improvements for Lighthouse-like socio-emotional support. To begin with, since increased aspiration affects mainly students with higher academic performance, it is advisable to encourage high-performers' participation. On the other hand, the matching result also implies that volunteers should pay more attention to low-performance students to ensure equity in outcome. Secondly, a more structural procedure for follow-up services should be established. There should be minimum standards for all sites to follow in order to avoid diminishing impact. And thirdly, the volunteers should be encouraged to spend time on informal interactions like home visits

and letter communications, which appear to work well in building the emotional attachment between the students and volunteers.

Methodologically speaking, this study is a unique showcase of how sequential mixed-methods perform better than pure quantitative or qualitative methods for exploratory analyses. PSM is popular in impact evaluation, but it is quantitatively impossible to persuade people what variables to consider for the estimation of propensity or what impacts to measure. Delphi resolves these problems. However, recalling the case of non-impact on confidence, it is the quantitative method's strength to reveal "counter-intuitive" facts that can hardly be captured by qualitative methods. The sequential combination of Delphi and PSM complement each other to provide more convincing findings.

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Appendix

A1. Recruitment/Training/Evaluation Schedule for New Volunteers, circa 2012

March

- Recruitment
- Application screening

April

- Interviews and admission. Usually 1 in 6 ~ 1 in 8 accepted.
- Introduction of Lighthouse (operation, idea, developmental strategy, etc.).

May

- First round of team building. This is a 3-day intensive session. The volunteers will be together for more than 12 hours per day.
- Teaching Training – education ideas
- Teaching Training – teaching skills and informal instruction
- Teaching Training – trial lecture

June

- Teaching Training – student affairs
- Optional trainings. In 2011, ten courses were provided by former Lighthouse volunteers, professional trainers, or other NGO trainers, including: applied drama, social gender, picture book education, creative music, photographing, outdoor living skill, state of rural education, Getting-Things-Done (GTD), connected to community, inquiry learning, and communication.

July

- Volunteer disciplines and first-aid treatment
- Second round of team building
- Specific training held by former volunteers from the same Lighthouse location

July-August

- Summer Camp starts, accompanied with simultaneous monitoring and evaluation by former volunteers and Lighthouse staff

September

- Workshops for each volunteer team
- Summative meeting

October

- Revisit during the National Day holiday

Table A2. Sample of the One-Month Lighthouse Activities in a School[a]

<table>
<tr><td>Week One</td><td></td><td>Monday</td><td>Tuesday</td><td>Wednesday</td><td>Thursday</td><td>Friday</td></tr>
<tr><td></td><td></td><td>Arrival</td><td>Enrollment</td><td>Enrollment</td><td>Team building</td><td>Team building & class assignment</td></tr>
<tr><td colspan="7"></td></tr>
<tr><td>Week Two</td><td></td><td>Monday</td><td>Tuesday</td><td>Wednesday</td><td>Thursday</td><td>Friday</td></tr>
<tr><td>8:00-8:10</td><td></td><td colspan="5">Morning reading(English pronunciation, news broadcast, story share)</td></tr>
<tr><td>8:10-8:50</td><td>1</td><td>Class meeting</td><td>Local product[b] 1</td><td>Local product 4</td><td>Local product 7</td><td>Local product 10</td></tr>
<tr><td>9:00-9:40</td><td>2</td><td>Team game</td><td>Local product 2</td><td>Local product 5</td><td>Local product 8</td><td>Local product 11</td></tr>
<tr><td>9:40-10:00</td><td></td><td colspan="5">Class-break exercise</td></tr>
<tr><td>10:00-10:40</td><td>3</td><td>Silent music</td><td>Local product 3</td><td>Local product 6</td><td>Local product 9</td><td>Local product 12</td></tr>
<tr><td>2:00-2:40</td><td>4</td><td>Basic marketing</td><td rowspan="2">Physical experiments</td><td rowspan="3">Optional courses[c]</td><td>Sales</td><td rowspan="3">Local products exhibition</td></tr>
<tr><td>2:50-3:30</td><td>5</td><td>Small story, big idea</td><td rowspan="2">Handcraft</td></tr>
<tr><td>3:40-4:20</td><td>6</td><td>Gymnastic</td><td>Gymnastic</td></tr>
<tr><td colspan="7">Long-distance household visit during weekend</td></tr>
<tr><td>Week Three</td><td></td><td>Monday</td><td>Tuesday</td><td>Wednesday</td><td>Thursday</td><td>Friday</td></tr>
<tr><td>8:00-8:10</td><td></td><td colspan="5">Morning reading(English pronunciation, news broadcast, story share)</td></tr>
<tr><td>8:10-8:50</td><td>1</td><td>Class meeting</td><td>Funny math</td><td>English speaking</td><td rowspan="2">Performing life</td><td>History (Three Kingdoms)</td></tr>
<tr><td>9:00-9:40</td><td>2</td><td>Drawing</td><td>Story of a boat</td><td>Communication</td><td>About teamwork</td></tr>
<tr><td>9:40-10:00</td><td></td><td colspan="5">Class-break exercise</td></tr>
<tr><td>10:00-10:40</td><td>3</td><td>Outdoor drawing</td><td>Fruit life</td><td>Logo design</td><td>Making a mask</td><td>Gender and society 1</td></tr>
<tr><td>2:00-2:40</td><td>4</td><td>Making a water rocket</td><td>Communication</td><td rowspan="3">Optional courses</td><td rowspan="2">Language and expression</td><td rowspan="2">Treasure-hunt</td></tr>
<tr><td>2:50-3:30</td><td>5</td><td rowspan="2">Discovery your community</td><td rowspan="2">Outdoor sketch</td></tr>
<tr><td>3:40-4:20</td><td>6</td><td>The world of voice</td><td>Class meeting</td></tr>
<tr><td colspan="7">Long-distance household visit during weekend</td></tr>
<tr><td>Week Four</td><td></td><td>Monday</td><td>Tuesday</td><td>Wednesday</td><td>Thursday</td><td>Friday</td></tr>
<tr><td>8:00-8:10</td><td></td><td colspan="5">Morning reading(English pronunciation, news broadcast, story share)</td></tr>
<tr><td>8:10-8:50</td><td>1</td><td>Class meeting</td><td>Funny math</td><td rowspan="2">Funny English</td><td rowspan="2">Life Auction</td><td rowspan="5">Art festival</td></tr>
<tr><td>9:00-9:40</td><td>2</td><td>Learn to reject</td><td>Bird’s moving</td></tr>
<tr><td>9:40-10:00</td><td></td><td colspan="4">Class-break exercise</td></tr>
<tr><td>10:00-10:40</td><td>3</td><td>Ads design</td><td>Geography</td><td>Cartoon drawing</td><td>Gender and society 3</td></tr>
<tr><td>2:00-2:40</td><td>4</td><td>Marketing</td><td>Gender and society 2</td><td>Learn to reject</td><td rowspan="3">Art festival drill</td></tr>
<tr><td>2:50-3:30</td><td>5</td><td rowspan="2">Marketing practice</td><td rowspan="2">Water purifier</td><td>Sales</td></tr>
<tr><td>3:40-4:20</td><td>6</td><td>Class meeting</td><td>Commencement</td></tr>
</table>

Notes:

a. The detailed activities vary among Lighthouse schools, but the design follows the Lighthouse standard operation procedure.

b. Local Product is a series of inquiry learning promoting the students care of local development.

c. Optional courses include Taekwondo, dance, drawing, and singing for this sample. They vary across Lighthouse schools depending on volunteers’ skill sets.

Table A3. Variable Construction

Category	Variable	Description	Used for Propensity Score Calculation
PCED and Treatment	pced	1 to 5 for Dropout/Work/VHS/AHS/Undecided	
	treated	Participated in either the latest or earlier Lighthouse program(s); 1/0=Yes/No	
	participation	Participated in the latest Lighthouse; 1/0=Yes/No	
Gender, Age and Ethnicity	female	Female student; 1/0=Yes/No	
	f_income	Female from a relatively high income household (log of income belongs to upper half); 1/0=Yes/No	
	f_performance	Female with relatively high performance (test score/ranking belong to upper half in school); 1/0=Yes/No	√
	f_cost	Female from a household that perceives relatively high cost of further education; 1 to 6 from low to high	
	age	Older than the mode of age within the grade; 1/0=Yes/No	
	minority	Minority; 1/0=Yes/No	
Parental Background	single_p	With single parent; 1/0=Yes/No	
	migrant_p	With migrant parent; 1/0=Yes/No	
	no_p	Both parents dead or at home for less than 1 month in the past year; 1/0=Yes/No	
	medu	Mother's education level; 1 to 6 for no schooling to some upper secondary education or above	
	fedu	Father's education level; 1 to 6 for no schooling to some upper secondary education or above	√
	peasant	Parents being peasant; 1/0=Yes/No	
	politicalc	Political capital; 1 to 3 for either parent is other/Communist League member/Communist Party member	
	parent_leader	Father or mother are cadres; 1/0=Yes/No	
	parentbadhealth	Father or mother's health does not allow for normal life or work; 1/0=Yes/No	
Number of	sibship	Number of siblings (including the student); 1 to 6 in which 6 means 6 or more siblings	√

Siblings and Birth Order	witheldersister	Has an elder sister; 1/0=Yes/No	√
	eldercohort	Being the older siblings; 1/0=Yes/No	
Peer	mignetwork	Perceive prevailing trend of going out as young migrant worker; 1/0=Yes/No	√
	peerpedu	Average parental education level in class; 1 to 3 for primary unfinished/primary/lower secondary unfinished	
Teacher	tch_origin	Homeroom teacher's origin; 1 to 4 for local town/other town in county/other place in province/other province	√
	tch_edu	Homeroom teacher's level of education; 1/0 for college/non-college	
	tch_admin	Homeroom teacher holds other administrative position in the school; 1/0=Yes/No	
	tch_exp	Homeroom teacher's experience as fulltime teacher; 1 to 4 for 2 years or less/3 or 4 years/5~10 years/over 10 years	
	tch_mthgain	Homeroom teacher's monthly income; divided into 6 quantiles	
	tch_paydelayed	Homeroom teacher experienced pay delayed in the past 6 month; 1/0=Yes/No	
	subtch_origin	Key subject (Chinese/math/English) teacher origin; take means and divide into 4 quantiles	√
	subtch_edu	Key subject (Chinese/math/English) teacher level of education; take means and divide into 4 quantiles	
	subtch_exp	Sum of key subject teacher's experience as fulltime teacher; take means and divide into 4 quantiles	
School	classsize	Classsize; divided into 4 quantiles	
	distance	Traveling time to school; divided into 6 quantiles	√
	survival	School has relatively high retention rate (>66%)	√
	school dummies	Dummy variables identifying which school the student was attending (there are eight schools)	√
Household Economic Status and Credit Constraints	wealth	Wealth status; 1 to 4 based on the availability of cement house, computer/internet/car, and motor cycle	
	housesize	Household size; divided into 4 quantiles	
	income	Log of household income; divided into 6 quantiles	
	credit_financiali	Log of available credit from bank or credit cooperative; divided into 6 quantiles	

	credit_relative	Log of available credit from relative; divided into 6 quantiles	
Subjective Factors	stu_eduaspiration	Expected highest level of education, 1 to 5 for lower secondary/vocational high/academic high/college/graduate school	
	expect_norm	Expect agriculture or manufacturing as future career; 1/0=Yes/No	
	expect_advanced	Expect science, technology, or government as future career; 1/0=Yes/No	
	percep_schquality	Perception of school quality; take mean of the ratings to related items and divide into 6 quantiles	
	percep_schaffiliation	Emotional attachment to school; take mean of the ratings to related items and divide into 6 quantiles	
	percep_schvalue	Perceived value of schooling; take mean of the ratings to related items and divide into 4 quantiles	√
	percep_scheffort	Willingness to study; take mean of the ratings to related items and divide into 4 quantiles	
	confidence	Level of confidence; take mean of the ratings to related items and divide into 6 quantiles	
	courage	Level of courage; take mean of the ratings to related items and divide into 6 quantiles	
	curiosity	Level of curiosity; take mean of the ratings to related items and divide into 6 quantiles	
	ambition	Level of ambition; take mean of the ratings to related items and divide into 6 quantiles	
	familyonstudy	Level the family cares about their study and PCED, perceived by the student; take mean of the ratings to related items and divide into 6 quantiles (end up only category 1 to 5 available)	
	familyonemo	Level the family cares about their emotional status and respects their opinion, perceived by the student; take mean of the ratings to related items and divide into 6 quantiles	
	tchr_contvsstop	Homeroom teacher's preference of continuing education over stopping education; take ratio of the ratings and divide into 4 quantiles	
	tchr_genvsvoc	Homeroom teacher's preference for academic high school over vocational high school; take ratio of the ratings and divide into 4 quantiles	
Health	sick	Suffers disease(s); 1/0=Yes/No	√
	sick_class	Suffers health issues that directly affect study, namely feeling hungry/dizzy during class and having eyesight problem; 1/0=Yes/No	√

Perceived Cost/ Reward of the PCED	cost_vocvsjunior	Cost of VHS relative to cost for middle school, perceived by the household; take ratio of the amounts and divide into 6 quantiles	
	cost_genvsvoc	Cost of AHS relative to cost for VHS, perceived by the household; take ratio of the amounts and divide into 6 quantiles	
	cost_colvsgen	Cost of college relative to cost for AHS, perceived by the household; take ratio of the amounts and divide into 6 quantiles	√
	earn_workvsdrop	Expected relative earnings in 35 if work-after-graduation instead of dropout, perceived by both the household and the student; take ratio of the amounts and divide into 6 quantiles	√
	earn_vocvswork	Expected relative earnings in 35 if continue to VHS instead of work, perceived by both the household and the student; take ratio of the amounts and divide into 6 quantiles	√
	earn_genvsvoc	Expected relative earnings in 35 if continue to AHS instead of VHS, perceived by both the household and the student; take ratio of the amounts and divide into 6 quantiles	√
	earn_colvsgen	Expected relative earnings in 35 if continue to college instead of AHS, perceived by both the household and the student; take ratio of the amounts and divide into 6 quantiles	√
Academic Performance and Possible PCED Determinants	knowvoc	Student and their family's knowledge of vocational education policies; 1 to 4 for No to Very Much	
	performance	Academic performance; take mean of both ranking and score and then divide into 4 quantiles within school	√
	business	Has family business to inherit; 1/0=Yes/No	
	interpersonal	Situation of interpersonal relationships in school; take mean of the ratings to related items and divide into 6 quantiles	√
	urbanlife	Used to stay in nearby cities for over 1 month; 1/0=Yes/No	√
	outreach_voc	Perceived frequent outreach from vocational schools; 1/0=Yes/No	
	outreach_fac	Perceived frequent outreach from factories; 1/0=Yes/No	
	local_negative	Holds very negative view of local development; 1/0=Yes/No	

	local_entertain	Perceived prevalence of entertainment industries (KTV, gambling or illegal lottery, internet bar) in the neighborhood; 1/0=Yes/No	
	gambling	Has been involved with gambling or illegal lottery; 1/0=Yes/No	
	schatmos	School has relatively good study atmosphere (level of violence, cheating, class discipline); 1/0=Yes(> mean value)/No	
	chore	Time spent on housechore; divided into 4 quantiles	√
	love	Was or is in love with someone; 1/0=Yes/No. Considering the sensitivity of this topic for teenagers, this question was asked with 6 options from strongly disagree to strongly agree, so student can answer "basically agree" if they feel shy about confirming the relationship	√
	grade dummies	Dummy variables identifying which grade the student was attending (there are three grades)	√
Additional Variables for Treatment Outcomes or Determinants	extraversion	Level of extraversion; take mean of the ratings to related items and divide into 6 quantiles	
	affiliationneed	Level of need of affiliation; take mean of the ratings to related items and divide into 6 quantiles	
	atti_chore_farm	Attitude towards housechore/farm works; 1 to 6 for hate to love	√
	other_act	Level of other activities (housechore/farm works/city visit or job), according to the household; take mean of the ratings to related items and divide into 6 quantiles	
	peertreated	Popularity of Lighthouse participation among classmates (Lighthouse participants as % to the class); divided into 4 quantiles	
	attoncamp	How supportive the household is of participating in summer camp or how much they respect the student's own preference; take mean of the ratings and divide into 6 quantiles	√

Notes: Detailed questionnaires and data for the graphs are available upon request. The last column informs a final list of variables that are used to estimate the propensity scores after education aspiration was confirmed as the outcome of interest. Following the rule set by Brookhart et al., 2006, this specification is generated to include variables correlated to educational aspiration ($p<0.05$) and not totally unrelated to participation ($p<0.6$), plus school and grade dummies.

College Student Entrepreneurship in China: Results from a National Survey of Directors of Career Services in Chinese Higher Education Institutions

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As the number of college graduates increases dramatically in recent years in China, the Chinese Central government encourages college graduates to partake in entrepreneurial activities. The current study uses data from a nationwide institutional survey of directors of career services of 840 Chinese colleges and universities to study the current situation of student entrepreneurship and relevant institutional guidance practices. Our results show that, although China's college graduates have a high level of entrepreneurial intention, the actual entrepreneurship population is low, and the entrepreneurship survival rate is not high. Among all colleges and universities, directors of career services in most competitive universities rate higher to the entrepreneurial guidance practices provided in their institutions. Our findings suggest that governments and higher education institutions should pay attention to cultivating college students' entrepreneurial spirit, encouraging opportunity entrepreneurship, as well as providing substantial startup supports based on actual needs.

Introduction

In view of entrepreneurial activities playing an important role in aspects such as creating employment opportunities, increasing productivity and promoting national economic development (Audretsch & Keilbach, 2003; Wong, Ho, & Autio, 2005), many countries encourage entrepreneurship to alleviate poverty and promote national economic growth (Van Stel, Storey, & Thurik, 2006). Existing literature has documented the importance of entrepreneurial talent on China's economic

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development since the 1980s. It is argued that the movement of entrepreneurial talents (e.g., peasant turned entrepreneurs, bureaucrat-turned entrepreneurs, overseas-returning and engineer-turned entrepreneurs) from traditional sectors (government, agriculture) to business activities has enabled China to realize its economic boom (Zhang et al., 2010).

Unlike the fast growth of China's economy since the 1980s, the overall size of China's higher education was relatively small before 1999. According to UNESCO, the 1996 gross college enrollment ratio in China was only 5%. This ratio was lower than that in India (6.3%), whose GDP per capita was less than one-half of China's, and was much lower than those in Thailand (20.7%) and in Philippines (28.8%), where the GDP per capita was equivalent to China's. In 1999, China began the largest and longest continuous expansion in higher education, and its overall college enrollments outnumbered the US (the largest higher education system of the time) in less than ten years. As a result, the number of college graduates has dramatically increased, thus leading to greater employment pressure on college students in the 21st century. The Chinese Central Government has published a number of policies to encourage college students and graduates to actively partake in entrepreneurial activities since the late 1990s, in the hope of rendering entrepreneurship as a new growth point in driving college student employment. Along with China's economic "new normal," the Chinese Central Government proposed the "mass entrepreneurship and innovation" policy in 2015 to promote China's entrepreneurial activities toward a climax. As the key to entrepreneurship is innovative talent, Chinese central and provincial-level governments expect college students, who are persons of high quality and high ability, to serve as a strong reserve force of entrepreneurial activity. Chinese universities also carry out the practices for the entrepreneurship education of college students, provide venture funds and services, and establish startup hubs and incubation bases, so as to encourage and support the self-employment and entrepreneurial activities of college students.

With the policy and economic environments favoring entrepreneurship, it is very natural to ask if these environments also bring in sufficient amount of opportunities for college students and graduates to participate in entrepreneurial activities. Based on unique data from a national institutional survey of directors of career services in Chinese colleges and universities, the present study intends to investigate the general entrepreneurial activity status of Chinese college students and higher education institutions' overall guidance practices of promoting student self-employment. The study also intends to describe the differences in the above situations among regions and colleges. One of our contributions lies in the data we collected. The data employed bears the advantage of objectivity and accuracy from administrative statistics on each institution surveyed, and at the same time, the data enables us to enjoy the self-

reported perceptions from close observers. In addition, the extensiveness in terms of the survey's geographical scope enables our findings to represent the general status of college student entrepreneurship in China. The other contribution of our study lies in the institutional and individual aspects of the entrepreneurial process. Different from previous studies, our study integrates college student entrepreneurship indicators at all stages (e.g., interest, intention, actual entrepreneurship, survival) and tries to provide an all-in-one description of college student entrepreneurship in China.

Literature Review

The development of college student entrepreneurial activities and the publication of related policies have led to college student entrepreneurship becoming a hot topic of academic discussion. From a dynamic perspective, entrepreneurial process can be viewed as a set of stages that follow one another: idea, the triggering event, implementation, and growth (Nassif et al., 2010). In the context of college student entrepreneurship, these stages can be restated as entrepreneurial intention, graduation as the triggering event, actual entrepreneurship after graduation, and survival or failure of entrepreneurial activities, respectively.

Entrepreneurial intention is considered as the best predictor of actual entrepreneurship. In view of previous research, college student entrepreneurial intention was mostly analyzed from the perspective of individual college students (Sun & Wei, 2011; Xu, Mei, & Ni, 2015; Ye, 2009; Zhou, Feng, & Chen, 2014; Xiang & Lei, 2014; Gao & Su, 2013). Individual attributes, resources accessed, as well as external (e.g., policy, cultural) environment are examined as common factors influencing college student entrepreneurial intention (Xia, Luo, & Yan, 2012; Ye, 2011; Chen & Sun, 2009; Qian & Chen, 2011; Chen & Mao, 2009). We find that a few studies have tried to estimate the percentage of college students who have entrepreneurial intentions in China (Tang & Yu, 2012; Zhang, Kang, & Ding, 2010; Chu & Zhang, 2013). It is noted that most of them are for entrepreneurial intention rate in a specific province or city[1], and the estimated entrepreneurial intentions among college students range from 25.9% to 70%. However, these local estimates are systematically much larger than Global Entrepreneurship Monitor (GEM) estimates of entrepreneurial intentions among

[1] According to the survey data from the National College Student Information Consultation and Employment Guidance Center, about 25.9% of college students had strong entrepreneurial intentions, and 53.02% had previously had such entrepreneurial intentions, thus reflecting the general entrepreneurial willingness of college students (Chu & Chang, 2008). As revealed by the survey of 716 undergraduate students in Zhejiang Province, 43% of the students chose entrepreneurship, and 37% agreed with and would consider entrepreneurship (Tang & Yu, 2012). Based on the survey of 1060 undergraduate students in 15 universities and higher vocational colleges in Wuhan City, it was shown that 65.0% of the college students had considered entrepreneurship (Zhang, Kang, & Ding, 2010). The survey of 448 college students in Hebei Province indicated that nearly 70% of the students were interested in entrepreneurship with entrepreneurial impulse (Chu & Zhang, 2013).

Chinese 18-64 populations (19.52% in 2015) and are also contradictory to our intuitions regarding college student entrepreneurship.

According to GEM data[2], entrepreneurial activity in China has rapidly increased, with the average percentage of early-stage entrepreneurial activity (TEA) over the past 10 years being about 15%, which is slightly higher than in US (12%). The GEM estimate is an overall percentage of entrepreneurship for the entire adult population (18-64 year-olds). If focusing on the group of college graduates in China, the estimate of actual entrepreneurship after graduation is not consistent, ranging from less than 1% to almost 3%, depending on the sample selected and the definitions of key terms (e.g., entrepreneurship, graduate, time point).

If we differentiate individuals who participate in TEA by motivation, GEM defines, those who choose to pursue an opportunity as a basis for their entrepreneurial motivations, as opportunity-driven entrepreneurship, and those, who have no better options for work and start out of necessity, as the necessity-driven entrepreneurship. Since opportunity-driven entrepreneurship will bring more employment opportunities for the society, it is considered to have a larger employment effect than necessity entrepreneurship. The motivation index in China estimated by GEM, which is the ratio of opportunity-driven to necessity-driven entrepreneurship, increases from 0.8 in 2010 to 1.5 in 2015. In contrast, the corresponding ratios for the same period in the US (1.8 and 6.4, respectively) are much higher, indicating different overall compositions of entrepreneurial populations existing in China and the US.[3] It is found that entrepreneurs with college and above level of education are more likely to be in opportunity-driven entrepreneurship (according to GEM China report 2007, entrepreneurial, transition and employment effect); however, we haven't found any specific estimates regarding the percentage of opportunity-driven entrepreneurship among college graduates.

At the growth stage of entrepreneurial process, GEM does not provide direct indicators for entrepreneurial activities. However, GEM's *fear of failure rate*, which calculated using the percentage of entrepreneurial population who claims that fear of failure would prevent them from setting up a business, can serve as an indirect measure. China has a rate of 49% in 2016, as opposed to a rate of 33% in the US, and is among one of the economies with the highest fear of failure rate. In terms of the actual survival time of enterprises, the State Administration for Industry & Commerce of China (SAIC) conducted an analysis of all the domestic enterprises in the country since 2000. SAIC found 98.4% of Chinese enterprises survive their first year, two-thirds

[2] Source: http://gemconsortium.org/country-profile/51

[3] The two economies have a similar percentage of TEA.

survive their fifth year, and 53% survive their eighth year. The peak period of exit is from the third to the seventh year. One survey of 2000 young entrepreneurs in Haidian District, Beijing, China, shows similar trends (Ding & Wang, forthcoming). It was found that in the first two years since the foundation of enterprises, the enterprise closing rate was low, at about 5.5%, and the annual closing rate was below 5%. We haven't found any studies or official statistics regarding survival time of college graduate entrepreneurial activities.

As entrepreneurship does not take place in a vacuum, along with the entrepreneurial process, there are many external factors influencing entrepreneurial activities. These factors range from market to government, from culture to infrastructure, as well as from research and development (R&D) to education. In these aspects, GEM's entrepreneurial ecosystem indicators provide valuable implications concerning how easy or difficult it could be to generally start up in a country. According to GEM's policy brief of China, physical infrastructure and market openness are the biggest enablers for entrepreneurship, while availability of financial support and entrepreneurial education serve as the main constraints for entrepreneurship in China. However, it is also noted that GEM indicators are aggregated ones that cannot describe potential differences existing within a country. For example, China is a big and diverse country, the same entrepreneurship policy from central government can be implemented differently at provincial and local levels, and entrepreneurship education can vary at college/university level as well. Thus, compared with China's overall entrepreneurship ecosystem, the local system experienced by individual college graduate entrepreneurs generates direct impact on entrepreneurial activities. Previous research lacks a systematic and objective investigation regarding the present entrepreneurial activity status of Chinese college students and the local entrepreneurship ecosystems due to the insufficiency of comprehensive survey data. It is difficult to obtain a comprehensive understanding of the overall entrepreneurial activity situation of college students throughout the country, and to further compare the entrepreneurial activities for different college types in various localities.

Methodology

Institutional Survey In 2015, the Graduate School of Education's Institute of Economics of Education at Peking University undertook a technical assistance project from the Asian Development Bank, titled "Policies for promoting employment of college graduates in China", to carry out an institutional survey of colleges and universities nationwide, regarding their students' employment and entrepreneurship, as well as their practices of career services. The investigation subjects were the directors of career services of colleges and universities. The survey was conducted using an online real-name method, requiring the directors of career services to

complete the questionnaire according to the actual statistical data of college and university graduates.

One-stage cluster sampling was applied and province is the primary sampling unit (PSU). With consideration to geographical regions (east, central and west) and provincial economic development levels, institution density and number of graduates, 14 provinces (municipalities) of 32 provincial administrative units throughout the mainland were chosen to be sampled as the subjects of the investigation. The samples covered 45% of Chinese provinces/municipalities and 56% of regular higher education institutions in China, and the number of college graduates from the sample institutions accounted for 56% of the national total. After extracting provinces, the online survey link was sent to the directors of career services of all of the institutions in the selected provinces (1408 in total). There were 1065 copies of returned online survey questionnaires, of which the valid sample size was 881, indicating a 60% valid return rate. We constructed a sampling weight for each observation to make our sample a nationally representative one. The weight compensates for sampling institutions' unequal probabilities of selection and their non-response. In addition, we conducted a post adjustment of the weight according to number of institutions in four tiers (Project 985 universities or 985, Project 211 universities or 211, general undergraduate colleges/universities or UG, vocational colleges or VOC).[4]

Table 1. Characteristics of Sample Institutions

Variable	Categories	N	%	Weighted %
Region	Eastern	374	42.45%	45.90%
	Central	260	29.51%	33.94%
	Western	247	28.04%	20.16%
Institution Tier & Type	985	19	2.16%	1.53%
	211	20	2.27%	2.86%
	Undergraduate	396	44.95%	43.36%
	Vocational	446	50.62%	52.25%

In addition to the survey having a representative and large sample with comprehensive coverage, the obtained data also had the two following advantages. The first is the college administrative data obtained by this study can be complementary with past student self-reported data to improve the accuracy of the understanding of the present situation of entrepreneurship. The second advantage is

[4] Project 211 and project 985 are the Chinese central government's endeavors aimed at founding high-level universities for the 21st century. These projects were initiated in 1990s and universities selected were provided substantial amount of earmarked appropriations to develop into national and world-class universities. Therefore, 211 and 985 universities are also considered as the second and the first tier of higher education institutions in China.

that the directors of career services can understand and grasp the implementation more fully in terms of the practical work in colleges and universities.

Variables and Methods In the questionnaire, the content related to college student entrepreneurship included the basic situation of graduate entrepreneurship and the situation of various university practices to promote the entrepreneurship of college students. In Table 2, we summarize the key variables employed in the present study. Variables are divided into two general categories, measuring the student entrepreneurship from the perspectives of process and environment, respectively. Specifically, college student entrepreneurial intention, actual entrepreneurship after graduation, types of entrepreneurship, as well as the survival of entrepreneurial activities constituted variables in the process perspective. Variables in the perspective of entrepreneurial environment referred to the local environment at the institutional level, including curriculum and training,[5] services, funds, infrastructure (e.g., hubs and incubators) provided for entrepreneurial activities of college students. Both categories included objective and subjective measures. The objective measure was reported by directors of career services according to administrative records, and the subjective measures were the directors' personal perceptions on corresponding aspects.

Weighted means are calculated to provide overall estimates for college student entrepreneurship and institutional entrepreneurial environments. In addition, for each variable, we calculated and compared the weighted means of key variables by regions (eastern, central, western) and by institution tiers (985, 211, undergraduate, vocational), respectively. ANOVA analysis and F test are conducted to examine whether differences among groups are statistically significant.

[5] Currently, college student entrepreneur courses and trainings in most Chinese higher education institutions are organized by department of career services. Typical courses focus on sharing of hands-on experiences.

Table 2. Descriptive Statistics of Key Variables

Variable			Min	Max	Mean
Process	Entrepreneurial intention	Intention rate (%)	0	78.43	3.95
		Perceived interest in entrepreneurship	1	4	2.94
	Actual entrepreneurship	Actual number of entrepreneurship	0	141	12.2
		Actual entrepreneurship rate (%)	0	9.69	.48
		Perceived increase in entrepreneurship	1	4	3.01
	Entrepreneurship type	Opportunity entrepreneurship (%)	0	100	71.75
		Employment difficulty as perceived reason for entrepreneurship (%)	0	100	10.35
	Survival rate	1-year survival rate (%)	0	100	53.62
		Perceived high survival rate of student entrepreneurship	1	4	2.14
Environment	Curriculum and training	Number of entrepreneurial courses	0	45	2.1
	Services	Number of services provided	0	5	3.27
	Venture funds	Amount per project (10000 YUAN RMB)	.04	30	3.14
		Funding shortage as perceived obstacles	1	4	3.14
	Hubs and incubators	Number of projects in incubator	0	200	7.97
	Perceived quality of institutional practices	Curriculum and training	1	4	3.04
		Services	1	4	3.07
		Venture funds	1	4	2.66
		Hubs and incubators	1	4	2.82

Note: Weighted means applied.

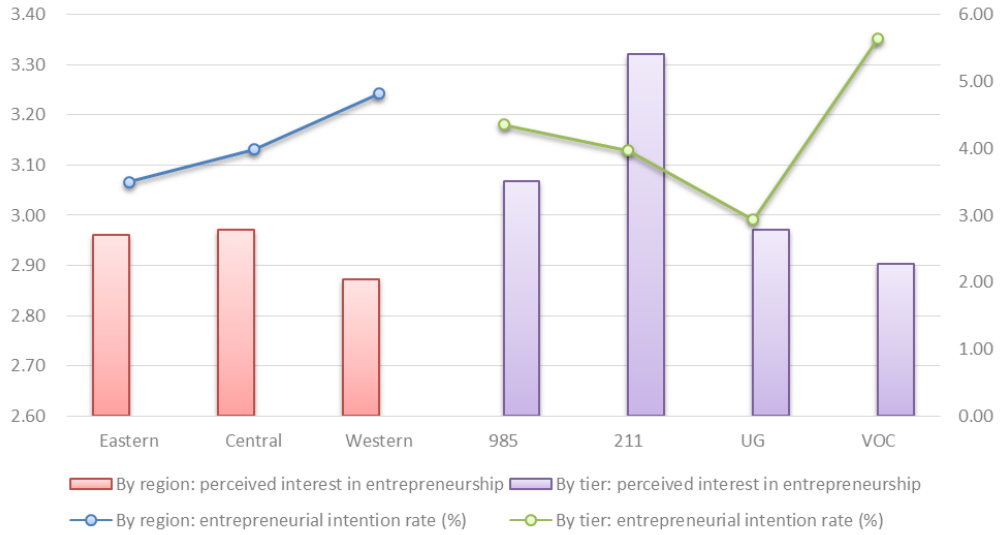
Empirical Results

Our survey indicates nearly 70% of directors for career services agree and very strongly agree with the following statement: "current college students are interested in entrepreneurship." It can be seen in recent years, college students are more interested in entrepreneurship. Nevertheless, our study shows that the mean rate of college students who have entrepreneurial intentions is only 3.95%, which is not consistent with previous local studies. One of the reasons for this inconsistency may lie in who is surveyed. Directors of career services may only count those who have serious considerations for entrepreneurial activities as having intentions, and thus could serve as a better predictor of actual entrepreneurship than student self-reported intentions, which may be causal.

As viewed from regional and institutional tiers, directors of career services at colleges and universities in the central regions have the highest degree of agreement with the statement, "current college students are interested in entrepreneurship". While the lowest degree of agreement was found in the western regions. This shows that the entrepreneurial enthusiasm of college students in the central and eastern regions is

greater compared to the western regions. Among colleges and universities of different tiers, the degrees of agreement of 985 universities and 211 universities are higher than those of general undergraduate and higher vocational colleges, suggesting that students of competitive universities are more interested in entrepreneurial activities in recent years. But in terms of entrepreneurial intention rates, students from vocational colleges and institutions in western regions have the highest intention rates (5.64% and 4.81%, respectively). Opposing patterns between perceived interest and in intention rate exist when the means are disaggregated by region and institutional tier. It is implied the top-down promotion of the idea of "mass entrepreneurship and innovation" may have promoted the awareness of entrepreneurship among college students, however, whether awareness or interest will transfer to serious intention still depends on many other factors, one of which could be the affluence and potential benefits of academic or work opportunities other than entrepreneurship.

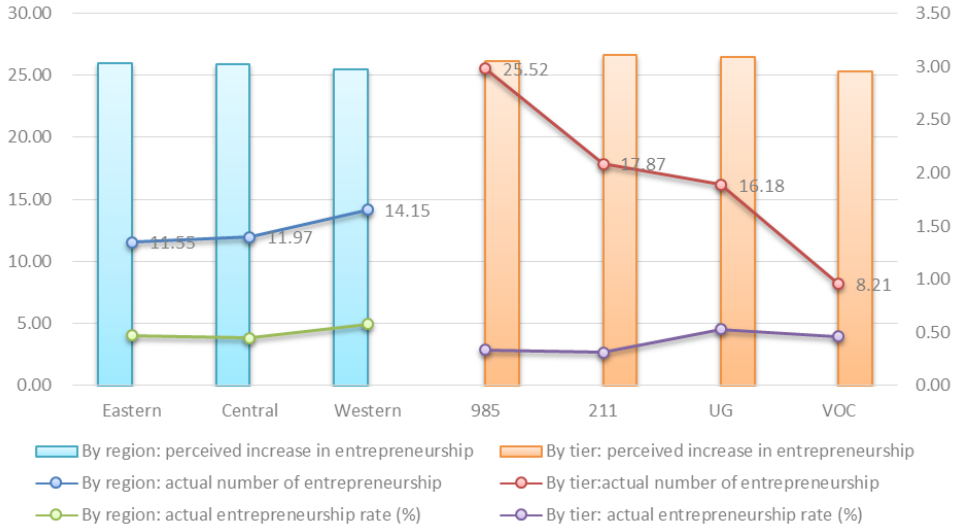
Figure 1. Entrepreneurial Intentions by Region and Institutional Tier



In terms of college student entrepreneurship trends, nearly 80% of the directors agree and very strongly agree with the statement: "there has been a great increase in the number of entrepreneurship students in recent years". According to the related research and subjective perceptions of directors of career services, college graduates presently exhibit common entrepreneurship intentions, with entrepreneurial enthusiasm rising and self-employment population increasing. However, the survey results show the graduate population with actual entrepreneurship after graduation accounts for only a small proportion of those with entrepreneurial intention. As viewed from the samples of this survey, the college graduate population with actual entrepreneurship is averaged at 12 people, only accounting for 0.48% of actual

employment and 12.1%[6] of the graduates with entrepreneurial intention. In terms of region and college types, the average number of actual entrepreneurship for college graduates in the western region is 14.15, accounting for 0.58% of total number of graduates, which is higher than the central and eastern regions (11.55 and 11.97, 0.47 and 0.45%). The average number of actual entrepreneurship after graduation from 985 universities is 25.52%, which is higher than that of 211 universities (17.87%), the general undergraduate colleges and universities (16.18%), and higher vocational colleges (8.21%).

Figure 2. Actual Entrepreneurship by Region and Institutional Tier



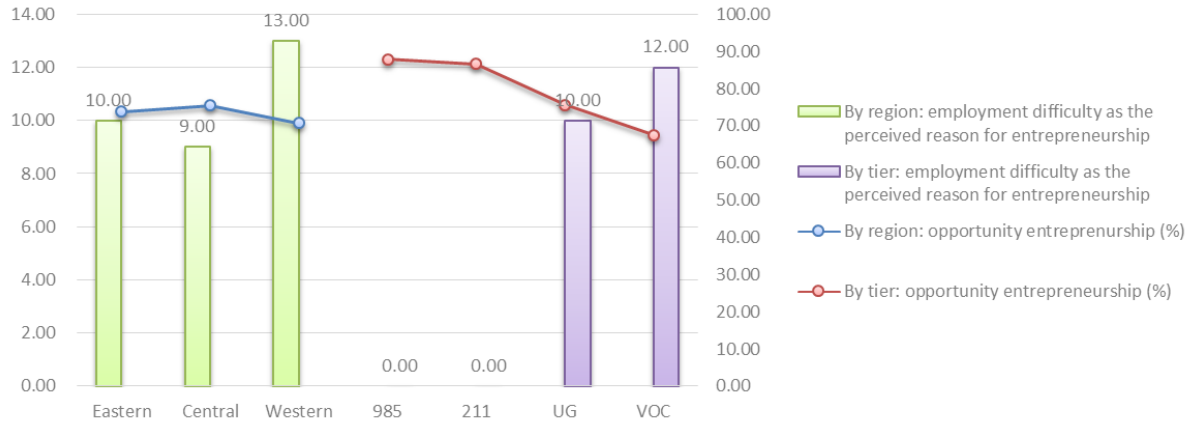
There is no significant difference in the perceived increase in entrepreneurship among regions and institutional tiers. However, in terms of the number of actual entrepreneurship among institutional tiers, there is a statistically significant difference. There are a greater number of graduate entrepreneurs from highly competitive universities (such as 985 universities) than other colleges and universities. Two reasons may account for this phenomenon. On one hand, institutional size of 985 universities is generally larger than that of others. Whereas, graduates with entrepreneurial intentions from the 985 universities are more likely to choose actual entrepreneurship. In our sample, the percent of graduate entrepreneurship by those with entrepreneurial intentions from the 985 universities is close to 30%, which is much higher than the sample mean (12.1%). It may imply that 985 universalities provide their graduates with entrepreneurial support with higher quality.

Opportunity entrepreneurship is defined by the entrepreneurial activities toward finding business opportunities, and necessity entrepreneurship is defined by the

[6] Calculated by dividing 0.48% by 3.95%.

forced entrepreneurship under survival pressure (Hay, Cox, Reynolds, Autio, & Bygrave, 2002). Based on China's data from the *Global Entrepreneurship Monitor*, in 2006 the proportions of China's opportunity entrepreneurship and necessity entrepreneurship were 59.2% and 38.7%, respectively (Gao J. , 2006). Among the sample colleges and universities covered in the survey, the proportions of opportunity entrepreneurship and necessity entrepreneurship were 71.75% and 28.25%, respectively. This shows that the entrepreneurship of current college graduates in China is mainly based on business opportunities, and the percentage of opportunity entrepreneurship in college student populations is higher than that among the general population. The undergraduates who are forced to choose entrepreneurship under employment or survival pressure account for only a small proportion. This is also confirmed by the subjective ranking of "potential reasons of student entrepreneurship" by directors of career services. There are only 10% of directors who chose "employment difficulties" as one of the three main reasons for entrepreneurship, and they believe most college students who choose self-employment mostly do so due to individual reasons, such as personality traits and job preference (43.9%), as well as the consideration of favorable projects (23.4%).

Figure 3. Type of Entrepreneurship by Region and Institutional Tier

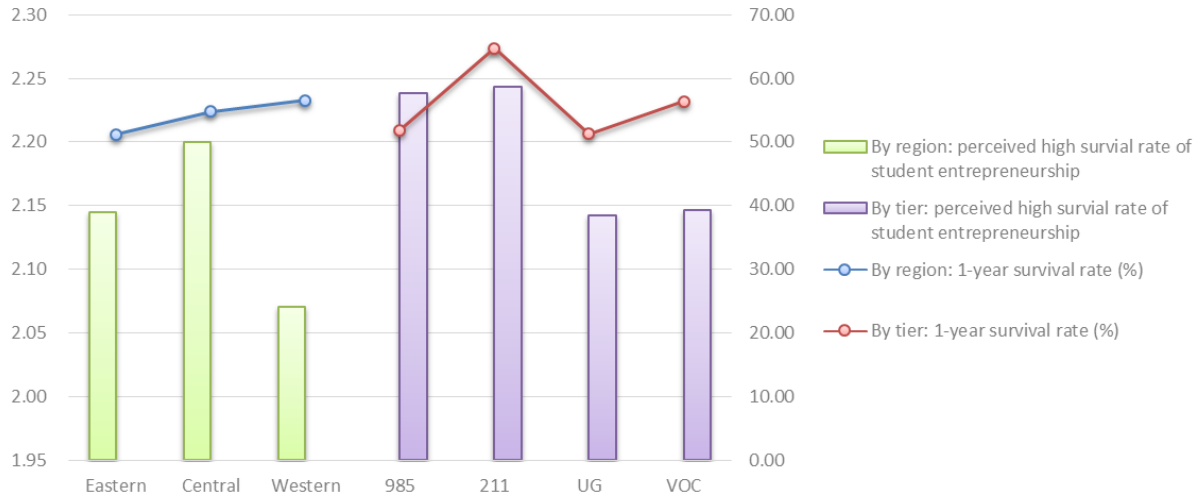


As viewed by the regions and institutional tiers, the difference in terms of percentage of opportunity entrepreneurship is not significant, but it is significant among tiers of institutions. The proportions of opportunity entrepreneurship for the 985 universities and 211 universities are higher, at 87.89% and 86.65%, respectively, while that of general undergraduate colleges and universities is 75.66%, and that of higher vocational colleges is 67.53%. In terms of the perceived reason for entrepreneurship, more graduates in higher institutions in western China and those in vocational colleges may count employment difficulties as one of the reasons for entrepreneurship, while none of the directors of career services in 985 and 211 universities consider

employment difficulty as a potential reason for their students' entrepreneurial decisions.

One of the most significant characteristics of the present situation of Chinese college student entrepreneurship is the low survival rate (20-21%), which is reflected in the current survey data. In the 2013-2014 academic year (one year prior to our survey), the survival rate of graduate entrepreneurship was 53.62%. If compared with findings regarding general entrepreneurial activities, the survival rate of college graduate entrepreneurship was relatively low.

Figure 4. Survival of Entrepreneurship by Region and Institutional Tier



No significant difference exists in the enterprise survival rate among regions, of which the rates were lower in the eastern (51.17%) region. The one-year survival rate of entrepreneurship enterprises for graduates from the 211 colleges was 64.75%, which was significantly higher than those of the other colleges and universities. However, in terms of the perceptions of the self-employment enterprise survival rate from the directors of career services, the entrepreneurship rates in the western region and general undergraduate and higher vocational colleges are even lower. There are some discrepancies of disaggregated patterns in one-year survival rate and in perceived high survival rate, which is due to the possibility that directors' degree of agreement of high survival rate may be based on their perceptions of the survival rate over a longer period.

The practices of colleges and universities to promote graduate entrepreneurship mainly include the following four aspects. First, entrepreneurship coaching courses and training programs have been set up to cultivate the self-employment awareness of college students and improve entrepreneurial skills. Second, venture funds have

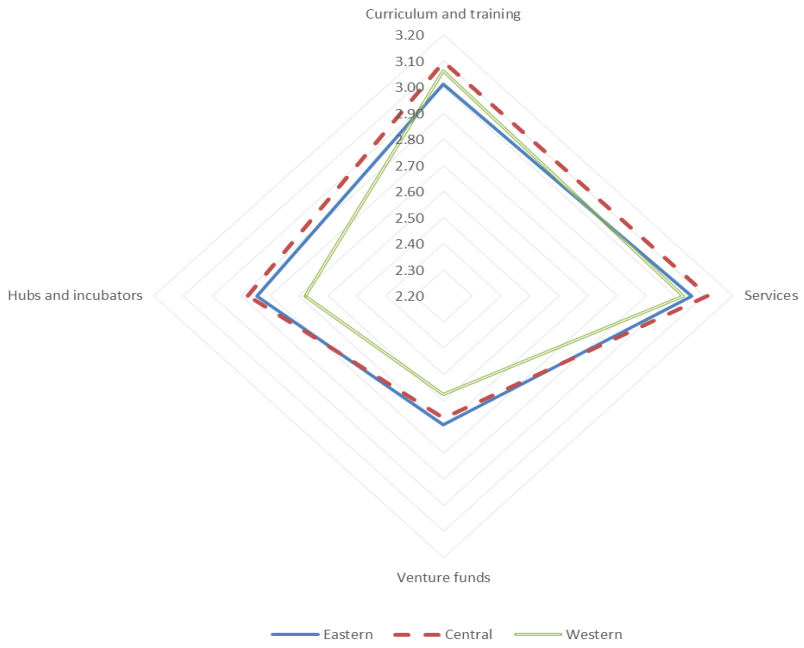
been provided to alleviate the pressure of acquiring venture capital. Third, business incubation parks and entrepreneurial bases have been established. Fourth, convenient conditions have been created for college student entrepreneurship, to provide consultations or solutions for entrepreneurship policies, give preferential policies to keep roll and credit for self-employed college students, and hold entrepreneurship contests. The questionnaire hopes that the directors of career services will make subjective evaluations on campus practices from four dimensions, i.e. for the institutional emphasis, actual resource support, student attention, and the directors' satisfaction. The evaluation is designed in the form of a Likert four-class scale. The higher the score, the better the work practice will be. For each aspect of practices, we construct a single measure by averaging the scores of its four dimensions.

As displayed in Table 2, the mean scores of the entrepreneurial curriculum and training (3.04) and entrepreneurship service work (3.07) are higher, while those of venture funds (2.66), and entrepreneurship hubs and incubator bases (2.82) are lower. In terms of some objective measures for the four aspects of institutional practices in promoting college graduate entrepreneurship, on average there are, 2.1 entrepreneurship courses, 3.27 entrepreneurial services are provided per college/university, 7.97 projects incubated, and each entrepreneurial project is funded with about 31.4 thousand Yuan RMB (equivalent to $5,000 USD). According to the perceptions of directors of career services, most (78.5%) agree funding shortages are the obstacles for college student entrepreneurship. This confirms previous findings that, currently, funding shortages are the most common problems for college students in China's various regions to find self-employment (Chu & Chang, 2008; Zhang, Kang, & Ding, 2010)

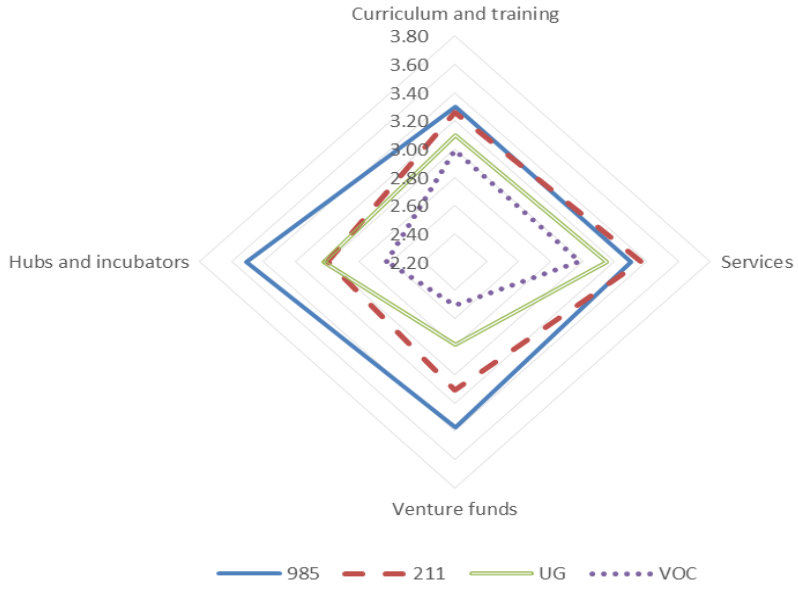
If comparing the institutional practices that encourage college student entrepreneurship among regions, the practices of institutions in eastern regions are, in general, superior to those in central and western regions. Practices in western regions lag behind, particularly in terms of venture funds and hubs and incubators (Figure 5, Panel A). The comparisons, by institutional tier, display a pattern that is significantly in favor of the 985 universities and is against vocational colleges (Figure 5, Panel B), particularly in venture funds and hubs and incubators.

Figure 5. Perceived Quality of Institutional Practices to Promote Entrepreneurship

Panel A | Perceived Quality of Institutional Practices, by Region



Panel B | Perceived Quality of Institutional Practices, by Institutional Tier



Conclusion and Discussion

Based on data from the institutional survey of directors of career services at 881 Chinese colleges and universities, conducted under the project of "Policies promoting the employment of college graduates in China" performed by the Graduate School of Education's Institute of Economics of Education at Peking University, this study analyzes the current entrepreneurship status of graduates from China's colleges and

universities, and the practices of colleges and universities to promote student entrepreneurship.

The main findings achieved are as follows.

1. Although China's college graduates have a high level of entrepreneurial interest, the entrepreneurial intention and actual entrepreneurship population is low, and the entrepreneurship survival rate is not high.

2. The opportunity entrepreneurship and necessity entrepreneurship of college graduates account for 72% and 28% of the total, respectively. The proportions of opportunity entrepreneurship from the 985 universities and 211 universities are higher, as are those of necessity entrepreneurship from general universities and higher vocational colleges.

3. For institutional practices that promote entrepreneurship of college graduates, the 985 and 211 universities provide relatively wider and deeper support, particularly in terms of college student entrepreneurs' access to financial resource and incubation infrastructure. Vocational colleges and institutions in western China are at a disadvantage in these aspects.

To help promote entrepreneurship for college students, this study offers the following opinions and suggestions:

Firstly, ad hoc promotion of immediate entrepreneurship after graduation without sufficient support should be cautious. Instead, the cultivation of innovation spirit at colleges should be encouraged. Our study shows that, although present Chinese college students are more and more interested in entrepreneurial activities, the percentages of those who have serious entrepreneurial intentions and who take actual entrepreneurship, as well as the survival rate of college graduate entrepreneurship, are still low. On the one hand, it reveals the potential opportunity for government and higher education institutions to encourage college students to pursue entrepreneurship. On the other hand, it implies the lack of entrepreneurial support and lack of innovation spirit could be among the reasons for the low rate of successful entrepreneurship of college graduates in China. The comparative advantage of higher education institutions lies in cultivating students' spirit of innovation and helping them achieve through appropriate channels, including entrepreneurship. The on-campus guidance and support of college student entrepreneurial activities,

particularly those who could be beneficial to students' future entrepreneurial success, can be strengthened.

Secondly, opportunity entrepreneurship should be encouraged, and attention should be given to necessity entrepreneurship. The encouragement of opportunity entrepreneurship can bring more jobs so as to fuel economic growth. At present, opportunity entrepreneurship is the main type of college student entrepreneurship, however, about one-third of college students' entrepreneurship is necessity entrepreneurship, especially for students in the western region and higher vocational colleges. Therefore, graduates who become self-employed due to necessity should focus on finding better employment opportunities, and these students should be provided with employment support from higher education institutions.

Third, governmental support for college graduate entrepreneurship should be based on actual needs to avoid flashy "face projects". Different types of college graduates have different entrepreneurship statuses and various characteristics of campus practices, thus leading to different development. For example, the western region and general colleges and universities rarely receive funding support, while the eastern region and 985 colleges and universities have strong abilities to absorb market funds to encourage student entrepreneurship. In terms of relevant practices in colleges and universities, entrepreneurship coach training and service works have been carried out successfully. But college students have more urgent demands for funding support and startup hub hardware construction. Therefore, institutional practices should follow differentiated rather than a unitary model to promote student entrepreneurship, and pure imitation of the "flagship" model only "looks good", but would be detrimental to student entrepreneurship in the long run. The government could encourage some top tier colleges and universities to improve the function of startup hubs and incubation bases, and to promote startup hubs to provide help and support for college student entrepreneurial projects. At the same time, the government can help college students in the western region reduce financial lending barriers, broaden the channels of funding sources, and absorb market and social idle funds to participate in startup hubs and incubators.

In sum, this study contributes to the current literature by promoting the overall understanding of the current status of college student entrepreneurship in China. It is unique because: 1) our measures of college student entrepreneurship involve all stages of entrepreneurial activities; 2) we combine objective and subjective measures of college student entrepreneurship to provide mutually consistent patterns of college student entrepreneurship in China; and 3) our sample is nationally representative and our inference is generalizable.

Our study has some limitations as well. Our study is a descriptive one, in which we delineate the pattern of college student entrepreneurship in China, but do not examine empirically on what the reasons are for lower entrepreneurship among college students and why it differs across regions and institutional tiers. We admit that many factors determining college student entrepreneurship, such as individual student characteristics and exposure to entrepreneur/business education at secondary level, cannot be examined due to a lack of data. Further studies can control for the above-mentioned factors and examine how governmental policies and institutional practices can affect college student innovation spirit and entrepreneurship.

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A Comparative Study of Pre-service Education for Preschool Teachers in China and the United States

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This study provides a comparative analysis of the pre-service education system for preschool educators in China and the United States. Based on collected data and materials (literature, policy documents, and statistical data), we compare two areas of pre-service training: (1) the formal system; (2) the informal system. In the formal system, most of the Chinese preschool teachers are trained in secondary education school but and the system is shifting towards higher reliance on associate degree programs in higher education, whereas the majority of American preschool teachers receive pre-service education in bachelor's degree and associate degree programs. US has relied more on the formal system to cultivate preschool teachers, while China has to rely on some informal pre-service training to candidates without early childhood background, especially for places with preschool teacher shortages. Trends for possible reforms in the two countries and lessons for elevating preschool teacher preparation are discussed.

Introduction

Early childhood education (ECE) has garnered more attention in the past few decades. To ensure children receive real benefits of early childhood education, the need for improving the quality of preschool teachers becomes a central policy topic in both the US and China. The US has a longer history of formal early childhood education than China; the first US preschool (at that time, called "kindergarten") opened in 1856 in Wisconsin, whereas China's first preschool opened in 1903, in Hubei province. Although US scholars see the need to improve the quality of the American ECE teacher education system (Kagan, Kaurez, & Tarrant, 2008; Whitebook & Austin, 2015), China can still learn from their best practices and lessons learned. By comparing the two countries, the purpose of the present study is to give practitioners and researchers context into the conditions that had

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undermined the quality of China's preschool teacher education and also provide experience from China's recent reforms.

A number of studies have compared preschool education practices in China and the US (Che, Hayashi, & Tobin, 2007), and compared teacher preparation and qualification (Ingersoll, 2007). The present study will be the first English study to compare the two systems for early childhood education with a focus on teacher preparation. It is important to know the differences in teacher preparation system in order to understand the differences in the two countries' pedagogical methods for young children. Some researchers have discovered that preschool education in China and the US have differences in teaching methods or concepts and cultivates different types of students (Tobin et al., 1991). Generally speaking, teachers in the US emphasize student autonomy while Chinese teachers pay more attention to skill development (Wang, Elicker, McMullen, & Mao, 2006). We show how differences in preschool pedagogy is accounted for by systemic differences in preschool teacher preparation. What distinguishes teacher preparation in China from the US? What can the two countries learn from their experiences in teacher education?

This study aims to provide a comprehensive overview of the contemporary pre-service teacher education system for preschool teachers in China, and how it differs or relates to the system in the United States. For the purpose of this study, pre-service teacher education is defined as any type of teacher education or training that happens before a person works as a preschool teacher. It can be also defined as teacher preparation or professional development activities before becoming a preschool teacher. In Gomez et al. (2015), pre-service training refers to the range of activities in which individuals engage prior to entering the workforce. As such, training and education are used interchangeably in this study.

Before we proceed, it is necessary to briefly introduce the backgrounds and terminologies of early childhood education in the two countries. In the United States, early childhood education is the widest concept that covers ages zero to eight, with a marked differentiation between preschool education (for three and four year olds) and kindergarten education (grade K in the K-12 education system). For China and many East Asian countries, however, the first year of school is grade one rather than grade K, with preschools serving children aged three to six (i.e., age three, four and five). Chinese scholars often use "kindergarten" to refer to the preschool education institutions serving this population when translating their work into the English language, which is the same as the term "kindergarten" in the American context. In this analysis, comparisons will be

restricted to only include children between the ages of three to six years. We observe that both countries are relying heavily on the private market for the provision of early childhood education for three and four-year olds, however, the US has performed better in publicizing its education for five year old children.

The next section briefly introduces prior studies, followed by a research method section. Section Four gives an overall description of the pre-service teacher education systems in the two countries. Section Five analyzes the similarities and differences in the formal part of the two pre-service teacher education systems. Section Six compares the informal part. The final section summarizes the findings and the reflections.

Literature Review

Although many studies have discussed the development of early childhood education in China or in the US, comparison of their distinct traditions in preschool teacher preparation is relatively scarce. After careful searching, we found that existing studies are mainly focused on primary school teacher preparation, especially in China. There are not many studies involving comparisons of preschool teachers in the US and China, with limited numbers (e.g., Jiang, Yan, & Xu, 2012; Wang, 2014; Zhao, 1996). Moreover, most of these comparisons have been published in Chinese instead of communicating effective suggestions for a broader base of researchers.

This literature review provides useful information for our study. In the US, preschool teachers have mainly graduated from comprehensive universities; many training institutions hosted by early childhood education association and private organizations also take the responsibility of teacher preparation (Zhao, 1996; Wang, 2008). In China, preschool teacher preparation has traditionally taken place in normal universities or teacher colleges (Jiang et al., 2012). Some researchers have compared different program objectives and find they are quite different in the US (e.g., Indiana State University) as compared to in China (e.g. East China Normal University); the objectives are more professional oriented and structured in the US, as compared to China's more ad hoc approach (Wang, 2014).

The main contribution of this study is a comprehensive review of the institutional preparation of preschool teacher between the two countries in the two main aspects of the formal and informal system for the first time for comparative education researchers. A policy relevant contribution is to provide policy recommendations for the US in aspects that were previously rarely discussed, such as the unity of certification processes across states, and the use of one certifying institution governed by the department of education.

Methodology

This study is a comparative study that compares both the formal and informal systems of preschool teacher preparation in the US and China. For the comparison in the formal system, several sub-national cases are selected for each country. For the comparison in the informal system, comparison takes place at the national level. A combination of four research methods is used for the comparison, including literature research, historical research, comparative research, and case study.

Literature and historical research. We searched relevant literature using several keyword variations, including preschool teacher preparation, preschool teacher education, preparation of ECE, teachers in the US and China, using both English and Chinese sources. To depict the backgrounds of preschool education in each country, we also searched for studies related to the process of preschool education development.

Comparative analysis. According to Beredy's (1964) framework for comparative research, there are four stages to a comparative analysis: during the first stage, we described the two systems based on relevant information and statistical data from websites, yearbooks, official reports. In the second stage, we organized the literature and contextualized the research in historical, political, social and economic perspective. At the third stage, we juxtapose the information and arrived at our terms for comparison. We defined preschool teacher in each country, preschool teacher preparation in the formal education system and preparation in informal education sector. In the final stage, we summarize the similarities and differences between the two systems, and make recommendations for each country.

Case study analysis. For the part on the US, three states were sampled to reflect diversity in geographical location and education development in the country. The three states are: New York, California, and Nebraska. For the comparison of the elements for degree programs, we select at least two institutes in each state: one offering associate degrees (AA), one offering bachelor's degree (BA). For example, Hudson Valley Community College and SUNY Fredonia were selected for New York. In China, we studied eight teacher preparation institutions at four levels (upper secondary, associate degree [AA], bachelor's, master's) across three geographical locations (East, Central and West). At the upper secondary level, we selected Baiyun Xingzhi Senior Vocational School and Zhangzhou City Vocational College; at the AA level, we select Shaanxi Xueqian Normal University, Shenyang Normal University, Southwestern University, Henan Institute of Science and Technology, Central China Normal University and East China Normal University as samples. We obtain detailed information about these schools from two sources: (1) policy documents and school plans available through each institutions'

websites, phone interviews, and school administrators, along with interviews with program directors at the Henan Institute of Science and Technology; and (2) information based on the published Chinese journal articles that described the course structure and school plans if the school had already been studied, such as Zhangzhou City Vocational College and Shenyang Normal University .

We use several sources in our data collection, including prior studies, policy documents, and statistical yearbooks. The analytical method includes statistical analysis, comparison, induction and deduction methods. The analytical framework for this study is divided into two parts. As mentioned earlier, we compared the teacher preparation system between the two countries by its formal and informal systems. We discuss the percentages of teachers in each system, educational background of the teaching workforce, the use of online early childhood education programs, in teacher certification, selected standards in early childhood programs, and courses and practicum by degree level. Regarding the informal system, we defined the concept of teacher preparation in the informal system, and outlined the share in each country.

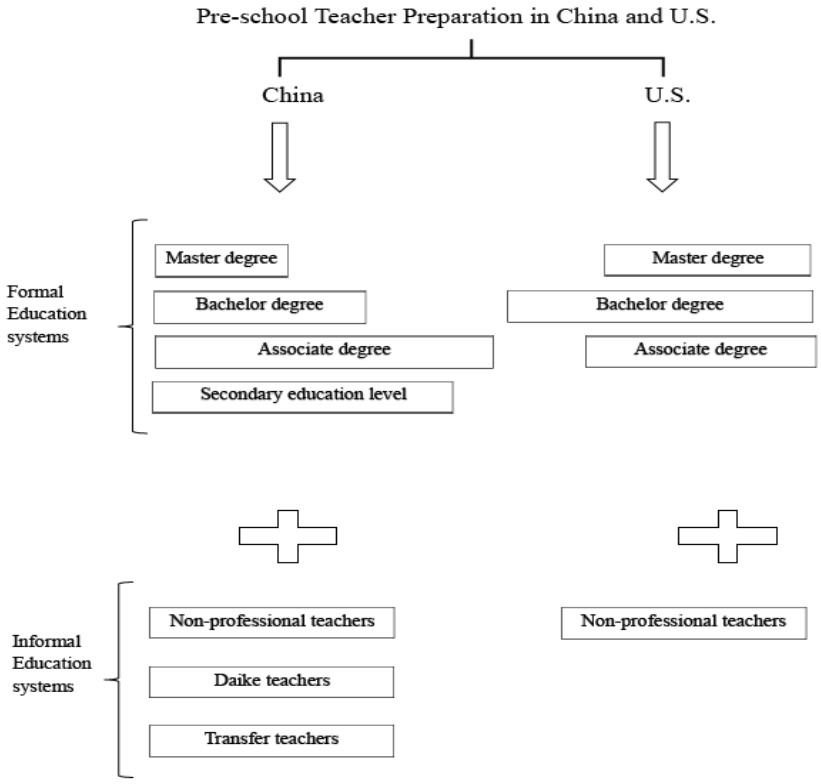
Overall Description of the Two Systems

In both the US and China, a system for pre-service teacher education exists according to career pathways. A person who goes to the preschool teaching workforce can either: (1) have no training or education in early childhood education; (2) have some informal training, but not a certificate, a permit or a credential; (3) have a certificate or a permit but not having a formal degree in early childhood education (including those with a degree in other irrelevant majors); (4) have a degree in early childhood education or a relevant major.

Structure of formal teacher preparation institutes. In the United States (see Figure 1), the formal system contains various degree programs (associate degree, bachelor's degree and above) in the higher education stage. Some early childhood education programs can certify teachers, but not all do. Those who enter the workforce with a Child Development Associate (CDA), state license or other permits but without a college degree can be viewed as partially in the formal system. The National Association for the Education of Young Children (NAEYC) and local school bureaus may also certify teachers. Moreover, those who get limited training or no training related to early childhood education could be defined in the informal teacher preparation system. Sometimes, a teacher may go through both a degree program and certification process. In China, the formal system also includes four degree programs in the higher education stage, which refers to associate degree,

bachelor's degree and above. All graduates regardless of their major should take the teacher certification exam hosted by the Ministry of Education.

Figure 1. The Formal and Informal Education Systems in China and the US



Note: Drafted according to information on formal education system and informal education system in the two countries; Length of text box for degree education indicates the share of that education level among all preschool teachers in each country.

Preschool teachers from the informal system. The percentage of preschool and kindergarten teachers with only informal pre-service education is about 25% in the US, whereas such percentage is about 40% in China. For the US, 25% is an estimate based on data in 2010 from the ECLS-B dataset for center-based care and education settings, considering the all kindergarten teachers in the US with a bachelor's degree and higher.[1] For China, according to statistics in 2012, 53.3% of the lead teachers have early childhood education background.[2] This figure does not include part-time teachers and *daike* teachers. Notably, *daike* teacher is a concept with Chinese characteristics, referring to teachers

[1] In the US, kindergarten teachers face the same options for specialization as any elementary school teacher. They can receive additional training to teach music, art, or physical education. They can also choose to earn a master's degree in special education to increase salary potential.

[2] http://www.moe.gov.cn/publicfiles/business/htmlfiles/moe/s8493/201412/181623.html

without a headcount in the public system (and thus informal), often not specialized trained. Figure 1 incorporates such information, along with the above description of the formal system.

Table 1. Distribution of Education Levels of China's Preschool Teachers, circa 2015

Graduates	M.A.	BA	AA	HS	Below HS
All China	5225	377392	1117219	529036	51445
Preschool leaders	2405	62786	127293	40048	3637
Full-time teachers	2820	314606	989926	488988	47808
(%)	(0.15%)	(17.06%)	(53.68%)	(26.52%)	(2.59%)
Urban Area	4243	220828	544294	195493	12679
Preschool leaders	1977	32731	47490	10192	774
Full-time teachers	2266	188097	496804	185301	11905
Rural-urban fringe zones	269	20639	85751	44847	3459
Preschool leaders	148	4370	9181	2547	190
Full-time teachers	121	16269	76570	42300	3269
County and Town Area	767	119869	399065	200470	20261
Preschool leaders	340	20109	45774	14073	1113
Full-time teachers	427	99760	353291	186397	19148
Rural Area	215	36695	173860	133073	18505
Preschool leaders	88	9946	34029	15783	1750
Full-time teachers	127	26749	139831	117290	16755

Source: Education Statistics from MOE China's website, based on authors' calculations

Educational backgrounds of the teaching workforce. Consistent with the pre-service preparation systems, existing educational backgrounds of the teaching workforce in the two countries also differ substantially. Common to the two countries, educational backgrounds vary widely among the early childhood workforce, from bachelor's degrees or higher to only limited formal schooling. However, the distributions are different. According to the Early Childhood Workforce Index 2016 report on the teaching staff in center based preschool settings of the United States (for year 2015), only 19% didn't have any college education, which means 81% have at least some college (Whitebook, Mclean, & Austin, 2016).[3] In another study, it was estimated that 28% to 73% of the preschool teachers having at least a bachelor's degree (Maroto & Brandon, 2012). All kindergarten teachers have a BA, as it is a minimum requirement. Those working with infants and

[3] Source: Number and Characteristics of Early Care and Education (ECE) Teachers and Caregivers: Initial Findings from the National Survey of Early Care and Education (NSECE) from the National Survey of Early Care and Education. Data were collected in the first half of 2012, include all instructional staff and do not differentiate by roles, for example, lead teacher, teacher, assistant teacher or aide.

toddlers have lower educational attainment. This percentage is higher than the number reported in 2015 by the Ministry of Education in China and is shown in Table 1, about half of the preschool teachers are associate degree (AA) graduates. Compared to earlier years, the number of BA graduates has increased and the number of high school graduates and lesser has decreased. In 2000, the majority of the teachers only had a high school education, and this situation changed in 2007 when 46% of the teachers earned an AA degree (Yuan, 2010). The levels for Chinese preschool teachers vary more widely than their American counterparts.

Comparing the Formal Pre-service Education Systems

Structure of the formal teacher preparation system in the United States. Having once relied on vocational high schools to train its teachers, pre-service training in the US now goes through colleges, and organizations that offer the Child Development Associate (CDA) and National Board for Professional Teaching Standards (NBPTS) credentials for training ECE teachers (Gomez, Kagan & Fox, 2015). Gomez et al. (2015) described it as a market-driven, mixed-delivery sector. There are more than 1000 teacher-training institutions (NPC, 2006; Whitebook & Austin, 2015). The teacher preparation system is tiered consisting mainly of BA programs alongside some AA and master's degree (MA) programs. The AA programs are offered by community colleges, whereas BA and MA's in related fields (e.g., human development, family studies, child development) are granted by four-year comprehensive universities or colleges offering BA and M.A. programs (NPC, 2006). In comparison, teachers colleges are much fewer. Bank Street College is famous for cultivating early childhood educators. Community colleges often provide one to two year programs and have students transfer to a four-year college to finish a bachelor's degree. Graduates can work at early childhood education centers with a certificate. Standards are important in the United States. National Association for the Education of Young Children (NAEYC) published its new guidelines for ECE professional preparation and stated learning objectives for each degree level (NAEYC, 2009).

We selected three states (New York, California and Nebraska) to illustrate the landscape for early childhood education degree programs in the regions of mid-Atlantic, Midwest, and West Coast. The Early Childhood Higher Education Report described the US landscape for degree programs in early childhood education in seven states (Whitebook & Austin, 2015). In New York, for the years of 2014-15, there were twenty-seven public community colleges, thirty-nine private and twenty-six public colleges offering an ECE major. Among them, there are about forty-four associate degree programs, fifty-eight bachelor's degree programs, 136 master's degree programs, and four doctoral degree programs. In California, there are 103 public community colleges, twenty-two private and

twenty public colleges offering the Early Childhood Degree. In the public community colleges, for the 2013-14 academic year, there are about 190 associate degree programs. 60% of these colleges offered two or more degree programs, and 20% provided three to five programs. In the private and public four-year colleges, there are fifty bachelor's degree programs, twenty-nine master's degree programs, and one doctoral degree program. In the 2014-15 academic year, three of Nebraska's eight public community colleges offered more than one associate degree program, and six of the twelve public and private colleges and universities offered more than one bachelor's degree. Notably, bachelor's degree programs also offered various endorsements.

States vary in the relative portion of programs in each degree level (California has more AA programs as compared to BA programs), but for the whole country, we can still conclude that the BA programs are the backbone. It is also interesting to relate the structure of these degree programs with the state economic and education development levels, as well as the qualification or standards for qualification that the state has set for the early childhood teaching workforce. According to the Early Childhood Workforce Index 2016 (pp. 63-64) and the National Institute for Early Education Research (NIEER) state of yearbook 2016, New York has been evaluated as "edging forward" when it set a BA threshold for all pre-K teachers, whereas California has not. This is consistent with the fact that NY has more M.A. and BA programs than California (the latter has more AA programs).

Scholars in China have observed that there are no teacher training institutions at the secondary education level in the United States at this time (Zhao, 1996; Wang, 2008). In the 1940s, many teacher schools in the US were closed; and public teacher schools were upgraded to teacher colleges or merged into universities (Wang, 2009). Compared to the US system, which consistently relies on AA, BA programs to meet its need for well-trained preschool teachers, China recently experienced a shift in the structure of its teacher preparation. Twenty years ago, high schools were the main institutions for training preschool teachers; teacher colleges or universities trained teacher educators to teach at these schools. For a long time, the qualification for preschool teachers in China was a high school graduation. Since the 1990s, however, AA and BA programs at the post-secondary education level have gradually increased their share. Some MA graduates also work as a preschool teacher (Guo, 2013; Liu & Wu, 2014). According to the most recent data from the Network of Science & Education Evaluation in China (2015), 266 colleges or universities have established a "preschool education" programs.[4] Some of the colleges or

[4] Source: http://www.nseac.com/html/261/676355.html

universities are teacher colleges or universities, i.e., normal colleges or universities according to China's English translation; some are specialized preschool (i.e., *xueqian*) colleges.

Online early childhood education programs. With the rise of Mass Open Online Courses came the online early childhood education programs.[5] Ashworth College of Nebraska provides online early childhood programs for candidates who want to work in a preschool program, after-school program or day care centers or special education classes and so forth. Graduation from this program allows potential teachers to apply 120 hours of professional development towards their requirements for a CDA credential.[6] This model helps accommodate teachers' part-time study. In addition, Hudson Valley Community College in New York has part of their courses available online. In contrast, there are no online pre-service programs for preschool teachers in China, however, most in-service training are offered through online education services for Chinese preschool teachers.

Qualifications. In the United States although entry requirements differ across states, the minimum requirement is at least having a CDA, and in many cases, it is a bachelor's degree. The map of standards is upgrading over the years.[7] Head Start mandated that more than half of all Head Start center-based preschool teachers had a BA or higher in Early Childhood Education, or in a related field with experience by 2013. For state pre-Kindergarten programs, according to the national Institute for Early Education Research (NIEER) 2014-2015 State of Preschool Yearbook, more than half of the states have adopted the BA as a threshold for a lead teacher, and some specifically required a BA in ECE. However, some states only implemented a BA threshold for teachers in public-school settings and require an associate degree (AA) or CDA credential for teachers in private school settings. The state of Rhode Island extended the BA requirement to all teachers. Many states have their own state license. Certification is called Birth-Grade 2 in New York, and Nebraska offers a Birth-through-age-eight certification.[8]

The teacher preparation system in China has changed substantially since the 2015 reform in teacher certification. Before the reform, early childhood education graduates from normal universities (i.e., universities that originally prepared teachers) and teacher schools could become certified by submitting materials, with exemption from the

[5] Source: http://www.early-childhood-education-degrees.com/top-online-early-childhood-education-degree-programs/

[6] Source: https://www.ashworthcollege.edu/bachelors-degrees/early-childhood-education-degree-online/

[7] Two states require that teachers complete a vocational childcare program (LeMoine & Azer 2006).

[8] This certification is required only for teachers working in public pre-kindergarten to third grade classrooms.

qualification test. Only non-ECE major students or candidates from other occupations had to take the test. In 2015, after the pilot use of the new policy in some provinces (e.g., Hubei, Zhejiang, and Guangxi), all college graduates in China, irrespective of his or her major, have to take the test. Along with tests for elementary school teachers, and middle school teachers, the test for preschool teachers is organized once a year, with three components: comprehensive competence, care and education skills, and interview. The certificate must be renewed with review every five years, following what similar procedures in the US. The aim of the reform is to encourage teacher education colleges and universities to improve the quality of teacher preparation quality, and to attract more individuals to join the early childhood teaching workforce.

Overall, as is also shown in Figure 1, China has just experienced the substitution of "schools and colleges," and approaching its AA threshold, whereas the US is experiencing the substitution of "AA and BA" in some states, and approaching a BA threshold. Although the Chinese government is upgrading teacher qualification requirements along with actual educational and training level, the preschool teaching workforce upgrading needs more time given the cyclical nature of teacher preparation.

***Arrangements in the teacher preparation institutions*.** At each level of the two countries' teacher preparation institutions, we compare candidate selection criteria, lent cultivating goals, credits and courses, and practicum, as shown in Table 2. The detailed data for the earlier mentioned eight institutions sampled from west, middle and east China are listed in Table A1 of the Appendix.

At the BA level in higher education, a major similarity of the programs in the two countries lies in length and basic course structure, as well as graduate placements. Four-year length is the standard. Course structure includes core courses and electives, in addition to a practicum in an actual preschool. The differences lie mainly in the criteria for student admissions and goals of the program, and practicum. The US's BA programs for preschools teachers are often hosted in liberal arts colleges and universities, whereas Chinese BA programs often reside in normal universities or specialized preschool (xueqian) normal universities.

Same as the system in higher education, selection for the US ECE bachelor's degree programs is two-fold: high school graduates apply into the program and college or university of his or her interest, and the college or university decides whether to accept them, based on multiple standards (high school GPA, ACT/SAT scores, personal statements, interviews, and so forth). Students' personal interest in early childhood

education is also considered for enrollment. For many schools, entry GPA requirement is a minimum average of B-. For example, the early childhood program in Indiana University asks for an average high school GPA over 2.5, and the applicants should finish courses like oral expression, writing, science, and child development. In China's normal universities, students are selected only by individual test scores on the national college entrance exam. For instance, the early childhood program in Central China Normal University has an entry score of about 552 (total score 750); no other standards are applied.

Table 2. Comparison of the BA and AA Programs in China and US

	China		US	
	BA	**AA**	**BA**	**AA**
Study years	Four years	Three years or five years	Four years	Two years
Selection Standards	The college entrance exam	Lower than BA	NAEYC's standards	Lower than BA
Teaching courses	Focus on theory courses, moral education and political belief course	More of skill courses	More of general education courses	Broad understanding of the psychological, emotional, intellectual and developmental needs of children
Practicum	Usually 108 hours to eight weeks to a semester	Almost a semester	The share is high	The share is less
Placements after graduation	Preschool teachers or administrators	Preschool teachers and assistant teachers	Assistant teachers, caregivers educators, administrators and researchers	Day care and nursery school teachers, teaching assistants and so on

Note. Content in this table was summarized by the authors according to website program information and the existing studies mentioned in the paper

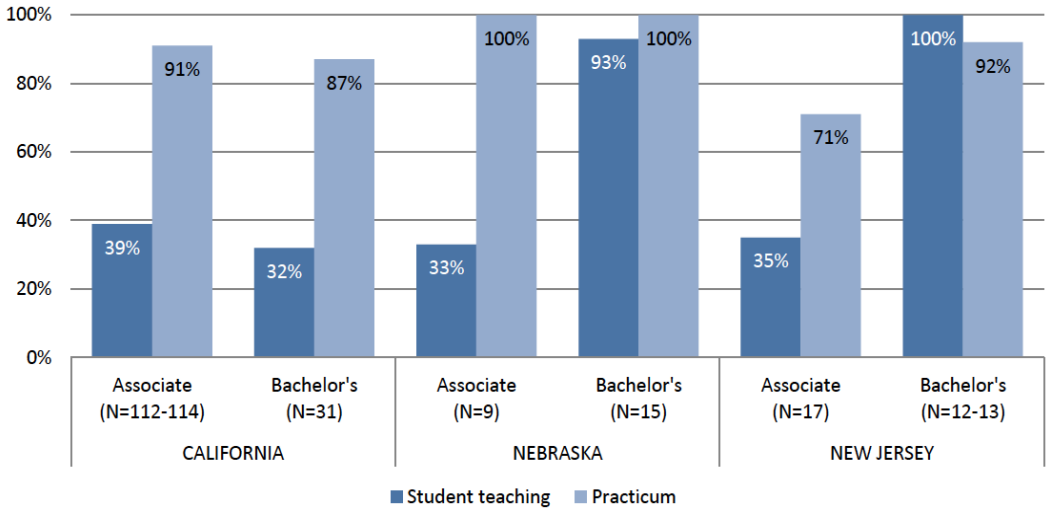
Goals for teachers stated differently for each country's BA programs. BA programs in the US often rely on the NAEYC's standards for professionals (NAEYC, 2009) as a performance reference, emphasizing multiple roles of an early childhood education professional (assistant teachers, caregivers, educators, administrators and researchers). In Nebraska, a recent job title description for Wayne State College's graduates lists the following job titles they can assume: "preschool teacher or director, daycare provider or director, after school program director, camp director, child development specialist, family service worker, and pediatric specialist." Conversely, BA graduates from Chinese colleges or universities (e.g., East China Normal University, Central China Normal

University, Shaanxi Xueqian Normal College) often work as teachers or administrators in kindergartens (preschools) and nursery schools.

There is no unified course standard in for BA programs of different universities. In SUNY Fredonia, the curriculum for the Bachelor of Science in Education (BSEd) degree involves courses, for the major, fulfillment of the College's Core Curriculum, and electives. At Wayne State College in Nebraska, students can choose to take "Principles of Food Preparation" or "Principles of Baking". At the California State University of Sacramento, the early childhood education program consists of the core child development courses and fourteen to fifteen units of electives, choosing from developmental theory, systematic observation and assessment, and preschool curriculum development. In China, like in the US, both general education in the liberal arts and sciences and early childhood education core courses are required; both academics and teaching skills are viewed as important. However, the share of general education courses (often one-third) is higher in the US BA programs, with more diverse content. In China, moral education and politics course takes up a significant portion. In the core course component, apart from early childhood pedagogy, child development and other related courses, China lacks courses like 0-3 [year-old] education and community education. Singing, dancing, and piano skills courses are overemphasized in China, whereas the US programs focus more on artistic appreciation. A recent innovation in China is to add mental health education course in the training program (pilot programs are ongoing at Beijing Normal University).

A practicum is part of most preschool teacher training programs. Two dimensions of the professional assessment system in the US include field observations to become acquainted with a preschool setting and a teaching practicum that is designed to give students supervised practical application of specialized methodologies, both of which must be evaluated by a cooperating teacher in that grade level or subject area, and a university supervisor (see The New York City Department of Education Student Teacher Handbook). Placement must be State Board of Education approved college/university education program, which must have a contract with the partnering school district. Practicum leads directly to teacher certification after 150 hours (New York State Education Department Office of Teacher Initiatives). In China, the concept of practicum in most of normal universities is similar to the US, but field experiences are often regarded as apprentice teaching.

Figure 2. Requirements of Field-based Experience by Degree Program



Source: Replicated from Figure 2 in Whitebook and Austin (2015).

In many US BA programs, practicum in the real teaching environment is required or encouraged with opportunities offered (Whitebook & Austin, 2015; Putman et al., 2016). For example, as shown in Figure 2, 87% of the BA programs in California offer student teaching experience and the share is 100% in Nebraska. Compared to practicum, student teaching is less required.[9] In Nebraska, which confers an early childhood certification at the bachelor's degree level, almost all baccalaureate programs required students to complete both a student teaching experience and at least one practicum. Field-based experience often starts in the second semester, including observation, research, reflections, and teaching practices in the third year and fourth years. At the University of Nebraska, which requires credit hours for observed learning, training in the lab and research practice account for 876 hours (about twenty-one weeks), which are conducted before student teaching practicum (about 600 hours). Among them, 324 hours are for interaction with zero to two-year olds; 198 hours are for interactions with two to five year olds. This is above the average for US BA programs in early childhood education (ECE), with practicum making up at least one-third of coursework. Wayne State College also has a separate preschool lab for three, four and five year olds. In China, practicum are regular components of a BA programs, but right now, the share of program time is not high. The length ranges from 108 hours to eight weeks (about two months), to a full semester (about four months).

[9] Student teaching is required for students who are not yet certified to teach. This is different from a practicum. The latter required when a student already holds certification to teach, yet wants a certificate extension to teach another area of specialization. They are both college-supervised field-based experiences.

At the associate level, both the US and China's early childhood programs emphasize more on student teaching skills than general education, but China can learn more from the long history of associate degree programs in the US. One example is Hudson Valley Community College's Early Childhood program, which is accredited by NAEYC. The program states that applicants should be aware that "early childhood education requires enthusiastic performance and sensitivity toward the diverse needs of children." The goal is to "prepare graduates for work in an early childhood education setting or for transfer to a four-year program." As an associate degree program, it requires a broad understanding of the psychological, emotional, intellectual and developmental needs of children. Job placements for graduates include: day care and nursery school teachers, who interact with young children and manage the staff and resources of childcare facilities; teaching assistants and substitute teachers in public and private schools and preschools, who work as members of a childcare or educational team; staff employees in hospital pediatric wards or in developmental facilities that provide specialized child care. Hudson Valley Community College students' field experience takes place in a school or childcare agency each term in urban, rural and suburban settings with high risk and special needs children. A total of 300 hours of student teaching field experiences is the goal for Hudson Valley. In California, fewer programs at the associate degree level required student teaching, but most did require the completion of at least one practicum.

In China, AA graduates from specialized teachers colleges or vocational colleges with ECE programs often work as assistant teachers in kindergartens preschools and other early childhood institutions. AA programs like the preschool education program in Zhangzhou City Vocational College requires 960 hours of practice time (Hu, 2013). At the MA level, in China, MA programs in first-tier teachers college like Beijing Normal University and East China Normal University are more research- and leadership-focused. Graduates work as teachers in a college or university's preschool education program, kindergarten leaders, researchers, or teachers in the cities' best kindergartens, etc. For example, in East China Normal University's program booklet, the placements are described as "college teachers, magazine editors, kindergarten (preschool) administrators, and researchers…" This is similar to Bank Street College, Vanderbilt University and Teachers College, Columbia University's MA program in early childhood education programs, as well as the MA programs at California State University at Long Beach.

At the secondary education level, graduates from vocational and technical high schools in China can take administrative jobs and care or education jobs in nursery schools, kindergartens (preschools), early childhood education centers, and senior household

management industry (e.g., with job placement rates as high as 98% for Baiyun Xingzhi Vocational and Technical School in Guangzhou City) (see Tang, 2014).

Reflections. In the era of change and innovation, both countries' formal teacher education institutions need to update courses to reflect new knowledge about children's development and learning, and to develop multidisciplinary expertise for future preschool teachers. China's early childhood teacher preparation programs can increase opportunities for field-based learning experiences and provide better courses, especially when policy encourages this shift. One possible adjustment for China is to combine early childhood education and early childhood special education in the BA programs, as done so at New York University in the US. Another potential reform area for China's AA programs is to specify the technical standard for teacher preparation programs regarding what practical skills are desirable and to add online course options, modeling that of Hudson Valley Community College. Furthermore, each program should build their own strength from their specialty in teacher preparation, and not to use the same standards across associate, bachelor's and master's programs. Both countries should align programmatic missions with NAEYC's six core standards for early childhood teachers, including promoting child's learning and development, able to connect family and community, capable of observing and evaluating child development, and so forth. (see Table A2 in the Appendix).

Comparing the Informal Pre-service Education Systems

As stated earlier, informal education or informal teacher preparation is related to "non-specialized" study, for whom students have "no early childhood education background," and lack a certificate, or their jobs are part-time in informal settings. In this article, it refers to education activities outside of the formal education system. It includes teacher induction program, pre-service training, short-term training, online learning, teachers' curriculum seminar, and other types of informal or irregular education.

First, in both countries, there are still many preschool teachers whose background training is not in early childhood education. They joined the early childhood teaching workforce without specialized training in ECE. As pointed out by Tout, Zaslow and Berry (2006), many teachers only have lower levels of education combined with workshops held outside of educational settings. Yet as the standards go up, the US has done a better job in cultivating teachers in the formal system than in the informal system: it equips teachers with more professionalized knowledge and skills before entering the profession. Based on the ECLS-B dataset for 2010, 57.13% of the center-attending children's teachers reported having a degree majored in ECE or a related field; more than 75.5% of the BA

teachers (including those above BA) have a degree majored in ECE, but this college major may be associated with a prior associate degree. Also, among those teachers with some college or above, 63% reported having majored in ECE, and the percentage is higher among those with BA or above (85.76%); and 80% of those with ECE majors have currently achieved a degree level of at least a BA (Gong, 2015).[10] In China, the proportion of preschool teachers with a bachelor's degree in poor, rural areas is 15.9% for rural poor areas in Shandong province (Li, 2014), and the status is worse in earlier years (Xie, 2007).

To meet teacher needs in the two Three Years Plan of Preschool Education (2011-2013 and 2014-2016), many primary school teachers are transferred to teach in preschools. The training they receive include one-day to one-week long classes on preschool education theory and skills, and some group activities in the recent years. In rural and remote areas, NGOs are helping local residents build preschool classrooms. They either use volunteer teachers who participate in the 'China Development Research Foundation' model or train villagers as teachers, who are at least graduates of junior high schools, according to the 'Human People to People China' model. In Shanghai's Qingpu district, preschool teacher applicants without an early childhood education background are required to have two certificates, one interview, and six skills proficiency before they can be hired.

In terms of certification, both countries face the need to increase the certificate holding rate, with a greater need in China's rural areas. According to US data in Kagan et al. (2008), 57% of teachers in pre-kindergarten programs were certified by their states, and 23% have the Child Development Associate (CDA) credential. Some states did worse on that measure, but certification rates have gone up in recent years (Gong, 2015). In China, 43.9% of preschool teachers held a teaching certificate in 2007, 56.1% the full time teachers were not certified. Such an issue is more serious in the middle and western regions (China's Preschool Education Development Strategy Research Group, 2010). In some rural areas, the ratio is even lower, ranging from 1% to 18.2% (Li, 2014).

Third, *daike* teachers or substitute teachers are specific to China, where they compose a significant portion of preschool teachers in rural areas with the share of such type of informal kindergarten teachers as high as 67% in Haian County, Jiangsu Province (Wang, 2014).

Conclusions and Discussion

[10] This is also confirmed in a study regarding California: according to the study for licensed centers, no degree, no college ECE credits, about 0.4% for teachers and 12.1% for assistant teachers.

The 21st century has witnessed a rapid growth of early childhood education programs around the world. Teacher preparation affects teacher quality and defines the core quality of a preschool program. This study compares the pre-service teacher education systems in China and the United States, based on various types of data and materials including literature, policy documents, and statistical data. The comparison mainly focused on children of three to six-years of age. Scholars in both countries have used terms like "incomplete" or "unsystematic" to describe their teacher preparation systems, but comparatively, the US has done better in improving the level of teacher education for preschool teachers.

Similarities. On the one hand, the relative low quality of preschool education in both countries can be reflected in the education background of their teachers, for whom the training is concentrated around a degree program: BA, or AA and below. The government should focus more on improving teachers' professional knowledge and skills, especially for those whose formal academic training is not in early childhood education, and provide more opportunities for teachers to develop practical skills through in-service training and online learning. On the other hand, inequality across different geographical areas (e.g., provinces and counties; rural and urban; east, middle and west) continues to exist, which may be related to economic development levels. For example, the average education level of preschool teachers' education in rural China is an AA, compared to a BA in urban China. This is expected to cause large disparity in the quality of preschool education. In the US, teachers' education level varies across states: for example, in 2015, 29.61% of the early childhood care and education teaching workforce has a bachelor's degree in Wyoming state; but only 11.70% in South Dakota state, based on data from ACS (Gong, 2015).

Differences. First, most of US preschool teachers have ECE background (a degree or credits related to ECE from colleges or universities), while only a little more than half of the Chinese preschool teachers do. In the current workforce, and over a long period, the average education level of US preschool teachers in center-based settings is higher than that of the Chinese preschool teaching workforce. A typical degree for a US preschool teacher is a BA, whereas the typical degree for a Chinese preschool teacher is an AA (from what used to be a vocational high school diploma about ten years ago). This may lead to differences in the effect of a bachelor's degree on children's development outcomes in the two countries and how educators and parents define a good preschool teacher. At the college level, student selection criteria, course content and practicum arrangements differ in the two countries. Ultimately, the US have relied more on a formal system than the informal system to train preschool teachers, whereas in some areas of China (especially for places with great preschool teacher shortages), preschools still rely heavily on informal

pre-service training (e.g., short teacher induction programs) for candidates who previously did not work worked have not been in the early childhood education sector or a related profession.

Policy suggestions for both countries. First, the Chinese system can improve student field experiences, provide standards for evaluating the quality of student teaching, consider expanding training to non-ECE candidates via online education, and establish a preschool law that ensures the rights and benefits of preschool teachers. Both countries can encourage teacher preparation programs to offer a preschool endorsement and ask relevant programs to provide relevant coursework and high-quality student teaching experiences. While alternative pathways can be used, the quality of training before the service should be monitored and ensured, and it should be consistent with in-service training. In this perspective, establishing a cohesive accreditation system is important.

Second, the US system can be simplified to make state-specific certificates applicable to all states, and a space to access and create centralized information on alternative pathways available to teach preschool, with the goals to achieve an integrated birth-through-age-eight certification pipeline, and improve program content. As previously mentioned, China has a unified educational system that is rooted in the country's characteristics, with plans to train its teacher to meet the needs of national development. For example, the government unifies teacher certification standards across the 32 provincial regions, and the Ministry of Education has exclusive rights to issue educational planning in order to promote quality of teacher preparation. The US may consider unifying standards of preschool teacher preparation and standards for certification.

Third, both countries need to build relevant systems to elevate the quality of preschool teacher preparation system. Such relevant systems may include: (1) formal preschool programs should update their framework to improve faculty development; and (2) address the importance of economic incentive in attracting high quality teachers into the preschool education workforce, given that the current compensation for preschool teachers in both countries is relatively low in each country (US Department of Education, 2016; He, 2015), a system for ensuring sufficient compensation is commensurate with the professional work of preschool teachers in the new century should be established, for both public and private preschools. Finally, it is worthy to consider of the dynamic nature of the two education systems. This paper mainly provides a snapshot or at most a brief introduction of the evolving process of preschool teacher preparation at the college level and the findings should be interpreted with this in mind.

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Appendix

Table A1. The content of the ECE programs in China, by degree levels and institute levels

Level	Region	Institution	Degree level	Credit	Length (Years)	Core courses	Internship (Practicum)
Regular universities/colleges	East	East China Normal University	MA, PhD	Thirty	Three	Child learning, children's play, preschool curriculum, the history of education thoughts	-
			BA	156	Four	Education theory, psychology of preschoolers, preschool curriculum, play, preschool science education, preschool arts education, etc.	108 hours
		Shenyang Normal University	BA	165	Four	Child development, preschool education, curriculum and teaching, music and singing for preschoolers, the basics of drawing, etc.	-
	Middle	Central China Normal University	MA, PhD	Thirty-eight	At least two	Degree courses+ electives	One-month for academic degree; two months for professional degree
			BA	130	Four	Preschool education, developmental psychology, preschool health, evaluation and observation of preschoolers, activity design, play, etc.	Eight weeks
		Henan Institute of Science and Technology	BA	—	Four	Anatomy and physiology, education, psychology, preschool education, piano playing skills, dancing, arts, play, etc.	-
	Western		MA.		Three	-	-

		Southwestern University	BA		Four	Anatomy and physiology, education, psychology, preschool education, preschool administration, piano playing skills, dancing, arts, play, etc.	
		Shaanxi Xueqian Normal College	BA		Four	Anatomy and physiology, education, psychology, preschool education, preschool administration, piano playing skills, dancing, arts, history of education, etc.	-
			AA (junior college degree)		Three	-	-
Vocational colleges	East	Zhangzhou City Vocational College	AA	130	Three	Music theory, sight singing, ear training ; piano and extemporaneous accompaniment; dance; preschool arts; Montessori education method; puppet show; Sensory integration training, etc.	960 hours
Secondary vocational and technical school	East	Baiyun Xingzhi Senior Vocational School	Secondary vocational school diploma	183.5	Three	Computer application, music, art designing, piano, dance, child health, education, psychology, preschool administration, , teacher oral language and activity design	A semester

Note: The content in this table was summarized by the authors according to: (1) website program information; and (2) the existing studies, including Tang (2014), Hu (2013), and Cao (2015).

Table A2. NAEYC's Six Core Standards for Early Childhood Preparation Programs

Core standards for students in the program		Key elements
1	Promoting child development and learning	• Knowing and understanding young children's characteristics and needs • Knowing and understanding the multiple influences on development and learning • Using developmental knowledge to create healthy, respectful, supportive, and challenging learning environments
2	Building family and community relationships	• Knowing about and understanding diverse family and community characteristics • Supporting and engaging families and communities through respectful, reciprocal relationships • Involving families and communities in their children's development and learning
3	Observing, documenting, and assessing to support young children and families	• Understanding the goals, benefits, and uses of assessment • Knowing about and using observation, documentation, and other appropriate assessment tools and approaches • Understanding and practicing responsible assessment to promote positive outcomes for each child • Knowing about assessment partnerships with families and with professional colleagues
4	Using developmentally effective approaches to connect with children and families	• Understanding positive relationships and supportive interactions as the foundation of their work with children • Knowing and understanding effective strategies and tools for early education • Using a broad repertoire of developmentally appropriate teaching/learning approaches • Reflecting on their own practice to promote positive outcomes for each child
5	Using content knowledge to build meaningful curriculum	• Understanding content knowledge and resources in academic disciplines • Knowing and using the central concepts, inquiry tools, and structures of content areas or academic disciplines • Using their own knowledge, appropriate early learning standards, and other resources to design, implement, and evaluate meaningful, challenging curricula for each child
6	Being a professional	• Identifying and involving oneself with the early childhood field • Knowing about and upholding ethical standards and other professional guidelines • Engaging in continuous, collaborative learning to inform practice • Integrating knowledgeable, reflective, and critical perspectives on early education • Engaging in informed advocacy for children and the profession

Source: NAEYC (2009).

Study Abroad during College: Comparison between China and the United States

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Study abroad can be a life-changing experience, but evidence of its effectiveness is mixed. We examine the experience of studying abroad at colleges in the US and China, which are the largest receiving and sending countries of international students respectively. Using data from two comparable national surveys that follow the same design, we estimate causal effects by matching students who studied abroad during college to those who did not, based on their propensity to study abroad. First, we survey student profiles to better understand who studied abroad. We found that parental education and urbanity makes difference in participation. Second, we examine the impact of study abroad on student academic achievement, using multivariate regression and propensity score matching. Finally, we exploit the matched samples to examine impact heterogeneity by student background. We find a positive, statistically significant but small impact on student academic achievement in both countries, with a higher impact for American students.

Introduction

The United States, a traditional receiving country of international students, has started to send more students abroad. One out of ten students now have overseas learning experience during college. In some colleges and universities, spending a semester or an academic year overseas has already become an integral part of college life (IIE, 2016).

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Given the growing proportion of undergraduate students with overseas learning experience, study abroad has become a significant part of the US higher education system that cannot be ignored by education researchers and policy makers. A key question for study abroad stakeholders is: what is the value-added of study abroad to college education?

China, a country that has traditionally sent students abroad, has started to involve more college students in study abroad programs that are sponsored by or affiliated with Chinese institutions, instead of letting Chinese students completely leave their Chinese institutions and enroll in a program at a foreign country as an international student. The most recent Chinese College Student Survey (CCSS) shows that 6% of college students studied abroad before graduation and approximately 35% of students are planning to do so.

Given the rapid increase of students studying abroad in higher education and the growing consensus that studying abroad provides some of the richest and most powerful forms of experiential learning for our students (Burn, 1991; Hamir, 2011; Kuh, 1995; Kuh et al., 2008; Laubscher, 1994; McKeown, 2009; Tarrant et al., 2014; Li, 2016), policymakers and the general public have become increasingly interested in the potential impact of study abroad across disciplines. Extant literature on Chinese students studying abroad mostly focus on students who leave China completely to pursue an overseas degree and potentially cause brain drain. Very few prior-studies examine the behavior of Chinese college students studying abroad in non-degree programs. As a comparison, the main stream of American college students studying abroad is in non-degree programs. Thus, results from the US may provide a good reference.

Hence, the goal of this research is therefore to quantify the value of studying abroad during college using descriptive analysis and quasi-experimental methods such as Propensity Score Matching with a good outcome measure (e.g., academic achievement) that is available in both the US and China. In this research, we choose GPA as a proxy for academic achievement. The data used in this research comes from the National Survey of Student Engagement (NSSE) in the US and the CSSS in China, both collected in 2014. After investigating student profile and estimating the impact of studying abroad on college students' academic development in the US, and China separately, this research also conducts a comparison by examining the similarities and differences

between the two countries. This research is designed to address the following research questions:

> 1) In the U.S, who studied abroad during college and what are the impacts of study abroad on undergraduate students' academic achievement?
>
> 2) In China, who studied abroad during college and what are the impacts of study abroad on undergraduate students' academic achievement?
>
> 3) What are the similarities and differences between the US and China, in terms of study abroad student profile and the impact of this experience on students' academic achievement?

The remainder of this paper is organized as follows: Section Two reviews existing literature on the impact of studying abroad on student academic achievement; Section Three describes the data source; Section Four introduces the empirical strategies and sample; Section Five presents the results based on Ordinary Least Square regression and Propensity Score Matching, by using studying abroad as an indicator; and Section Six concludes the paper with a summary of findings, limitations, and further analysis.

Literature Review

Regarding the value of study abroad, a large body of study abroad research focused on intercultural understanding and reported a positive impact of study abroad on student global engagement, cross-cultural adaptability and cultural sensibility (Carlson, 1990; Carlson, 1998; Paige et al., 2002; Chieffo, 2004; Kauffmann et al., 1992; Kitsantas, 2004; Williams, 2005; Anderson et al, 2006; Black & Duhon, 2006; Lewin, 2010; Li, 2016). More recent studies looked into the relationship between study abroad and labor market outcomes such as employment and starting salary. Findings from these studies are consistent: study abroad has positive impact on student career path, earnings and employment (Paige, 2009; Palifka, 2009; Salisbury, 2009; Li, 2016). Trooboff (2008)'s results also shed light of the mechanism because employers value study abroad in hiring recent college and university graduates. However, the findings on academic achievement are mixed. A number of studies have evaluated the effects of study abroad experience on student academic development. Overall, evidence from

these studies was mixed, depending on the data, outcome measure, program type, and methodology. However, there are more studies reporting positive effects.

On the positive side, many studies (Allen, 2009; Barron, 2003; Diao, &Freed, 2011;, Engle, 2012; Foster, 2001; Freed, 1995; Freed, 1998; Freed, Segalowitz, & Dewey, 2004; Jimenez-Jimenez, 2010; and Segalowitz et al., 2004) reported students gained foreign language proficiency from their studies overseas. Engle and Engle (2004), Kinginger and Farrell (2004), Allen (2009), and Diao and Freed (2011) found positive evidence in French grammar and vocabulary of students by using a pre-/post-test comparison. Similar evidence was found in other language programs such as for Spanish (Jimenez-Jimenez, 2010; Segalowitz et al., 2004), Chinese (Foster, 2001), and Hebrew (Donitsa-Schmidt & Vadish, 2005). Regarding concerns that studying abroad may delay timely college completion, Xu et al., (2013) found beneficial effects of study abroad programs on undergraduate degree completion. O'Rear et al., (2014) also confirmed that studying abroad can increase the likelihood of college graduation. Li (2016) found that study abroad during college has positive impact on student GPA.

On the negative side, Wilkinson (1998) interviewed four students and challenged the idea that study abroad facilitates student language acquisition; Savicki et al., (2012) reported no evidence that studying abroad improves student language acquisition from the two programs to Austria and Spain; Mendelson's (2004) assessment did not find positive evidence of student academic achievement either.

It is important to bear in mind, however, that despite the results, sample sizes of these studies are commonly small and only one study identify a control group (Jimenez-Jimenez, 2010) and its selection criteria remains questionable. Even though small group studies may provide deep understanding of a behavior where large datasets can fail, Jimenez-Jimenez chose a group of six native speakers from Spanish-speaking countries as a control group to study abroad students who learned Spanish as a second language, which was not the best comparison for many reasons. The two undergraduate degree completion studies, Xu et al., (2013) and O'Rear et al., (2014), addressed the sample size problem by using data from one college (Old Dominion University) and from one state (Georgia), but one college and one state is hardly representative. Thus, solid research with national-level data is needed to check the external validity of these studies in order to obtain an accurate estimate of the real effect of study abroad on a student's academic achievement.

Even when national-level datasets are available, a comparative study might still not be feasible, unless the data from different countries are collected with the same (or similar enough) survey design and outcomes are measured in the same way. By the same token, even though studies reporting positive effects seem to be more in number than other studies, heterogeneous effects by sending countries (i.e., the impact of study abroad on American students are substantially different from that on Chinese students) remain unknown. There is far too little understanding of the theory and practice of this type of learning in the context of comparative and international education.

Data Source

This study uses two comparable national surveys in the US and China to estimate and compare the impact of study abroad programs on student academic achievement. The American dataset used is from the National Survey of Student Engagement (NSSE) 2014 conducted by Indiana University.[1] The Chinese dataset we used is the restricted use data from the Chinese College Student Survey (CCSS), which is the largest national survey on college students in China. Specifically, we used the Questionnaire for Undergraduate Students in Four-year Institutions, which was developed from the NSSE questionnaire through the collaboration between Indiana University and Tsinghua University. Based on our knowledge, the CCSS is the only national survey in China that contains information about study abroad during college. More importantly, because the questionnaire is developed from NSSE, the CCSS has many similarities with the NSSE. Given the substantial similarities[2] between these two surveys, this pair of datasets provides a unique opportunity to conduct a comparative study that perfectly fits this research's purpose.

[1] To the best of our knowledge, the NSSE, the Student Experience in the Research University Survey (SERU), and the College Senior Survey (CSS) are the only three US national college experience surveys that contain information on study abroad. These surveys focus on how students evaluate their experience at the higher education institutions they attend, and each survey has its own pros and cons. We chose the NSSE over SERU and CSS because the NSSE is larger and the most spread-out sample than the other two. For example, the NSSE 2014 contains data on 29,836 senior students from 622 US colleges and universities vs. 23,523 senior students from 95 US institutions in the CSS 2014. Another example from SERU is that the survey excludes non-research colleges and universities, such as liberal arts colleges, which are the majority institutions with respect to both undergraduate enrollment and study abroad. Therefore, the NSSE is the most desirable dataset for this research.

[2] Like NSSE, the CCSS examines student engagement at college with a particular focus on higher impact activities such as study abroad. And because the CCSS employs NSSE's survey design, CCSS's instruments, measurements and the coding structure are very similar to NSSE as well. For instance, both CCSS and NSSE ask students how many hours per week they spend to prepare their classes and specify that "preparing for class" include studying, reading, writing, doing homework or lab work, analyzing data, rehearsing, and other academic activities.

Methodology

Quantitative identification of the causal effect of study abroad is difficult because of data constraints and problems such as endogeneity (i.e. participation in study abroad programs is determined by variables which also determine the dependent variable). This research uses a multivariate regression model and a Propensity Score Matching (PSM) strategy to address the endogeneity problem.

Baseline Model The baseline model to estimate the effect of studying abroad on student academic achievement is specified as following:

$$Y = \alpha + \beta Z + \gamma_1 X_1 + \gamma_2 X_2 + \gamma_3 X_3 + \varepsilon \quad (1)$$

This model builds upon the standard education production function. Where Y refers to academic achievement, Z is a dummy variable indicating whether or not the student studied abroad during college, and X is the vector of confounding covariates, and ε is the error term that follows a normal distribution. More specifically, we use the self-reported Grade Point Average (GPA) to measure academic achievement. In the NSSE 2014 survey, students were asked to report the most grades received on courses. We convert grades to GPA on a scale of 1-4 based on the guideline of the College Board,[3] and then rescale the GPA into 1-100 scale to make it comparable with the Chinese data. The CCSS asked for the average course grade in "last semester" (1-100 scale). As the GPA measures are not directly comparable across countries, we estimate the models separately for the US and the Chinese samples, and compare the effect size of the estimates.[4] With regards to the covariates, we include variables that are correlated to academic performance as suggested by the literature (Freed, 2014; Salisbury, 2009). Specifically, X_1 stands for student characteristics and college experience, including age, gender, ethnicity, academic major, enrollment status (US only), whether live on campus (US only), and hours per week spent on course-related work, X_2 are the family covariates including parents' education level, whether live in urban area (China only), and whether the student is the only child in his/her family (China only), $X_3$are institutional characteristics including the type, size, and location of the institution. The variables are constructed with self-reported information in the

[3] http://www.collegeboard.com/html/academicTracker-howtoconvert.html

[4] GPA may not be comparable across universities. A conventional way to address this problem is to include institution fixed-effect in the model. However, when institution fixed-effects were included, some individual and family variables were omitted because of collinearity. Thus we decided to control for available institutional characteristics that may result in differences in grading.

NSSE 2014 and CCSS 2014. Tables A1 and A2 (see Appendix) report the measurement and descriptive statistics of the variables used for the US and the Chinese samples, respectively.

Propensity Score Matching In order for the Ordinary Least Square (OLS) estimate of the coefficient on study-abroad program to be the true causal effect, participation in study abroad programs must be exogenous to student academic performance. But we are concerned about the selection bias that could arise because students are not randomly assigned to such programs, but self-selected. It could be argued that students from affluent families are more likely to go abroad as they can obtain extra financial support from parents, which is implied by the descriptive analysis. Affluent families are also more likely to afford extra educational services that assist students with their coursework such as data/software licenses, private tutoring, and professional editing. Consequently, the between-group difference in academic achievement may not be caused by study abroad experience, but because the study-abroad group is ultimately different from the non-study-abroad group. In other words, these two groups are not comparable at all. If that is the case, estimates from the OLS regression will be biased.

In order to identify the true treatment effect, this study endeavors to address the endogeneity problem with Propensity Score Matching (PSM). Propensity score theory states that rather than controlling for all the variables, it is sufficient to control for just the propensity score, which is just a one-number summary of the covariates.

$$e(X) = \Pr(Z = 1 \mid X) \tag{2}$$

where Z is the treatment variable (participating study abroad in this research) and X is a vector of pre-treatment covariates. In practice, this means using the matched groups to estimate each mean. The primary advantage of Propensity Score Matching over Ordinary Least Square is that Propensity Score Matching does not have to specify the multi-dimensional relationship between X and the outcome. This way, Propensity Score Matching also reduces bias caused by possible multicollinearity among covariates. In this study, the estimand is Average Treatment effect on the Treated (ATT). In terms of estimation strategy, Probit regression is used to estimate this effect

size.[5] The results reported in this paper are from use of the nearest neighbor method without replacement.[6]

Analytic Sample The American data used is a 20% random sample from the NSSE 2014, which was collected by Indiana University and shared with Teachers College, Columbia University.[7] It contains 5,361 students from 71 universities and college. Institutions' participation in the NSSE survey is voluntary, and each institution uses different sampling strategies to select students. The response rate varies across institutions with an average of 31% in 2014. Although the NSSE sample cannot be considered as a strictly representative sample of the US undergraduate students without a random sampling scheme, its demographic composition is overall similar to the US Bachelor's-Granting institutions and students, with a little over-representative of public colleges and universities and master's colleges and universities under the Carnegie Basic Classification.

The Chinese sample from the CCSS 2014 survey contains 55,529 students from 38 four-year universities and colleges in China.[8] Similar to NSSE, the participation in the CCSS survey is voluntary. But in each participating institution, the student sample is selected with a stratified random sampling strategy. The overall response rate of the 2014 survey is 67%. The sample is a little over-representative of Project "985" and Project "211" universities (i.e. the two elite university projects in China) and universities specialized in science and engineering. In order to make the samples representative for both countries, institutional and individual sampling weights provided by the NSSE team and the CCSS teams are applied in all analyses.

Empirical Results

Descriptive analysis Overall, studying abroad during college is more common in the US than in China. The American representative sample used in this research includes more than 5,500 students who were attending college in 2014. Among them, approximately 14% of students have study abroad experience. The Chinese data from

[5] Probit regression is a conventional way to estimate models with binary dependent variable. The error term is assumed to follow the standard normal distribution. Probit models are most often estimated with the standard maximum likelihood procedure.

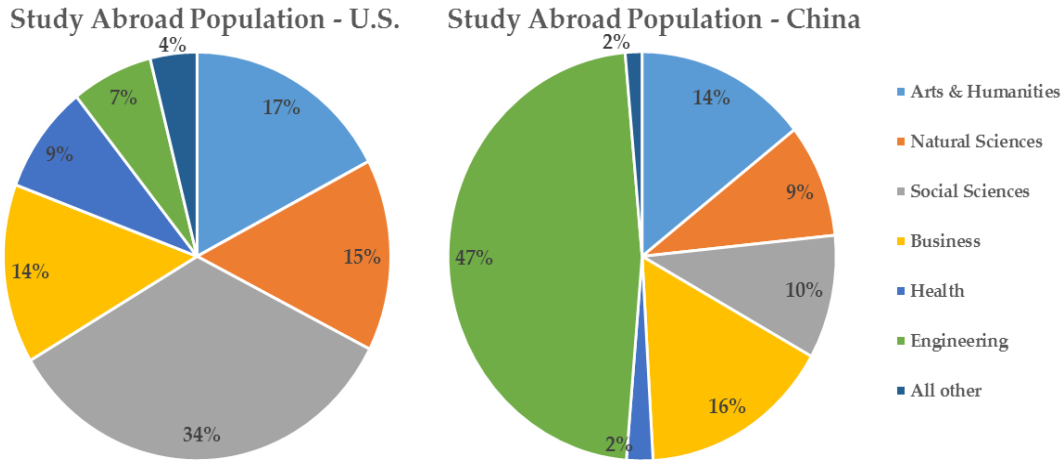
[6] The nearest neighborhood matching is one of the methods to construct comparable control group for the treatment group. It chooses the control unit that is closest to the treated unit on a given distance measure based on the propensity score. The matching is done one at a time for each individual in the treatment group. Once a match is selected, it will not be replaced back to the untreated pool.

[7] According to NSSE's data sharing policy, only a random sample up to 20% of the full sample is available.

[8] We were able to have access to the full sample of CCSS 2014.

over 55,500 college students in the same year shows a 6% participating rate in study abroad, less than half of the American participating rate.

Figure 1. Disciplinary Distribution of Study Abroad Population, by field of study



The composition of study abroad population is also different. Female students are underrepresented (43% in the study abroad sample vs. 47% in the full sample) in China and overrepresented in the US (75% female in the study abroad sample vs. 65% female in the full sample). Figure 1 breaks down the study abroad populations by their field of study. Engineering program accounts for 47% of the Chinese study abroad population but only 7% in the U.S.[9]

With regard to the differences in study abroad behavior by sub groups, Table 1 presents the percentage of students that studied abroad in each groups, which can be interpreted as how likely a student from that group will study abroad. In general, female students are more likely to study abroad in the US but less likely in China. In both countries, students in Arts & Humanities, Social Sciences, and Business majors are more likely to study abroad than other majors. In contrast, the percentage of Health students studied abroad is dramatically low.

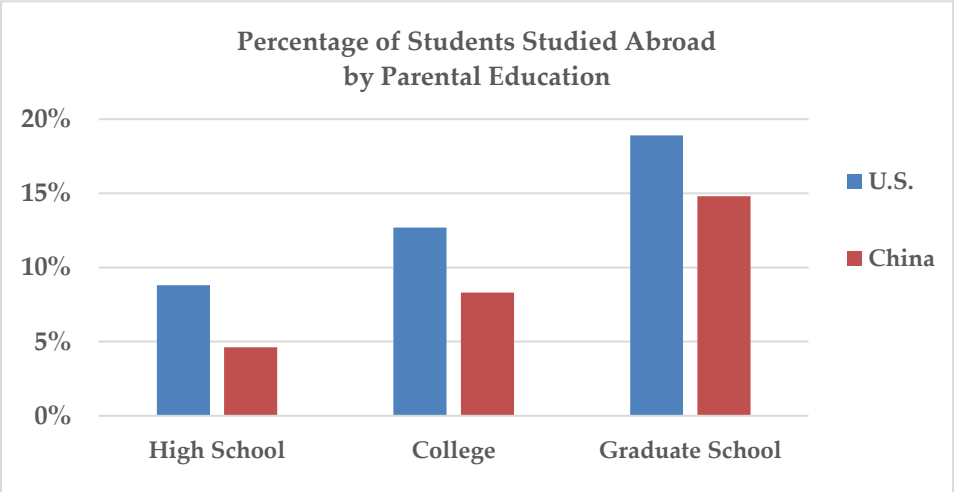
[9] This could be explained by sampling difference. The Chinese sample is over-representative of engineering students. According to the national statistics of 2014, engineering students accounted for 33% of the total enrollment of four-year undergraduate students. The percentage in CCSS 2014 is 46.6% after weights are applied. This is because the sample contains a higher percentage of engineering concentrated universities and colleges.

Table 1. Percentage of Students Studied Abroad

	US		China	
	Number of Students	% of students studied abroad	Number of Students	% of students studied abroad
Total	5,631	13.9	55,529	6.1
Gender				
Male	1,968	10.3	28,592	6.6
Female	3,663	15.9	26,937	5.7
Major				
Arts & Humanities	615	21.8	6,263	7.8
Natural Sciences	906	13.1	5,877	5.7
Social Sciences	1,642	16.3	4,304	7.1
Business	850	13.1	7,750	7.0
Health	792	8.5	3,163	2.3
Engineering	452	11.9	27,041	6.0
All other	374	16.7	1,131	4.1
Enrollment Size				
Small	1,802	15.1	9,904	5.9
Medium	1,236	14.6	28,937	6.6
Large	2,453	13.3	16,688	5.5
Parental Education				
High School	1,067	8.8	36,444	4.6
College	2,773	12.7	15,878	8.3
Graduate School	1,791	18.9	1,878	14.8

Parental education turns out to be a strong indicator of students' study abroad behavior. As indicated in Figure 2, both in the US and China, students with highly educated parents are more likely to study abroad compared to other students. The US-China gap is quite small among students with parents with a graduate school education. One possible explanation could be that highly educated parents are more likely to have a high income to pay for their children's study abroad programs. Another possibility could be that highly educated parents have international exposure themselves. Compared to less educated parents, these parents tend to be more open-minded and willing to support their children studying abroad. Having an urban background is another strong determinant to studying abroad behavior. In particular, the participating rate of Chinese students from rural areas is remarkably low. Again, family's socio-economic status determines students' decisions about studying abroad.

Figure 2. Percentage of Students Studying Abroad by Parental Education



Multivariate regression The baseline Ordinary Least Square regression model based on Equation (1) is established to investigate the average effect of study abroad. We ran three sets of regressions on each dataset and report the results in Table 2. Models 1 and 4 include student demographic characteristics; Models 2 and 5 include student and family variables; Model 3 and 6 are the full specification by adding institutional control variables.

The estimations across these three models consistently report a statistically positive impact of study abroad on student academic achievement, in both the US and China settings. Results indicate about a roughly three point increase[10] in GPA on a scale of 1-100 for American students and one-point increase[11] for Chinese students. Results also suggest the following: 1) in both the US and China, female students outperform male students; compared to students in Arts and Humanities, students in other majors tend to have a lower GPA; majority students (white American students and Han Chinese students) outperformed minority students; 2) in terms of family background, parental education is not associated with student GPA in the US but a strong predictor of Chinese students' academic achievement. In China, the father's education turns out to be positively associated with student GPA while no such evidence is found in the relationship between mother's education and student academic outcomes, after controlling for institutional characteristics; and 3) students from American private institutions or Chinese elite colleges and universities (e.g., Chinese Project 985 and

[10] Effect size is 0.22 standard deviation for American students
[11] Effect size is 0.10 standard deviation for Chinese students

Project 211 higher education institutions that receive exclusive funding from the central government) outperformed students of other institution types.

Table 2. OLS Regression Results

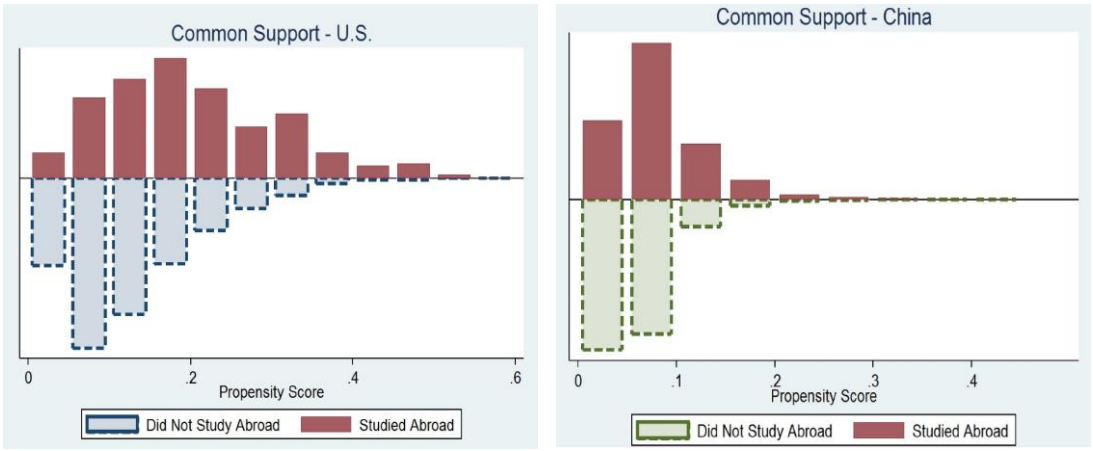
US				China			
Variable	Model 1	Model 2	Model 3	Variable	Model 4	Model 5	Model 6
abroad	3.02***	2.84***	2.77***	abroad	0.96***	0.91***	0.97***
	(0.44)	(0.46)	(0.46)		(0.21)	(0.21)	(0.20)
hours	0.22***	0.21***	0.21***	hours	0.17***	0.17***	0.14***
	(0.02)	(0.02)	(0.02)		(0.01)	(0.01)	(0.01)
age	0.18***	0.21***	0.20***	age	-0.04***	-0.04***	-0.03***
	(0.02)	(0.03)	(0.03)		(0.01)	(0.01)	(0.01)
male	-1.17***	-1.22***	-1.20***	male	-3.16***	-3.15***	-3.29***
	(0.38)	(0.39)	(0.39)		(0.11)	(0.11)	(0.10)
white	2.48***	2.53***	2.59***	minority	-1.20***	-1.26***	-1.97***
	(0.54)	(0.55)	(0.56)		(0.17)	(0.17)	(0.17)
black	-5.40***	-5.07***	-5.12***	party	4.69***	4.66***	4.33***
	(0.89)	(0.90)	(0.91)		(0.15)	(0.15)	(0.15)
hispanic	-1.17	-0.47	-0.70	m_social	-0.55	-0.59	-0.77
	(0.80)	(0.83)	(0.85)		(0.23)	(0.23)	(0.22)
asian	1.79*	2.06**	1.82*	m_natural	-1.49***	-1.53***	-1.99***
	(0.94)	(0.93)	(0.95)		(0.21)	(0.21)	(0.21)
m_social	-1.80***	-1.62***	-1.51***	m_business	-1.30***	-1.34***	-1.11***
	(0.57)	(0.57)	(0.57)		(0.20)	(0.20)	(0.19)
m_natural	-2.31***	-2.31***	-2.18***	m_health	-1.95***	-2.03***	-2.20***
	(0.65)	(0.66)	(0.66)		(0.25)	(0.25)	(0.27)
m_business	-2.67***	-2.59***	-2.64***	m_engineer	-1.48***	-1.52***	-1.56***
	(0.66)	(0.66)	(0.66)		(0.17)	(0.17)	(0.17)
m_health	-2.91***	-2.69***	-2.73***	m_other	-2.02***	-2.06***	-2.43***
	(0.68)	(0.69)	(0.69)		(0.37)	(0.37)	(0.37)
m_engineer	-5.49***	-5.58***	-5.34***	onlychild		-0.36***	-0.33***
	(0.86)	(0.86)	(0.88)			(0.11)	(0.11)
m_other	-4.43***	-4.20***	-4.26***	urban		-0.46***	-0.64***
	(0.88)	(0.88)	(0.88)			(0.11)	(0.11)
				Father			
Full-time		-0.03	-0.03	College+		0.81***	0.37**
		(0.66)	(0.66)			(0.18)	(0.17)
				Mother			
Transfer		0.39	0.36	College+		0.45**	0.21
		(0.49)	(0.49)			(0.20)	(0.20)
dorm		0.45	0.38	medium			-0.59***
		(0.41)	(0.42)				(0.17)
first		-1.77***	-1.75***	large			-1.61***
		(0.52)	(0.52)				(0.19)
pedu_cl		0.75	0.80	inst_985			5.43***
		(0.59)	(0.59)				(0.19)

pedu_gs		0.69	0.73	inst_211			2.07***
		(0.74)	(0.74)				(0.17)
private			1.50***	inst_univ			0.57***
			(0.56)				(0.15)
medium			0.87	munici			-1.05***
			(0.55)				(0.12)
large			0.96				
			(0.64)				
r_neweng			1.01				
			(0.70)				
_cons	79.51***	78.58***	77.40***	_cons	79.13***	79.53***	79.73***
	(0.92)	(1.50)	(1.59)		(0.31)	(0.32)	(0.34)
N	5,477	5,387	5,387	N	36,736	36,736	36,736
R-Squared	0.08	0.08	0.08	R-Squared	0.08	0.09	0.12

Note: a) Coefficients are reported; b) Robust standard errors are in parentheses; c) Reference group for race, major, region, and enrollment size are other race (US data) or minority (China data), Arts and Humanities majors, and small enrollment size (American institutions with under 2,500 enrollment or Chinese institutions with under 20,000 enrollment); and d) * p<0.1; ** p<0.05; *** p<0.01.

Propensity score matching To address selection bias, we employ a Propensity Score Matching approach. We first compute propensity scores for each student, then find a match for each study-abroad student from the non-study-abroad group based upon their propensity score, run a weighted regression on the matched sample, and estimate the Average Effect on the Treated (ATT). Because Propensity Score Matching is only appropriate when certain assumptions hold, such as common support and balance, we check the common support in Figure 3.

Figure 3. Propensity Score Matching – Common Support, by country



Specifically, we plot the distribution of propensity scores with the study-abroad group in the top histogram and the non-study-abroad in the bottom histogram. The

horizontal axis indicates propensity scores and the length of each bar on the vertical axis indicates the fraction of sample falling into a corresponding interval of propensity score. As we can see from Figure 3, the overlap of the propensity score is pronounced, especially in the lower half. Only a few observations are off support at the high end of the propensity score.

The critical task for Propensity Score Matching is to find a balanced model. This study uses a rule of thumb to define "good balance": 1) for continuous variables, the difference in means is less than or equal to .05; treatment group (study abroad students) standard deviations and the ratio of standard deviations are between .91 and 1.1; and 2) for binary/indicator variables, the difference in percentage across groups is less than or equal to .025. Table A3 (see appendix) summarized the balance check for each of the variables. Overall this model satisfies the balance criteria except the variable *age*, not perfectly but as well as we can achieve. Regression results from Propensity Score Matching are reported in Table 3, along with heterogeneous effects.

Heterogeneous effects and robustness check For heterogeneous effects, we seek to determine how individual characteristics interact with the study abroad experience in terms of academic achievement. Hence, we examine how the impact of study abroad varies depending on individual characteristics, such as gender, race, and major. These potential differences are tested by adding a series of interaction terms to the final regression model (Model 3) on the matched sample. The interaction is generated as the product of two dummy variables. Study abroad is coded as a dummy, as are student characteristics. For example, the *AbroadXmale* variable is the interaction of study abroad and gender, which is computed by the study abroad variable (1=studied abroad; 0=did not study abroad) multiplied by the gender variable (1=male; 0=female). The coefficient of *AbroadXmale* indicates the gender difference in the impact of studying abroad on student academic achievement. Table 3 summarizes the regression results for each of the above characteristics by adding one interaction at a time, along with the original results from Propensity Score Matching without interactions.

Table 3. Propensity Score Matching Results and Heterogenous Effects

US					China				
Variable	**PSM**	**Male**	**White**	**Natural Science**	**Variable**	**PSM**	**Male**	**Han**	**Natural Science**
abroadRXmale		2.61*			abroadXmale		0.45		
		(1.60)					(0.77)		
abroadRXwh~e			0.84		abroadXhan			0.67	
			(1.61)					(1.16)	
abroadRXm_natural				-0.19	abroadXm_natural				-0.19
				(0.81)					(0.78)
abroadR	2.86***	2.18***	2.24***	2.95***	abroad	0.75*	0.50	0.13	0.86
	(0.74)	(0.89)	(1.35)	(0.83)		(0.39)	(0.55)	(1.09)	(0.59)
hours	0.22***	0.22***	0.22***	0.22***	hours	0.11***	0.11***	0.11***	0.11***
	(0.04)	(0.04)	(0.04)	(0.04)		(0.02)	(0.02)	0.02	0.02
age	0.13	0.13	0.13	0.13	age	0.00	0.00	0.00	0.00
	(0.09)	(0.09)	(0.09)	(0.09)		(0.05)	(0.05)	(0.05)	(0.05)
male	-0.89	-2.18	-0.89	-0.89	male	-2.94***	-3.16***	-2.94***	-2.94***
	(0.81)	(1.34)	(0.81)	(0.81)		(0.40)	(0.58)	(0.40)	(0.40)
white	0.48	0.46	0.05	0.48	han	1.98***	1.97***	1.62***	1.99***
	(1.14)	(1.14)	(1.56)	(1.13)		(0.61)	(0.61)	(0.75)	(0.61)
black	-11.06***	-11.03***	-11.03***	-11.07***	party	3.52	3.53	3.53	3.52
	(2.15)	(2.16)	(2.15)	(2.15)		(0.50)	(0.50)	(0.50)	(0.50)
hispanic	-1.35	-1.18	-1.36	-1.34	m_social	-1.03	-1.04	-1.03	-1.03
	(1.62)	(1.63)	(1.62)	(1.62)		(0.81)	(0.81)	(0.81)	(0.81)
asian	-4.73***	-4.86***	-4.74***	-4.74***	m_natural	-1.77**	-1.77**	-1.77**	-1.67*
	(1.91)	(1.92)	(1.91)	(1.92)		(0.84)	(0.84)	(0.84)	(0.99)
m_social	-1.92*	-1.90*	-1.91*	-1.92*	m_business	-1.52**	-1.53**	-1.52**	-1.52**
	(1.05)	(1.05)	(1.04)	(1.04)		(0.75)	(0.75)	(0.75)	(0.75)
m_natural	-1.82	-1.76	-1.82	-1.22*	**m_health**	-1.68	-1.68	-1.67	-1.68

	(1.22)	(1.22)	(1.22)	(2.90)		(1.34)	(1.33)	(1.33)	(1.34)
m_business	-3.12***	-3.10***	-3.11***	-3.11***	m_engineer	-1.01	-1.01	-1.01	-0.91
	(1.15)	(1.15)	(1.15)	(1.15)		(0.64)	(0.64)	(0.64)	(0.81)
m_health	-3.22**	-3.21**	-3.24**	-3.21**	m_other	-4.37***	-4.37***	-4.38***	-4.36***
	(1.46)	(1.45)	(1.47)	(1.46)		(1.78)	(1.78)	(1.78)	(1.78)
m_engineer	-5.63***	-5.54***	-5.62***	-5.05***	onlychild	-0.28	-0.28	-0.29	-0.28
	(1.71)	(1.71)	(1.71)	(3.09)		(0.47)	(0.47)	(0.47)	(0.47)
m_other	-2.90	-2.68	-2.88	-2.89	urban	-0.99	-0.98	-0.99	-1.00
	(1.89)	(1.90)	(1.89)	(1.89)		(0.49)	(0.49)	(0.49)	(0.49)
ft	1.60	1.67	1.64	1.61	fabaplus	0.08	0.08	0.08	0.08
	(1.34)	(1.34)	(1.34)	(1.34)		(0.56)	(0.56)	(0.56)	(0.56)
trans	-0.67	-0.69	-0.68	-0.67	mobaplus	0.28	0.28	0.29	0.29
	(1.12)	(1.12)	(1.12)	(1.13)		(0.63)	(0.63)	(0.63)	(0.63)
dorm	-0.43	-0.44	-0.43	-0.43	large	-2.25***	-2.25***	-2.25***	-2.25***
	(0.85)	（0.86）	(0.85)	(0.85)		(0.80)	(0.80)	(0.80)	(0.80)
first	-0.19	-0.16	-0.16	-0.20	medium	-0.75	-0.76	-0.75	-0.75
	(1.14)	(1.14)	(1.14)	(1.14)		(0.62)	(0.62)	(0.62)	(0.62)
pedu_cl	2.35*	2.39*	2.37*	2.36*	inst_985	5.79***	5.79***	5.79***	5.79***
	(1.37)	(1.37)	(1.37)	(1.37)		(0.68)	(0.68)	(0.68)	(0.68)
pedu_gs	2.06	2.13	2.08	2.06	inst_211	1.97***	1.97***	1.97***	1.97***
	(1.66)	(1.67)	(1.66)	(1.66)		(0.64)	(0.64)	(0.64)	(0.64)
pri	2.31**	2.28**	2.31**	2.31**	inst_univ	0.28	0.28	0.28	0.28
	(1.07)	(1.07)	(1.07)	(1.07)		(0.58)	(0.58)	(0.58)	(0.58)
medium	1.54	1.55	1.54	1.54	munici	-1.58***	-1.58***	-1.58***	-1.58***
	(1.08)	(1.08)	(1.08)	(1.08)		(0.49)	(0.49)	(0.49)	(0.49)
large	4.39***	4.35***	4.38***	4.39***					
	(1.33)	(1.33)	(1.32)	(1.33)					
r_neweng	1.53	1.49	1.50	1.53					
	(1.44)	(1.46)	(1.44)	(1.45)					

_cons	76.04***	76.34***	76.32***	75.95***	_cons	80.38***	80.50***	80.37***	80.33***
	(3.62)	(3.64)	(3.70)	(3.62)		(1.43)	(1.48)	(1.43)	(1.47)
N	1,280	1,280	1,280	1,280	N	3,568	3,568	3,568	3,568
R-Squared	0.11	0.11	0.11	0.11	R-Squared	0.09	0.09	0.09	0.09

Note: a) Coefficients are reported; b) Robust standard errors are in parentheses; c) Reference group for race, major, region, and enrollment size are other race (US data) or minority (China data), Arts and Humanities majors, and small enrollment size (American institutions with under 2,500 enrollment or Chinese institutions with under 20,000 enrollment); and d) * p<0.1; ** p<0.05; *** p<0.01.

Table 4. Corrected Standard Errors with Bootstrap (US) - Sample Size: 5,453

Variable	Replication	Observed	Bias	Std. Err	[95 % Conf. Interval]	
_bs_1	1,000	2.60	-0.07	0.87	0.88	4.32 (N)
					0.80	4.33 (P)
					0.94	4.51 (BC)

Note: N=normal; P=percentile; BC=bias-corrected

Table 5. Corrected Standard Errors with Bootstrap (China) - Sample Size: 38,634

Variable	Replication	Observed	Bias	Std. Err	[95 % Conf. Interval]	
_bs_1	1,000	1.13	-0.04	0.42	0.31	1.94 (N)
					0.34	1.98 (P)
					0.43	2.13 (BC)

Note: N=normal; P=percentile; BC=bias-corrected

Three main observations emerge from Table 3. First, the coefficient of studying abroad in the US sample is consistently significant across models, which indicates that study abroad experience has a robust positive impact on student academic achievement across gender, race, and major. Second, the coefficient of studying abroad turns out to be insignificant after adding gender. This suggests that for Chinese students, the impact of study abroad on student academic achievement is not as robust as for American students. Third, the gender interaction term is significant in the US sample. This means that being male increases the impact of study abroad on student academic achievement. In other words, male American students benefit more from study abroad than female American students. There are no such gender differences among Chinese students participating in study abroad.

We use bootstrap to simulate the matching procedure 1,000 times to get the distribution of the average treatment on the treated (ATT)[12]. As reported in Table 4 and Table 5, on average, for students who studied abroad, having that experience increased GPA by 2.60 points for American students and 1.13 points for Chinese students. These simulation results are consistent with the finding from the baseline regression, Propensity Score Matching, and heterogeneous effects. Overall, on average, study abroad experience at college seems to have a larger and more consistent impact on American student academic achievement than on Chinese students.

Conclusions and Discussion

Overall, we find significant positive impact of study abroad on student academic achievement in both countries, with higher impact for American students. Results from the NSSE data reveal a positive impact of study abroad on students' academic achievement during college. On average, study abroad experiences improve students' GPA by 3 points (on a scale of 1 to 100). For comparison, China's study abroad group is more evenly distributed across gender and the field of study. However, descriptive analysis reveals that students from rural areas are less likely to study abroad. Propensity score matching results indicate a slight (one point) positive impact on students' academic achievement in China. These results are consistent with Freed (2004) and Ingraham, & Peterson (2004)'s findings that study abroad during college has a positive impact on GPA and facilitate students' intellectual growth. This increase in GPA may translate into benefits for the labor market, as research also shows that

[12] Bootstrap is a resampling method to get robust estimates on parameters through estimation of sampling variability. We resample the original sample for 1,000 times and conduct propensity score matching on each redrawn sample to estimate the distribution of average treatment on treated (ATT) effect.

students with high GPA have an advantage in the job market because of human capital and signaling effects (Jones, & Jackson, 1990).

Regarding studying abroad student profiles, the majority of American students who study abroad are still comprised of the traditional study-abroad student body: white female in Arts and Humanities or Social Science programs at a private institution. The gender and major differences in Chinese students are smaller than American students. Importantly, parental education turns out to be the strongest predictor of students' study abroad behavior. Students with highly educated parents are more likely to study abroad compared to other students. The US-China gap is quite small among students with graduate-school-educated parents. Urbanicity is a strong indicator as well. In particular, Chinese students from large cities (such as direct-controlled municipality) are much more likely to join study abroad programs than students from other places. These finding confirms Goldstein, & Kim (2006) and Salisbury, et al., (2009)'s arguments that social economic status (SES) matters for American students and proves that the same for Chinese students.

Thus, aids to students from low SES families are solely needed to improve education equality both in the US and China. From a policy perspective, engaging college students in non-degree study abroad programs without completely leaving their Chinese institution will alleviate concerns about potential brain drain (Bhagwati, & Hamada, 1974; Mountford, 1997; Beine, Docquier, & Rapoport, 2001; Beine, Docquier, & Rapoport, 2008; Mountford, & Rapoport, 2011).

This research contributes to the extant literature in several ways: a) it presents the comparison and contrast between two countries (instead of within one country); b) it employs quasi-experimental methods to estimate the effect size of study abroad experience on students (adding onto descriptive & correlation analysis); and c) it utilizes data from two national surveys that follow almost identical survey designs, which is rare in the field. Yet, we need to be cautious that our findings are subject to social and economic differences between the US and China.

Nonetheless, there are a few limitations of this study. First, the study abroad measure is an indicator that only captures whether or not students studied abroad, but does not differentiate by duration, subject, and organization of the study abroad program students attended. Dwyer (2004) and Carlson, & Widaman (1990) found long-term effects and McKeown (2009) reported the first-time effect. Hence, further comparative studies can exploit the variation of study abroad programs and evaluate effects of

various program design (e.g., duration, location, and curriculum) on student outcomes. Li (2016) conducted research on American students but there is no such study on Chinese students.

Second, this research focuses only on academic achievement. As Lewin (2010) pointed out that students benefit from study abroad through three ways: language study, courses in the student's major that offers new perspectives and knowledge acquisition. Future research can measure non-academic outcomes such as global mindset and labor market outcomes. Since 2013, NSSE incorporated a module of Global Perspectives to measure student cross-cultural awareness and attitude (Li, 2016). A new comparative study will be feasible if CCSS includes Global Perspectives module in the Chinese survey.

Finally, in order to truly understand the mechanism of how study abroad during college affects student outcome, we need to be able to track students (both study abroad alumni and their peers) during and after their college life. Qualitative research (i.e., interviews, focus group) will also provide deep understandings that large survey fails to capture.

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Appendix

Table A1. Summary of Variables (US Dataset)

Variable	Observation	Mean	**Standard Deviation** (% for dummy variables)	Description
gpa100	5,613	85.67	13.44	GPA on a scale of 1 to 100 to be comparable with Chinese data
abroadR	5,567	0.14	0.35	Indicator of having studied abroad during college
hours	5,586	15.02	8.75	Hours per week spent on course-related work
age	5,590	23.09	7.82	Age at 2014
male	5,631	0.35	0.48	Male
white	5,631	0.66	0.47	Race: Caucasian
black	5,631	0.08	0.27	Race: African American
hispanic	5,631	0.07	0.25	Race: Hispanic
asian	5,631	0.05	0.22	Race: Asian
m_social	5,631	0.29	0.45	Major: Social Sciences
m_natural	5,631	0.16	0.37	Major: Natural Sciences
m_business	5,631	0.15	0.36	Major: Business
m_health	5,631	0.14	0.35	Major: Health
m_engineer	5,631	0.08	0.27	Major: Engineering
m_other	5,631	0.07	0.25	Major: Other major but not Education
ft	5,587	0.89	0.31	Full-time student
trans	5,605	0.26	0.44	Transferred student
dorm	5,605	0.40	0.49	Live on campus
first	5,609	0.39	0.49	First-generation attending college
pedu_cl	5,631	0.49	0.50	Parental education: College
pedu_gs	5,631	0.32	0.47	Parental education: Graduate Schools
pri	5,631	0.42	0.49	Institution control: private
medium	5,631	0.22	0.41	Institution size: medium
large	5,631	0.44	0.50	Institution size: large
r_neweng	5,631	0.05	0.23	Institution location: New England area

Table A2. Summary of Variables (China Dataset)

Variable	Observation	Mean	Standard Deviation (% for dummy variables)	Description
gpa	38,634	76.68	9.65	GPA on a scale of 1 to 100
abroad	55,529	0.06	0.24	Indicator of having studied abroad during college
hours	52,590	15.82	7.72	Hours per week spent on course-related work
age	55,529	22.61	7.97	Age at 2014
male	55,529	0.51	0.50	Male
minority	55,529	0.08	0.27	Race: Minority (not Han people)
party	55,529	0.11	0.31	Communist Party member
m_social	55,529	0.08	0.27	Major: Social Sciences
m_natural	55,529	0.11	0.31	Major: Natural Sciences
m_business	55,529	0.14	0.35	Major: Business
m_health	55,529	0.06	0.23	Major: Health
m_engineer	55,529	0.49	0.50	Major: Engineering
m_other	55,529	0.02	0.14	Major: Other major but not Education
onlychild	55,529	0.53	0.50	Only child in the family
urban	55,529	0.50	0.50	Live in urban area
fabaplus	55,529	0.15	0.36	Father's education: BA and above
mobaplus	55,529	0.11	0.31	Mother's education: BA and above
large	55,529	0.30	0.46	Institution size: large
medium	55,529	0.52	0.50	Institution size: medium
inst_985	55,529	0.15	0.36	Institution type: 985 project (extremely selective)
inst_211	55,529	0.17	0.38	Institution type: 211 project (very selective)
inst_univ	55,529	0.47	0.50	Institution type: regular university (average selective)
munici	55,529	0.35	0.48	Institution location: municipalities

Table A3. Propensity Score Matching – Balance Check (US & China)

US					China				
Variable	**Sample**	**STD Diff**	**SD Ratio**	**% Diff**	**Variable**	**Sample**	**STD Diff**	**SD Ratio**	**% Diff**
age	Unmatched	-0.436	0.44		age	Unmatched	0.201	1.44	
	Matched	-0.005	0.62			Matched	-0.007	0.98	
male	Unmatched	-0.251	0.91		male	Unmatched	0.078	1.00	
	Matched	-0.042	0.98	-0.018		Matched	0.008	1.00	0.004
white	Unmatched	0.206	0.92		minority	Unmatched	-0.026	0.96	
	Matched	-0.021	1.01	-0.009		Matched	0.019	1.03	0.005
black	Unmatched	-0.147	0.79		party	Unmatched	0.112	1.14	
	Matched	0.049	1.13	0.010		Matched	-0.022	0.98	-0.008
hispanic	Unmatched	-0.145	0.78		m_social	Unmatched	0.045	1.07	
	Matched	-0.006	0.99	-0.001		Matched	0.019	1.03	0.006
asian	Unmatched	-0.014	0.97		m_natural	Unmatched	-0.03	0.96	
	Matched	-0.018	0.97	-0.004		Matched	0.007	1.01	0.003
m_social	Unmatched	0.121	1.05		m_business	Unmatched	0.060	1.06	
	Matched	-0.022	0.99	-0.010		Matched	-0.010	0.99	-0.004
m_natural	Unmatched	-0.042	0.96		m_health	Unmatched	-0.257	0.62	
	Matched	-0.004	1.00	-0.001		Matched	0.018	1.07	0.003
m_business	Unmatched	-0.027	0.97		m_engineer	Unmatched	-0.028	1.00	
	Matched	-0.004	1.00	-0.001		Matched	-0.012	1.00	-0.006
m_health	Unmatched	-0.214	0.80		m_other	Unmatched	-0.063	0.81	
	Matched	-0.042	0.94	-0.011		Matched	-0.018	0.93	-0.002
m_engineer	Unmatched	-0.060	0.91		onlychild	Unmatched	0.307	0.95	
	Matched	-0.005	0.99	-0.001		Matched	-0.006	1.00	-0.002
m_other	Unmatched	-0.168	0.75		urban	Unmatched	0.238	0.98	
	Matched	-0.028	0.94	-0.005		Matched	-0.009	1.00	-0.005
ft	Unmatched	0.062	0.92		fabaplus	Unmatched	0.251	1.24	
	Matched	-0.018	1.03	-0.005		Matched	0.024	1.01	0.011
trans	Unmatched	-0.376	0.79		mobaplus	Unmatched	0.269	1.36	
	Matched	0.000	1.00	0.000		Matched	0.027	1.02	0.011
dorm	Unmatched	-0.212	0.94		large	Unmatched	-0.079	0.96	
	Matched	-0.021	0.99	-0.010		Matched	-0.005	1.00	-0.002
first	Unmatched	-0.318	0.90		medium	Unmatched	0.086	0.99	
	Matched	0.003	1.00	0.001		Matched	0.012	1.00	0.006
pedu_cl	Unmatched	-0.103	1.00		inst_985	Unmatched	0.023	1.02	
	Matched	-0.011	1.00	-0.005		Matched	0.022	1.02	0.009
pedu_gs	Unmatched	0.274	1.08		inst_211	Unmatched	-0.009	0.99	
	Matched	0.013	1.00	0.007		Matched	-0.014	0.99	-0.006
pri	Unmatched	0.196	1.02		inst_univ	Unmatched	-0.091	0.99	
	Matched	-0.003	1	-0.001		Matched	0.003	1	0.002
medium	Unmatched	0.045	1.03		munici	Unmatched	0.124	1.03	
	Matched	0.053	1.04	0.023		Matched	0.007	1.00	0.004
large	Unmatched	-0.060	0.99						
	Matched	-0.048	0.99	-0.024					
r_neweng	Unmatched	-0.050	0.91						
	Matched	0.032	1.08	0.006					

The Incidence and Influencing Factors of College Student Term-time Working in China

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As the labor market pressure for college graduates keeps rising in the past decade, working while attending college becomes increasingly popular among undergraduate students in China. With a nationally representative dataset of 6,977 students from 49 institutions, this study examines the incidence and influencing factors on undergraduate student term-time working in four-year universities and colleges in China. Overall, the paper finds that: 1) 63% of undergraduate students work for about 23 hours per week in academic semesters for an average of 5.7 months in college; 2) student term-time working pattern (i.e. participation, length, and intensity) differs across forms of work, and varies by types of institution; 3) students' non-academic ability, financial constraint, and institutional environment jointly influence the participation and intensity of term-time working. The findings provide implications to policies regarding financial and developmental support to undergraduate students.

Introduction

After 18 years of rapid expansion, the Chinese higher education system has become the largest in the world, with more than 41.4 million students in over 2,800 institutions in the year of 2015.[1] Along with the enrollment expansion is the changing environment faced by college students. Before the reform of higher education in 1999, the cost of attending college was kept low through government subsidies, and college graduates were like "hotcakes" on the job market. As the expansion went on, a significant number of students from low-income families entered college. At the same time, tuition and fees charged by higher education institution (HEIs) increased significantly (Bai, 2006; Yu, 2010). Though the Chinese Ministry of Education (MoE) carried out new financial aid policies aiming at providing sufficient financial support to all low-income college students, the forms of financial aid had changed from mostly grants and scholarships to a combination of grants, scholarships, work-study compensations, and subsidized student loans (Yu, 2010). As the number of college graduates started to increase since 2003, the job market competition kept leveling up. According to a bi-annual national survey, the first employment rate of

[1] Source: http://www.moe.edu.cn/s78/A03/moe_560/jytjsj_2015/2015_qg/201610/t20161011_284371.html

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bachelor degree holders decreased from 75.7% in the year of 2003 to 68.7% in the year of 2011(Yue, 2012).[2]

Under these circumstances, more and more undergraduate students actively seek work opportunities while enrolled in college. Though there are no official statistics from the MoE, this trend is documented by empirical studies in various regions in China. The percentage of students who worked during college has increased from about 20-30% in surveys conducted in 1999 (e.g., Li, 2000; Jun Li & Ma, 1999) to about 60-80% in recent datasets (e.g. Du, 2015; Ren, Guo, & Pan, 2013; B. Zhao & Qiao, 2014). In addition, the China College Student Survey (CCSS) 2016, a national-wide survey of 38 four-year colleges and universities, shows 64% of students have working experience during academic terms. Working while enrolled in college has become a prevalent activity among Chinese undergraduate students.

This raises an increasingly hot debate on the influence of student working. The proponents suggest that working provides students with both monetary compensations and opportunities to gain practical and social experience (e.g. G. Li, Zhao, & Huang, 2007; Tang & Wang, 2007; Wang, 2000, etc.). But the opponents argue working during academic terms reduces the time for studying, but provides little meaningful practical training because most of the jobs are low-skilled and labor-intensive ones (Chu, Yang, & Ma, 2010; Jiaheng Li, 2007; L. Li et al., 2011; Qian, 2011; Wang & Li, 2008; Zhao & Hao, 2010; Zhu, Li, & Xu, 2009). Though there is, so far, no consensus on whether term-time working is beneficial to students, it is suggested that at least off-campus intensive work (i.e., more than 20 hours per week) during term time is harmful to student academic performance (Furr, Elling, & Furr, 2000; Lundberg, 2004; Umbach, Padgett, & Pascarella, 2010; Wu & Zhong, 2012).

For HEIs to form up relevant policies regarding student working, it is necessary to understand the current situation and identify influencing factors of student term-time working. Specifically, this study examines two questions:

1. What is the incidence and characteristics of undergraduate student term-time working in four-year HEIs in China?

2. What are the factors influencing undergraduate students' term-time working decisions?

The first question is answered with a descriptive analysis of a nationally representative dataset. The second is answered by multiple regression analysis based on a comprehensive conceptual framework. The analysis is limited to four-year universities and colleges because three-year (vocational) colleges in China place a higher emphasis on

[2] The first employment rate refers to the percentage of college graduates who are offered a job or admitted to graduate schools by June 30th.

practical training, and student experience may be systematically different from that in four-year HEIs. The study provides an opportunity to understand students' college experience and financial need from a non-academic angle. The findings of this study will help HEIs better support college student development. It will also provide policy makers with evidence for the reform of higher education tuition and financial aid policies.

The key term, "term-time working" is defined as taking paid jobs during academic semesters. There are three general forms of paid jobs taken by students during term time in China. The first is on-campus work-study jobs provided by institutions. This is part of the financial aid system to support low-income students. Therefore, there is an income requirement to be eligible for work-study positions. The positions are usually labor intensive, such as librarians, student assistants, and so forth. The wages vary by positions and institutions but usually are just above the minimum wage standard.

The second form is part-time jobs offered by employers outside one's institution. These jobs are usually temporary and uncontracted positions. Most jobs are labor-intensive, such as sales man, waiters/waitresses, and so forth; a few are knowledge-intensive, such as private tutors, designers, language interpreters, and so forth. Job locations and wages vary by the nature of jobs. There is usually no institutional requirement or restriction on taking part-time jobs. Students have the freedom to decide whether and how much to work.

The third form of work occurs as internships. To differentiate from the second form, internships in this study refer to formally contracted positions related to students' academic majors and career development. Most HEIs require students to take internships before graduation. Some even have agreements with employers to arrange internships for students. But most institution-arranged internships are unpaid and take place during the summer breaks or in the last semester of college. Therefore, they are not included in this study. What is included is paid internships obtained through personal channels. Most of these jobs are off-campus and require the full-time attendance of several work days.

As summarized in Table 1, the three forms of term-time work have different features with regards to the job nature, location, eligibility requirement, flexibility of schedule, and wage level. Students who take any of the three forms of jobs during term time are referred to as "term-time working students". In the rest of the paper, I first review previous studies in China, then present a theoretical framework on determinants of student term-time working decision, discuss the method and data, describe the results, and finally conclude with a discussion on the findings.

Table 1. Characteristics of Different Forms of Term-time Work

	Work-study Jobs	Part-time Jobs	Internships
Formal/informal	Formal	Usually informal	Usually formal
Type of job	Labor-intensive	Varies, but mostly labor-intensive	Mostly knowledge intensive
Location	On-campus	Mostly off-campus	Mostly off-campus
Eligibility	Low-income students	No	No
Schedule	No full-time attendance requirement; Flexible schedule.	Varies; but usually no full-time attendance requirement; Flexible schedule.	Usually require full-time attendance of several working days
Wage level	Relatively low	Varies	Varies

Literature Review

Previous empirical studies provide some evidence on the situation of in-college working in China based on institutional student surveys. They summarize the characteristics of jobs, attitudes and motives of working students, and students' perceptions on gains and losses from working. With regards to the influencing factors of student term-time working, only a few studies have conducted examinations with regression analysis. Using data on marketing majored students in an HEI, Jing, Lv, and Sun (2010) find that parental attitudes towards part-time working and whether taking student leadership positions in college were positively correlated with the part-time working decision. Zhao & Qiao (2014) use a dataset of 6 HEIs in Jiangsu Province and find that students' gender, grade, family income, financial aid, and origins were all significantly correlated with their part-time working decisions. Other studies summarize the reasons and motives for students to work. They find that the primary two reasons are to gain social and work experience and to earn monetary compensation (Cheng & Wang, 2010; Chu et al., 2010; Deng, Zhang, Yang, Pang, & Xiao, 2004; Du, 2015; Jing, Wu, & Zhao, 2005; Jiaheng Li, 2007; Li, 2011; Li & Ni, 2006; Ma, 2012; Qian, 2011; Wang, 2010; Yuan, Ren, & Ouyang, 2009; Zhang & Wu, 2008; Zhao & Hao, 2010; Zhu et al., 2009). Other incentives for part-time work include to spend spare time, to make friends, and to follow what other students do (Chu et al., 2010; Jing et al., 2005; Li et al., 2011; Ma, 2012; Wang, 2010; Zhang & Wu, 2008). These findings imply that students' financial need, eagerness to improve labor market competitiveness, time constraints, and peers' influence may be additional factors influencing decisions for term-time working.

There are some knowledge gaps in the current Chinese literature. First, most previous studies are descriptive summaries of survey questions. The two studies using regression analysis only examine the influence of a few factors. There is still a need to examine the influencing factors based on a comprehensive theoretical framework. Second, previous studies are based on data collected from a single or a limited number of institutions. Few studies use regional data (T. Li, 2011; B. Zhao & Qiao, 2014). National data has not been used. It is necessary to learn about the situation of college student term-time working

nationally. Third, few studies have explicitly distinguished between working during term time and during summer and winter breaks. Under different time constraints in the academic semester and on breaks, students' incentives to work, gain working experience, and benefits from working may all be different. There are two recent studies focusing on jobs taking in academic semesters, but only concentrated on part-time jobs (Du, 2015; B. Zhao & Qiao, 2014). This paper attempts to fill the knowledge gaps with quantitate analysis on a nationally representative dataset.

Theoretical Framework

Students' decision on whether and how much to work in academic terms is in the nature of the allocation of time for studying and working. The decision process can be modeled with the Human Capital theory which describes individuals' time allocation between schooling and work. The classical model (Becker, 1993; Mincer, 1974) divides individuals' lifetime into two periods: a period of full-time schooling and a period of full-time work in the labor market. People decide the length of the first period to maximize their lifetime income. Scott-Clayton (2012) suggests two circumstances in which people may choose to work part-time in a schooling period. The first is when there is a credit constraint and individuals cannot borrow enough to pay for college. Working during term time is the only way for them to continue schooling. The second is when students expect valuable human capital gains from term-time working. Assuming a diminishing rate of return to time spent on a specific activity (i.e., study/work), students would benefit from allocating time on more than one activity.

Combining the two circumstances, Scott-Clayton (2012) proposes an empirical model to describe students' time allocation decision:

$$w_1(a) + \beta\, r^w\, \frac{\partial g(h_w; a, Q^w)}{\partial h_w} = \beta\, r^s\, \frac{\partial f(h_s; a, Q^s)}{\partial h_s} \quad (1)$$

where functions *g()* and *f()* are the production functions of work- and school-related human capital. The accumulated human capital from a specific activity is determined by the amount of time spent on that activity (h_s and h_w), individual's innate ability (a), and the quality of that activity ($Q^s$and Q^w). r^w and r^s represent the rates of return to work- and school-related human capital in the labor market. β represents the market and personal discount rate. The left-hand side of Equation (1) represents the marginal benefit of one additional hour on working. It equals to the current income return to that additional hour (i.e., $w_1(a)$) plus the present value of future income returns to work-related human capital gained from that additional hour (i.e., $\beta^*\ r^w * \frac{\partial g(h_w; a, Q^w)}{\partial h_w}$). The right-hand side of the equation represents the marginal benefit of one additional hour on studying, which is the present value of future income returns to school-related human capital gained from that hour. Assuming that $\frac{\partial g}{\partial h_w}$ and $\frac{\partial f}{\partial h_s}$ are decreasing and that r^w is not equal to r^s, rational students would stop spending more hours on term-time working when the marginal

benefit of spending an addition hour on working equals to the marginal benefit of spending that hour on studying.

This equation suggests four categories of factors that may influence students' term-time working decisions. The first is related to students' financial constraint while attending college. The income from term-time working represented by $w_1(a)$ can be considered as the monetary opportunity cost for students to spend an additional hour on studying. Assuming zero present value of future income returns to term-time working, a student will not work if the opportunity cost is affordable; or in other words, if he/she is not under a financial constraint while attending college. Students' financial constraint is determined by the cost and expenses of attending college (i.e., tuition and fees, basic living expenses, and other consumptions to maintain a certain lifestyle, etc.) and the amount of available funding from sources other than personal work income (i.e., personal savings, family/parents support, grants/scholarships, loans, etc.). From this vein, students' term-time working decision would be influenced by institutional characteristics that determine the direct cost of attending college and the amount of financial aid, and by family background that influence the amount of parental support and expected consumption level.

The second category is related to students' inclination to work. As shown in Equation 1, students may spend more time on working if they perceive more gaining from term-time jobs than school courses. The production functions $g()$ and $f()$ suggest that students' attitudes towards study and work, innate ability, education quality provided by institution, and the quality of work experience may all influence students' term-time working decision.

The third category is the local labor market condition that determines work opportunities available to college students during term time. The amount, types, and wage level of jobs influence both the income from term-time working (i.e., $w_1(a)$) and the potential human capital gains.

In summary, from the lens of Human Capital theory, college students' term-time working decision may be influenced by personal ability and attitude, family background, institutional characteristics, and jobs available during term time. This model is supported by previous empirical studies in the U.S. (DesJardins, McCall, Ott, & Kim, 2010; Kalenkoski & Pabilonia, 2008; Titus, 2010) as well as studies in China summarized in the last section.

Methodology

Data and sample The data used in this paper is from the College Student Labor Market Survey (CSLM) conducted by Tsinghua University in the year of 2011.[3] The CSLM is an

[3] The CSLM survey is also called "Follow-up Survey of College Graduates in China".

annual survey on undergraduate students who are graduating in the year of the survey. It collects information on individual characteristics, family background, pre-college experience, college activities, and financial situation during college, working experiences during college, and placement after graduation. The questionnaires are distributed in late May and June, about one month before the commencement in most Chinese universities.

In 2011, the Tsinghua survey team constructed a national representative sample with a multi-stage random sampling strategy. First, the team randomly sampled HEIs by geographic region (Municipalities (i.e., Beijing, Shanghai, and Tianjin), Northeast area, East area, Central area, and West area) and by institution type (Project 985 and Project 211 HEIs (the elite HEIs), public non-elite four-year HEIs, vocational (three-year) colleges, and independent (private) colleges).[4] Second, in each HEI, about 200 to 400 students in the graduating class were randomly drawn based on their student ID. In all, 8,179 students in 50 institutions participated in the 2011 survey. The average responding rate was about 74%.

As this study focused on students in four-year HEIs, the only vocational college with 180 students was dropped. Furthermore, the sample was restricted to students in Cohort 2007 (i.e., students entered college in 2007) to eliminate cohort-level differences. The final analytic sample contained 6, 977 students in 49 institutions. Among the institutions, 13 were from the three municipalities, 5 from the northeastern region, 8 from the eastern region, 11 from the central region, and 12 from the western region. With regards to institution types, there were 8 universities in the Project 985, another 16 universities in the Project 211, 23 non-elite public HEIs, and 2 independent colleges. The Tsinghua survey team purposefully over-sampled the elite universities. But they provided sampling weights based on the sampling scheme to ensure national representativeness of the data.

Empirical Models Based on the theoretical framework, I constructed the following empirical models to examine factors influencing student term-time working participation and intensity:

$$\Pr(W_i=1) = \alpha_0 + \alpha_1 Fin_i + \alpha_2 Ind_i + \alpha_3 Edu_i + \alpha_4 Job_i + \alpha_5 X_i + \varepsilon_i \qquad \text{Model (1)}$$

$$Hour_i = \beta_0 + \beta_1 Fin_i + \beta_2 Ind_i + \beta_3 Edu_i + \beta_4 Job_i + \beta_5 X_i + \varepsilon_i \qquad \text{Model (2)}$$

[4] The Project 985 and Project 211 were launched by the Chinese Minister of Education in late 1990s to promote the building of world-class universities in China. The Project 211 consisted of 112 universities, 39 of which were selected to the Project 985. All of these universities were research universities awarding bachelor and above level of degrees. They received additional financial support from the central government. Though the two projects were terminated by MoE in 2016, the 112 universities are still considered to be the elite universities in China, and those in the Project 985 are considered to be the best. For more information, please refer to http://www.chinaeducenter.com/en/cedu/ceduproject211.php. Independent colleges are financed and operated by the private sector but affiliated to a public university. They only offer associate and bachelor degrees. The tuition charged by independent colleges is higher than the public institutions.

The dependent variable in Model (1), W_i , indicates whether the student participated in term-time working (i.e., the participation). The dependent variable in Model (2), $Hour_i$, is the number of hours spent on working per week (i.e., the intensity). Fin_i, Ind_i, Edu_i, and Job_i represent financial constraint, individual attitude and ability, education quality, and term-time labor market conditions respectively. X_i is the demographic covariates including gender, age, ethnicity, and academic major.

The key explanatory variables are the four categories of influencing factors suggested by the theoretical framework. They are measured with available information in the CSLM survey. Table 2 presents the measures/indices of the factors, along with the descriptive statistics. To be noted, there is no direct measure of labor market conditions during term time in the CSLM data. The models use the regions of institution, location of campus, and the percentage of low-SES students in the institution as indirect measures of job availability. In addition, the popularity of term-time working in the institution (i.e., the percentage of term-time working students)[5] is included as an index of the overall institutional environment to working students.

Model 1 is estimated with Probit regression[6] on the entire analytic sample, and Model 2 with Ordinal Least Square (OLS) regression on the sample of working students. In addition, observations with a value above the 97.5 percentile of intensity are excluded when estimating Model (2) to eliminate the influence of outliers. Sampling weights are applied in all regressions to maintain national representativeness. Standard errors are clustered at institutional level to adjust for the nested data structure. Missing values in explanatory variables are treated with the Dummy Flag method.

As a check of multi-collinearity between explanatory variables, I first examine the Pearson's correlation coefficients between explanatory variables (not presented in paper because of page limitation). Overall, most of the correlation coefficients are below .3. But the correlations between the amount and type of financial aid and between whether from rural area and SES score are relatively high (r = .685 and -.619 respectively). I then examine the Variation Inflation Factor (VIF) after regressions. The VIFs of all individual variables, including the pairs of variables with relatively high correlations, are below 5. The overall VIFs of the models are below 2. In sum, the analysis suggests that the multi-collinearity between explanatory variables is not severe. The CSLM data is cross-sectional but not longitudinal, meaning, the regression coefficients only represent the associations between the factors and student term-time working, but not the causal impacts of the factors.

[5] To rule out the possibility of reverse causation, the percentage of term-time working students is calculated based on the larger sample, i.e. the sample with students in both Cohort 2007 and other cohorts (sample size=8,179).

[6] Probit regression is a way to estimate models with binary dependent variable using the standard maximum likelihood procedure. The error term is assumed to follow the standard normal distribution.

Table 2. Descriptive Statistics of Explanatory Variables

Factor	Measure / Index	M (SD)	Missing rate (%)
Category 1: Financial constraint			
Financial burden	Ratio of tuition to household income	0.23 (0.23)	18.26
Funding	Total financial aid (in RMB)	2266.73 (2409.46)	3.55
	Family fund (in RMB)	9412.62 (5826.81)	18.55
Source of funding	Had merit aid (Yes=1) (%)	34.13	0
	Had need aid (Yes=1) (%)	21.09	0
	Had loan (Yes=1) (%)	27.92	2.85
Family background	Single child (Yes=1) (%)	36.38	1.10
	Rural (Yes=1) (%)	43.15	0.32
	SES score (constructed)	-0.15 (0.97)	22.33
Category 2: Individual ability and attitude			
Academic ability	NCEE score (rescaled to 1~100)	70.41 (7.88)	12.05
Non-academic ability	Student leader in high school (Yes=1) (%)	41.62	0
Attitude on work	Ever worked in high school (Yes=1) (%)	3.05	0
Attitude on studying	Attitude towards major (%)	2.67 (0.80)	2.52
Category 3: Education quality			
HEI Type (%)	Project 985 HEIs	6.65	0
	Project 211 HEIs [a]	12.28	
	Public non-elite HEIs	69.72	
	Independent colleges	11.44	
HEI concentration	Comprehensive HEIs (%)	22.18	0
	Engineering-concentrated HEIs (%)	43.34	0
	HEIs in other concentrations (%)	34.48	
Category 4: Term-time labor market conditions			
HEI environment	% of term-time working students	0.59 (0.15)	0
	% of low-income students	0.24 (0.11)	0
HEI location (%)	Municipalities	14.48	0
	East	41.70	
	Central/West	44.82	
Campus location (%)	Urban	66.66	0
	Suburban	33.34	
Covariates: Demographic background			
Age	Age	22.99 (1.00)	2.11
Gender	Female=1 (%)	47.27	0.46
Race	Minority=1 (%)	5.25	0.95
Major	STEM majors (%)	54.61	0.21
	Economic & business major (%)	16.94	
	Other majors (%)	28.24	

Note: Sample size=6,977; sampling weights applied. Institutions in both the "985" & "211" Projects are not included in this category.

Empirical Results

Incidence and Pattern of Term-time Working The nationally representative CSLM 2011 data shows that 62.7% of undergraduate students in China's four-year colleges and universities have term-time working experience. As presented in Table 3, by the time of graduation, they on average have accumulated a total of 5.7-month work experience during academic semesters. This is about one month longer than a regular academic semester in China. When students participate in term-time working, they, on average, work for about 22.7 hours per week, which can be considered a heavy workload according to the U.S. studies.

With regards to the forms of work, the participating rate in work-study jobs, part-time jobs, and internships is 19.98%, 35.05%, and 36.73% respectively. In addition, about 28.60% of working students have taken two forms of work, and about 9% have taken all three forms. The participating pattern varies across work forms. As shown in Table 3, students taking work-study jobs work for a relatively longer period (5.6 months) but less intensively (13.0 hours per week). Those taking internships work more intensively (31.8 hours per week) but for a shorter period (3.0 months). The data also reveals a trend of change in work forms as students go into senior grades. About 76% of work-study jobs and 65% of part-time jobs are taken in the first two years, and about 79% of internships are taken in the last two years. As internships are more demanding and major-relevant than work-study and part-time jobs, such a trend implies a shift from low-skilled to high-skilled jobs as students enter their final years in college.

The incidence and pattern of term-time working varies across the types of HEIs. As shown in Table 3, the overall participating rate is lower in elite universities than in public non-elite universities, and it is lowest in independent colleges. Yet the overall average length and intensity do not differ much across types. Specifically, elite universities have a higher participating rate in work-study jobs than non-elite universities (23% vs. 19%). Students in elite universities work for a longer time (about 7 months vs. less than 5 months) but slightly less intensively (about 10-13 hours per week vs. 13.5-14 hours per week) than those in non-elite universities when taking work-study jobs. Public non-elite HEIs have the highest participating rate in part-time jobs and internships (about 40% vs. less than 34% in others for both), as well as the highest length and intensity of part-time jobs (4.7 months vs. fewer than 4 months in others; 18 hours per week vs. no more than 17 hours per week in others). Independent colleges have the lowest participating rate in part-time jobs and internships (14.8% and 26.0% respectively). Yet comparing to those taking the same form of work in other institutions, students in independent colleges work for the longest time when taking internships (3.2 months), and work most intensively when having work-study jobs (14 hours per week).

Table 3. Undergraduate Students' Term-time Working Participation in China

	Overall	Work-study	Part-time job	Internships
Whole sample				
Incidence (%)	62.74	19.98	35.05	36.73
Length (*M*/*SD*)	5.67 (5.91)	5.57 (6.01)	4.45 (5.36)	2.95 (2.66)
Intensity (M/SD)	22.71 (15.53)	13.01 (12.23)	17.71 (14.82)	31.80 (15.65)
Project 985 HEIs				
Incidence (%)	60.29	23.39	33.12	29.52
Length (*M*/*SD*)	5.73 (6.42)	7.07 (7.37)	3.94 (5.85)	2.34 (2.25)
Intensity (*M*/*SD*)	20.6 (15.09)	12.85 (12.98)	16.74 (14.77)	31.15 (14.65)
Project 211 HEIs				
Incidence (%)	59.99	24.35	32.41	30.39
Length (*M*/*SD*)	6.19 (6.76)	7.35 (7.66)	3.90 (4.89)	3.07 (3.06)
Intensity (*M*/*SD*)	20.36 (15.41)	10.29 (11.08)	15.69 (14.48)	31.54 (15.25)
Public non-elite HEIs				
Incidence (%)	65.99	19.02	39.02	40.29
Length (*M*/*SD*)	5.71 (5.85)	5.20 (5.55)	4.66 (5.51)	2.94 (2.60)
Intensity (*M*/*SD*)	23.46 (15.50)	13.48 (12.66)	18.14 (14.95)	32.36 (15.47)
Independent colleges				
Incidence (%)	47.31	19.16	14.8	25.98
Length (*M*/*SD*)	4.57 (4.52)	4.23 (3.94)	2.94 (2.46)	3.24 (2.95)
Intensity (*M*/*SD*)	21.10 (15.84)	14.04 (10.00)	17.09 (13.46)	26.53 (18.12)
Incidence by HEI concentration (%)				
Comprehensive	62.5	19.91	34.61	36.03
Engineering	52.55	15.47	27.76	28.07
Other concentration	75.71	25.69	44.49	48.07
Incidence by region (%)				
Municipality	62.06	14.99	29.59	41.85
East	71.49	22.22	40.6	37.33
Central & West	71.69	19.52	47.02	34.49
Incidence by campus location (%)				
Urban area	64.04	21.52	37.59	36.43
Suburban	60.14	16.9	29.98	37.32

Note: Sample size=6,977; Sampling weights applied.

The incidence of term-time working also varies by institution's disciplinary concentrations and locations.[7] Engineering institutions have a lower participating rate than comprehensive universities in all three forms of work, while institutions with other concentrations have more. With regards to location, institutions in municipalities have the lowest overall participating rate, but the highest internship participating rate. Institutions in urban areas have a higher participating rate in work-study and part-time jobs than institutions in suburban areas.

[7] There is no clear difference across institution concentrations and locations with regards to the length and intensity. Therefore, the descriptive statistics are not reported in this section for page limitation.

To examine factors influencing students' participation and intensity of different forms of term-time working, Model 1 and Model 2 are estimated on overall term-time working, work-study jobs, part-time jobs, and internships respectively.[8] Results are presented in Table 4.

Financial constraint. As shown in Columns (1) to (4) in the table, students' term-time working participation is strongly correlated with the financial constraint measures. First, holding other things constant, the financial burden of attending college measured by the ratio of tuition to household income is statistically significantly and positively associated with the likelihood to participate in term-time working. But the significant association is only found for work-study jobs. Second, having need-based aid is statistically significantly associated with a higher likelihood to take work-study jobs. Having loans is positively associated with a higher likelihood to participate in all three forms of work. Third, students from rural area and low-SES families are statistically more likely than other students to take work-study jobs. Students with siblings participate significantly more in part-time jobs and internships. The other variables, including the amount of family funding, the amount of financial aid, and having merit aid have no significant associations with the participation in any form of term-time working. The financial constraint measures, however, have limited influence on the intensity of term-time working. As shown in Columns (6) and (8), the intensity of work-study jobs and internships is not correlated with any of the measures. The intensity of part-time jobs is positively associated to having need-based aid, but negatively associated to family SES score and being from rural area.

Individual characteristics. The results show that students' academic ability measured by standardized NCEE score is significantly, negatively associated with overall probability and intensity of term-time working, but their non-academic ability (measured by being a student leader in senior high school) is positively associated with participation in all three forms of work, though association with work intensity is not statistically significant. Students' attitude toward working shows no significant correlation with the participation and intensity of working in college. But their attitude towards their academic major is found to be significantly associated with the participation in part-time jobs (negative) and the length of work-study jobs (positive). The results also show that female, older, and Han students are more likely to take part-time jobs during term time. Female students are also more likely to take internships and work more intensively than males. Students in STEM majors are overall less likely to work, but they work more intensively in internships. Students in economics and business majors also work more intensively in internships.

[8] A caveat is that, when examining the participation in different forms of term-time work, I do not intent to model the choice between the forms for three reasons: 1) students may take more than one form of work, and about 36% of students in the CSLM 2011 sample did so; 2) the choices do not satisfy the Independence of Irrelevant Alternatives (IIA) assumption; 3) not all students are exposed to the same set of choices (for instance, work-study positions is only available to eligible students). The assumptions of multinomial analysis are therefore not satisfied.

Table 4. Regression Estimates on Influencing Factors of Term-time Working.

	Participation				Intensity			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Overall	Work-study	Part-time	Internship	Overall	Work-study	Part-time	Internship
	M.E. (s.e.)	M.E. (s.e.)	M.E. (s.e.)	M.E. (s.e.)	b (s.e.)	b (s.e.)	b (s.e.)	b (s.e.)
Financial constraint								
Tuition as % of income	0.10*	0.12*	0.0063	-0.044	-1.11	-0.28	-2.09	2.21
	(0.041)	(0.056)	(0.047)	(0.050)	(1.16)	(1.12)	(2.54)	(2.49)
Total family funding (log)	0.0052	-0.0098	-0.0091	-0.0064	0.79	0.18	1.22	0.16
	(0.018)	(0.017)	(0.017)	(0.013)	(0.83)	(0.58)	(0.90)	(0.71)
Total financial aid (log)	0.012***	0.0067	0.0094	0.012	-0.13	-0.37	-0.39	0.041
	(0.0029)	(0.0047)	(0.0053)	(0.0091)	(0.16)	(0.30)	(0.24)	(0.25)
Has merit aid	0.0074	0.028	0.0080	-0.019	-0.084	1.00	0.25	0.43
	(0.018)	(0.016)	(0.021)	(0.034)	(1.10)	(1.28)	(0.96)	(2.37)
Has need aid	0.014	0.075**	0.021	-0.028	0.23	1.67	3.98**	1.04
	(0.035)	(0.029)	(0.030)	(0.057)	(0.85)	(1.30)	(1.18)	(0.89)
Has loan	0.085***	0.086***	0.092***	0.049*	-2.21*	-0.76	-1.73	-1.68
	(0.019)	(0.014)	(0.021)	(0.024)	(0.88)	(0.52)	(1.17)	(1.04)
Rural	0.065**	0.043*	0.041	-0.0024	-1.06	-0.18	-2.07*	1.06
	(0.024)	(0.020)	(0.030)	(0.039)	(0.64)	(1.21)	(1.00)	(0.71)
SES score	0.0016	-0.030**	-0.030	0.016	0.23	0.21	-1.36*	-0.53
	(0.016)	(0.0094)	(0.016)	(0.015)	(0.37)	(0.55)	(0.59)	(0.63)
Single child	-0.088***	-0.0037	-0.082***	-0.075**	-0.24	1.38	-1.52	1.14
	(0.017)	(0.016)	(0.024)	(0.023)	(0.85)	(1.75)	(1.36)	(1.34)
Individual ability and attitude								
NCEE score (std.)	-0.039***	-0.0016	-0.016	-0.050***	-0.86*	-0.31	-0.63	0.31
	(0.011)	(0.011)	(0.010)	(0.014)	(0.35)	(0.37)	(0.56)	(0.45)
HS student leader	0.032*	0.063***	0.030*	0.034**	-0.60	-0.33	0.12	-0.68
	(0.016)	(0.015)	(0.013)	(0.013)	(0.67)	(0.68)	(0.95)	(0.93)
Worked in HS	-0.054	-0.024	-0.031	-0.043	-0.99	-0.70	2.22	-3.04
	(0.049)	(0.033)	(0.056)	(0.042)	(1.67)	(2.41)	(2.55)	(3.30)

Attitude on major	-0.018	0.0029	-0.026**	-0.011	-0.14	1.33**	-0.85	-0.40
	(0.0097)	(0.0065)	(0.0094)	(0.014)	(0.34)	(0.46)	(0.43)	(0.46)
Institutional characteristics								
Inst. Type (ref.: public non-elite HEIs)								
Project 985	-0.043*	0.059	-0.066*	-0.075**	-2.21*	-2.10	-2.24*	-0.92
	(0.021)	(0.050)	(0.030)	(0.027)	(0.86)	(1.31)	(1.09)	(1.60)
Project 211	0.0052	0.13***	0.0096	-0.060*	-4.15***	-3.44**	-4.80***	-1.66
	(0.019)	(0.032)	(0.023)	(0.029)	(0.93)	(1.03)	(0.98)	(1.26)
Independent college	-0.033	0.043	-0.21***	0.012	0.30	2.00	2.41**	-5.20**
	(0.034)	(0.071)	(0.039)	(0.075)	(1.37)	(1.50)	(0.85)	(1.62)
Inst. Concentration (ref.: HEIs in other concentration)								
Comprehensive HEI	-0.0049	0.0018	0.049	-0.018	0.63	1.63	1.62*	-0.029
	(0.023)	(0.032)	(0.026)	(0.039)	(0.72)	(1.05)	(0.71)	(1.14)
HEI in engineering	-0.048*	-0.011	0.020	-0.072	-0.61	-0.74	0.62	0.16
	(0.024)	(0.029)	(0.027)	(0.041)	(0.97)	(1.29)	(0.88)	(1.28)
% of term-time working	0.0066***	0.0035***	0.0062***	0.0041***	0.0075	0.035	-0.019	0.14**
students	-0.00057	(0.00094)	(0.0011)		(0.029)	(0.045)	(0.025)	(0.045)
% of low-SES students	-0.0023	-0.0034***	-0.0066**	0.00079	0.18***	0.0011	0.18***	-0.055
	(0.0012)	(0.0010)	(0.0024)	(0.0017)	(0.041)	(0.032)	(0.028)	(0.045)
Inst. Location (ref.: HEIs in East region)								
HEIs in Municipalities	-0.0058	-0.083**	-0.058	0.100*	5.87***	1.88	6.27***	1.41
	(0.026)	(0.026)	(0.044)	(0.050)	(1.03)	(1.28)	(0.93)	(1.56)
HEIs in Central/West	-0.061***	-0.073**	0.018	-0.022	1.43	2.77**	1.61*	2.28*
	(0.015)	(0.023)	(0.023)	(0.036)	(0.73)	(0.85)	(0.63)	(0.95)
Suburban campus vs. urban	-0.026	-0.032	-0.098***	0.052	2.66***	0.47	2.38***	1.01
	(0.015)	(0.019)	(0.027)	(0.028)	(0.72)	(0.99)	(0.62)	(1.14)
Covariates								
Age	0.013*	0.010	0.042*	-0.0038	-0.50	0.19	-0.71	0.36
	(0.0066)	(0.0070)	(0.018)	(0.011)	(0.56)	(0.63)	(0.54)	(0.84)
Female	0.086***	-0.0057	0.11***	0.039*	0.52	-0.35	0.82	2.20*
	(0.016)	(0.027)	(0.018)	(0.018)	(0.64)	(0.96)	(0.86)	(0.88)

Minority	-0.077**	-0.030	-0.091**	-0.051	0.63	3.09	1.29	-0.14
	(0.026)	(0.024)	(0.031)	(0.034)	(1.81)	(1.78)	(1.60)	(2.73)
Stem major	-0.060*	0.0082	-0.046	-0.085	-0.63	-0.99	-1.29	4.53*
	(0.030)	(0.024)	(0.026)	(0.050)	(0.85)	(1.16)	(0.83)	(1.69)
Econ & business major	-0.032	0.030	-0.054	0.031	3.51**	-0.12	1.41	6.73***
	(0.036)	(0.027)	(0.038)	(0.046)	(1.12)	(1.54)	(1.33)	(1.71)
No. of obs.	6262	6251	6251	6251	3693	1185	1893	1889
F					129.6	138.2	110.1	116.8
R-squared [a]	0.17	0.12	0.13	0.079	0.085	0.11	0.085	0.080

Note: 1) M.E. stands for marginal effects of Probit models; 2) Sampling weights applied and standard errors clustered at institution level; 3) Robust errors are in parentheses; 4) Missing dummies included in all regressions; 5) * p<0.05, ** p<0.01, *** p<0.001. a. Pseudo R-squared for Probit regressions.

Institutional characteristics. As shown by the descriptive results in previous section, the incidence and pattern of term-time working varies across institution types. The regressions reveal that, after controlling for students' financial constraint and personal factors, institutional characteristics still have strong associations with students' term-time working behavior.

First, institution type is significantly associated with the likelihood and intensity of individual students to work during term time. Comparing with public non-elite HEIs, attending elite universities is in general associated with a lower likelihood to take part-time jobs and internships, but a higher likelihood to take work-study jobs. It is also associated with fewer hours spent on working per week in general.

Second, institution location still matters. Comparing to the east region, attending HEIs in municipalities is significantly associated with a higher probability of taking term-time internship, more intensive participation in part-time jobs, but a lower probability to take work-study jobs. Attending HEIs in the central and west region is also associated with a lower probability of taking work-study jobs. But students in these institutions work significantly more intensively than those in the east region in all three forms of term-time jobs. In addition, studying in suburban campuses is associated with a significantly lower probability of taking part-time jobs. But when having the jobs, students in suburban campuses work more intensively than those in urban campuses.

Third, the regressions reveal institutional environments are significantly associated with term-time working participation. The prevalence of term-time working is positively associated with individuals' likelihood of participation in all three forms of term-time working. Specifically, the marginal effect is largest in the model for part-time jobs, indicating that students' participating in part-time jobs is more likely to be influenced by peers than their participating in work-study and internships. As for the percentage of low-income students on campus, it is surprising to find that the percentage is negatively associated with individual students' participation in work-study and part-time jobs. Assumedly, HEIs with more low-income students should have a higher percentage of working students. A possible explanation is that the competition for such jobs might be more severe in HEIs with higher percentages of low-income students, and therefore it is more difficult for students to obtain jobs.

Overall, the regression analyses reveal students' participating in term-time working are significantly associated with individual financial constraints, personal abilities, and institutional characteristics. However, the intensity of work is hardly associated with individual level factors, and varies mainly by institution characteristics.

Conclusions and Discussion

Using a nationally representative dataset collected through the CSLM 2011 survey, this study finds that about 62.7% of students in four-year universities and colleges in China

have working experiences during academic semesters. Students participate in term-time working for less than half a year, on average, throughout college, but work intensively when having a job (23 hours per week on average).

Comparing to the literature on college students working in China, students in this study work more intensively during term time. Previous studies found that students worked for less than 10 hours per week (Bao, Tao, Jiang, Wang, & Qi, 2010; Chen, Zhang, Ye, & Sun, 2005; Qian, 2011) . A possible reason for this difference might be that, previous studies did not specifically distinguish students' grade in college, while the CSLM sample contained only those in the graduating class. As students in the first two years in college have relatively heavier course load than those in the third and fourth year, they may not be able to spend too much time to work. Previous studies did reveal a trend of increasing intensity as students getting into senior years (Chen et al., 2005; Jun Li & Ma, 1999; L. Zhang, 2009; B. Zhao & Qiao, 2014; R. Zhao & Hao, 2010; Zhou & Chen, 2010). A similar trend is found in this study as well. The average number of hours spent on working per week is 14, 16.7, 20.6, and 24.8, respectively, in the first through fourth year in college. However, even in early years in college, students in this sample still spend more time per week on working than those in previous studies.

With regards to the forms of term-time working, the data shows that internships and part-time jobs are more popular than work-study jobs. This may be partly due to the fact that work-study positions are only available to low-income students. In addition, about one-third of working students in the CSLM sample take more than one form of work. This confirms the finding of Jing, Lv, and Sun (2010) that many working students have multiple working experiences. The data also indicates a trend of a shift from work-study and part-time jobs to internships as students go into senior grades. This is consistent with Chu et.al (2010) which finds that students in the junior and senior years are more likely to take high-skilled and major-relevant jobs than those in lower grades. As for the participating pattern, the findings suggest that work-study jobs last longer than part-time jobs and internships, while internships are more intensive than the other two forms of work. This partly explains the trend of increasing work intensity through grades.

The multiple regression analyses finds that only three variables have consistently shown significant coefficients in all participation models: that is, having loans for college, being student leaders in high school, and institutional prevalence of term-time working. This suggests that heavy financial burden, non-academic ability, and peer effects are the three major factors influencing students' decision on whether to work during term time. This finding is consistent with the theoretical hypotheses and previous studies. However, for

those who are involved in term-time working, the work intensity is hardly influenced by individual characteristics, especially for the intensity of work-study jobs and internships. Work-study jobs and internships are formal positions provided by institutions (i.e., HEIs and companies) rather than individuals. Therefore, students have relatively less bargaining power in determining the work intensity.

Furthermore, the findings on individual level factors suggest that it is the internally perceived financial pressure rather than the real shortage of funding that incentivizes students to work during term time. Evidence comes from three aspects. First, taking loans for college, as well as being eligible for need-based financial aid and work-study positions, indicates a lack of funding from personal sources. However, there is no direct evidence on the negative association between participation in term-time working and the total amount of family funding and financial aid. Secondly, the likelihood to participate in part-time jobs and internships is higher for students with siblings than for the "single child", but the likelihood of taking work-study jobs is not. Having siblings does not necessarily mean insufficient funding from parents in absolute amount—it does not make students more eligible for work-study positions. But it does imply less-than-full parental support, and therefore increases students' willingness to work for money on their own. Thirdly, it is found that females and students of older ages are more likely to participate in part-time work than their counterparts, but not more likely to take work-study jobs. This could be explained from the same vein that females and older students may perceive less funding from parents, or they are not willing to rely on parents for college. Another possible explanation is that these students may have higher consumption levels. Yet the pressure to maintain a self-chosen consumption level is also internally-imposed (Scott-Clayton, 2012).

As for institutional factors, the descriptive and regression analyses find that institution type, location, and environment are significantly associated with students' term-time working behaviors, even after controlling for individual level factors. But the association differs across forms of jobs. To interpret the findings, we need to take into account the nature of jobs, institutional characteristics, and student motives of working. As described in earlier sections, work-study jobs and most part-time jobs are similar in nature: they both are low-skilled and labor-intensive. The primary reason for students to take such jobs is to earn monetary compensations. Yet work-study positions are provided by institutions. Elite universities, with adequate funding from central and provincial governments, usually have well-designed work-study programs to support students' need of working. By contrast, public non-elite HEIs, which have less funding but a higher percentage of low-SES students, may not be able to provide sufficient work-study opportunities to

students in need. In this case, students who cannot obtain jobs on campus have to turn to off-campus part-time jobs for alternatives.

The participation in internships is another story. Students take internships in preparation for future work. As suggested by the theoretical framework, students in non-elite universities may perceive lower educational quality, and therefore participated more in internships. Yet an alternative explanation is that students' participation in internship is influenced by their graduation plan. In the CSLM sample, about 40% of students in Project 985 HEIs and 33% in Project 211 HEIs do not plan to enter the labor market after college, whereas nearly 80% of students in non-elite universities plan to work directly. It is reasonable that students in elite universities participate less in internships than those in non-elite universities. However, the graduation plan and internship participation are endogenous decisions: students' internship experience may alter their graduation plan. This cross-sectional dataset does not allow for a test on which this explanation is more plausible.

This paper contributes to the current literature in two ways: First, it provides a nation-level record on the incidence and status of term-time working in Chinese universities and colleges. Second, it examines the influencing factors of students' term-time working participation and intensity based on a comprehensive conceptual framework. The representativeness of the dataset makes the findings generalizable to most four-year HEIs in China. In addition, there are several limitations in this study. First, the CSLM is a retrospective cross-sectional survey. Besides the above-mentioned inability to make causal inference on the regression coefficients, the data collection method also raises a potential problem of measurement error in variables regarding pre-college experience and experience in the early years in college. Secondly, the measure of some factors, such as student ability, attitude, and education quality, might be inadequate with the current data. There is also a lack of information on some other important factors suggested by the theoretical framework, such as job and labor market characteristics during term time. The R-squared of the regression models are relatively small, suggesting that important factors influencing college students term-time working behaviors are omitted. Future studies could use longitudinal data in combination with multiple data sources to better model students' decision process. Qualitative studies may also be helpful in finding the other driving factors of student term-time working.

In summary, this study finds that students' term-time working behavior is jointly influenced by individual factors including perceived financial constraint and non-academic ability, and institutional environment including peer effects, institution quality,

and job availability. From policy perspective, the findings suggest that HEIs need take more responsibility to provide support and guidance to working students. Though the impact of term-time working on college outcomes is still under debate, many studies using quasi-experimental designs find significant negative impacts of term-time working hours on GPA (Dadgar, 2012; DeSimone, 2008; Kalenkoski & Pabilonia, 2008; Stinebrickner & Stinebrickner, 2003; Wenz & Yu, 2010). Intensive off-campus working is found to be especially detrimental (Furr et al., 2000; Lundberg, 2004; Umbach et al., 2010; Wu & Zhong, 2012). From this point, HEIs should improve and expand the institutional work-study program to retain students on campus. They should also offer students with guidance on how to balance study and work, how to choose high-quality jobs, and what to expect from term-time working. With regards to financial aid policies, it shows that taking loans distracts students from studying. Previous studies also find that loans negatively influence students' academic achievement (Huang, Yang, & Li, 2016). From this vein, HEIs should give more attention and academic support to student loan-takers. In addition, not only HEIs but also the whole higher education system needs to consider providing more scholarship, grants, and subsidies to students rather than loans.

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Did Better Colleges Bring Better Jobs? Estimating the Effects of College Quality on Initial Employment for College Graduates in China

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The unemployment problem of college students in China has drawn much attention from academics and society. Using the 2011 College Student Labor Market (CSLM) survey data from Tsinghua University, this paper estimated the effects of college quality on initial employment, including employment status and employment unit ownership for fresh college graduates. The propensity score matching method was employed to account for the potential endogeneity of elite college attendance. The empirical evidence suggested that students who attended Project 985 colleges were more likely to find jobs immediately after college graduation. Moreover, students graduated from Project 211 universities gained a competitive edge by entering into public working sectors, such as the government or state-owned enterprises (SOEs), compared with students from non-elite colleges. The results imply the students who graduated from non-elite universities faced labor market segmentation. They not only had obstacles in finding jobs, but also ended up in the secondary labor market.

Introduction

Over the past several years, unemployment has become a troubling issue for a considerable number of fresh college graduates and their families in China. Although this unemployment dilemma did not solely appear in China, it was more prominent in mainland China and drew much attention from academia and Chinese society. Several factors combined together may play dominant roles in explaining the sources of severe unemployment problems that lasted for years. First, the Chinese Central Government initiated the higher education expansion policy in 1999. The expansion began as an attempt to alleviate the economic crisis and became the fastest expansion in human history (Levin, 2010). The expansion sharply increased the unemployment rate among young

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college[1] graduates (S. Li, Whalley & Xing, 2014). Meanwhile, the economic downturn and staggered industry development greatly decreased the demand to absorb labor forces, especially those who newly entered the labor force with limited work experience and unguaranteed productivity(Bai, 2006). Moreover, the unified college course curriculum and low-quality university training that produced graduates with limited capacity gains and skill accumulation during their college education may deteriorate youth unemployment. Under these circumstances, finding employment immediately after college graduation has become a big challenge for many students, not to mention those who never predicted fierce initial job market competition and were seriously underprepared. Even for those who were lucky enough to locate jobs after college graduation, they may end up with secondary labor market jobs with unsecured future prospects and a low salary.

By weighing the costs and benefits of attending college, some senior high school students chose not to take the National College Entrance Examination (NCEE). For those who still wish to pursue higher education domestically, it is crucial for them to choose where to attend a university. Therefore, admission into better–quality universities is viewed as the path to ensure college returns for human capital investment. However, there is limited empirical evidence in China that estimates the impact of college quality on initial employment. In addition, it is essential for higher education institutions (HEIs) to clarify the impact of college quality on fresh graduates' employment, and to improve institutional effectiveness and efficiency. In addition, obtaining an answer to the research question of whether attending better colleges brought better jobs would be illuminating for higher education policymakers who conduct an evaluation and appraisal of large and costly national college quality enhancement programs, such as Project 985 and Project 211.

Project 985 and Project 211 involved the Chinese government's initiatives for strengthening and establishing world-class universities. Given the widespread recognition that higher education is a major driver of a nation's economic growth and cultivates the future labor force, higher education quality upgrading has become an important national education strategy. Specifically, Project 985 was named after its announcement date on May 4, 1998, and designed to build world-leading universities. It fulfilled tasks in five aspects, including mechanism innovation, team building, platform construction, condition support, and international communication. Project 211 universities refer to about 100 key Chinese universities in the 21st century. The development of Project 985 and Project 211 universities was the priority of the Chinese

[1] In this paper, "college" and "university" are used interchangeably.

higher education quality upgrade plan, and additional resources and massive funding from the central government were allocated to these HEIs. Project 985 universities consist of 39 universities selected from the Project 211 universities and enjoy even higher appropriation for building world-class universities. Although no official university ranking exists in terms of higher education quality, the universities on the Project 985 and Project 211 lists represent the best in China. Essentially, these national projects served as stratification tools to concentrate the nation's resources—professors, student body, equipment, and facilities, etc. to a few top universities to gain a competitive edge in the global higher education competition. Thus, the returns to college quality could be manifested partly by better jobs obtained, and a greater contribution of their students after graduation. Meanwhile, we also observed the construction and rise of independent colleges, which were private and non-governmental HEIs that were considered to be relatively poor-quality HEIs. Considering the enormous public expenditure of supporting Project 985 and Project 211 universities while substantially fewer investments were made in other regular HEIs and independent colleges, the relevant evaluations of economic returns to college quality is rare.

How does the labor market respond to fresh college graduates of various quality types of universities? This study suggest two testable hypotheses for analyzing the returns to college quality under the circumstances of Chinese higher education: the first hypothesis to be tested is that higher quality colleges offer more employment opportunities for their students, and the other is that higher quality colleges bring more jobs in the public sector to their students.

Literature Review

Current literature relies heavily on human capital theory to explain the impact of college quality on future labor market outcomes. According to this theory, human capital refers to knowledge, skills, attitudes, aptitudes, and other acquired traits that enhance the productive capacity of individuals accumulated through education (Becker, 1964;). Therefore, education is an important investment of time, expenditure, and foregone earnings for a higher rate of either economic or non-economic return in later periods (Becker, 1964; Schultz, 1961). Education in high-quality colleges will accelerate the speed of knowledge and skill accumulation through various channels, such as positive peer effects, intensive and extensive faculty and student interactions, better study environment, and equipment support, etc. Graduates from high-quality colleges with a higher stock of human capital will be rewarded by the labor market with faster and better job offers since they are favored by employers.

A wealth of literature has documented the positive correlation between college education and future incomes since the late 1960s in the United States. Most of the papers have been covered by the summary and comments by Pascarella and Terenzini (1991) and Zhang (2005). However, there are relatively scarce existing research concentrated on education quality to portray the causality between the higher education quality and labor market outcomes. The majority of previous research in the US has focused on the effect of college quality on personal wage, and used multiple identification strategies to circumvent the endogeneity problem. Nevertheless, far from getting closer to the convergence on how large the college quality impact was, the recent empirical evidence yielded mixed results (Black & Smith, 2004; Brewer, Eide, & Ehrenberg, 1999; Dale & Krueger, 2002, 2011; Hoekstra, 2009; Long, 2008; Thomas, 2000). Zhang (2012) further examined the impact of college education on the odds of unemployment during the first 10 years after college graduation and found although college graduates of high-quality private institutions enjoyed the highest earning premium among all quality types of HEIs, they were also more likely to be unemployed.

Although the unemployment of college graduates has also been a problem in the US, it has been of paramount concern to the Chinese government and society in the era of mass higher education, and it is in some aspects unique to China's circumstances and requires attention. Numerous empirical studies have focused on the unemployment problem of college graduates after the start of the higher education expansion. For example, Chen and Tan (2004) selected a sample of college students from South Central China and regarded employment as an occupational attainment. They concluded college prestige, which was measured by whether the student has graduated from a key university, had no significant impact on either employment status or starting wage.

Yue, Wen, and Ding (2004) found the initial employment rate was the highest in public colleges, followed by private independent colleges and private colleges. However, the authors did not detect a higher chance of employment for Project 211 university students than for students in regular HEIs. In contrast, Min, Ding, Wen, and Yue (2006) showed the probability of finding a job right after college graduation was higher for graduates from Project 211 universities than from other types of universities. The higher the degree, the greater the probability for obtaining employment. Using data from multiple years, Li and Yue (2009) reported the employment rate had dropped since 2005. Based on the 2007 national survey, college quality type or prestige was a key factor for job seeking. The probability of employment for Project 211 university students was higher than for students from regular HEIs, whereas three-year college students were more likely to find jobs than four-year college students.

Xie and Zhao (2009) collected the 2008 employment status, starting salary level, and employment sector data for some college and university graduates in Nanjing to quantify the impacts of human capital as well as social capital on employment outcomes. When Project 985 college students were used as the reference group, the probability of employment for students from Project 211 colleges, regular HEIs and private colleges were significantly lower as reported in the probit model. The authors split the employment sector into three categories, namely, public sector, state-owned sector, and competitive sector (including foreign and private companies). The results revealed graduates from regular HEIs were less likely to find jobs in the public sector than their Project 985 university counterparts.

Du and Yue (2010) examined the determinants of initial employment status with the 2009 survey and found 61.9% of the whole sample were graduates with bachelor's degrees. The authors grouped the potential determinants of getting employment into three major categories: student and family background; family economic, culture, and social capital; and students' academic achievement in college. It turned out that higher employment opportunities went to Project 211 university students when other things being equal. Likewise, Yue and Yang (2012) conducted a national scale survey of 30 universities and eight provinces in 2011 and calculated the influence of factors on employment opportunities. The results showed the coefficient on the Project 211 college type dummy was positive in the logit model, and it was statistically significant at the 1% level when compared with regular HEIs as the reference group

Most recently,Yang and Yue (2016) explored the initial socioeconomic status of graduates defined by whether the student had a managerial and technology related job position, which included occupations, such as managers and technology staff in government, communist party organizations, and state-owned enterprises. In other words, the authors viewed high positions in these employment units as having high socioeconomic status.

In summary, the existing Chinese empirical evidence generally suggested college quality played an important role in individual early labor market prospects, however, Chinese studies tend to vary in terms of the magnitude of various college quality types. Furthermore, the majority of studies that explored the link between college quality and student employment treated college quality as a covariate. Most scholars failed to analyze the impact of college quality in a counterfactual framework in which students in different college quality types were similar in all aspects except for college quality. In addition, there were few studies that included a comprehensive set of covariates, which called into question if potential missing variables, such as student ability caused biases. Building

upon previous empirical studies, we used a nationally representative sample of fresh Chinese college graduates to examine the role of college quality, which may contribute to students' labor market outcomes in China, and tried to fill in the gaps identified above. Our study also aimed to extend the existing literature by rigorously examining the short-term effects of college quality on initial employment status and employment unit ownership of fresh college graduates with propensity score matching (PSM) with the hope that findings from this study will offer implications for shaping policies to improve the efficiency of college student employment and ensure equal job opportunities.

Methodology

Data The survey data used in this studywere collected through the College Student Labor Market (CSLM) survey conducted by the Institute of Education, Tsinghua University,China. The CSLM survey contains not only basic information, such as student characteristics and family backgrounds, but also rich information about students' pre-college experiences, during-college activities, and post-college placement after graduation. Therefore, these survey data enables us to address concerns of the non-random college selection process by including possible confounding factors in our regression analyses. In addition, this survey employed a multi-stage stratified random sample strategy taking into account institutional regions (municipal cities, Northeast, East, Central and West China)[2], quality categories (Project 985, Project 211, non-key, and independent colleges), and institutional academic specializations (comprehensive, science and engineering, agriculture, finance and economics, etc.). Therefore, this sample was a good national representative sample of HEIs in China in terms of geographic locations and academic concentration, and the overall response rate was about 74%. In order to make inferences about the national population of college graduates in 2011, the sampling weight was calculated according to the stratified sampling arrangement and employed to adjust for the non-representativeness of the surveyed students.

The original sample size of submitted student questionnaires was 8176. In order to study the Cohort 2007 students, who entered college in 2007 and graduated in 2011, we restricted our sample to Cohort 2007 students and excluded observations in other cohorts, three-year vocational colleges, those outside of mainland China, and contract students

[2] We divide the sample into several economic regions according to the seventh 5-year plan in 1986. The institution region division is according to the regional belonging of the province or the municipal city where the college campus locates. The municipalities include Beijing, Tianjin, Shanghai. The East region includes Hebei, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Guangxi and Hainan. The northeast region includes Liaoning, Jilin and Heilongjiang. The central region includes Shanxi, Anhui, Jiangxi, Henan, Hubei and Hunan. The west region includes Inner Mongolia, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shannxi, Gansu, Ningxia, Qinghai, and Xinjiang.

whose jobs after graduation were assigned rather than obtained by themselves. Afterwards, the remaining 6977 observations constituted the final whole sample. According to criteria that related to the college graduates' plans right after graduation, the whole sample can be split into three subgroups, namely the "Intention-to-work" sample, "No-intention-to-work" sample, and the "Missing-intention" group. In accordance with labor economics definitions, unemployed status is conditional on one's intention to find a job. Thus, the analysis on employment status was conducted based upon the "Intention-to-work" sample. The final sample size was 4,984, accounting for 61% of the original sample. Given the moderate missing data percentages for some variables in the "Intention-to-work" samples, the dummy variable adjustment approach was employed to treat the missing data.

In multiple regression, retaining all available covariates may lead to severe multicollinearity problems and cause over fitting of the model. Therefore, some variables derived from the CSLM instruments were combined into indexes with the principal component analysis (PCA) method, including the socioeconomic status (SES) index and pre-college home environment index. The SES index is commonly applied to measure the student's family's social and economic position relative to other students. [3]The home environment index describes the study environment at home and parental attention to the child's study. This first component explains 42% of the total variance; it was constructed from four indicator variables as to whether the student has a private room, a private desk, a private computer, and a high volume of books during the senior middle school period.[4]

Empirical Methods We used the term "initial employment status" to refer to whether the student was employed when he or she took the CSLM survey conditional upon the student's work intention after college graduation. To examine the effects of college quality on initial employment status and ownership of the employer, logistic regressions were performed since the dependent variable was binary. For example, the initial employment status was measured by whether the student had successfully obtained at least one job by the time of the survey before college graduation. The dependent took the value of 1 if the student had obtained at least one job; otherwise, it was coded as 0. The logistic regression of the dependent variable on key independent variable and covariates can be specified as follows:

$$\text{logit}(\text{p}) = \text{logit}\left(\frac{\text{p}}{1-\text{p}}\right) = \beta_0 + \beta_1 Q + \beta_2 X_1 + \cdots + \beta_k X_k + \varepsilon \quad (1)$$

[3] The SES index is presented in Table A1 in the appendix.
[4] The pre-college HOME environment index is presented in Table A2 in the appendix.

where p denotes the probability of the dependent variable to be 1, and Q measures college quality. X_i is a set of covariates, including student demographics, student ability, family background, college experience, and institutional characteristics, and ε is the error term. [5]Multiple college quality measures were used in this study to distinguish each college quality type and to achieve estimation results with better precision. Chinese universities and colleges were divided into four quality categories, namely, Project 985 colleges, Project 211 colleges, regular HEIs, and independent colleges, to be consistent with previous studies. Furthermore, Project 985 and 211 colleges were furthered defined as elite colleges, while other regular and independent HEIs were the so-called non-elite colleges. Hence, the treatment was defined as whether the student attended an elite college when we treated the college quality variable as dichotomous.

We controlled for a rich set of covariates that are of importance for fresh college graduates' employment. Specifically, we included students' demographics, such as gender, age, and ethnic minority. Confounders that represent student ability (student intellectual ability, and non-cognitive leadership skills) were also included. For family characteristics, we controlled for the student's family's rural residency status, single child or not, and SES index. A set of college experiences were also taken into consideration, including student's major, party membership, leadership experience, holding certificates, English proficiency, part-time work experience, earning merit-aid, and having a minor. For institutional characteristics, the institutional region and specialization type were what we cared about most. Since we also collected detailed information about students' pre-college experiences, these variables were used to model the elite college selection and entry process. The typical methodological challenge to draw causal inferences with observational data was that we did not observe the employment outcome if the student attended a college that differs in quality from the one the student actually attended. In this study, the treatment variable of college quality may suffer from an endogeneity problem, which may occur when college quality is correlated with the error term and results in biased estimation results. This problem can arise due to possible omitted variable bias and the nonrandom assignment into colleges of various qualities even after we controlled for the NCEE score, which served as the proxy of students' cognitive ability. If the baseline characteristics for high-quality colleges and low-quality colleges differed, directly comparing students from these two college groups would have been inappropriate. Therefore, we adopted the potential outcome approach and resorted to propensity score matching (PSM) as the

[5] The list of definitions and measures of key variables are included in Table A3 in the appendix.

identification strategy to adjust for the potential endogeneity problem. It was also performed as the additional robustness check of our results from logistic regressions.

PSM has several advantages over traditional regressions and it works when two underlying assumptions are fulfilled: (1) the Conditional Independence Assumption (CIA) and (2) the common support assumption. The CIA assumption implies that after controlling for confounders, the assignment of units to treatment is "as good as random" (Angrist & Pischke, 2008), and the common support assumption requires that the probability of receiving treatment is strictly within the unit interval between 0 and 1 so that there is sufficient overlap for adequate matching. Once these assumptions were fulfilled, we will be able to construct comparable treatment and control groups to assess the contribution of college quality to students' initial employment.

According to Caliendo and Kopeinig (2008), six steps were implemented when we conducted the PSM: First, this study estimated the propensity scores of elite college attendance with the logistic model. Based on the college choice and human capital theory, elite college attendance could be influenced by observed covariates, including student ability, senior high school characteristics, pre-college experiences, home environment, and family background. Second, we matched up elite college students (the treatment group) with those in non-elite colleges (the control group) based on their propensity scores using the 1 to 3 nearest neighbor matching algorithm, and we restricted the matched sample in the common support area. Third, we checked the overlap or the common support assumption by visual analysis to ensure this assumption was met. Fourth, we checked the balance of the covariates and made sure that the treatment and the control groups were indeed comparable. Fifth, we obtained the regression-adjusted treatment effects by running regressions on the matched sample in which observations in the treatment and control group were identical in all aspects. Finally, we tested for sensitivity by changing matching algorithms to confirm that our PSM results were robust to alternative ways of matching.

Empirical Results

Descriptive Statistics Table 1 displays the descriptive statistics for all of the variables used in the models for the "Intention-to-work" sample. According to Table 1, the percentage of students who had at least one offer was 66.2%, while the government or SOEs employed 26.8%. Female students accounted for around 46% of all of the students who had the intention to work after graduation. About 5.4% of graduates were minority students and 46.6% were rural registered-residence students. Their average NCEE score was 69.8 in the

rescaled range of 0 to 100. Within this sample, 34.8% were an only child in the family. More than half chose science, technology, engineering, and math (STEM) majors compared with 13.1% who majored in liberal arts, 8% in social sciences, 17.8% in economics and management and 6.1% in other disciplines. The sample college average score was about 79. The percentage of party members, student union leaders, and technical certificate holders was 27.1%, 20.5% and 45.1% respectively. There were 24.1% of students in the sample who did not pass the College English Test Level 4(CET4) even when they were about to graduate; in contrast, 46.3% of the students passed CET4, and 29.6% of the students passed College English Test Level 6 (CET 6). Part-time working during the term was quite prevalent for students in our survey (82.2%). The percentages of students who earned scholarships, or had load burden were just under 30%. On average, each student submitted 17 resumes while job hunting.

With regard to institutional characteristics, 16% of the students were in elite colleges versus 84% in non-elite colleges after we adjusted the sampling weight. More specifically, 5.1% of the students were in Project 985 colleges, 10.8% were in Project 211 colleges, 72.8% were in non-key colleges, and 11.2% were in independent colleges. A considerable proportion of the students were in HEIs and specialized in engineering, followed by 29.7% of the students who were in normal universities, and 21.2% who were attending comprehensive colleges. In addition, our sample covered institutions in five regions. HEIs in the Eastern and Central China accommodated over half of the whole sample.

Impact of College Quality on Initial Employment Status In Table 2, the dichotomous categorical measure of college quality (elite/non-elite) was used in the estimation equations and the odds ratios from estimating the logit models are reported. Student demographic characteristics, family background, student ability, college experience, and institutional characteristics were included as covariates. In model 1, we report a model that does not control for student ability and college experience. Student cognitive ability and non-cognitive leadership skill are included in model 2. In model 3, we add a set of college experience covariates. We put more weight on interpreting estimation results in model 3 and 4, because model 3 included comprehensive controls of covariates, and results from PSM in column 4 accounted for potential endogenous elite college attendance, and can be used for robustness check. The estimation from logistic regressions provide benchmarks for assessing the matching estimates. Also, for all of the models, we controlled for college characteristics other than quality with a series of dummy indicators.

Table 1. Summary of Variables in the "Intention-to-work" Sample, weighted

Variable	N	Mean/%	S.D.	Minimum	Maximum
Student variables					
Have job offer (Yes=1) (%)	4984	0.662	0.473	0	1
Employed by government or SOEs	3460	0.268	0.443	0	1
Age	4890	23.016	0.995	20	31
Female (Yes=1) (%)	4967	0.459	0.498	0	1
Minority (Yes=1) (%)	4942	0.054	0.227	0	1
Rural household (Yes=1) (%)	4969	0.466	0.499	0	1
NCEE (rescaled to 1~100)	4420	69.824	7.721	24	100
Academic track in high school (%)					
Humanity	4930	0.245	0.430	0	1
Science & Comprehensive	4930	0.693	0.461	0	1
Art & Athletics	4930	0.062	0.242	0	1
Non-cognitive leadership skills (%)	4984	0.398	0.490	0	1
Single child (Yes=1) (%)	4921	0.348	0.476	0	1
SES index	3888	-0.237	0.942	-2.191	2.799
Key senior high school (%)	4926	0.760	0.427	0	1
Residential region before college (%)					
Municipality	4858	0.093	0.291	0	1
East	4858	0.308	0.462	0	1
Northeast	4858	0.134	0.340	0	1
Central	4858	0.248	0.432	0	1
West	4858	0.216	0.412	0	1
Home environment in high school	4892	-0.155	1.167	-1.479	2.95
College majors (%)					
Liberal arts	4978	0.131	0.338	0	1
Social sciences	4978	0.080	0.271	0	1
STEM	4978	0.551	0.497	0	1
Economics & Management	4978	0.178	0.382	0	1
Others	4978	0.061	0.239	0	1
Average academic score in college	3859	78.617	6.553	25	100
Communist party member (Yes=1)(%)	4935	0.271	0.444	0	1
Student leader (Yes=1) (%)	4984	0.205	0.404	0	1
Have technical certificate (Yes=1) (%)	4984	0.451	0.498	0	1
College English Test proficiency (%)					
Did not pass CET4 & CET6	4848	0.241	0.428	0	1
Pass CET4	4848	0.463	0.499	0	1
Pass CET6	4848	0.296	0.456	0	1
Part-time workexperience (Yes=1) (%)	4917	0.822	0.382	0	1
Have merit aid (Yes=1) (%)	4396	0.308	0.462	0	1
Have need-based aid	4984	0.210	0.408	0	1
Have loan	4884	0.293	0.445	0	1
Have minor (Yes=1) (%)	4880	0.064	0.246	0	1
Like major	4886	2.633	0.802	1	4
Number of resume submitted	3665	16.621	14.502	0	50

Institution variables					
Elite college (Yes=1) (%)	4984	0.160	0.366	0	1
Institution quality categories (%)					
Project 985 college	4984	0.051	0.221	0	1
Project 211 college	4984	0.108	0.311	0	1
Non-key college	4984	0.728	0.445	0	1
Independent college	4984	0.112	0.316	0	1
Institution specialization (%)					
Comprehensive	4984	0.212	0.408	0	1
Engineering	4984	0.441	0.497	0	1
Normal	4984	0.297	0.457	0	1
Agriculture	4984	0.040	0.196	0	1
Finance	4984	0.001	0.035	0	1
Political Science	4984	0.007	0.081	0	1
Minority	4984	0.003	0.053	0	1
Institution region (%)					
Municipality	4984	0.133	0.339	0	1
East	4984	0.272	0.445	0	1
Northeast	4984	0.150	0.357	0	1
Central	4984	0.242	0.428	0	1
West	4984	0.203	0.403	0	1

Table 2. Impact of College Quality (Elite vs. Non-elite) on Initial Employment Status

Models	**(1) Logistic**	**(2) Logistic**	**(3) Logistic**	**(4) PSM**
Elite college	1.299	1.060	1.095	1.183
	(0.244)	(0.176)	(0.151)	(0.210)
Age	1.025	1.026	0.995	1.049
	(0.038)	(0.039)	(0.039)	(0.087)
Female	0.892	0.919	0.800*	0.743
	(0.121)	(0.123)	(0.105)	(0.182)
Minority	0.819	0.856	0.844	0.816
	(0.177)	(0.175)	(0.190)	(0.281)
Rural	1.125	1.102	1.038	1.245
	(0.273)	(0.272)	(0.332)	(0.255)
Only child	0.675***	0.664***	0.746***	1.085
	(0.061)	(0.062)	(0.084)	(0.216)
SES	0.891	0.916	0.925	0.944
	(0.068)	(0.068)	(0.093)	(0.115)
NCEE		1.021***	1.024**	1.017
		(0.008)	(0.009)	(0.014)
Humanities track		0.768**	1.003	1.325
		(0.093)	(0.208)	(0.349)
Arts and athletics track		0.873	1.280	0.953
		(0.220)	(0.546)	(0.379)

Non-cognitive leadership skills		1.386***	1.321**	1.006
		(0.158)	(0.158)	(0.169)
Major in liberal arts			0.843	0.475
			(0.137)	(0.224)
Major in social sciences			0.455***	0.390**
			(0.090)	(0.151)
Major in economics and management			0.718	0.644**
			(0.158)	(0.132)
Major in other disciplines			0.639	1.333
			(0.248)	(0.429)
Average academic score			0.975**	1.001
			(0.011)	(0.021)
Party member			1.191*	1.038
			(0.125)	(0.223)
Student leader			0.984	0.916
			(0.107)	(0.110)
Have certificate			1.167	1.095
			(0.155)	(0.113)
Pass CET4			1.306	2.661***
			(0.226)	(0.638)
Pass CET6			1.285**	1.830***
			(0.148)	(0.381)
Part-time work			1.672***	1.329
			(0.246)	(0.282)
Have merit aid			1.097	0.865
			(0.143)	(0.117)
Have nee- based aid			1.304*	0.898
			(0.194)	(0.210)
Have loan			1.292	1.275
			(0.252)	(0.269)
Have minor			1.273	2.016**
			(0.251)	(0.681)
Like major			1.199***	1.011
			(0.070)	(0.087)
Number of submitted resumes			1.007**	1.003
			(0.003)	(0.004)
College discipline concentration	Y	Y	Y	Y
College region	Y	Y	Y	Y
N	4984	4984	4984	3079
Pseudo R^2	0.059	0.073	0.196	0.254

Note: Clustered standard errors over colleges are shown in parentheses * p<0.1, ** p<0.05, ***p<0.01

The results indicated the odds ratios in all of the models were larger than 1, but they were insignificant at any significance level. It suggested the dichotomous measure of college quality might be too abstract and disguised the discrepancy between colleges of various qualities. Hence, we turned to a more concrete quality measure by dividing Chinese universities into four college quality categories, namely, Project 985 colleges, Project 211 colleges, non-key colleges, and independent colleges for more informative analysis. Moreover, the estimation results on the elite college dummy from PSM were quite similar to those from model 3, suggesting our results were generally robust. Alternative matching algorithms, such as kernel matching and radius matching were also performed, and the PSM results stayed consistent.[6]

We also identify a number of covariates in student demographics, student ability, family background, college experience, and institutional characteristics that have significant effects on initial employment right after college graduation as shown in Table 2. Specifically, female students were less likely to find jobs, although it was only significant at the 10 % significance level. Holding other things constant, being the single child in the family produced less chance of finding a job; however, students with higher cognitive ability and non-cognitive leadership ability were more likely to get employed. Students who majored in social sciences were at a disadvantage in terms of job seeking. Students who had higher English proficiency levels were more likely to find jobs, and part-time working experience was beneficial for job seeking. Considering that the sample size was restricted to the common support area when we used PSM, the results from the PSM and logistic regressions were not consistent on some of the covariates, such as whether the student had a minor, or whether the student liked his/her major, etc., but the inferences on the key independent variable remained consistent.

Table 3 displays the odds ratios from logistic regressions for students in Project 985, Project 211 colleges, and students in non-key, and independent colleges. Given that the definition of the treatment and control groups can be arbitrary if we had four college quality categories, PSM was not performed when we adopt this college quality measure. The odds ratio of graduates from Project 985 colleges is about 1.6 in model 3, suggesting that they are 1.6 times more likely to find jobs than those in non-key regular institutions, although it is only significant at the 10% level. We do not detect significant differences between students in Project 211, non-key, and independent colleges in terms of employment. In other words, students from Project 985 colleges might gain an advantage

[6] Detailed PSM results of alternative matching algorithms are not reported, but are available upon request.

in the early labor market while students from Project 211 colleges may not be able to easily find jobs compared with students in non-key colleges.

Table 3. Impact of College Quality on Initial Employment Status

Models	(1) Logistic	(2) Logistic	(3) Logistic
Project 985 college	1.683*	1.364	1.605*
	(0.522)	(0.392)	(0.417)
Project 211 college	1.089	0.991	0.982
	(0.187)	(0.157)	(0.128)
Independent college	0.513**	0.590*	0.686
	(0.142)	(0.174)	(0.199)
Age	1.028	1.028	0.998
	(0.040)	(0.040)	(0.040)
Female	0.860	0.894	0.785*
	(0.117)	(0.117)	(0.099)
Minority	0.831	0.841	0.835
	(0.177)	(0.171)	(0.186)
Rural	1.089	1.079	1.019
	(0.262)	(0.265)	(0.329)
Only child	0.685***	0.671***	0.746***
	(0.061)	(0.062)	(0.085)
SES	0.892	0.914	0.922
	(0.069)	(0.068)	(0.093)
NCEE		1.013	1.018*
		(0.010)	(0.011)
Humanities track		0.784**	1.014
		(0.093)	(0.209)
Arts and athletics track		0.798	1.216
		(0.212)	(0.533)
Non-cognitive leadership skills		1.375***	1.308**
		(0.160)	(0.160)
Major in liberal arts			0.859
			(0.148)
Major in social sciences			0.445***
			(0.084)
Major in economics and management			0.718
			(0.158)
Major in other disciplines			0.633
			(0.250)
Average academic score			0.976**
			(0.011)
Party member			1.180
			(0.123)

Student leader			0.978
			(0.107)
Have certificate			1.188
			(0.160)
Pass CET4			1.322
			(0.226)
Pass CET6			1.281**
			(0.145)
Part-time work			1.650***
			(0.233)
Have merit aid			1.103
			(0.146)
Have need-based aid			1.302*
			(0.193)
Have loan			1.286
			(0.248)
Have minor			1.268
			(0.260)
Like major			1.203***
			(0.069)
Number of submitted resumes			1.007**
			(0.003)
College discipline concentration	Y	Y	Y
College region	Y	Y	Y
N	4984	4984	4984
Pseudo R^2	0.065	0.076	0.198

Note: Clustered standard errors over colleges are shown in parentheses * p<0.1, ** p<0.05, ***p<0.01

When compared to previous empirical studies that utilized Chinese data, our study not only contained more comprehensive controls of covariates, such as student cognitive or non-cognitive abilities, but also took into account the potential endogeneity of elite college attendance by performing the PSM method. In addition, our sample contained all four-year college students with bachelor's degrees, and excluded three-year vocational college students, and postgraduate students, while early Chinese studies often mixed them all together in their analyses (W. Li & Yue, 2009; Min et al., 2006; Yang & Yue, 2016; Yue et al., 2004; Yue & Yang, 2012). These might be the reasons why previous studies tended to find statistically significant effects of elite college attendance (Du & Yue, 2010; Yue & Yang, 2012) that were not so evident in this study.

Impact of College Quality on Employment Unit Ownership As college enrollment rocketed and the job search competition heated up, many college students were oriented towards seeking government officer/civil servant jobs or positions in state-owned

enterprises (SOEs). Jobs in these public sectors were usually regarded as promising jobs with secured remuneration, stable fringe benefits, high social status and recognition, and less work burden when compared with private sector jobs. Table 4 reports the odds ratio of the dichotomous categorical measure of college quality (elite/non-elite) on the ownership of employment units for students who were employed. Again, student demographic characteristics, family background, student ability, college experience, and institutional characteristics were included as covariates. The model specifications were the same as we examined the effects of college quality on initial employment status.

The results demonstrated the odds ratios in all of the models were larger than 1 but only the odds ratio from PSM was significant at the 10% significance level. The magnitude of estimate yielded by matching was slightly higher than those yielded by logistic regressions. This may due to the fact that this PSM estimate could be interpreted as the average treatment effect on the treated (ATT), which refers to the effect of elite college attendance on those who actually attended elite colleges rather than the average treatment effect (ATE), which captures the effect of college quality on students in both elite and non-elite colleges. On the whole, the regression estimates from all of the 4 models implied elite college attendance plays a key role in determining employment unit ownership of jobs obtained. In order to figure out which students from the specific college quality categories benefited from their college quality, we ran the regressions again with four concrete college quality categories.

Several covariates were the determinants of whether the student took job positions in the government or SOEs. We discovered that female students were less likely to find such jobs while one unit increase in the family socioeconomic index increased the odds of entering such jobs by over 20%. With regard to student ability, cognitive ability may not be correlated with finding public sector jobs, while non-cognitive leadership was highly valued in locating these types of jobs. Moreover, liberal arts students were at a disadvantage in finding employment in the government or SOEs compared to students with STEM majors. There were several ways to accumulate human capital in order to enter public job sectors, such as earning certificates, passing College English Tests, and spending more effort on major course studies. However, submitting more resumes may not improve the chances of finding these public sector jobs.

Previous studies that examined the job sector choice of college graduates yielded mixed results (Xie & Zhao, 2009; Yang & Yue, 2016). Although we found positive effects on locating public sector jobs, our results were contrasted to Xie and Zhao (2009)'s study, which attributed more chances to Project 985 college students. The reason might be that

most Project 985 colleges are research universities that produce a considerable proportion of students who will pursue postgraduate education and thus, they are less likely to take alternative positions as employees in government or SOEs in comparison to Project 211 college students.

Table 4. Impact of College Quality on Employment Unit Ownership

Models	(1) Logistic	(2) Logistic	(3) Logistic	(4) PSM
Elite college	1.451***	1.268	1.265	1.723***
	(0.207)	(0.205)	(0.194)	(0.323)
Age	0.907*	0.917*	0.924	0.842*
	(0.047)	(0.047)	(0.052)	(0.074)
Female	0.549***	0.594***	0.621***	0.503***
	(0.088)	(0.090)	(0.096)	(0.074)
Minority	0.980	1.016	1.061	0.854
	(0.207)	(0.196)	(0.204)	(0.199)
Rural	0.867	0.853	0.835	1.303
	(0.132)	(0.128)	(0.105)	(0.222)
Only child	1.004	1.047	1.019	0.938
	(0.111)	(0.121)	(0.116)	(0.202)
SES	1.181*	1.216**	1.234**	1.225**
	(0.105)	(0.109)	(0.109)	(0.125)
NCEE		1.015	1.007	0.981
		(0.012)	(0.012)	(0.017)
Humanities track		0.679*	0.882	1.526
		(0.149)	(0.233)	(0.534)
Arts and athletics track		0.380**	0.642	0.203***
		(0.180)	(0.294)	(0.090)
Non-cognitive leadership skills		1.183*	1.121	1.224
		(0.107)	(0.117)	(0.188)
Major in liberal arts			0.491**	0.257***
			(0.143)	(0.084)
Major in social sciences			1.035	0.613
			(0.600)	(0.264)
Major in economics and management			0.867	0.959
			(0.174)	(0.160)
Major in other disciplines			0.325***	1.063
			(0.132)	(0.293)
Average academic score			0.991	1.006
			(0.011)	(0.018)
Party member			1.234	1.583**
			(0.179)	(0.313)
Student leader			1.115	0.719
			(0.196)	(0.149)

Have certificate			1.099	1.420*
			(0.101)	(0.255)
Pass CET4			1.442***	1.567*
			(0.194)	(0.388)
Pass CET6			1.333	1.400
			(0.243)	(0.421)
Part-time work			0.846	0.703**
			(0.093)	(0.118)
Have merit aid			1.065	1.005
			(0.114)	(0.210)
Have nee- based aid			1.221*	0.884
			(0.127)	(0.241)
Have loan			1.042	1.264
			(0.114)	(0.259)
Have minor			1.127	0.614
			(0.225)	(0.199)
Like major			1.272***	1.078
			(0.117)	(0.109)
Number of submitted resumes			0.993***	0.992
			(0.002)	(0.005)
College discipline concentration	Y	Y	Y	Y
College region	Y	Y	Y	Y
N	3714	3714	3708	2342
Pseudo R^2	0.105	0.117	0.146	0.160

Note: Clustered standard errors over colleges are shown in parentheses * p<0.1, ** p<0.05, ***p<0.01

Table 5 displays the odds ratios from logistic regressions for students in Project 985, Project 211 colleges, and students in non-key and independent colleges. The odds ratio of graduates from Project 985 colleges was close to 1 in model 3, suggesting that they probably had equal odds as the students in non-key universities in terms of finding jobs in the government or SOEs. On the contrary, students from Project 211 universities were 1.42 times more likely to take government or SOE positions than those in non-key universities, and the odds ratio value was significant at the 5% significance level. Also, independent college students had less chance to find these types of jobs.

Table 5. Impact of College Quality on Employment Ownership

Models	(1) Logistic	(2) Logistic	(3) Logistic
Project 985 college	1.066	0.883	0.921
	(0.213)	(0.219)	(0.215)
Project 211 college	1.556***	1.446***	1.419**
	(0.219)	(0.203)	(0.199)
Independent college	0.656*	0.763	0.769
	(0.160)	(0.218)	(0.226)
Age	0.901*	0.911*	0.920
	(0.048)	(0.047)	(0.052)
Female	0.534***	0.583***	0.609***
	(0.090)	(0.091)	(0.095)
Minority	0.982	1.011	1.052
	(0.206)	(0.194)	(0.201)
Rural	0.863	0.852	0.835
	(0.131)	(0.128)	(0.105)
Only child	1.014	1.056	1.032
	(0.114)	(0.123)	(0.119)
SES	1.181*	1.215**	1.236**
	(0.105)	(0.109)	(0.109)
NCEE		1.012	1.004
		(0.012)	(0.012)
Humanities track		0.676*	0.878
		(0.147)	(0.234)
Arts and athletics track		0.357**	0.612
		(0.166)	(0.278)
Non-cognitive leadership skills		1.180*	1.118
		(0.105)	(0.114)
Major in liberal arts			0.494**
			(0.144)
Major in social sciences			1.038
			(0.607)
Major in economics and management			0.861
			(0.172)
Major in other disciplines			0.320***
			(0.133)
Average academic score			0.990
			(0.011)
Party member			1.227
			(0.180)
Student leader			1.107
			(0.195)
Have certificate			1.101

			(0.103)
Pass CET4			1.437***
			(0.195)
Pass CET6			1.332
			(0.243)
Part-time work			0.843
			(0.092)
Have merit aid			1.072
			(0.114)
Have need-based aid			1.234**
			(0.123)
Have loan			1.033
			(0.111)
Have minor			1.098
			(0.221)
Like major			1.273***
			(0.117)
Number of submitted resumes			0.993***
			(0.002)
College discipline concentration	Y	Y	Y
College region	Y	Y	Y
N	3714	3714	3708
Pseudo R^2	0.107	0.119	0.148

Note: Clustered standard errors over colleges are shown in parentheses * p<0.1, ** p<0.05, ***p<0.01

Conclusions and Discussion

In this paper, we investigated whether better colleges bring better jobs for their graduates by measuring college quality in two different ways, either as a dichotomous variable or as multiple quality categories with a nationally representative sample. Two major conclusions were reached. First, even after we controlled for a comprehensive set of covariates, including student demographics, student ability, family background, student college experiences, and institutional characteristics, the results showed that students who graduated from elite colleges gained advantages in terms of obtaining employment opportunities. More specifically, higher employment probabilities went to students in Project 985 colleges instead of students in Project 211 colleges; this is consistent with Xie and Zhao (2009) and supported the notion that elite college students acquired higher human capital stock and capabilities that paid off when they hunted for jobs. Second, we also examined whether students from elite colleges were more likely to find public sector jobs in the government or SOEs. It turned out that students who graduated from elite colleges had a higher probability to find such jobs. According to the PSM estimate that was significant at the 10% level, elite college students were 1.72 times more likely to take

public sector jobs. After splitting the colleges into four quality categories, we found that students who graduated from Project 211 colleges were the actual beneficiaries in the early labor market in terms of finding employment positions in the government or SOEs. We did not observe the same situation for students who graduated from Project 985 colleges since the coefficient on the Project 985 college dummy was less than 1 and was statistically weak

The major findings from our study contribute to existing Chinese literature by extending past endeavors to estimate the effects of college quality on early labor market employment outcomes in several ways. First, we examined two dimensions of early labor market employment outcomes, including both initial employment status and work unit ownership. Second, we showed a clear pattern of results by emphasizing alternative measurements of college quality, and by contrasting estimation parameters from alternative specifications and identification strategies.

Our study also offers important policy implications for shaping national as well as institutional policies to enhance college quality and promote the employment of college graduates. As the number of college graduates grew year after year, it became increasingly difficult for students to find jobs in China after many years of higher education expansion. Our study using the 2011 data helped to investigate whether college quality mattered even more when the college student labor supply surges in recent years. The short-term college quality effects on college students' initial employment status in our sample were generally consistent with the findings from many earlier studies. Thus, our results indicate that college quality gaps worsen the equity in the early career stages and labor market performance for college attendees. Given the fact that the scale of college enrollment after the higher education expansion persists, this equity in terms of employment opportunity may continue to emerge for elite and non-elite college graduates. To some extent, the findings justified Chinese students and families' keen interest in being admitted to elite Chinese universities, and it called for the attention of HEIs to cultivate knowledge and skills that are valued in the labor market, and to improve college campus recruitment services to maintain a higher employment rate.

Furthermore, our findings show that substantial pre-college background characteristics and experiences exist and influence who goes to elite colleges, and intensify education stratification at the phase of tertiary education. If students from socioeconomically disadvantaged families have difficulties entering elite colleges, they will probably face social stratification and low social mobility when they complete their college education. For example, they may spend more time and money on their job search and tend to move

to the coastal region and large cities where job opportunities are abundant. Even for students with identical characteristics, employers may prefer to hire elite college students, which urges the government and society to eliminate college diploma discrimination against institutional quality, and to avoid early labor market segmentation by efficiently matching job positions with qualified college-trained graduates.

In addition, it is notable that among all obtained job offers, only 27% of them were located in the government and SOEs and Project 211 students gain more such job positions. Our findings reflected that public sector employers implemented job filter and selection to recruit employees with signs of potential high future productivity, which is manifested by college prestige and social perception of college quality. However, we have to keep in mind that it is the private sector that absorbs the majority of fresh college graduates. If entities and companies in the private sector were motivated to recruit more college-educated labors and public sector employers were derived of privileges that originate from administrative and monopoly power due to their ownership attribute, the dispersion of college graduates in public and private job sectors would be more even and the economy would be better boosted by numerous private enterprises comprised of more elite college graduates, which answers the call from the national strategy to enhance mass entrepreneurship and innovation in China.

Despite the key findings and implications suggested above, this study had some important limitations. First, an obvious caveat is data constraint. Given the time to conduct the survey, there would be a higher proportion of fresh graduates who did not receive any job offers compared with U.S. studies that typically collect job placement data several months after graduation (Black & Smith, 2004; Brand & Halaby, 2006; Dale & Krueger, 2002, 2011; Long, 2008; Zhang, 2012). It may bias the estimates when we draw inferences for time-variant outcomes such as initial employment status and employment unit ownership status. In addition, due to the survey timeline, the effective sample size was substantially lower, and the statistical power was compromised. Further research is still needed to track the sampled students and check the reliability of the results due to the fact that the returns to college quality may be fully exhibited in the college graduates' mid- or late-career. Second, the internal and external validity of the research designs are subject to potential threats. Although we tried to solve the endogeneity problem with the PSM method, it is based on the "selection on observables" assumption, and generated results that were not that different from those discovered from logistic regressions. We should be cautious to interpret the results as causal rather than as a correlation. More research with higher precision and reliability are expected to confirm the causality.

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Appendix

Table A1. Component Loadings for Socioeconomic Status Variable

Variable	Component 1
Annual household income	0.625
Area of dwelling	-0.120
Mother's years of schooling	0.723
Father's years of schooling	0.729
Rural residency	-0.739
Ordinary commercial residency	0.514
At least one parent is a manager in the household	0.568
At least one parent is a professional in the household	0.541
At least one parent is an ordinary staff in the household	0.307
At least one parent is a farm worker	-0.602
At least one parent works in the government	0.414
At least one parent works in the public institutions	0.606
At least one parent works in public service sector	0.582
At least one parent works in service and retail industry	0.168

Note: Extraction Method: Principal Component Analysis; Component 1: Socioeconomic Status (SES)

Table A2. Component Loadings for Pre-College Home Environment Variable

Variable	Component 1
Have private room in senior middle school	0.4496
Have private desk in senior middle school	0.4832
Have private computer in senior middle school	0.5779
Have a high volume of book in senior middle school	0.4800

Note: Principal Component Analysis; Component 1: Pre-college home environment index (HOME)

Table A3. Definitions and Measurements of Key Variables

Variable name	Definition	Measures
Dependent Variable		
Employment status	Initial employment status: whether student has at least one job offer at the time of the survey	Dummy:1=employed, 0=unemployed
Employment unit ownership	Employment unit ownership: whether student was employed by government or State-Owned Enterprises (SOEs)	Dummy:1=employed by government or state owned enterprises, 0=otherwise
Key Independent Variable: College Quality		
Elite	College quality categories: 985 and project 211 colleges are elite colleges; other regular HEIs are non-elite colleges	Dummy: 1=elite college, 0=non-elite
Project 985 college	College in the project 985	Dummy:1=project 985 college, 0=otherwise
Project 211 college	College in the project 211	Dummy：1=211 colleges, 0=otherwise
Non-key college	Public college not in the 985 or project 211	Dummy: 1=non-key colleges, 0=otherwise

Independent college	Private college affiliated to public HEIs	Dummy: 1=independent colleges, 0=otherwise
Key Covariates		
Student demographics		
Female	Student's gender	Dummy variable: 1=Female, 0=Male
Age	Age at college graduation	Continuous, calculated from birth year and month
Minority	whether the student is an ethnic minority	Dummy variable: 1=Minority, 0=Han
Student ability		
Intellectual /Academic ability	Student cognitive ability measured by NCEE score rescaled to 0-100	Continuous
Academic track	Academic track in upper secondary school	Categorical: Science, liberal arts, arts and athletics
Non-cognitive leadership skills	Whether the student has leadership experiences in upper secondary school	Dummy:1=class/school leader, 0=otherwise
Family background		
Rural Residency	The Household's registered residence location is in urban or rural area	Dummy variable: 1=Rural, 0=Urban
Single child	Whether a single child in the family	Dummy: 1=Single child, 0=has siblings
SES index	An index of family socio-economic status constructed from the family background variables	Continuous
Pre-college experiences		
Key school	Student's high school quality type	Dummy: 1=key school, 0=non-key
Residential region before college	Student's residential region before college	Categorical: Municipalities (reference group) , Northeast, East, Central and West
Home environment	An index calculated from indicators including the number of books at home; have private room/private desk/private computer	Continuous
College experiences		
Major	Major field of study in college	Categorical: STEM is the reference group
Party membership	Whether the student join the Communist Party of China (CPC)	Dummy: 1=CPC Party member, 0=otherwise
Student leader	Whether has leadership experiences in student organizations	Dummy: 1=student organization leader, 0=otherwise
Certificate	Whether have technical certificate	Dummy:1=have certificate, 0=otherwise
English Proficiency	Whether pass the College English Test (CET) level 4 & level 6	Categorical: do not pass CET4 is the reference group

Part-time working	Whether have part-time working experiences during college	Dummy:1=worked in college,0=otherwise
Have merit aid	Whether have merit aid scholarships in college	Dummy:1=have merit aid, 0=otherwise
Have minor	Whether have a minor in college	Dummy: 1=have minor, 0=otherwise
Institutional characteristics		
Institution region	The institutional location region	Categorical: Municipalities (reference group) , Northeast, East, Central and West
Institution specialization	The institutional specialization type	Categorical: Comprehensive (reference group), Engineering

Table A4. Determinants of Elite College Attendance

Model	(1) Logistic
Age	0.821***
	(0.036)
Female	0.881
	(0.081)
Minority	3.236***
	(0.616)
Rural	1.030
	(0.112)
Residential region in the East	0.815
	(0.158)
Residential region in the Northeast	0.988
	(0.215)
Residential region in the Central	0.828
	(0.170)
Residential region in the West	3.381***
	(0.633)
NCEE	1.335***
	(0.017)
Humanities track	0.662***
	(0.074)
Arts and athletics track	28.737***
	(11.133)
Non-cognitive leadership skills	1.051
	(0.088)
Only child	1.148
	(0.121)
SES	1.137**
	(0.072)
Key senior high school	1.512***
	(0.166)

Home environment index	1.021
	(0.041)
N	4984
Pseudo R^2	0.319

Note: Robust standard errors are shown in parentheses * p<0.1, ** p<0.05, ***p<0.01

Table A5. Balance Between Elite and Non-elite College Attendees.

		Mean		SD		STD	SD
Variable	**Sample**	**Treated**	**Control**	**Treated**	**Control**	**Diff**	**Ratio**
NCEE	Unmatched	75.41	69.67	7.540	7.630	0.760	0.990
	Matched	75.42	74.98	7.450	7.320	0.0580	1.020
Muni	Unmatched	0.0450	0.187	0.210	0.390	-0.682	0.530
	Matched	0.0440	0.0390	0.210	0.190	0.0280	1.070
East	Unmatched	0.260	0.194	0.440	0.400	0.151	1.110
	Matched	0.260	0.244	0.440	0.430	0.0350	1.020
Northeast	Unmatched	0.0860	0.115	0.280	0.320	-0.102	0.880
	Matched	0.0870	0.0800	0.280	0.270	0.0240	1.040
Central	Unmatched	0.179	0.281	0.380	0.450	-0.267	0.850
	Matched	0.179	0.165	0.380	0.370	0.0350	1.030
West	Unmatched	0.430	0.224	0.500	0.420	0.416	1.190
	Matched	0.431	0.472	0.500	0.500	-0.0840	0.990
Humanities track	Unmatched	0.185	0.212	0.390	0.410	-0.0690	0.950
	Matched	0.184	0.211	0.390	0.410	-0.0690	0.950
Arts and athletics track	Unmatched	0.0490	0.0740	0.220	0.260	-0.118	0.820
	Matched	0.0490	0.0520	0.220	0.220	-0.0130	0.970
Science track	Unmatched	0.756	0.703	0.430	0.460	0.123	0.940
	Matched	0.756	0.720	0.430	0.450	0.0850	0.960
Minority	Unmatched	0.104	0.0500	0.300	0.220	0.177	1.400
	Matched	0.103	0.118	0.300	0.320	-0.0490	0.940
Key senior high school	Unmatched	0.831	0.741	0.370	0.440	0.242	0.850
	Matched	0.832	0.833	0.370	0.370	-0.00200	1
Rural	Unmatched	0.460	0.416	0.500	0.490	0.0870	1.010
	Matched	0.461	0.420	0.500	0.490	0.0820	1.010
SES	Unmatched	-0.180	-0.176	0.970	0.900	-0.00400	1.070
	Matched	-0.181	-0.116	0.970	0.940	-0.0670	1.030
Home environment index	Unmatched	-0.117	-0.0880	1.250	1.220	-0.0230	1.030
	Matched	-0.118	-0.0680	1.250	1.310	-0.0400	0.960
Age	Unmatched	22.95	23.00	1.020	0.970	-0.0550	1.050
	Matched	22.95	22.93	1.020	1.050	0.0150	0.970
Female	Unmatched	0.374	0.451	0.480	0.500	-0.158	0.970
	Matched	0.374	0.408	0.480	0.490	-0.0700	0.980
Only child	Unmatched	0.359	0.397	0.480	0.490	-0.0800	0.980
	Matched	0.359	0.348	0.480	0.480	0.0240	1.010
Non-cognitive leadership skills	Unmatched	0.427	0.417	0.490	0.490	0.0200	1
	Matched	0.427	0.446	0.490	0.500	-0.0380	1

Note: SD refers to standard deviation; STD Diff. refers to absolute standardized difference in group means; and Ratio of RDs refers to the ratio of the standard deviations between the treatment and control groups. The balance table demonstrates that the propensity score matching has fulfilled the balance requirement on all covariates. For each covariate, the absolute STD Diff. was <0.1 With regard to the balance of standard deviations, the ratio of standard deviations between the two groups was <1.1 after matching. Since a ratio close to 1 indicates better balance, our results show that the balance is satisfactory. Therefore, we believe that we construct a control group for the treated group and the two groups are identical in every aspect after matching.

Figure A1. Distribution of Propensity Scores Before Matching

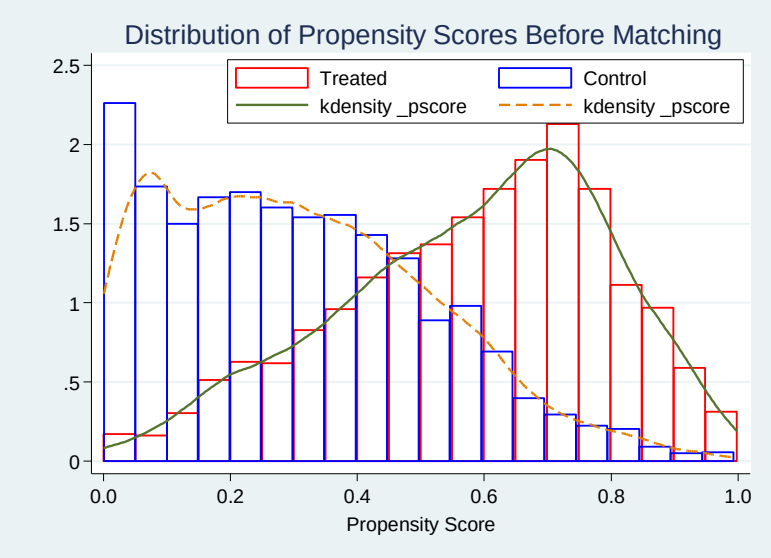

Figure A2. Distribution of Propensity Scores After Matching