

International Journal of Educational Development
Is Higher Education Worthwhile for China's Upper-Secondary Vocational Graduates?
--Manuscript Draft--

Manuscript Number:	
Article Type:	Full Length Article
Keywords:	China; vocational education; higher education; labor market outcomes
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Suggested Reviewers:	Anita Koo, Ph.D. Professor and Associate Dean, Hong Kong Baptist University anitakoo@hkbu.edu.hk expertise on educational opportunity and social mobility, including consideration of gender Geng Wang, Ph.D. Associate researcher, Tianjin University geng_wang@tju.edu.cn research on education and work through the lifecourse, particularly in relation to vocational education and training for young people
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Is Higher Education Worthwhile for China's Upper-Secondary Vocational Graduates?

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April 23, 2023

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Declarations of interest: none.

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Abstract:

Higher education has expanded rapidly, worldwide, in the past two decades with the aim of broadening its accessibility, aiming to serve students in both the general and vocational tracks. We draw on sample survey data from China. For the 40 percent of upper-secondary students who earn vocational degrees there, higher education opportunities have opened up gradually since 2007. Our results show mixed evidence on the effects of higher educational attainments. It is concerning that the higher education options pursued by so many of the students in our sample offer so little in terms of sustained improvements in labor market outcomes.

Keywords: China, vocational education, higher education, labor market outcomes

Introduction

Higher education has expanded rapidly in the last two decades. Measured by the gross enrollment ratio, global participation in higher education doubled from 19 percent to 40 percent between 2000 and 2020. Although the rates observed in Europe and North America exceed those of any other region, the largest rate increase occurred in the East Asia and Pacific region, growing from 16 to 51 percent over the 20-year interval (UNESCO, 2022).

In many countries, a key driver behind this expansion is the desire to broaden higher education's accessibility among upper-secondary school graduates, aiming to serve students both from the general as well as the vocational tracks¹. The UNESCO statistics show that, in 2019, vocational track students accounted for around 31 percent of upper-secondary students. More and more countries have opened their higher education programs to upper-secondary vocational graduates; in China, where upper-secondary vocational students account for about 40 percent of upper-secondary students, higher education opportunities gradually have opened to them since 2007.

With the expansion of higher education in recent years, a strand of literature has tried to answer the question about whether the investment is worthwhile. Knight, Deng, and Li (2017) China's higher education expansion, until now, reflects almost exclusively the rising enrollment of upper-secondary general graduates. Knight, Deng, and Li (2017) report that, as a result of this expansion, unemployment for higher education graduates has risen, but only modestly, and there has been a small decline in the higher education wage premium, with the recent cohort of

¹ Vocational education is designed for learners to acquire the knowledge, skill, and competencies specific to a particular occupation, trade, or class of occupations or trades. General education is designed to develop learners' general knowledge, skills and competencies, as well as literacy and numeracy skills, often to prepare participants for more advanced education programs at the same or a higher level and to lay the foundation for lifelong learning (UNESCO Institute for Statistics, 2012).

university graduates experiencing the largest relative decline. In addition, recent cohorts initially obtain jobs of lesser quality, but the likelihood of acquiring a good job increases with age. As such, the labor market appears to be adjusting to the increased supply of higher education graduates, with the expansion era cohorts, in particular, bearing some moderate costs of their absorption.

There is mixed evidence on the impacts of higher educational attainments for upper-secondary vocational graduates. A significant net wage gain in Switzerland for vocational upper-secondary graduates who complete a higher vocational education degree (Cattaneo, 2011). The returns for completing a higher education degree for students following a vocational track exceed the returns for those in the general track, even though general track students display a higher likelihood of degree completion (Saltiel, 2011). Upon entering the academic track, there is additional evidence to suggest that students with a vocational degree background are more likely to exit without completing the program (for France, see Gury, 2011; for the UK, see Katartzia and Hayward, 2020; for more OECD countries, see OECD, 2022). And examining a relatively new master's level vocational education program in Finland, Böckerman *et al.* (2019) find meaningful and sustained wage boost for post-graduate level vocational study.

The goal of this study is to examine the effects of higher education degree attainment on the labor market outcomes of China's upper-secondary vocational graduates. To our knowledge, ours is the first study to examine this question with an explicit focus on students in the vocational education system. Our outcome measures include wage, duration of unemployment, and job satisfaction. For both the wage and satisfaction measures, we have observations for both the first job after the highest degree graduation as well as the current job held at the time of the survey. Two different surveys of vocational upper-secondary students are utilized, representing a broad

cross section of the youth who enter China's labor market at the threshold of their adulthood. While higher education has been shown to pay off in other instances, our results suggest that, for China's current vocational graduates, higher education in fact may not hold substantial promise for sustained gains in wages, employment, or satisfaction.

China's changing labor market structure and the demand for skilled labor

While China's abundant supply of relatively cheap labor has been a key contributor to its rapid economic growth over the past forty years, the landscape appears to be changing in ways that have critical implications for future employment and wage trends. The technological forces that have disrupted labor markets around the world also have bearing on labor demand and the composition of jobs in China. For instance, automation has rapidly escalated; by 2017, China's proportion of multipurpose industrial robots to employed workers exceeded the world average (Ge, *et al.*, 2021). This development helps to explain why, in China, the share of jobs categorized as "routine manual" declined from 57 to 32 percent between 1990 to 2015 (*ibid.*, p. 174).

Looking beyond the important role of technological change, Rozelle, *et al.*, 2020, describe a mix of additional phenomena which together have led China's wage structure to become more polarized in recent years. Included among these is China's growing middle class which has shifted consumer demand in the direction of industries (such as banking, education, health care, etc.) characterized by skill-intensive employment, coupled with a supply of labor whose skill level has not kept up with growing demand. Meanwhile, the supply of lesser-skilled workers has increased faster than its demand. Taken together, these produce the familiar patterns of polarization experienced in many other countries, where the wage growth of highly skilled

workers severely outpaces growth in the wages for low or unskilled labor. These trends reinforce the need for education to remain a high priority in China, especially so in rural areas where opportunities are often scarce and investments in human capital historically relatively low.

Expansion of vocational education in China

To meet the economy's demand for skilled labor, China has built the largest vocational education system in the world, serving a substantial portion of China's youth. In 2021, 48.9 million students (or 35 percent of students in upper-secondary education) were newly enrolled in upper-secondary vocational schools and 55.6 million students (or 56 percent of full-time students in higher education) were newly enrolled in vocational higher education (Ministry of Education of China, 2022). Nationally representative survey data confirm that around 65 percent of upper-secondary vocational graduates in 2020 continued to enroll in higher education (China Youth Daily, 2022). Within this group, 90 percent followed vocational pursuits, while 10 percent enrolled in four-year university (*ibid.*).

In China, students are tracked into vocational and academic schools after lower-secondary education, and the profiles of vocational-track students often differ, substantially, from their academic-track counterparts. In recent decades they typically display lower standardized test scores and may be characterized, also, by poorer socioeconomic conditions (Loyalka, *et al.*, 2016). Prior to the mid-1990s, vocational students, unlike their academic track counterparts, typically were offered long-term employment at the point of their upper-secondary graduation. Thus, even though they had few opportunities to pursue higher education, they were qualified for opportunities that put the vocational track more or less on par with the academic track—such that there was little systematic difference in the high school entrance examination

scores between the two tracks. However, coinciding with state enterprise reforms, the policy of offering jobs to upper-secondary vocational school graduates was canceled. Meanwhile, the higher education expansion beginning in 1998 generated more opportunities for students in the academic track while offering little for vocational students. So the academic track became relatively more attractive, disincentivizing students from pursuing upper-secondary vocational programs, and enrollments declined. In response, entry requirements on academic performance were lowered, contributing to the view that vocational students are deficient relative to their academic track peers (*The Economist*, November 26, 2022).

To meet the demand of vocational students for higher education, higher education has opened the door to upper-secondary vocational graduates gradually in recent years. Beginning in 2007, pilot programs in a few provinces started to allow higher vocational education programs to enroll upper-secondary vocational graduates (Ministry of Education of China, 2007). In the latest iteration of policy, the government plans to expand five-year vocational program opportunities—where students commit at the outset to complete their upper-secondary degree (3 years) followed by 2 years of post-secondary education (Office of Ministry of Education of China, 2021).

In China today, upper-secondary vocational graduates may proceed along a variety of different paths upon completion of their degrees. Direct employment without further schooling is possible, and a sizeable portion within the data begins working immediately after completing high school. However, for graduates who wish to continue their schooling, there are a few options. The most common path for students who complete a vocational upper-secondary degree is to continue into a higher vocational education program. The 4-year university option is a far reach for many secondary vocational graduates, as it requires a higher level of academic

performance. However, a small portion of upper secondary vocational graduates manages to successfully bridge this gap, as our data will show. Finally, adult online or continuing education programs offer a third option for graduates who choose to enter the workforce immediately but also embark on further schooling during their non-work hours.

The expansion and elevation of the higher vocational education system is consistent with an East Asian model where efforts are largely driven by the national government's agenda, but complemented by predominant Confucian values which reinforce families' willingness to pay for educational investments in their offspring (Jiang and Ke, 2021). As its workforce has long been an important source of comparative advantage for China, gearing vocational education policy towards maintaining labor power while advancing skill is a sensible strategy. Some evidence suggests that the vocational system is having a positive impact on preparing China's future workforce. For example, some studies report solid performance, on the part of vocational graduates, in terms of their wages and employability (Liu, 2015; Xie, 2019; and Lu and Zhang, 2021). But Lu and Zhang (2021) also point out that the labor market advantages of a vocational degree have eroded over time and Stewart (2015) suggests that the vocational system may be overly focused on preparation for the first job after graduation at the expense of the lifetime career trajectory. These mixed results raise concerns about whether upper-secondary vocational graduates are well served by the current array of higher education options available to them.

Methods

Sampling

Two sample survey datasets are utilized to examine the recent employment experiences of upper-secondary vocational graduates. One of these is drawn from a single province in

China—Henan province. This survey project began in 2013, with a random sampling of seven cities, stratified by economic level. All included schools have at least 30 students present in each grade for one or both of two specific (and very popular) major courses of study—computing and digital control. In 2013, in each school, one first-year class was randomly selected, and all students in the class were interviewed, along with the class head (similar to a homeroom teacher), and the school principal. A final follow-up online inquiry was made in 2021 to all of the students initially surveyed in 2013, which is when the employment and other current information was collected. Among the 7,300 students, from 117 schools, which comprised the original 2013 sample, 3,585 students (slightly less than half of the original sample) responded to the 2021 inquiry. The main reason for the low response is the inability to track down students whose contact information had changed in the years since graduation.

To check for evidence of sample selection arising from the low response rate, a set of basic descriptive statistics using information collected in 2013 across the subset of those who responded in 2021 are compared with those who did not. Table 1 reveals that there are relatively few significant differences in sample means between the two groups. Male representation in the responders’ group is slightly higher (a difference of around 2.7 percentage points). Thirteen percent of responders hold an urban *hukou*, compared with 11 percent of the non-responders’ group. Finally, 70 percent of the respondents have a father who completed lower secondary school, relative to 68 percent of the non-responders. The sample of responders may be slightly more male and urban, and to come from families with marginally more educated fathers, but the very small magnitudes of all these differences is comforting.

The other data set we utilize is a national one, drawn from six provinces (Henan, Liaoning, Zhejiang, Guangdong, Chongqing, and Shaanxi), chosen to be regionally

Table 1: Checking for attrition bias in the Henan sample

	Respondents present in both 2013 and 2021	Respondents present in 2013 but not 2021	<i>p</i> -val for difference
	percent or mean <i>number of observations</i>	percent or mean <i>number of observations</i>	
Male	73.6 <i>3585</i>	70.9 <i>3568</i>	0.01
Han ethnicity	98.1 <i>3568</i>	98.0 <i>3582</i>	0.85
With urban hukou	13.2 <i>3583</i>	10.8 <i>3566</i>	0.00
Took high school entrance exam	67.1 <i>3578</i>	58.4 <i>3558</i>	0.00
High school entrance exam score	320 <i>2385</i>	316 <i>2080</i>	0.09
Family owned a car in 2013	18.3 <i>3583</i>	17.3 <i>3567</i>	0.26
Family had air conditioning in 2013	47.5 <i>3582</i>	45.9 <i>3568</i>	0.17
Father completed lower secondary school	70.4 <i>3510</i>	67.6 <i>3477</i>	0.01
Mother completed lower secondary school	57.4 <i>3493</i>	56.3 <i>3463</i>	0.33
Father in agriculture in 2013	35.8 <i>3510</i>	37.6 <i>3478</i>	0.13
Mother in agriculture in 2013	42.4 <i>3493</i>	44.0 <i>3464</i>	0.18
Father was migrant in 2013	33.6 <i>3584</i>	35.1 <i>3473</i>	0.17
Mother was migrant in 2013	16.0 <i>3487</i>	16.7 <i>3461</i>	0.43

representative. Random selection of six upper secondary vocational schools within each province, followed by a selection of two year-2013-enrolling classes within each school (based on each school principal’s recommendation of which classes best represent their schools). This survey project was conducted entirely in early 2020, using the student contact information provided by the schools, and collecting both retrospective and current information. Among the initial set of 1,788 students (from 47 classes across 26 schools²), 1,005 responded to the online survey request, yielding a response rate of 56 percent. Unfortunately, we are unable to make any comparisons between the initial 1,788 graduating students and 1,005 who responded because we have no data (other than contact information) on the original set.

It is worth noting some key differences and similarities across these two data sets. The Henan dataset is relatively homogenous in terms of both the location of the students’ vocational secondary schools (all are in Henan province) as well as the students’ majors—all are either computing or digital control, which are relatively more technical fields of study. The national dataset is more heterogeneous across both these dimensions. With respect to majors, technical fields such as computing and digital control are present in the national data, but there is a wide representation of other majors, as well, such as accounting, education (pre-school), healthcare, graphic design, etc. Both surveys targeted students who aimed to complete their upper secondary vocational degree in 2016, though actual upper-secondary level graduation years exhibit some variation according to individual student circumstances, and of course decisions about whether to continue into higher education also vary within the samples.

Data Collection

² Initially there were 72 classes from 36 schools, but 9 schools had not preserved student rosters from the selected classes, and an additional 7 classes (including 2 from a single school) failed to provide contact information for their students.

The Henan data sample used in this study was collected through a student survey questionnaire in 2013, the beginning of these students' enrollment in upper secondary vocational schools, and subsequently in 2021—four and half years after their graduation in 2016. In 2021, each respondent's detailed information about their education history after 2013 was collected. Then, each of them was asked about their employment experiences, focusing on their first job, current job, and unemployment history. In 2013, data collection included students' information about their demographics (age, gender, *hukou*), their academic performance before entering into upper-secondary vocational school, the socioeconomic status of their family, and their aspirations for future educational attainment. Two standardized tests were administered to students to test their general knowledge (math score) and specific knowledge (computer) respectively.

All national sample data used in this study were collected in the first half year of 2020, three and half years after respondents' graduation from upper-secondary vocational schools. The modules of the survey questionnaire are very similar to those used in Henan sample except there was an additional module to ask students to recall information from before and during their upper-secondary years. To avoid recall bias as much as possible, several key points were the focus. Another minor difference between the two surveys is that we asked respondents to indicate their monthly wage using a series of categorical options in the national survey while respondents were asked to fill in the actual wage amount in the Henan survey.

Empirical Strategies

To learn how completion of a higher education degree affects the labor market outcomes of upper-secondary vocational school graduates, multiple specifications of our regression models are estimated. Ordinary least squares estimation is used for the wage models, examining both

the monthly wage earned in the first job following the highest degree completion as well as the monthly wage earned in the current job at the time of the survey³. While current wages are uniformly reported for a common year (2021 for the Henan data and 2020 for the national data), the year in which the respondent took their first job varies across respondents. To account for changes in the price level; all first job wages are measured in constant 2020 Chinese *yuan* for the national data and constant 2021 Chinese *yuan* for the Henan data. A two-limit tobit model is used, correcting for censoring of the dependent variable (at zero from below and at one from above), to analyze the percent of time spent in unemployment since completion of the highest degree. Finally, a probit model is used to analyze job satisfaction, estimating separately for the first job and the current one. The satisfaction dependent variable takes a one-value if the respondent reports being “very satisfied” or “somewhat satisfied” and it takes a zero-value for answers of “neither satisfied nor unsatisfied,” “somewhat dissatisfied,” or “very dissatisfied.” In all estimation models, standard errors are clustered at the upper-secondary school level.

For all of the models described above, the baseline estimation controls for age and age squared (we use age at graduation for the first job models), sex, and dummy variables for the year in which the highest degree was obtained. These dummy variables control for market conditions in place at the point when the respondent first entered the labor market. Variables of interest are the three higher education completion variables—higher vocational education, university, and adult continuing education. A one-value in any of these indicates that the degree was earned. For each respondent, only the highest educational degree is recorded.⁴ For each

³ The monthly wages were collected by categorical options in the national survey, for example, less than 2000, 2000-4000, 4000-6000, and so on. For brevity, we use the middle point value of each bracket in the regressions.

⁴ In cases where a respondent reports more than one degree, a university degree trumps all others. With respect to the other two, if the adult continuing education degree is a four-year university equivalent, it dominates a higher vocational education degree. If the adult continuing education degree is in vocational education, then the conventional higher vocational education degree is coded as the highest degree.

regression, two expanded models are provided, the first adds upper secondary school fixed effects and the second adds upper secondary major fixed effects. Common rules are applied across the two datasets (Henan and national) to construct the estimation samples. Only those who completed an upper secondary vocational degree are included; anyone who reports lower secondary as their highest degree or who received a general (academic) upper secondary degree is omitted. Because we are interested in learning how further education affects labor market outcomes, we also omit anyone who reports a start date prior to the year they obtained their highest degree. Finally, we restrict analysis to only those who were at least 16 years of age and no more than 25 in the year when their highest degree was awarded.

Higher educational degree completion patterns

The majority of respondents in both data sets report completion of some kind of higher education degree, and females are more likely to do so than males (Table 2). More than 40 percent of both samples report completion of a higher vocational education degree, making it the most popular, by far, higher educational option. On the other hand, the university degree is the least popular option, with only about 1 percent of the national sample and about 6 percent of the Henan sample reporting having completed it. Recall that the Henan data contain only students whose upper-secondary vocational school major was computing or digital control. Perhaps these majors are more amenable to moving on to university than other majors. Finally, about 6 percent of the Henan sample and 10 percent of the national sample have adult continuing education degrees.

These statistics demonstrate that students who complete their upper secondary work in China's vocational track nonetheless are strongly disposed towards completion of a higher

Table 2: Patterns of higher education completion

	Henan data			National data		
	Female	Male	Total	Female	Male	Total
	# of obs	# of obs		column percent	column percent	
Higher vocational degree	205 43.2	600 42.4	805 42.6	231 45.9	164 37.9	395 42.2
University degree	40 8.4	61 4.3	101 5.3	11 2.2	1 0.2	12 1.3
Adult continuing education degree	30 6.3	92 6.5	122 6.5	60 11.9	38 8.8	98 10.5
No higher ed degree	199 42.0	663 46.8	862 45.6	201 40.0	230 53.1	431 46.0
Total	474 100.0	1416 100.0	1890 100.0	503 100.0	433 100.0	936 100.0

education degree. Even prior to secondary completion, the aspirations of many reflect dedication to further learning. In the national sample, 29 percent of respondents give the desire to continue on to higher education as their reason for attending upper-secondary vocational schools. In the Henan sample, in the first semester of their upper-secondary vocational education, 32 percent of respondents hoped they could achieve a three-year college education, and 57 percent hoped they could achieve a four-year university education.

Although there is no clear pattern in the social and economic status among students with different educational attainment, students who completed higher education are more likely to be students who had a better academic performance in lower-secondary education (Table 3). Those students were more likely to have taken the high school entrance exams than students who only completed upper-secondary vocational education. They also scored substantially higher. The Henan sample provides more supportive evidence. The enumerator-administered standard tests show that they score much better in both academic scores (math) and specific scores (computer) than their counterparts at the point of the first semester of their upper secondary enrollment. Meanwhile, the Henan data shows that students who completed university were more likely to have attended an upper-secondary vocational school which considered high school entrance exam as a prerequisite for admission.

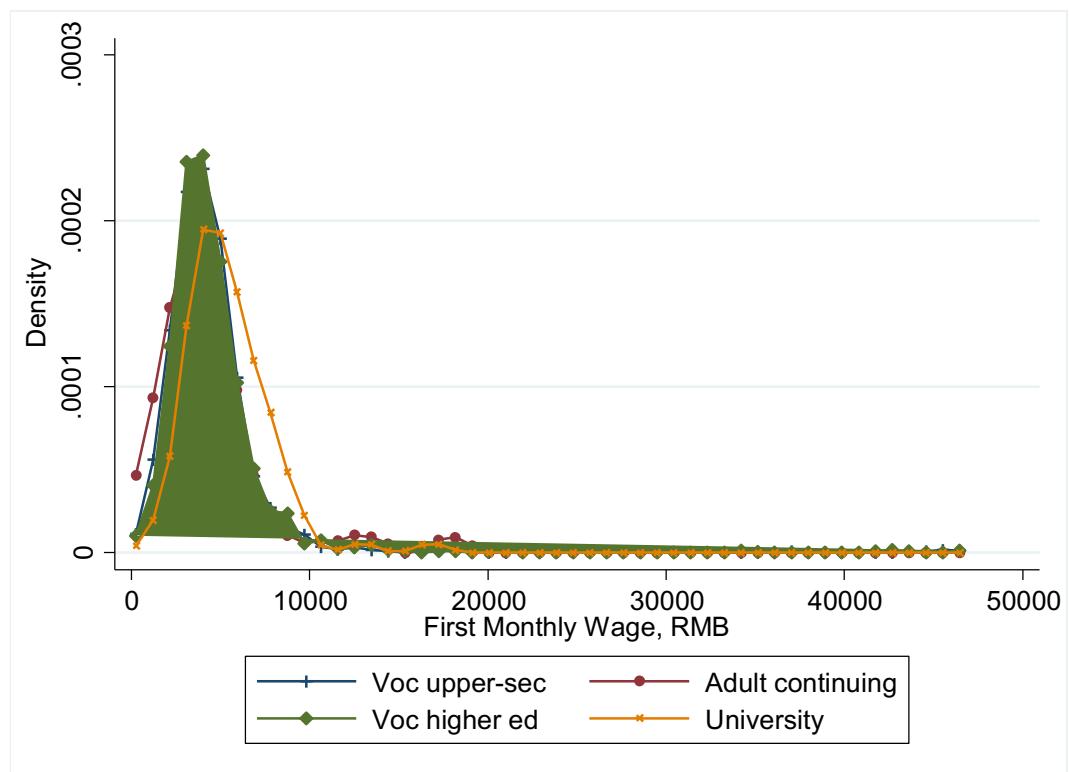
First job and current job wage analysis

Figure 1 shows the distribution of first job monthly wages by educational attainment. Panel A (Henan sample) suggests that in comparison with other groups, those with a university degree are likely to earn more. There is no clear pattern comparing a university degree with others in Panel B (national sample) because only few students completed university. However,

Table 3: Baseline (2013) student characteristics by highest degree

	Henan sample				National sample			
	Vocational upper-sec	Vocational higher ed	University degree	Adult continuing	Vocational upper-sec	Vocational higher ed	University degree	Adult continuing
Age (years)	15.91	16.00	16.10	15.98	15.77	15.67	15.75	16.07
Male	0.77	0.75	0.60	0.75	0.53	0.42	0.08	0.39
With urban household registration (<i>hukou</i>)	0.11	0.16	0.09	0.17	NA	NA	NA	NA
Took high school entrance exam	0.64	0.68	0.65	0.74	0.79	0.86	1.00	0.81
Of which: High school entrance exam score	311	321	385	334	395	442	432	444
Family owned a car in 2013	0.19	0.17	0.14	0.18	0.58	0.69	0.67	0.60
Family had air conditioning in 2013	0.48	0.46	0.32	0.57	0.31	0.34	0.67	0.42
Father completed lower secondary school	0.70	0.71	0.62	0.79	NA	NA	NA	NA
Mother completed lower secondary school	0.57	0.55	0.51	0.66	NA	NA	NA	NA
At least one parent completed lower secondary school	0.77	0.78	0.69	0.85	0.75	0.79	1.00	0.74
Father in agriculture in 2013	0.36	0.34	0.38	0.38	0.15	0.14	0.00	0.08
Mother in agriculture in 2013	0.42	0.40	0.53	0.43	0.12	0.13	0.00	0.06
Father was migrant in 2013	0.33	0.36	0.50	0.29	NA	NA	NA	NA
Mother was migrant in 2013	0.17	0.20	0.20	0.13	NA	NA	NA	NA
Living together with parents in 2013	NA	NA	NA	NA	0.71	0.82	0.83	0.78
Standardized math test score	-0.04	0.28	0.87	0.01	NA	NA	NA	NA
Standardized computer test score	-0.04	0.26	0.67	0.13	NA	NA	NA	NA
High school entrance exam required for admission	0.23	0.20	0.37	0.16	NA	NA	NA	NA
Number of observations	862	805	101	122	431	395	12	98

Panel A. Henan Sample



Panel B. National Sample

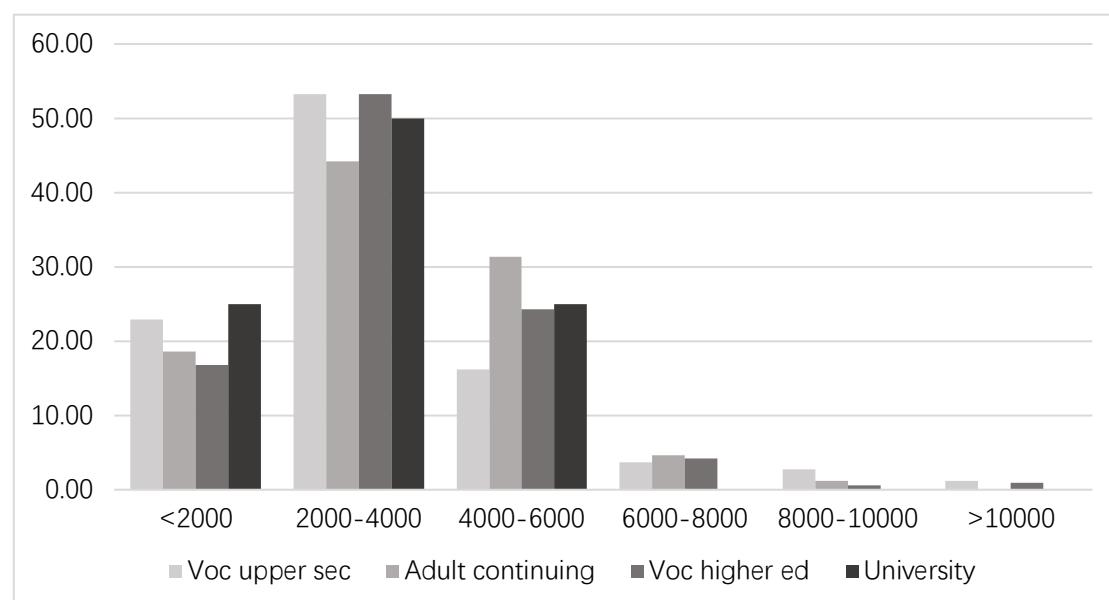


Figure 1. Distribution of first job monthly wages, by educational attainment (current value)

Note: Only 8 students hold a degree of university in national sample.

Panel B indicates that those completing any higher education will be considerably less likely to land in the lowest monthly wage category compared with those who only completed upper-secondary vocational education.

In Table 4 we find no significant effect of a higher vocational education degree on the first job wage is detected in any of the models for either dataset. Completion of a university degree, however, displays a statistically significant positive effect on the first job wage in several instances. Using the Henan data, a university degree raises wages by a highly significant 23 percent in the pooled baseline model, while females show a 43 percent wage gain. Males display a slightly lower 16 percent gain, with reduced significance at just under 10 percent. Including secondary school fixed effects reduces the coefficient magnitudes and their significance, but major fixed effects exert little impact with the university wage premia remaining largely intact. The national data tell a somewhat different story, with most coefficients estimates not significantly different from zero, and negative in sign.

The evidence on returns to an adult higher education degree is somewhat mixed. Using the Henan data, most estimates are negative. In the pooled baseline model, the degree reduces the first job wage by 14.5 percent. The penalty is higher for males, at a consistent 23 or 24 percent in all three models. For women, the adult education coefficient is insignificant for all models using the both the Henan data and the national data. In fact, using the national data, the adult education degree is insignificant in every model specification.

Turning to the effects of higher education on respondents' current monthly wages, Figure 2 shows that, similar to the first job, graduates with a university degree seem to earn more than others in Panel A (Henan data). However, there is no clear pattern in Panel B (national data).

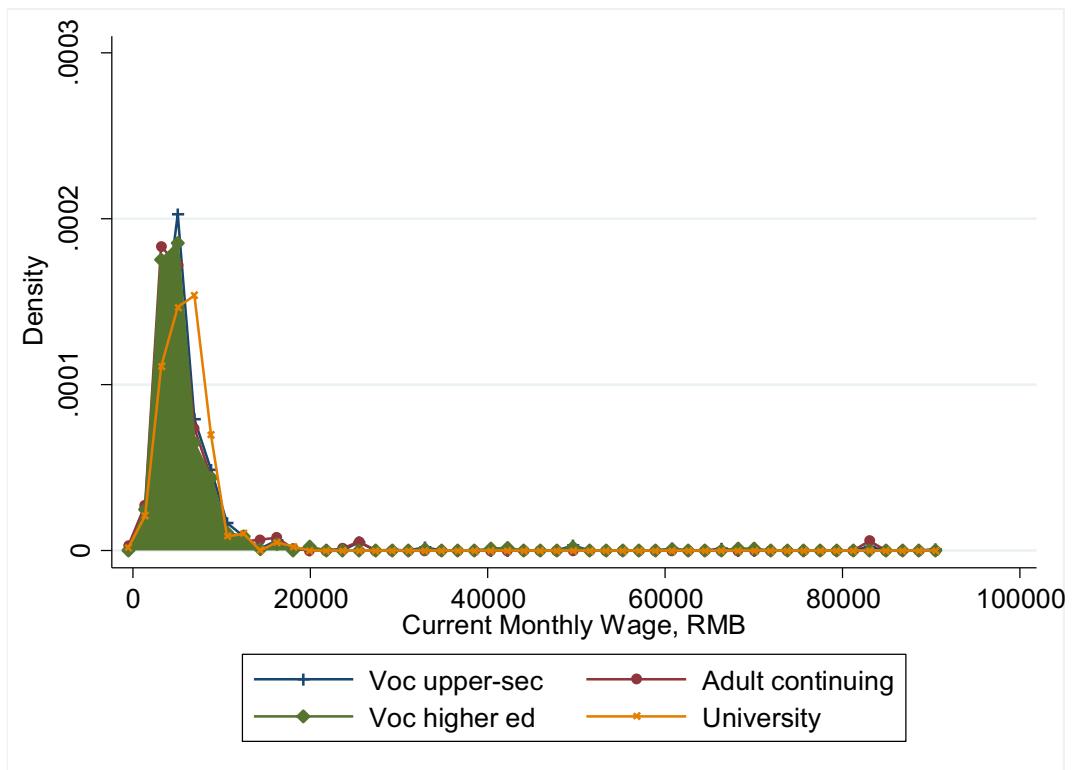
Table 4: Marginal effects of higher education completion on log of first job monthly wages

	Henan data--pooled			Henan data--female			Henan data--male		
	OLS	OLS with school FE	OLS with major FE	OLS	OLS with school FE	OLS with major FE	OLS	OLS with school FE	OLS with major FE
Higher vocational education degree	-0.0409 (0.425)	-0.0566 (0.246)	-0.0407 (0.429)	0.0691 (0.538)	0.0537 (0.661)	0.0733 (0.513)	-0.0517 (0.380)	-0.0736 (0.206)	-0.0517 (0.382)
University degree	0.231*** (0.00700)	0.127 (0.132)	0.220*** (0.00898)	0.426*** (0.00620)	0.176 (0.396)	0.405** (0.0123)	0.165* (0.0964)	0.0940 (0.370)	0.151 (0.123)
Adult continuing education degree	-0.145* (0.0636)	-0.133* (0.0851)	-0.146* (0.0627)	0.209 (0.114)	0.246 (0.100)	0.213 (0.104)	-0.237** (0.0154)	-0.233** (0.0135)	-0.238** (0.0152)
Number of observations	1,583	1,583	1,583	387	387	387	1,196	1,196	1,196

	National data--pooled			National data--female			National data--male		
	OLS	OLS with school FE	OLS with major FE	OLS	OLS with school FE	OLS with major FE	OLS	OLS with school FE	OLS with major FE
Higher vocational education degree	-0.0146 (0.892)	-0.0326 (0.783)	-0.0371 (0.764)	-0.200 (0.471)	-0.185 (0.543)	-0.211 (0.482)	0.143 (0.115)	0.101 (0.327)	0.122 (0.275)
University degree	-0.128 (0.682)	-0.177 (0.535)	-0.198 (0.493)	-0.221 (0.575)	-0.250 (0.491)	-0.250 (0.508)			
Adult continuing education degree	0.0226 (0.835)	0.0349 (0.752)	0.00627 (0.959)	-0.0432 (0.879)	0.00439 (0.987)	-0.0534 (0.854)	0.0370 (0.742)	0.0477 (0.696)	0.0613 (0.590)
Number of observations	754	754	750	390	390	390	364	364	360

Notes: Robust standard errors, clustered at the level of the upper-secondary school, are in parentheses with *** p<0.01, ** p<0.05, * p<0.1. All models control for age at highest degree graduation (as a quadratic), sex, and year of highest degree graduation. Sample sizes vary slightly in the National data due to missing data on the respondent's major in a few cases.

Panel A. Henan Sample



Panel B. National Sample

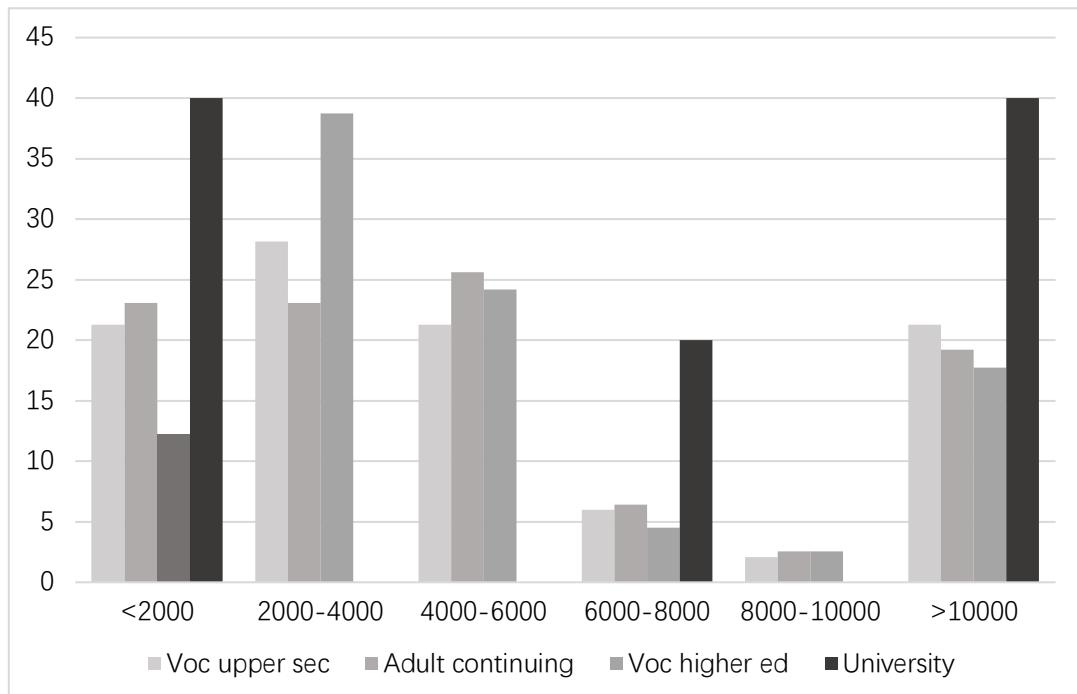


Figure 2. Distribution of current job monthly wages, by educational attainment (current value)

Note: Only 5 students hold a degree of university in national sample.

Considering the regression results (Table 5), we find, across the board, fewer statistically significant results for current job wages than we found for first job wages.

With respect to the higher vocational education degree, coefficient estimates in the Henan data are entirely insignificant. Results from the national data are similar, with most specifications revealing no significant effects, though when the school fixed effects are included, a wage penalty of 24 percent for the full sample and 25 percent for the male subsample is shown. The university degree confers a 15 percent wage premium in the Henan pooled baseline model. The university degree is insignificant for all other Henan specifications. In the national data, the coefficients are not significantly different from zero in any model. Finally, the adult continuing education degree coefficients are almost all insignificant. In the one case of significance, the coefficient is negative, reflecting a penalty on the order of 48 percent, for the national male subsample when major fixed effects are included.

Taken together, the university degree exhibits the strongest evidence of positive returns to higher education, and especially so for the first job following graduation. That there is much less evidence of a positive effect of a university degree on current job wages is consistent with a signaling hypothesis, where the signaling value decays once the respondent's true ability is revealed to the employer. Only the Henan data reveal a positive wage effect for a university degree. Perhaps the technical nature of the Henan-specific majors (computing and digital control) is more conducive to value-added through university training relative to the wider set of majors included among the respondents in the national data set. Recall that university degree completion rates in the Henan data exceed those in the national data, which may be motivated by a higher expectation of positive returns to a university degree among the Henan respondents.

Table 5: Marginal effects of higher education completion on log of current job monthly wages

	Henan data--pooled			Henan data--female			Henan data--male		
	OLS	OLS with school FE	OLS with major FE	OLS	OLS with school FE	OLS with major FE	OLS	OLS with school FE	OLS with major FE
Higher vocational education degree	-0.0779 (0.189)	-0.0661 (0.256)	-0.0782 (0.189)	-0.0788 (0.524)	-0.124 (0.504)	-0.0796 (0.519)	-0.0845 (0.191)	-0.0577 (0.379)	-0.0850 (0.191)
University degree	0.154* (0.0763)	0.0618 (0.534)	0.145 (0.102)	0.183 (0.286)	-0.0529 (0.861)	0.186 (0.290)	0.136 (0.123)	0.0807 (0.409)	0.123 (0.165)
Adult continuing education degree	-0.0761 (0.305)	-0.00573 (0.945)	-0.0767 (0.302)	0.0547 (0.721)	0.1000 (0.673)	0.0531 (0.728)	-0.118 (0.163)	-0.0604 (0.520)	-0.120 (0.161)
Number of observations	1,267	1,267	1,267	266	266	266	1,001	1,001	1,001

	National data--pooled			National data--female			National data--male		
	OLS	OLS with school FE	OLS with major FE	OLS	OLS with school FE	OLS with major FE	OLS	OLS with school FE	OLS with major FE
Higher vocational education degree	-0.165 (0.218)	-0.236* (0.0944)	-0.186 (0.157)	-0.178 (0.475)	-0.230 (0.316)	-0.156 (0.436)	-0.151 (0.223)	-0.249* (0.0870)	-0.213 (0.166)
University degree	-0.383 (0.394)	-0.387 (0.476)	-0.493 (0.263)	-0.366 (0.490)	-0.407 (0.555)	-0.326 (0.555)			
Adult continuing education degree	-0.213 (0.188)	-0.229 (0.179)	-0.260 (0.133)	-0.145 (0.613)	-0.114 (0.648)	-0.0914 (0.722)	-0.343 (0.146)	-0.457 (0.103)	-0.482* (0.0845)
Number of observations	726	726	722	383	383	383	343	343	339

Notes: Robust standard errors, clustered at the level of the upper-secondary school, are in parentheses with *** p<0.01, ** p<0.05, * p<0.1. All models control for age (as a quadratic), sex, and year of highest degree graduation. Sample sizes vary slightly in the National data due to missing data on the respondent's major in a few cases

There is little compelling evidence of positive returns either to higher vocational education degrees or to adult higher education degrees in wages of either the first or current job. At best, these returns are zero, and in some cases, may be negative. To explain the negative results, a signaling hypothesis may again come into play here—embarking upon either of these degrees may reflect inside information about the respondent’s ability, or even attitude.⁵ It is remarkable that so many vocational secondary school graduates pursue one of these degrees given so little evidence that they contribute positively to their wages.

Though the results are not reported here, the authors conducted a robustness test of the wage results, taking into account the possibility of joint determination between the wage and the higher educational decision. In this exercise, a propensity score matching procedure was applied to the Henan data, utilizing responses to a self-assessment block in the 2013 student questionnaire covering a list of personal or character traits that reflect dimensions of attitude, grit or perseverance, and confidence. These responses, along with the student’s 2013 household registration status (whether rural or urban), and the student’s sex, were utilized in the matching stage, where a propensity score (of treatment) was predicted using a logit model.⁶ The average treatment effects, estimated separately for each of the three different higher education degrees, corroborate the results described above. Only the university degree was shown to have a positive and significant effect on wages, and only on the first job wage. Both higher vocational education

⁵ A very pessimistic (and likely not universally accurate) view of higher vocational training is that it is used to address behavioral problems—keeping a young person engaged and out of trouble, while giving them a few more years to mature before taking on the responsibilities of an adult lifestyle.

⁶ Guirong Li, Jiajia Xu, Liying Li, Zhaolei Shi, Hongmei Yi, James Chu, Elena Kardanova, Yanyan Li, Prashant Loyalka and Scott Rozelle, ‘The Impacts of Highly Resourced Vocational Schools on Student Outcomes in China’, *China & World Economy*, 28(6), (2020), pp. 125- 150, employ a somewhat similar set of matching variables drawn from the same sample survey dataset in their assessment of how school resources affect student learning outcomes.

degrees and adult continuing higher education degrees were shown to have negligible wage effects, with the possibility of negative impacts.

Unemployment analysis

As there is no “first job” and “current job” analog to our unemployment measure (the percent of time spent in unemployment, subsequent to highest degree graduation), only one set of unemployment estimation results is provided. Looking at the relative unemployment time by gender and education attainment (Figure 3), in the Henan sample, female students with vocational higher education experienced the relatively longest unemployment duration, followed by female university graduates. Meanwhile, female students in this sample with upper-secondary vocational education or adult higher education experienced the shortest unemployment durations. In the national sample, those with an adult continuing higher education degree show considerably greater unemployment than any other category.

Completing a higher vocational education degree has no statistically significant effect on the unemployment experience of the Henan respondents (Table 6). However, in the national data sample, the degree is correlated with a 2 or 3 percentage point reduction in time spent in unemployment for the pooled sample, and a 4 to 6 percentage point reduction for the female subsample. It is notable, though, that for the male subsample, the higher education degree has little impact on unemployment duration.

University degree completion reduces respondents’ time in unemployment by nearly 3 percentage points for the Henan pooled sample. Statistical power is lost when moving to the female and male subsamples, though marginal effects are in a similar range, with a slight edge in

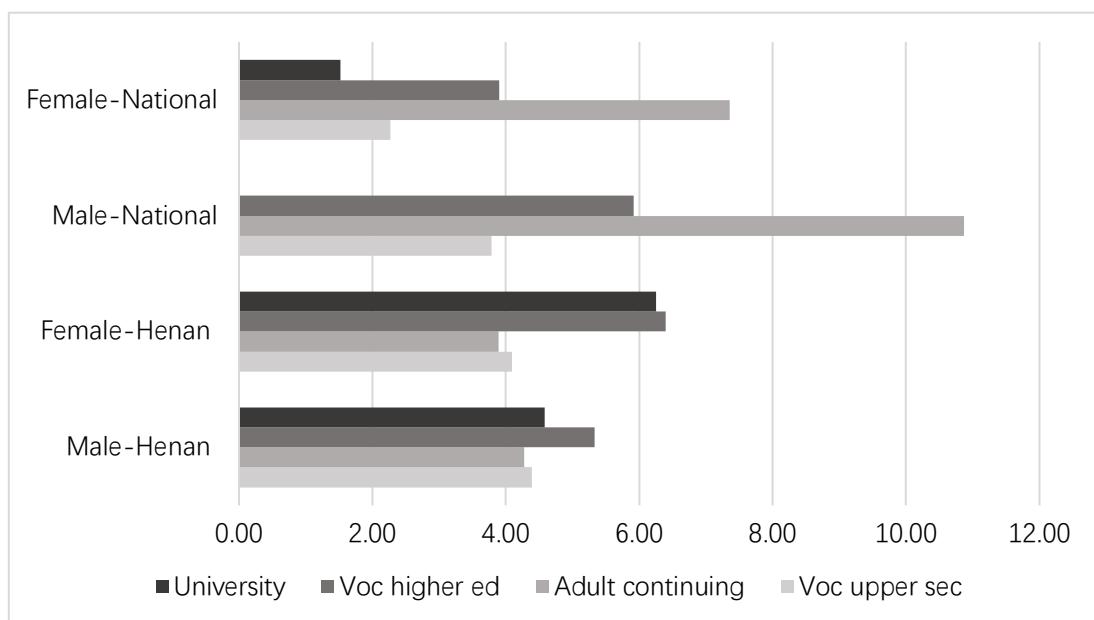


Figure 3. Percent of time spent in unemployment since the highest degree graduation (%)

Note: We don't report the mean of male university graduates in the national sample because there is only 1 observation.

Table 6: Marginal effects of higher education completion on percent of time spent in unemployment since highest degree graduation

	Henan data--pooled			Henan data--female			Henan data--male		
	Tobit model	Tobit with school FE	Tobit with major FE	Tobit model	Tobit with school FE	Tobit with major FE	Tobit model	Tobit with school FE	Tobit with major FE
Higher vocational education degree	-0.00383 (0.644)	-0.00209 (0.810)	-0.00386 (0.643)	-0.00446 (0.806)	0.00494 (0.792)	-0.00430 (0.812)	-0.00455 (0.593)	-0.00393 (0.656)	-0.00461 (0.590)
University degree	-0.0278* (0.0812)	-0.0224 (0.184)	-0.0269* (0.0896)	-0.0385 (0.141)	-0.0222 (0.336)	-0.0407 (0.131)	-0.0275 (0.105)	-0.0251 (0.185)	-0.0262 (0.118)
Adult continuing education degree	-0.0200* (0.0790)	-0.0158 (0.211)	-0.0199* (0.0805)	-0.0243 (0.309)	-0.0169 (0.467)	-0.0240 (0.316)	-0.0191 (0.109)	-0.0162 (0.228)	-0.0190 (0.111)
Number of observations	1,888	1,888	1,888	474	474	474	1,414	1,414	1,414

	National data--pooled			National data--female			National data--male		
	Tobit model	Tobit with school FE	Tobit with major FE	Tobit model	Tobit with school FE	Tobit with major FE	Tobit model	Tobit with school FE	Tobit with major FE
Higher vocational education degree	-0.0280** (0.0260)	-0.0224* (0.0969)	-0.0233* (0.0745)	0.0535*** (8.88e-05)	-0.0481*** (0.00191)	-0.0461*** (0.00270)	-0.0173 (0.249)	-0.00851 (0.611)	-0.00894 (0.572)
University degree	-0.0421 (0.162)	-0.0362 (0.231)	-0.0454 (0.111)	-0.0649** (0.0289)	-0.0629** (0.0241)	-0.0626** (0.0200)			
Adult continuing education degree	0.00138 (0.907)	0.00178 (0.882)	0.00623 (0.612)	-0.0306* (0.0914)	-0.0282 (0.126)	-0.0200 (0.217)	0.0149 (0.183)	0.0230 (0.128)	0.0231 (0.160)
Number of observations	930	930	926	501	501	501	429	429	425

Notes: Marginal effects are derived from tobit coefficients. The parentheses contain *p*-vals which are constructed using standard errors clustered at the level of the upper-secondary school, with *** $p<0.01$, ** $p<0.05$, * $p<0.1$. All models control for age at highest degree graduation (as a quadratic), sex, and year of highest degree graduation. Sample sizes vary slightly in the National data due to missing data on the respondent's major for a few male respondents. The lone male university graduate in the National data is omitted, and so those coefficients are not estimated.

magnitude for the females. For the national data, the university degree reduces time in unemployment in the female subsample by around 6 percentage.

Completing an adult higher education degree is shown to have a small negative effect on unemployment in the Henan data, with a 2 percentage point reduction for the pooled sample. In the national data, the female respondents' results stand out; here the adult higher education degree decreases time spent in unemployment by 3 percentage points in the baseline model.

Several inferences arise from these results. First, perhaps the completion of higher education matters somewhat less for the Henan respondents' unemployment because, given the technical nature of their study, they typically may have little trouble finding a job, and in cases where longer unemployment spells arise, it may be due to unobservable idiosyncrasies. Second, the strongest and most consistent evidence that supports a correlation between higher education and lower unemployment arises in the female subsamples. Perhaps women face more barriers or even potential employer discrimination in the labor market, and obtaining a higher education degree is important for signaling ability, perseverance, or stronger career attachment.

First and current job satisfaction analysis

Table 7 shows that male students are typically more likely to report satisfaction than females. The share of respondents reporting satisfaction increased when students transited from the first jobs to the current jobs. However, the descriptive statistics do not show a clear pattern between educational attainment and job satisfaction. Marginal effects (displayed in Tables 8 and 9) are derived from probit model coefficient estimates.

In the Henan sample, having a higher vocational education degree increases respondents' likelihoods of reporting satisfaction in their first job by 8 to 10 percentage points, for the pooled

Table 7: Percent reporting job satisfaction by highest educational degree

Henan Sample				National Sample				
	Vocational upper-sec	Vocational higher ed	University degree	Adult continuing ed degree	Vocational upper-sec	Vocational higher ed	University degree	Adult continuing ed degree
First job								
Male	42.42	39.43	50.98	39.73	49.73	46.21	NA	59.38
Female	35.95	33.90	36.11	43.48	39.29	40.74	42.56	53.7
Current job								
Male	57.96	51.43	60.87	60.66	62.22	59.04	NA	54.54
Female	60.87	61.65	58.06	61.11	55.67	57.55	54.8	41.46

NA: The number of observations is too few

Table 8: Marginal effects of higher education completion on likelihood of first job satisfaction

	Henan data--pooled			Henan data--female			Henan data--male		
	Probit model	Probit with school FE	Probit with major FE	Probit model	Probit with school FE	Probit with major FE	Probit model	Probit with school FE	Probit with major FE
Higher vocational education degree	0.104*** (0.00933)	0.0883* (0.0597)	0.104*** (0.00925)	0.00862 (0.934)	-0.0370 (0.784)	0.00256 (0.980)	0.127*** (0.00365)	0.0683 (0.191)	0.127*** (0.00358)
University degree	0.203** (0.0110)	0.204** (0.0261)	0.215*** (0.00786)	0.142 (0.341)	0.113 (0.600)	0.174 (0.242)	0.217** (0.0390)	0.182 (0.109)	0.229** (0.0328)
Adult continuing education degree	0.107* (0.0949)	0.117* (0.0847)	0.108* (0.0903)	0.0972 (0.462)	-0.0228 (0.894)	0.0899 (0.491)	0.0834 (0.213)	0.0736 (0.301)	0.0852 (0.204)
Number of observations	1,595	1,553	1,595	389	314	389	1,206	1,159	1,206

	National data--pooled			National data--female			National data--male		
	Probit model	Probit with school FE	Probit with major FE	Probit model	Probit with school FE	Probit with major FE	Probit model	Probit with school FE	Probit with major FE
Higher vocational education degree	0.142** (0.0441)	0.0613 (0.364)	0.0706 (0.418)	0.258** (0.0327)	0.173 (0.143)	0.177 (0.131)	0.105 (0.226)	0.0539 (0.536)	0.0305 (0.771)
University degree	0.447*** (0.00802)	0.453** (0.0250)	0.407** (0.0241)	0.567** (0.0181)	0.590** (0.0253)	0.535** (0.0274)			
Adult continuing education degree	0.257*** (0.000198)	0.185** (0.0128)	0.224*** (0.00239)	0.369*** (0.00696)	0.308** (0.0339)	0.340*** (0.00839)	0.232*** (0.00279)	0.163* (0.0618)	0.192** (0.0172)
Number of observations	754	742	746	390	385	389	361	351	352

Notes: Marginal effects are derived from probit coefficients. The parentheses contain p-vals which are constructed using standard errors clustered at the level of the upper-secondary school, with *** p<0.01, ** p<0.05, * p<0.1. All models control for age at highest degree graduation (as a quadratic), sex, and year of highest degree graduation. Sample sizes vary for two reasons. One is that there are a small number of missing values on some included variables. The other is that in cases of near perfect collinearity, some observations are dropped when they represent very small cells in the data matrix. The lone male university graduate in the National data is omitted, and so those coefficients are not estimated.

sample, and by as much as 12.7 percentage points for the male subsample. The degree seems inconsequential for female first job satisfaction. Results from the national sample also are supportive of the hypothesis that a higher vocational education degree increases the likelihood of first job satisfaction. In contrast to the Henan sample, the strongest effect appears in the female subsample, with a marginal effect magnitude of better than 25 percent. In the national dataset, it is notable that addition of either school or major fixed effects has a clear moderating effect on the contribution of the higher vocational education degree towards first job satisfaction.

University degree completion also increases the likelihood of first job satisfaction in the Henan sample, this effect is largely driven by the male subsample, and marginal gains hover in the range of 20 percentage points. The marginal effects are noticeably higher in the national dataset; female respondents experience a better than 50 percentage point increase in the job satisfaction likelihood from acquiring a university degree.

Even the adult continuing education degree has a consistently positive effect on first job satisfaction for the pooled sample in the Henan data, adding around 10 percentage points to the likelihood of reporting job satisfaction, with significance of at least 10 percent. Findings are similarly high and even more striking in the national data, posting statistically significant results of around 20 percentage point gains, for the pooled sample, and more than 30 percentage point gains, for female subsample, to the likelihood of reporting satisfaction in the first job. Males in the national sample also show satisfaction gains, but of lesser magnitudes and significance.

There is no evidence of significant effects of higher education degree completion on current job satisfaction with one exception. In the Henan data, completion of the university degree increases the likelihood of reporting current job satisfaction for the pooled sample (in the

Table 9: Marginal effects of higher education completion on likelihood of current job satisfaction

	Henan data--pooled			Henan data--female			Henan data--male		
	Probit model	Probit with school FE	Probit with major FE	Probit model	Probit with school FE	Probit with major FE	Probit model	Probit with school FE	Probit with major FE
Higher vocational education degree	0.0581 (0.201)	0.0696 (0.187)	0.0588 (0.194)	-0.0359 (0.816)	0.00555 (0.984)	-0.0359 (0.816)	0.0588 (0.228)	0.0687 (0.231)	0.0596 (0.220)
University degree	0.196** (0.0117)	0.253*** (0.00890)	0.221*** (0.00522)	0.0230 (0.906)	0.309 (0.407)	0.0232 (0.906)	0.235** (0.0216)	0.276** (0.0214)	0.265** (0.0110)
Adult continuing education degree	0.0708 (0.318)	0.103 (0.206)	0.0725 (0.299)	-0.0656 (0.730)	-0.0715 (0.798)	-0.0657 (0.730)	0.0829 (0.294)	0.144 (0.139)	0.0858 (0.265)
Number of observations	1,288	1,251	1,288	273	199	273	1,014	977	1,014

	National data--pooled			National data--female			National data--male		
	Probit model	Probit with school FE	Probit with major FE	Probit model	Probit with school FE	Probit with major FE	Probit model	Probit with school FE	Probit with major FE
Higher vocational education degree	0.101 (0.352)	0.0758 (0.492)	0.0861 (0.495)	0.141 (0.436)	0.111 (0.490)	0.163 (0.316)	0.0892 (0.502)	0.0658 (0.631)	0.0415 (0.790)
University degree	0.308 (0.293)	0.264 (0.391)	0.260 (0.386)	0.364 (0.220)	0.257 (0.477)	0.282 (0.409)			
Adult continuing education degree	-0.0345 (0.714)	-0.0450 (0.632)	-0.0154 (0.883)	-0.0274 (0.872)	-0.0325 (0.836)	0.00394 (0.980)	0.0326 (0.802)	0.0421 (0.781)	0.0482 (0.731)
Number of observations	543	538	538	281	275	279	258	253	250

Notes: Marginal effects are derived from probit coefficients. The parentheses contain *p*-vals which are constructed using standard errors clustered at the level of the upper-secondary school, with *** $p<0.01$, ** $p<0.05$, * $p<0.1$. All models control for age (as a quadratic), sex, and year of highest degree graduation. Sample sizes vary for two reasons. One is that there are a small number of missing values on some included variables. The other is that in cases of near perfect collinearity, some observations are dropped when they represent very small cells in the data matrix. The lone male university graduate in the National data is omitted, and so those coefficients are not estimated.

range of 19 to 25 percentage points) and in the male subsample (in the range of 23 to 27 percentage point).

In sum, it seems that completion of a higher education degree is consistent with greater satisfaction with respect to a variety of cases in the first job following graduation. In the Henan data, these effects were derived from the male subsample whereas in the national data, positive effects on job satisfaction were even higher but were largely driven by the female subsample. While having a university degree generates the greatest positive impact, other higher education degrees also demonstrated satisfaction gains. We find almost no significant effect of higher degree completion on current job satisfaction. These results show some similarity to the wage analysis where the greatest effects were found with respect to the first job following highest degree completion.

Discussion and conclusions

To our knowledge, ours is the only study to focus exclusively on the graduates of China's upper secondary vocational schools in an assessment of the returns to higher education degrees. Given the high proportion of upper-secondary students in the vocational track, their preponderance for continuation into higher education, and China's re-focus of policy attention towards vocational education, inspection is warranted. We find, at best, mixed evidence with respect to the benefit of higher education degrees on the labor market outcomes that we examine. A university degree delivers the most gain, in terms of higher wages, shorter unemployment, and greater job satisfaction. Female respondents experience the greatest benefits from higher education with respect to unemployment reduction. While higher vocational education and adult continuing education degrees have little effect on wages, they do contribute towards increased

satisfaction. There is little evidence that any higher education degree contributes towards higher wages or greater job satisfaction beyond the first job. This may well indicate that the value of these degrees is largely related to their signaling of intrinsic qualities that are not easily observed at the point of hiring.

Part of the explanation for our results may be that in China's current labor market, the value of a higher vocational education degree or an adult continuing education degree has declined. Between 1990 and 2015, a growing share of higher education degree earners are employed in routine cognitive jobs, as a result of changes to the structure of labor demand (Ge, *et al.*, 2021). These developments have implications for the kinds of jobs that higher education degree holders in our sample can obtain, and the extent of any higher education-related wage premia they can earn. They also may speak to a need for renewed attention to the mission of the vocational and adult continuing components of higher education programs, examining how their curricula can best prepare students for the evolving labor market.

Another part of the explanation might be the quality of higher education, or content delivered to the upper secondary graduates. For example, some authors suggest that general content (humanities and the sciences) is not given enough curricular weight (Ding, 2014; Feng and Sun, 2016). On the practical side, Ding (2014) and Zhao and Wu (2017) argue that students' skill development is insufficient, and not on par with workforce needs. Several authors (Lai, 2016; Guo and Deng, 2014; and Pan, *et al.*, 2016) report that internship assignments often are mismatched with students' training needs and rarely provide for skill acquisition beyond very basic levels. With these problems pervading both the upper-secondary and higher levels of the vocational system, the labor market outcomes of vocational graduates are found to be inferior to their academic track counterparts, with vocational graduates especially prone to more precarious

job prospects and lacking in upward mobility (Koo, 2016; Wang and Wang, 2022). Moreover, there is worrisome overlap in content coverage between the upper-secondary and higher education levels (Feng and Sun, 2016). Higher vocational education degree earners require study programs that are more clearly delineated from the upper-secondary curriculum in order to ensure labor market distinction of their degree value (Guo and Deng, 2013; Fu, 2020).

Sex differences in the returns to higher education also are noteworthy. Our results suggest that females may benefit more than males from the credential effect of a higher education degree, especially with respect to reduced periods of unemployment. Differential treatment, on the basis of sex, is well documented in the contemporary Chinese labor market. For example, Du and Dong (2009) report that women experience more institutional barriers to employment than do men, leading to systematically longer unemployment spells. Several studies document a growing male-female wage gap, along with an increasing portion that may be attributed to discrimination (Lee and Wie, 2017; Hare, 2019; and Iwasaki and Ma, 2020). In this context, it is not unreasonable to infer that employers may place more weight on a higher education credential, for women relative to men, in making their hiring decisions.

It is concerning that the two most popular options (higher vocational education and adult continuing education) pursued by students in our sample offer so little in terms of sustained improvements in labor market outcomes. At the same time, the results we obtain are consistent with others' findings, such as Wang and Wang (2022), who report that higher vocational education graduates systematically earn less, are more likely to be in blue-collar occupations, and are less likely to secure permanent positions relative to those who earn a university degree. While upper-secondary vocational graduates, and their families, may be willing and eager to

invest in their human capital, the educational system, coupled with the current labor market structure, is not conducive to a pattern of ongoing returns.

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Acknowledgements:

This work was supported by the National Natural Science Foundation of China (No. 71922001 and 72273003) and the Reed College Summer Economics Program, for which we are grateful. We also wish to thank Aleina Aliwarga, Yuhang Li, Xiao Liang, Wani Pandey, Rishith Sinha, Chloe Tian, and Jianghong Xu for outstanding research assistance. Earlier versions of this paper were presented at the 2022 Chinese Economists Society Annual Conference, the 2022 Western Economic Association Annual Conference, and the 2022 International Symposium on Human Capital and Labor Markets, where discussants and session participants offered helpful comments and suggestions.

Declarations of interest: none.