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ABSTRACT

Higher Education Opportunity and the Choice of Vocational vs. Academic High School

This research uses CHIP data of 2018 to examine the impact of higher education opportunities on the middle school graduates' choice between academic and vocational high schools. The findings indicate that a higher university quota at the provincial level increases the likelihood of middle school graduates choosing an academic high school, and the probability of choosing a vocational high school is negatively correlated with elite university opportunities in urban China. These results suggest that spatial differences in higher education opportunities significantly influence the type of human capital investment at the high school stage in China.

JEL Classification: I24, I25, I26, H75

Keywords: human capital investment, higher education opportunity, the choice of vocational vs. academic high school

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1 Introduction

Education enhances human capital, thereby affecting individuals' performance in labor market as well as overall economic growth. The utilization efficiency of human capital depends on whether the skill structure of the labor force matches market demand. With the development of China's education system, improving students' education level and optimizing the high school education structure are important to build a high-quality education system. The choice of academic high school, vocational high school, or dropping out for middle school graduates who finish their compulsory education determines the education level and skill structure of the labor force. The demand of families for different types of education is mainly determined by the return on family human capital, while different types of education to be provided is largely influenced by policies. This article analyzes the impact of higher education opportunity (indicator allocation) on the educational decisions of middle school graduates.

Since 1999, the number of universities in China has grown rapidly, but there still exists insufficient and unbalanced development of higher education. As academic high school is a necessary step for most people to enter colleges, there is a close relation between college opportunities and the enrollment rate of academic high schools. Additionally, this relation is also constrained by various factors. Firstly, the impact of college opportunities on the high school education structure is restricted by the popularity of high school education and the complementation and substitution relation between academic high schools and vocational high schools. If the popularity rate of high school education is low, the increase in college opportunities generally reduces the dropout rate of middle school graduates and have a small impact on vocational education, or even increase the enrollment rate of both vocational high schools and academic high schools. In the case of a high popularity rate of high school education, an increase in college opportunities may reduce the probability of choosing vocational education. In the latter case, the substitutability between vocational high schools and academic high schools actually depends on the competition between higher education and vocational high schools.

Secondly, the impact of college opportunities on educational decisions of middle school graduates is determined by relative returns of different types of education. If the return on investment in universities is lower than that in vocational education, an increase in college opportunities will have a limited impact on the enrollment rate of academic high schools. Thirdly, the elastic supply of academic high schools also affects the response of families to higher education opportunities. In the case of a lack of elastic academic high schools, an increase in college opportunities will not significantly enhance the enrollment rate of academic high schools. Although the restricted supply of academic high schools may promote people's choice of vocational high schools, this is contrary to the relative return of different types of education. Finally, the admission opportunities for different types of universities affects the decision-making of high school enrollment in a heterogeneous way. Therefore, it is necessary to analyze the impact of higher education opportunities on the choices for high school education from both theoretical and empirical perspectives.

In recent years, a shortage of skilled workers has become increasingly apparent, and there is a growing demand for vocational education. The National Plan for Medium- and Long-Term Education Reform and Development (2010–2020) pointed out that high school education would be basically popularized in China by 2020,[①] which included vocational education. The corresponding policy is "balance between vocational and academic high school education," that is, the number of students attending vocational and academic high schools should each account for about 50%.[②] However, in the past 20 years, the number of students attending academic high schools in China has been generally higher than that of vocational high schools. Although the number of students enrolled in vocational schools surpassed that of academic high schools before 2010, the enrollment rate of

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① According to the *Educational Statistics Yearbook of China*, by 2017, about half of the provincial-level regions in China had a high school enrollment rate (including academic high schools and vocational high schools) of over 90%.

② Regarding policies on vocational and academic education equivalency, references can be made to the Notice of the Ministry of Education on Doing a Good Job in the Enrollment of Secondary Vocational Schools in 2021 (http://www.gov.cn/zhengce/zhengceku/2021-04/07 content_5598132.htm, accessed on June 15, 2021). In addition, the term "vocational high school" in this paper corresponds to secondary vocational education, including vocational high schools, technical secondary schools, and vocational schools.

the latter has been expanding beyond the former since then. This indicates that the choice between academic and vocational high schools might differ from the policy goal of "balance between vocational and academic high school education." This paper believes that this difference might be related to college opportunities.

Among factors determining regional differences in college opportunities, the quota allocation at the provincial level plays an important role. Under the guidance of the national enrollment plan,[①] education authorities and universities in each province formulate their own enrollment plans. Provincial universities can collaborate with those in other provinces to determine cross-provincial enrollment plans, but they usually focus more on local students. The enrollment scope of central universities is the whole country, but due to the fact that local governments also bear a considerable proportion of education funding and there is the need of supporting local economy, these universities also have an obvious tendency towards local students in setting admission scores and quotas. Due to the uneven distribution of educational resources, this allocation mechanism has resulted in huge regional differences in college opportunities (Qiao, 2007). With the expansion of university enrollment, regional disparity in higher education opportunities has shown a narrowing trend (Yang, 2014; Cao and Zhang, 2017). The government has also introduced a series of policies, such as cooperation plans in central and western regions and special plans to enroll students from rural and poverty-stricken areas, to balance higher education opportunities in different regions. However, regional disparity in high-quality higher education opportunities remains significant, which has even shown an upward trend in recent years (Yang, 2014; Xu et al., 2018).

While discussing regional differences in college entrance exam

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① The Ministry of Education and the National Development and Reform Commission of China preliminarily established the total enrollment of higher education in China based on the needs of national economic and social development and the development plan of the national education industry, which was then reviewed and confirmed by the National People's Congress. The Ministry of Education comprehensively calculates and proposes enrollment plans for each provincial-level region based on factors such as the number of applicants and the teaching conditions of higher education institutions, which were then reviewed and confirmed by the National Development and Reform Commission.

opportunities, little is known about the impact of regional differences on high school education choices. Previous research mainly focused on influencing factors such as family background, migration opportunities, and public education spending (Yang et al., 2014; De Brauw and Giles, 2017; Wang and Luo, 2019). Luo and Meng (2016) used the ratio of people who enter universities in the corresponding age group to measure college entrance exam opportunities and found that higher education opportunities led to urban-rural differences in high school enrollment decisions, but they failed to examine the choice between academic and vocational high schools for middle school graduates.[①]

To examine the impact of college opportunities on high school education choices, this paper mainly utilized inter-provincial differences in the indicator allocation of college entrance exam. The admission indicators of college entrance exam in China are allocated on a provincial basis, with each university allocating enrollment indicators on a provincial basis according to national policies, social needs, and school conditions (Liu and Li, 2014). When determining the number of admissions from different provincial-level regions, universities have a clear preference for local applicants, and the uneven distribution of higher education resources among regions (Qiao, 2007) leads to significant differences in college opportunities for students from different provincial-level regions (Luo et al., 2019).

This study indicated that an increase in college entrance exam indicators leads to an increase in the enrollment rate of academic high schools. With the expansion of college enrollment and the increase in the enrollment rate of academic high schools, the relation between college entrance exam indicators and the enrollment rate of academic high schools among urban populations is weakened, while the relation among rural populations is strengthened. In recent years, the admission to “985” and “211” universities has a significant impact on the enrollment rate of academic high schools, which is greater than that of ordinary universities. However, the influence of college opportunities on the probability of choosing vocational high schools is small at the beginning of college enrollment expansion. With the

[①] Duo and Yang (2014) and Lu and Zhang (2019) also emphasized the promoting effect of college opportunities on rural high school education.

popularization of high school education, college opportunities (especially excellent universities) begin to negatively affect the choice of vocational high schools among middle school graduates in urban areas.

The differential impact of college opportunities has influenced the educational decisions of families in high school education in various provincial-level regions, which has undergone significant changes over the past 20 years. Increasing high-quality higher education resources improves the enrollment rate of academic high schools. Since the substitution effect of higher education opportunities on vocational education is smaller than their positive impact on the enrollment rate of academic high schools, increasing higher education opportunities further improves the education level in China. The significant impact of college opportunities on the enrollment rate of academic high schools also reflects that the rate of return on ordinary higher education is still much higher than that of vocational education. Relaxing constraints on higher education supply leads the structure of high school education and even the entire education system to be more adaptable to social and economic development.

This paper was designed as follows. Section 2 discussed how regional differences in college opportunities affect people's decisions to attend high school from a theoretical perspective; Section 3 examined the impact of college opportunities on academic high school enrollment using provincial data such as college indicators and CHIP 2018 data; Section 4 explored the impact of college opportunities on vocational high school enrollment and middle school dropout; Section 5 examined the wage returns of different types of education using microdata; and Section 6 drew a conclusion.

2 Theoretical analysis of how college entrance exam opportunities affect high school enrollment decision

Given the following conditions: the college admission quota is standardized to 1; the number of middle school graduates (or population of corresponding age group) corresponding to each college quota is N; the number of students enrolled in academic high schools is x, which is a function of N. Therefore, the college admission rate is $1/x$; the overall probability of attending college is $1/N$; and the high school enrollment rate is x/N. Based on these relations, it is possible to determine how college opportunities affect the high school enrollment rate:①

$$\frac{d(x(N)/N)}{d(1/N)} = x(N) - Nx'(N) = x(N)(1 - \frac{dx/x}{dN/N}) \tag{1}$$

When the elasticity of the number of candidates taking the college entrance examination relative to the number of middle school graduates is less than 1, the high school enrollment rate increases with the increase of college opportunities. Obviously, x is an endogenous variable, which depends on N, the distribution of candidates' abilities, and random factors.

Assuming the benefit of attending college is R② and the cost is C, only when the expected benefit of taking college entrance examination is greater than the cost, will middle school graduates attend academic high school. Given that x candidates take the college entrance examination, the final score of each candidate (s_i) is determined by the following equation:

$$s_i = a_i + \epsilon_i \tag{2}$$

where a_i is the ability of a student and ε_i is a random factor.③ The probability of each student being admitted (P_i) is:

$$\text{the probability of being admitted of } i = \Pr\left(a_i + \epsilon_i > a_j + \epsilon_j : for\ \forall j \neq i\right) \tag{3}$$

Assuming ε_i follows an independently and identically distributed extreme value, the above probability can be expressed in the form of a logit distribution.

$$P_i = \frac{\exp\,(a_i)}{\sum_{j=1}^{x} \exp\,(a_j)} \tag{4}$$

The probability of being admitted to a university is determined by the number of candidates x. At equilibrium, the xth candidate is the marginal candidate, and it can be expressed as follows:

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① Let $y = \frac{1}{N}$, $\frac{d\left(\frac{x(N)}{N}\right)}{d\left(\frac{1}{N}\right)} = \frac{d(yx(1/y))}{dy} = x(1/y) + yx'(\frac{1}{y})\left(-\frac{1}{y^2}\right) = x\left(\frac{1}{y}\right) - \frac{1}{y}x'(\frac{1}{y})$.

② Different estimates of the return on education at various stages are provided later in the paper, but this is just a simplified assumption.

③ The model does not specifically consider individual effort, although an individual's optimal effort may also depend on factors such as the number of students taking the college entrance exam, the distribution of abilities, and other uncertain factors.

$$P_x R = \frac{\exp\,(a_x)}{\sum_{j=1}^{x} \exp\,(a_j)} R = C \tag{5}$$

Assuming that the individual ability still conforms to the same distribution, the change in the number of students enrolled in academic high schools is considered when the population (N) doubles. Generally, the number of academic high school students does not increase in the same proportion, because this results in a 50% decrease in the probability of each candidate being admitted to a university. Considering the benefits and costs of attending university, academic high school is not the optimal decision for the marginal candidate.

Will the number of candidates remain unchanged? If the increase in population consists solely of individuals with low ability, they will not alter the distribution of abilities at the high end, and hence, will not affect the number of candidates for university admissions. However, in general, an increase in population may not alter the distribution of abilities. When the population doubles, the number of candidates at each ability level roughly doubles as well. If the number of candidates does not change, the probability of marginal candidates x being admitted to university increases. As the population rises, differences in abilities between candidates above a_x diminishes, making the advantage of marginal candidates smaller and increasing their probability of being admitted to universities. This increases the expected return of attending universities, attracting candidates with slightly low abilities to take the university entrance examination. As it is impossible for the number of candidates to double, the increased candidates still possess higher abilities than the marginal candidates at the initial state.

The above analysis indicates that in provinces with a large population, there are more candidates competing for a given number of university admission quotas; however, the number of candidates participating in the competition is relatively small compared with the population base.[①] This result also suggests that it is not appropriate to measure the college opportunities by using the admission rate based on academic high school students in empirical research.

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① As the abilities of competitors become equivalent, competition also becomes more intense (Berger and Niekken, 2016; Baik, 1994).

Therefore, it is a balance between three choices in the high school stage: attending academic high school, attending vocational high school, or dropping out. High school entrance exam indicator directly affects benefits of attending academic high school, and whether it causes a substitutive choice between academic high schools and vocational high schools depends on the dropout. When the economic development is low, the dropout in the high school stage is high, and an increase in the high school entrance exam indicator may not necessarily affect the enrollment rate of vocational high schools. It reduces the dropout rate and increases the enrollment rate of academic high schools. With the popularization of high school education, the substitutability between vocational high schools and academic high schools increases and an increase in the high school entrance exam indicator necessarily affects the enrollment rate of vocational high schools.

This section mainly examines the impact of the high school entrance exam indicator on the probability of attending academic high school. Students who do not attend academic high school have two choices: dropping out or attending vocational high school. The impact of the high school entrance exam indicator on the enrollment of vocational high schools depends on the economic development and the popularization of high school education in the region. If the economic development is low and the dropout is high, the high school entrance exam indicator may not necessarily affect the enrollment of vocational high schools. However, as high school education is popularized, vocational high schools become a major alternative to academic high schools, and the high school entrance exam indicator will have an opposite effect on vocational high schools. The above differences are particularly evident between urban and rural areas.

In the empirical analysis, there are further issues to consider. Firstly, this paper assumes that the supply of high school education resources is completely elastic, while it is constrained in some regions in reality. When there is a constraint, the empirical analysis may underestimate the number of students who are willing to attend high school in response to changes in university quotas. If the supply of high schools equals the number of students who are willing to attend, the effect of college opportunities will be more significant.[①] Secondly, university quotas may not be exogenously determined. The university quotas in a region may be the result of the popularization of high schools as well as the quality of candidates, rather than the cause. This paper would have a detailed discussion in the empirical analysis. Finally, the rate of return on education (R) may also be influenced by the popularization of high schools. This general equilibrium effect was not explored in this paper because the empirical results showed that there was no significant correlation between the return on education and the popularization of high schools.

3 College opportunities and high school enrollment: empirical analysis

3.1 Data

The data used in this paper mainly come from the CHIP 2018,[②] covering 15 provincial-level regions in the eastern, central, and western regions.[③] The samples were randomly selected from the annual household income survey of the National Bureau of Statistics, including both urban and rural households. Since rural students who receive university education may transfer their household registration to cities, the urban samples who converted to non-agricultural household registration after the age of 16

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① It can be assumed that for x middle school graduates who want to attend high school (i.e., the number of students willing to attend high school where the expected benefits of attending high school are greater than the opportunity cost), the local area can provide $h(x)$ high school enrollment opportunities (this is the actual number of students who can enter academic high school). Due to limitations such as teaching staff, venues, funding, and policies, $h(x) < x$. However, as long as $0 < \frac{dh/h}{dx/x} \leq 1$, an increase in college opportunities will also bring about an increase in high school enrollment.

② Due to different classification of vocational and academic high schools in the early data from that of 2013 and 2018, especially it is impossible to identify academic and vocational high schools from high school education for the rural data in 1995 and 2007, CHIP data before 2007 was not used. In addition, the admission data for "985" and "211" universities collected in this paper only cover the years from 2014 to 2018, and it is difficult to collect admission rate data from earlier years, which makes it difficult to ensure the data quality. Therefore, we were unable to examine the impact of "985" and "211" university opportunities on high school education decisions using CHIP 2013. However, we still examined the impact of all university opportunities on academic (vocational) high school enrollment using the 2013 data. The results were similar to those of the 2018 data. When we combined the two years of data and added time and province fixed effects in the model, the results remained similar. Therefore, the results of the 2013 data were not reported in the paper.

③ The provinces included Beijing, Shanxi, Inner Mongolia, Liaoning, Jiangsu, Anhui, Shandong, Henan, Hubei, Hunan, Guangdong, Chongqing, Sichuan, Yunnan, and Gansu.

were put back into the rural sample. When analyzing the urban sample, migrant population from rural areas were excluded. Next, we selected individuals from 16 to 24 years old receiving the middle school or higher education and determined their high school education choices based on their educational level. Those with academic high school or higher education were considered to have chosen academic high school; those with vocational school or secondary technical school education were considered to have chosen vocational high school; those with a college degree or above obtained from a secondary technical school, vocational high school or technical school were considered as having received vocational education; and those who graduated, dropped out or under graduated from middle school were considered as dropout. We also used other personal and family characteristic information, including age, gender, whether they are only child, and father's education level. Table 1 offers descriptive statistics of relevant variables. There are significant differences in high school and vocational school enrollment rates between rural and urban samples. The academic high school enrollment rate in urban areas is 80.1%, significantly higher than that in rural areas (59.6%), while the vocational high school enrollment rate in urban areas is 14%, lower than that in rural areas (18.7%). The proportions of only child and father's education level in urban samples are both higher than those in rural samples.

In this paper, data from *Educational Statistics Yearbook of China*, *China Education Examinations Yearbook*, and news websites was used to assess college opportunities based on the corresponding number of college, "985" and "211" quotas for middle school graduates.① Regional disparities

Table 1 Descriptive statistics of main variables (aged 16–24)

Variables	Full sample		Urban sample		Rural sample	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Individual characteristics						
Academic high school	0.684	0.465	0.801	0.399	0.596	0.491
Vocational high school and technical school	0.170	0.376	0.140	0.347	0.187	0.390
Age	20.23	2.496	20.11	2.480	20.31	2.484

① In this paper, the number of middle school students corresponding to each university quota was obtained by dividing the reciprocal of the admission rate (number of admissions divided by the number of test takers) based on high school students by the number of high school graduates and then multiplying by the number of middle school graduates (i.e., N in the theoretical analysis).

Gender (female = 1)	0.456	0.498	0.453	0.498	0.452	0.498
Family characteristics						
Only child	0.312	0.463	0.515	0.500	0.178	0.383
Father's education: middle school or below	0.715	0.451	0.480	0.500	0.870	0.337
Father's education: high school	0.136	0.343	0.194	0.396	0.089	0.285
Father's education: vocational high school or technical school	0.041	0.197	0.070	0.255	0.022	0.146
Father's education: associate degree or above	0.108	0.311	0.256	0.437	0.020	0.139

Note: individuals aged 16–24 with at least a junior high school education were selected from the 2018 CHIP data, while those currently enrolled in junior high school were excluded. The sample sizes for full sample, urban areas, and rural areas are 5392, 1951, and 2984, respectively.

in college opportunities calculated in this way were even greater. For example, in 2018, the provincial-level regions with the most and least "985" admission opportunities had 17 and 91 high school students vying for one spot, respectively. When it was measured according to relative number of middle school graduates, these figures were 26 and 161, respectively. This paper divided the number of high school admissions in each provincial-level region by the number of middle school graduates to obtain the high school enrollment rate (x/N), and multiplied it by the collected college entrance exam admission rate ($1/x$) to obtain the probability of university enrollment for a certain age group ($1/N$). Furthermore, China's expanded university enrollment has resulted in significant changes in admission quotas and student composition. In this paper, the university admission rates for middle school graduates from 1998 to 2000 were used to measure college opportunities before the expansion and examine the impact on the corresponding age group (35–39 years old) in high school enrollment decision. The university admission rates for middle school graduates from 2014 to 2018 were also employed to measure current university admission opportunities.[①]

The paper also collected GDP per capita, urbanization rate, and the (relative) number of "985" and "211" universities in 15 provincial-level regions from CHIP data, with the former two serving as control variables and the latter one as instrumental variable. The distribution of "985" and "211" universities is extremely uneven across regions. Taking "211"

① Due to the lack of early admission data and the influence of "985" and "211," the data from 2014 to 2018 was only used in this paper.

universities as an example, the provincial-level region with the most (Beijing) has 26, while many other provincial-level regions (such as Guangxi) only have one. In the provincial-level region with the most "211" universities, one "211" university corresponds to 2700 middle school graduates on average, while in the provincial-level region with the least, one "211" university corresponds to 1.3 million middle school graduates.

3.2 Empirical results: college opportunities and academic high school enrollment

This section first examined the impact of university indicators on the choice of academic high school enrollment, with a particular focus on the effect of elite universities ("985" and "211"). Table 2 reveals the regression results and the standardized coefficients of university admission opportunities. Panel A analyzed the impact of university indicators in recent years (2014–2018) on the enrollment rate of the young high school group. As for the full sample, for every 1 percentage point increase in the university admission rate for middle school graduates, the enrollment rate of academic high schools would increase by 1 percentage point (Column (1)). After controlling some variables, the coefficient dropped to 0.005, but it was still significant at the 10% level (Column (3)). According to the sample data, the standard deviation of all university admission opportunities was 5.85, which meant that increasing college opportunities by 1 standard deviation would increase the high school enrollment rate by approximately 3 percentage points. Panel B provided the analysis results at the beginning of the enrollment expansion. For every 1 percentage point rise in the university admission rate for middle school graduates, the high school enrollment rate would increase by 1.1 percentage points, but the coefficient was no longer significant after adding control variables. Before the enrollment expansion, for every 1 standard deviation increase in the admission rate, the probability of high school enrollment for urban students would increase by about 3.3 percentage points, while after expansion, it would only increase by 1.8 percentage points. However, the relation between the two in rural areas was strengthened. Although the proportion of rural population enrolling in academic high schools was increased significantly with the enrollment expansion, the proportion was still much lower than that in urban areas. In the sample of 16–24 years old in rural areas, the proportion of those who enrolled in academic high schools was only about 60%, while in urban areas it was about 80%. Therefore, with the expansion of universities, an increase in admission to general universities would still significantly increase the probability of rural students enrolling in high schools.

Table 3 analyzes the enrollment opportunities of elite universities. The full sample analysis showed that the "985" and "211" admission opportunities had a positive impact on high school enrollment. In terms of the coefficients, the impact of "985" admission opportunities was greater than that of "211." However, the "985" enrollment quota was much lower than that of "211," and its inter-provincial difference was lower. In the sample data, the standard deviations of the "985" and "211" enrollment rates were 0.522 and 1.454, respectively. According to the estimation results, for every one standard deviation increase in the "985" enrollment rate, the probability of high school enrollment increased by 5.2 percentage points, while for every one standard deviation increase in the "211" enrollment rate, the probability increased by 6.7 percentage points. In terms of explanatory power, the "211" admission opportunities had a greater impact on attending high school. After controlling some variables (especially the proportion of employment in the manufacturing industry), the coefficient for admission opportunities was no longer significant (at the 10% level). Panel A in Column (4) shows the impact of "985" admission opportunities on urban population's educational choices. Without controlling the other variables, the coefficient of the enrollment rate was 0.087. For every one hundred middle school graduates, an additional "985" enrollment opportunity corresponded to an increase in the probability of attending academic high school by about 8.7 percentage points.

Table 2 All university admission opportunities and academic high school enrollment

	Full sample			Urban sample			Rural sample		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: aged 16-24									
Overall college admission opportunities	0.010***	0.007***	0.005*	0.009**	0.006**	0.003	0.010***	0.009***	0.007*
(average during 2014–2018)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)
Obs.	5,392	5,392	5,392	1,951	1,951	1,951	2,894	2,894	2,894
Adj. R2	0.013	0.096	0.097	0.012	0.095	0.099	0.011	0.052	0.053
Standardized coefficient	0.059	0.041	0.029	0.053	0.035	0.018	0.059	0.053	0.041

Panel B: aged 35-39									
Overall college admission opportunities	0.011***	-0.002	-0.002	0.009***	0.007**	0.006**	0.006	-0.002	-0.002
(average during 1998–2000)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.005)	(0.005)	(0.004)
Obs.	3,546	3,546	3,546	1,330	1,330	1,330	1,536	1,536	1,536
Adj. R2	0.011	0.178	0.178	0.009	0.091	0.092	0.004	0.033	0.035
Other control variables	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Proportion of manufacturing employment	No	No	Yes	No	No	Yes	No	No	Yes
Standardized coefficient	0.060	-0.011	-0.011	0.049	0.038	0.033	0.033	-0.011	-0.011

Note: the students currently enrolled in middle school in CHIP 2018 were deleted, and only those with middle school education and above were included. The education level was defined as 0 for middle school, vocational school/technical school, and secondary technical school, and 1 for high school and above. If a student with an associate education or above graduated from a secondary technical school, vocational school, or technical school, their educational level was set to 0. Other control variables included age, gender, whether the student was an only child, the father's education level, and the average salary at the provincial level. In columns (2) and (3), household registration status is also controlled. The robust standard errors are clustered by province in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Taking into account the changes in the "985" enrollment rate, for every one standard deviation increase in the difference in the enrollment rate between provincial-level regions, the difference in the probability of high school enrollment increased by 4.5 percentage points. After further controlling the individual characteristics (age and gender), family factors (whether the student is an only child and the father's education level), and provincial characteristics (salary and proportion of employment in the manufacturing industry), the coefficient of the "985" enrollment rate decreased. In the regression using the "211" enrollment rate, for every one hundred middle school graduates, an additional "211" enrollment opportunity corresponded to an increase in the probability of attending academic high school by about 3 percentage points. However, in terms of changes in the independent variable, one standard deviation increase in the "211" enrollment opportunity corresponded to an increase in the probability of high school enrollment by 4.7 percentage points, slightly higher than the impact of the "985" enrollment opportunity (Column (5)). In addition, according to regression results of this paper, the difference in "985" enrollment opportunities (2.67－0.65＝ 2.02) between provincial-level regions with the highest and lowest opportunities (Beijing and Henan) led to a difference of about 17 percentage points in high school enrollment rate, while the difference in "211" enrollment opportunities led to a difference of about 18 percentage points in high school enrollment rate. These results reflected the important impact of regional inequality in enrollment opportunities on high school enrollment.

The results of the rural sample were different from those of the urban sample. While an increase in the "985" and "211" enrollment rates did increase the probability of attending academic high school, the coefficients were usually not significant due to large standard errors. After controlling variables, the coefficients decreased significantly, which was mainly caused by including the variable of the proportion of employment in the manufacturing industry, indicating a strong correlation between the proportion of manufacturing employment and university indicators. Since the manufacturing industry generally requires low education, provincial-level regions with a high proportion of manufacturing employment have a high demand for vocational high school or middle school graduates, leading to increased opportunity costs for attending academic high school. The proportion of manufacturing employment might also be a response to the labor supply situation, and thus controlling manufacturing status might underestimate the results.

Compared with general university opportunity, the opportunity to attend "211" and "985" universities had a greater impact on people's probability of attending high school. This suggested that the main factor influencing people's decisions to attend high school was the opportunity to attend a good university. As for urban populations, the admission opportunities of high-quality universities greatly impacted the enrollment rate of academic high schools.

Table 3 Admission opportunities for "985" and "211" universities and academic high school education (aged 16–24)

	Full sample			Urban sample			Rural sample		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: "985"									
985 university admission opportunities (average during 2014–2018)	0.099**	0.034	-0.026	0.087**	0.085***	0.042	0.069	0.035	-0.040
	(0.036)	(0.042)	(0.044)	(0.030)	(0.026)	(0.031)	(0.066)	(0.066)	(0.063)
Obs.	5,392	5,392	5,392	1,951	1,951	1,951	2,894	2,894	2,894
Adj. R2	0.006	0.091	0.095	0.009	0.096	0.099	0.001	0.044	0.050

Standardized coefficient	0.052	0.018	-0.014	0.045	0.044	0.022	0.036	0.018	-0.021
Panel B: "211"									
211 university admission opportunities (average during 2014–2018)	0.046***	0.022	-0.001	0.033**	0.032***	0.016	0.045*	0.032	0.003
	(0.012)	(0.015)	(0.020)	(0.014)	(0.008)	(0.013)	(0.023)	(0.023)	(0.027)
Obs.	5,392	5,392	5,392	1,951	1,951	1,951	2,894	2,894	2,894
Adj. R2	0.010	0.092	0.095	0.011	0.097	0.098	0.005	0.046	0.050
Other control variables	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Proportion of manufacturing employment	No	No	Yes	No	No	Yes	No	No	Yes
Standardized coefficient	0.067	0.032	-0.001	0.048	0.047	0.023	0.065	0.047	0.004

Note: the students currently enrolled in middle school in CHIP 2018 were deleted, and only those with middle school education and above were included. The education level was defined as 0 for middle school, vocational school/technical school, and secondary technical school, and 1 for high school and above. If a student with an associate education or above graduated from a secondary technical school, vocational school, or technical school, their educational level was set to 0. Other control variables included age, gender, whether the student was an only child, the father's education level, and the average salary at the provincial level. In columns (2) and (3), household registration status is also controlled. The robust standard errors are clustered by province in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

3.3 Endogeneity

In the above analysis, the university admission quota was considered as an exogenous variable, which was in line with China's "provincial quota" admission system. However, when universities determine the admission quotas and score lines for each provincial-level region, they may consider factors such as the number and quality of students in each region. For example, a high admission rate in Beijing may be due to its high economic development and the quality of primary and high school education. In other words, higher education opportunities may not result in a high enrollment rate in high school, but may be the cause. Correspondingly, low education quality in some provincial-level regions may lower the ability distribution of middle school graduates, and only high-ability candidates participate in the competition (attending academic high school). Additionally, the average ability of these candidates may also be lower than the average quality of high school students in other provincial-level regions, leading to a low admission rate. If the goal of a university is to equalize the average ability of admitted students from each provincial-level region, its strategy should be to increase the admission rate for high-ability provincial-level regions.

Table 4 addresses the above-mentioned issues in two ways. On the one hand, it further controls the social and economic development of different regions, including GDP per capita and urbanization rate. On the other hand, the number of "211" or "985" universities in each middle school graduate's home province is used as an instrumental variable for the probability of being admitted to such universities. Whether a region has such universities and the number of these universities are determined by historical factors. Although the enrollment number may be based on the quality of high school students, the number of these universities fails to respond to the changes in the number of high schools and students in a particular region. ① Table 4 reports the relevant results, where Panel A and Panel B examine the impact of regional differences in "211" and "985" admission opportunities, respectively, and the first four and last four columns show the results for urban and rural areas, respectively. Columns (1) and (5) are OLS estimates after controlling age, gender, whether the student is an only child, father's education level, and average provincial wage. The impact of college opportunities on high school enrollment is positive. In columns (2) and (6), the natural logarithm of GDP per capita and urbanization rate in each provincial-level region in 2016 is controlled, which have a small effect on high school enrollment rate. After controlling these two kinds of variables, college opportunities exert a slightly increased effect on academic high school enrollment rate.

In columns (3) and (7) of Table 4, the logarithm of the number of middle school graduates per capita, either from the "211" (Panel A) or "985" (Panel B) universities, is used as an instrumental variable for college opportunities.② As "211" and "985" are historically established universities,

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① As there was only one instrumental variable in our regression, we failed to conduct an overidentification test. However, our evidence indicated that the number of top universities in each provincial-level region in China had strong exogeneity. Moreover, although there was a significantly positive correlation between the number of top university admissions and the population size of each provincial-level region, no increase was observed in relative admission opportunities solely relying on an increase in the number of schools or high school students.

② The use of logarithmic form was determined by the relation between university admission opportunities and the relative quantity of universities. Compared with the direct use of the relative quantity of universities, logarithmic form results in a higher R^2 in the first stage. This paper also attempted to use linear form, which resulted in a decrease in the significance of instrumental variable estimation coefficients. However, no significant impact was made on the conclusions.

the relation between a province's student quality and the presence or quantity of these universities is weak, especially after controlling GDP and urbanization rate. The instrumental variable estimation results show that in urban areas, university admissions opportunities have a stronger impact on high school enrollment rate compared with the OLS results. The impact of "211" admission opportunity on the probability of high school enrollment increased from 0.035 to 0.047, while that of "985" increased from 0.100 to 0.130. In the rural sample, the impact of "211" admission opportunity decreased from 0.050 to –0.003, while that of "985" decreased from 0.082 to 0.065; however, both estimates were not significant. It should be noted that in the instrumental variable analysis for "985," only provincial-level

Table 4 Impact of university admission on high school enrollment (aged 16–24) with additional control variables and instrumental variables

	Urban sample				Rural sample			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A:	OLS		IV=Ln(Average number of "211" universities)	Excluding Beijing	OLS		IV=Ln(Average number of "211" universities)	Excluding Beijing
"211" admission opportunities	0.032***	0.035***	0.047***	0.077***	0.032	0.050**	-0.003	-0.016
	(0.008)	(0.010)	(0.010)	(0.021)	(0.023)	(0.018)	(0.040)	(0.048)
Ln(GDP per capita)		-0.106*	-0.093*	-0.148***		0.022	-0.007	0.015
		(0.056)	(0.055)	(0.056)		(0.094)	(0.106)	(0.101)
Urbanization rate		-0.000	-0.001	-0.000		-0.007	-0.003	-0.004
		(0.002)	(0.002)	(0.002)		(0.005)	(0.006)	(0.005)
Kleibergen-Paap rk Wald F			17.175	30.583			10.679	18.147
Obs.	1,951	1,951	1,951	1,856	2,894	2,894	2,894	2,860
Adj. R2	0.097	0.099	0.098	0.101	0.046	0.049	0.044	0.043
Panel B:	OLS		IV= Ln(Average number of "985" universities)	Excluding Beijing	OLS		IV=Ln(Average number of "985" universities)	Excluding Beijing
"985" admission opportunities	0.085***	0.100**	0.130***	0.068	0.035	0.082	0.065	-0.029
	(0.026)	(0.034)	(0.020)	(0.065)	(0.066)	(0.056)	(0.050)	(0.125)
Ln(GDP per capita)		-0.087	-0.009	-0.012		0.042	-0.036	-0.033
		(0.070)	(0.059)	(0.055)		(0.122)	(0.095)	(0.085)
Urbanization rate		-0.001	-0.005***	-0.003		-0.006	-0.006	-0.004
		(0.003)	(0.002)	(0.002)		(0.006)	(0.005)	(0.005)
Kleibergen-Paap rk Wald F			470.240	6.185			104.268	5.941

Obs.	1,951	1,951	1,472	1,377	2,894	2,894	1,990	1,956
Adj. R2	0.096	0.098	0.098	0.098	0.044	0.046	0.042	0.041

Note: annotations for urban and rural groups are the same as those in Table 2.

regions that have these universities were used, as many provincial-level regions do not have “985” universities.① To examine whether the results were dominated by differences between Beijing and other regions, in columns (4) and (8), Beijing was removed. The results for urban areas were strengthened in the study for “211” universities, while the coefficients for the rural sample were negative and not significant at the 10% level.② Therefore, although universities might determine the admission quotas based on student quantity and quality, this was not the main factor that determined higher education opportunities in different regions, and would not alter the estimated results of the impact of college opportunities on high school enrollment decision of families.

4 Impact of university quotas on vocational high school enrollment and middle school dropout

In the following part, we examined the relation between university quotas and vocational high school enrollment. When the university admission rate calculated based on middle school students from 1998 to 2000 was used, no significant correlation was found between general university admission and vocational high school enrollment (Panel B, Table 5). Similar results have also been obtained in recent studies (Panel A, Table 5).

Next, we examined the impact of elite university opportunities. As for urban populations, with the “211” and “985” university admission increased, the probability of attending vocational high schools decreased. After controlling the proportion of employment in manufacturing, the absolute value of the admission rate coefficient decreased and was no longer significant (see columns (4)–(6) in Table 6). This was opposite to regression

① Avoiding the logarithm of the relative quantity of “985” universities can alleviate this issue, resulting in a slight decrease in coefficients but no significant impact on the conclusions.

② When using two-stage least squares for estimation, the results of the first stage indicated a significant positive correlation between the logarithm of the number of middle school students per capita with “211” and “985” universities and the admission rates of “211” and “985” universities, respectively.

results for high school enrollment that the opportunity to attend prestigious universities weakened the tendency to attend vocational high schools, and academic high schools and vocational high schools showed a competitive relation. If we focused on the coefficient of university admission rate, we concluded that the opportunity to attend high-quality universities (such as "985") had a great impact on the probability of attending vocational high schools. However, if examining the changes in high school enrollment rates brought about by changes in the standard deviation of the admission rate, we obtained different conclusions. The standardized coefficient of admission opportunities was reported in the last row of each group. For every one standard deviation increase in the "211" admission rate, the enrollment rate for vocational high schools would decrease by 2.3 percentage points, slightly higher than the impact of "985" universities (1.7 percentage points). Compared with general university admission opportunities in Table 5, it indicated to some extent that people still hoped to improve their socio-economic status by attending

Table 5 All university admission opportunities and vocational high school enrollment

	Full sample			Urban sample			Rural sample		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: aged 16-24									
Overall college admission opportunities	-0.002	-0.002	-0.000	-0.003*	-0.002	0.001	-0.001	-0.003	-0.002
(average during 2014–2018)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Obs.	5,392	5,392	5,392	1,951	1,951	1,951	2,894	2,894	2,894
Adj. R2	0.001	0.017	0.018	0.002	0.033	0.037	-0.000	0.005	0.005
Standardized coefficient	-0.012	-0.012	0.000	-0.018	-0.012	0.006	-0.006	-0.018	-0.012
Panel B: aged 35-39									
Overall college admission opportunities	0.002	-0.000	-0.001	-0.003	0.001	-0.000	0.004	-0.000	-0.001
(average during 1998–2000)	(0.003)	(0.003)	(0.002)	(0.004)	(0.004)	(0.003)	(0.005)	(0.004)	(0.003)
Obs.	3,546	3,546	3,546	1,330	1,330	1,330	1,536	1,536	1,536
Adj. R2	0.001	0.030	0.033	0.001	0.007	0.012	0.004	0.018	0.030
Other control variables	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Proportion of manufacturing employment	No	No	Yes	No	No	Yes	No	No	Yes
Standardized coefficient	0.011	0.000	-0.005	-0.016	0.005	0.000	0.022	0.000	-0.005

Note: vocational high school and technical school, as well as secondary vocational education are defined as 1. If an individual with an associate degree or above graduated from technical school, secondary vocational school, their education level is also set to 1. Other conditions are set to 0. The other settings are the same as those in Table 2.

prestigious universities. In addition, the absolute coefficient of the admission rate was smaller than the impact of university enrollment opportunities on academic high schools. This reflected that the impact of "985" and "211" enrollment opportunities on academic high school and vocational high school enrollment was not completely negatively correlated. Although the increase in prestigious university opportunities would reduce the enrollment of vocational high schools by increasing the academic high school enrollment, it was not completely replaced. As for rural samples (columns (7)–(9)), "211" enrollment opportunities presented an insignificant impact on attending vocational high schools, and some coefficients were positive. "985" enrollment opportunities had a significantly positive impact on vocational high school enrollment in rural areas. Since rural education resources are lagging behind those in urban areas, it is difficult for rural populations to attend prestigious universities, and their opportunities to enter "985" and "211" are small. Therefore, attending academic high schools and vocational high schools were not mutually competitive. When examining the entire sample, it was generally not significant.

Table 6 "985" and "211" university admission and vocational high school enrollment (aged 16–24)

	Full sample			Urban sample			Rural sample		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: "985"									
"985" university admission opportunities	-0.001	0.008	0.050*	-0.030*	-0.033	0.009	0.060*	0.049	0.092**
(average during 2014–2018)	(0.022)	(0.029)	(0.026)	(0.015)	(0.022)	(0.025)	(0.033)	(0.038)	(0.038)
Obs.	5,392	5,392	5,392	1,951	1,951	1,951	2,894	2,894	2,894
Adj. R2	-0.000	0.017	0.020	0.001	0.034	0.037	0.002	0.006	0.009
Standardized coefficient	-0.001	0.004	0.026	-0.016	-0.017	0.005	0.031	0.026	0.048
Panel B: "211"									
"211" university admission opportunities	-0.011	-0.010	0.004	-0.014*	-0.016**	-0.001	0.003	-0.004	0.008
(average during 2014–2018)	(0.007)	(0.008)	(0.013)	(0.007)	(0.006)	(0.009)	(0.014)	(0.015)	(0.019)
Obs.	5,392	5,392	5,392	1,951	1,951	1,951	2,894	2,894	2,894
Adj. R2	0.001	0.017	0.018	0.002	0.035	0.037	-0.000	0.005	0.005
Other control variables	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Proportion of manufacturing employment	No	No	Yes	No	No	Yes	No	No	Yes
Standardized coefficient	-0.016	-0.015	0.006	-0.020	-0.023	-0.001	0.004	-0.006	0.012

Note: vocational high school and technical school, as well as secondary vocational education are defined as 1. If an individual with an associate degree or above graduated from technical school, secondary vocational school, their education level is also set to 1. Other conditions are set to 0. The other settings are the same as those in Table 2.

As for middle school graduates, besides attending academic high schools and vocational high schools, they may also drop out of school. Table 7 analyzes the results with dropout as the dependent variable (middle school dropout, under graduation, and working after graduation are all defined as dropout). ① Both overall college opportunities and top university opportunities tended to reduce the probability of dropout. When we used overall college opportunities as the independent variable, regardless of considering more control variables, the effect of rural areas was greater than that of urban areas. As for the admission opportunities of top universities, the influence of rural areas was still greater without controlling the other variables. However, after controlling variables, the coefficient of rural areas became close to that of urban areas, and the former was no longer significant.

In summary, increasing college opportunities could increase the enrollment of academic high schools and reduce the dropout, but the impact of reducing the enrollment of vocational high schools was relatively small.

5 Return on academic high school and vocational school

The above analysis showed that the increase in college opportunities would significantly increase the academic high school enrollment while decreasing the vocational high school enrollment and dropout. In this way, what is the actual return of individuals who attend academic high schools and vocational high schools? This section examined the economic returns for both situations.② It was evident that students chose academic high schools primarily to obtain higher education. To comprehensively consider the returns on academic high school, this study classified all academic high school graduates, including those who graduated from high schools, junior

① Different sample selection and definitions of dropout were also attempted: only samples of middle school graduates were retained, and those who did not continue their education were defined as middle school dropouts. The results were very close to Table 7.

② A large number of empirical studies indicate that the education return in China experienced a significant increase in the 1990s (Liu et al., 2010; Meng et al., 2013; Li et al., 2018). Even with a significant increase in the number of college graduates, the return rate of education remains at a high level.

colleges and universities, as well as undergraduates, into one category.[1]The regression results showed the expected return on attending academic high schools, which was equivalent to the weighted average of all possible outcomes after attending high school.

Table 7 University admission and middle school dropout

	Urban sample			Rural sample		
	All	"211"	"985"	All	"211"	"985"
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Without controlling other variables						
College admission opportunities	-0.006**	-0.019**	-0.057**	-0.009***	-0.047***	-0.128**
(average during 2014–2018)	(0.002)	(0.007)	(0.020)	(0.002)	(0.012)	(0.044)
Controlling other variables	No	No	No	No	No	No
Obs.	1,951	1,951	1,951	2,894	2,894	2,894
Adj. R2	0.014	0.010	0.012	0.012	0.008	0.009
Standardized coefficient	-0.035	-0.028	-0.030	-0.053	-0.068	-0.067
Panel B: Controlling other variables						
College admission opportunities	-0.004*	-0.015**	-0.051***	-0.005***	-0.012	-0.053
(average during 2014–2018)	(0.002)	(0.006)	(0.014)	(0.002)	(0.013)	(0.040)
Proportion of manufacturing						
employment within a provincial-level region	0.001	0.000	0.000	0.002	0.004	0.003
	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)	(0.003)
Other control variables	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1,951	1,951	1,951	2,894	2,894	2,894
Adj. R2	0.071	0.069	0.071	0.082	0.080	0.081
Standardized coefficient	-0.023	-0.022	-0.027	-0.029	-0.017	-0.028

Note: individuals aged 16–24 with middle school education or above were selected, and those currently enrolled in middle school were excluded. Dropout was defined as leaving school during middle school, under graduation or graduating but not continuing education. The other control variables included age, gender, whether an individual is an only child, father's education level, and average provincial wage. Robust standard errors were clustered at the provincial level in parentheses. And *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively.

Panel A in Table 8 retains the sample of individuals with middle school education or above, using middle school as the control group and estimating the effects of vocational education and academic high school education on the natural logarithm of annual wages. The results indicated that except for 1995, the return on academic high school education was significantly higher

[1] If individuals with college or higher degrees graduated from a vocational school, technical school, or vocational high school, they will be included in the sample of vocational high schools.

than that of vocational education in each year, and academic high school education had increasing advantages. In 2018, the average wage of individuals who attended academic high school was 0.123 (0.399 – 0.276) natural logarithmic unit higher than that of vocational high school graduates, while the difference was only 0.063 in 2002.①

The results from Panel A do not necessarily imply that academic high school education itself yielded higher returns than vocational high school education. In fact, returns on academic high school education mainly come from returns on junior college and university education. Panel B in Table 8 presents regression results for different education levels. It was found that returns on attending academic high school were significantly lower than those of vocational schools, which was consistent with previous studies on low returns of academic high school education (Li and Ding, 2003; Yan, 2012; Chen and Wuni, 2016). However, returns on higher education were much higher than those of vocational high school.② This suggested that attending academic high school could lead to higher expected returns.

6 Conclusion

China's education industry has made great progress in the past two decades. The expansion of university enrollment has led to a rapid expansion of higher education in China, and high school education is also universalizing.③ However, there are still insufficient and unbalanced development in both higher education and high school education. As for high school education, families have a higher demand for academic high school education than for vocational high school education. At the policy-making level, in recent years, there has been a strong emphasis on

① Research has revealed that the initial return of general education is lower than that of vocational education, but as individual age increases, the return will be higher than that of vocational education (Hanushek et al., 2017).

② The return on top university education is high. With the CHIP data for urban areas with higher education qualifications, it is estimated that the income difference between "211" and non-"211" universities was 0.224 and 0.332 natural logarithm values (about 25% and 39%) in 2013 and 2018, respectively. The income of "985" graduates was 30% and 57% higher than non-"985" graduates in 2013 and 2018, respectively.

③ In 2019, the number of middle school graduates in China was 14,540,936, while the enrollment number for high school education was 13,901,270 (excluding 497,336 technical secondary school adult students), accounting for 95.6% of the number of middle school graduates (source: *China Statistical Yearbook* 2020, Table 21-2).

vocational high school education, and it has been required to achieve a "balance" between vocational and academic high school education in local enrollment.

With the universalization of high school education, there is a certain degree of competition between vocational high schools and academic high schools. This is actually a competition between academic higher education and vocational education. When given the opportunity for higher education and the ability to pursue it, people will choose to attend academic high school and take the college entrance exam, indicating that the return on academic higher education is significantly higher than that of vocational education. The increase in higher education opportunities has also increased the expected return on academic high school education, and people will make choices between vocational and academic education based on their relative return on the two. A reasonable distribution of vocational and academic education should make the return on both types

Table 8 Return on academic high school and vocational school

	1995	2002	2007	2013	2018
	(1)	(2)	(3)	(4)	(5)
Panel A:					
Vocational school	0.250***	0.515***	0.229***	0.291***	0.276***
	(0.021)	(0.036)	(0.027)	(0.027)	(0.026)
Academic high school or above	0.222***	0.578***	0.393***	0.406***	0.399***
	(0.016)	(0.027)	(0.033)	(0.030)	(0.031)
Obs.	10,392	9,934	6,166	8,525	14,926
Adj. R2	0.263	0.176	0.217	0.152	0.131
Panel B:					
High school	0.116***	0.330***	0.131***	0.176***	0.111***
	(0.021)	(0.027)	(0.032)	(0.026)	(0.021)
Vocational school	0.250***	0.504***	0.268***	0.244***	0.195***
	(0.021)	(0.035)	(0.023)	(0.030)	(0.028)
Associate degree	0.308***	0.748***	0.467***	0.406***	0.362***
	(0.024)	(0.031)	(0.031)	(0.031)	(0.028)

Bachelor degree or above	0.380***	0.987***	0.735***	0.665***	0.703***
	(0.022)	(0.024)	(0.047)	(0.049)	(0.044)
Obs.	10,392	9,826	6,166	8,525	14,926
Adj. R^2	0.278	0.226	0.292	0.194	0.183

Note: the CHIP urban samples were used in this study (due to the difficulty of identifying vocational school and academic high school from the educational attainment of rural students before 2007, only urban samples were used in this section of the study). The age range was 22–54 years old, and individuals with primary education or below, as well as those who were still students or not working, were removed for OLS estimation. In the 1995 data, the technical secondary school, vocational school, and secondary vocational school education was defined as vocational high schools, while high school was defined as academic high school. In the 2002 survey, vocational high schools were included in the category of high school education, and thus we identified whether the high school education they received was a vocational school according to the type of graduation school: technical secondary school, vocational school, or secondary vocational school. Individuals with technical secondary school education, high school education and graduation schools of technical secondary school, vocational school, or secondary vocational school were defined as vocational high schools, while those with other high school education were categorized as academic high schools. In the 2007 data, technical secondary school education and education grade codes related to vocational high schools and technical schools were classified as vocational high schools, and high school education and education grade codes for academic high schools were classified as academic high schools. In the 2013 and 2018 data, vocational high schools, technical schools, and technical secondary schools were defined as vocational high schools, while high schools were defined as academic high schools. The dependent variable was the natural logarithm of annual income. In the regression, the omitted group for education level was middle school, and constant term, gender, age, and province dummy variables were controlled. Robust standard errors clustered by province are reported in parentheses. And *** denotes statistical significance at the 1% level.

of education roughly equivalent, rather than limiting their proportions. This also means that increasing the proportion of students attending vocational high schools depends fundamentally on the improvement of the quality of and return on vocational high school education. Relevant policies should maintain a certain degree of flexibility, allowing local governments to develop appropriate enrollment plans based on their actual situations. In recent years, college opportunities have had exactly opposite impacts on academic and vocational high schools, but the impact on the former is greater than the latter. Therefore, increasing opportunities for universities (especially high-quality universities) is still an effective way to increase the overall enrollment in high school education. If the supply of academic high schools is elastic, the positive impact of increasing college opportunities on high school enrollment will be even great.

The college entrance examination system still plays a commanding role in human capital investment for Chinese families. When the college entrance examination enrollment system causes regional differences in college opportunities, it also brings differences in attending high schools. This paper analyzed the above-mentioned impact from both theoretical and empirical perspectives, demonstrating that when a region has relatively few college entrance examination opportunities, the number of high school students competing for a single university seat would increase, but the magnitude of the increase is smaller than that of the corresponding population base. Regions with few college opportunities also have low enrollment rate for academic high schools. This is of great significance for measuring and understanding regional disparities in college entrance examination opportunities.

This paper also indicated that the distribution of high-quality higher education resources (such as “211” and “985”) has become an important force influencing high school education decisions in different regions. Therefore, in future policy-making, the focus should be on regional balance of high-quality higher education resources. Possible policy options include balanced allocation of admission quotas for existing high-quality universities, subsidizing and developing higher education in regions with relatively inadequate high-quality education resources, and encouraging local governments to invest in high-quality higher education resources. Among these options, the first policy option (balanced allocation of existing high-quality higher education resources) has a relatively small effect of increasing high school enrollment, for it increases the high school enrollment in a region while decreasing it in others. In contrast, funding and encouraging local governments to develop high-quality higher education can improve fairness and increase high school enrollment. Although more investments are needed, it can promote both fairness and efficiency, thus gaining more support.

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