RETURNS TO EDUCATION UNDER THE HUKOU SYSTEM: WHAT IS THE ROLE OF SCHOOL TYPE?

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ABSTRACT

Purpose – Estimating the gap in returns to education between China's urban and rural areas based solely on education attainment can be misleading, especially when there are significant differences in the allocation of educational resources between urban and rural areas. This paper explores the relationship between school types, primarily representing the educational resources available in China, and education returns in urban and rural China under the Hukou system.

Methodology – This paper used data from the 2013 Chinese Household Income Project (CHIP) and applied the OLS method to estimate the traditional Mincer and extended models by adding school types.

Results – Firstly, we found that school types significantly impact income, and different types of schools have different returns on education. The returns to school type increase with the geographical administrative level of the school. In addition, in most cases, the impact of key schools on the income of urban people is more significant than that of rural people. Secondly, when we consider the effect of school type on income, the gap in education returns between non-agricultural Hukou groups and agricultural Hukou groups is widened compared to the results under the traditional Mincer model. Finally, migration does not appear to have brought the desired improvement to their education, with the returns to education for migrants being significantly lower than rural in some cases.

Implications – For individuals, especially those rural Hukou holders, investment in education should be strengthened to improve access to key schools. Providing equal access to quality education and reducing educational disparities between urban and rural areas is essential for the government.

Originality/Value – The results highlight the role of inequality in the allocation of educational resources and the inequality of educational opportunities among the groups with different Hukou statuses and also show that migrating to urban areas may place migrants in a more adverse environment.

Keywords: Returns to education, School type, Hukou system, Urban-rural divide, China

Paper Type: Research Article

INTRODUCTION

One of the most extensive dividers in the Chinese population is the dissimilarity of education development in urban and rural areas. The difference in education development is helping to maintain or increase the urban-rural divide (OECD, 2016). The prominent problem of urban-rural disparities has historical roots, particularly the Hukou policy that began in the 1950s and played an essential role in supporting inequality in China (Liu & Xing, 2016; Whalley & Zhang, 2004). The Hukou system is a residence registration system that divides the total population into two groups: non-agricultural Hukou residents in urban areas and agricultural Hukou residents in rural areas.

According to the regulations, any person born should be registered in the place where either of their parents is registered, with the same type of Hukou as their parents, and the rights and obligations people have been granted at birth; this limits their access to educational opportunities outside their Hukou registration area (Liu & Xing, 2016).

The impact of the Hukou system on educational opportunities will remain with the citizens on their journey to school until university. In other words, from kindergarten to high school, the first condition a student must meet to attend a school is that the student's Hukou must be within that school's admission area, and all public schools are not allowed to enroll across city districts. In China's dualistic system of urban and rural areas, the allocation of educational resources shows a strong preference for urban residents (Fu & Ren, 2010).

Firstly, there is an evident lack of resources for primary and middle schools in rural areas. Based on the information from the 2013 China Education Statistical Yearbook, over 58% of primary school teachers in urban areas had completed at least a bachelor's degree, while less than 25% of their rural colleagues had done so; over 86% of middle school teachers in urban areas had graduated with at least a bachelor's degree, while only 66% of middle school teachers in rural areas had achieved that level. In terms of material resources for education, the average value of instruments and equipment per pupil in primary schools in urban areas is RMB 1,221 compared to RMB 539 for rural students; at the middle school level, this gap is still evident, with the average value of instruments and equipment per pupil in middle schools in urban areas being RMB 1,720, compared to RMB 1,206 for rural areas.

Secondly, beyond compulsory education, high schools are usually located in urban areas. The government implemented a policy of selective resource allocation in the early 1950s to concentrate its human and material resources on the construction of key schools to train the large number of talents needed for economic development (Min & Xiuwen, 2001). Consequently, the types of high schools in China can be broadly classified into four categories: National-level key high schools, Regional-level key high schools, County-level key high schools, and Non-key high schools (including regular high school and specialized high school/vocational senior high school/technical school). In general, the educational resources of key high schools are better than those of non-key high schools. Among the key schools, the higher the geographical administrative level, the more educational resources are available. All the key schools are public and concentrated in urban areas. Although rural students within the Hukou enrolment area also have the opportunity to enroll in key high schools in urban areas, the significant gap in educational quality that already exists at the compulsory education level prevents most rural students from passing scores on their key high school admission exams. Furthermore, to access those key high schools, the urban group, with their income and resource advantages, hires good teachers to tutor them for exams. Although the exams are the same for all the students, these practices have consolidated the gap in educational opportunities, especially access to quality education, mainly through the advantage of resource endowment in urban areas.

These circumstances have led to significant disparities between urban and rural areas regarding access to education. The inequitable distribution of resources in many schools in rural areas has led many families to migrate to urban areas (Xu & Wu, 2016; Zhang, 2016). Migration and education are essential ways for the rural poor to free themselves from the rural poverty trap (Zhang, 2017). However, under the restrictions of the Hukou system, many rural families who migrate to urban areas cannot change their Hukou and are thus not allowed to attend public schools. Only a few highly talented migrant workers can change their Hukou through channels such as obtaining advanced degrees or having competitive skills.

Some studies have noted the impact of educational resource inputs on rural-urban disparities. Bianchi et al. (2022) evaluated the China Rural Modern Distance Education Program, which was implemented in 2004, and the program increased the availability of quality teachers in rural areas by linking quality teachers in urban areas to over 100 million students in rural primary and middle schools. They found that implementing the policy explained a 21% reduction in the pre-existing urban-rural education gap and a 78% reduction in the pre-existing income gap.

Some studies focus on the role of educational resource inputs in explaining the urban-rural education outcome gap (e.g., Wang et al., 2021; Zhang et al., 2018); they all claim that the inequality in the allocation of educational resources is an essential reason for differences in student's academic achievement between urban and rural areas. For comparative studies of education returns in urban and rural China, most studies estimate education returns between urban and rural areas based on education attainment (e.g., Messinis, 2013; Sicular et al., 2008; Zhang, 2012). Estimating rural-urban returns based on education attainment may be biased when there are significant differences in the education received in rural and urban areas due to the unequal distribution of educational resources. In China, where school type essentially represents the availability of educational resources, this paper explores the relationship between returns to education and school type in urban and rural areas, using data on high school type from the 2013 Chinese Household Income Project (CHIP).

Hukou system

To grasp the essence and significance of the Hukou system, one must understand how Hukou is classified and how it affects individual lives. Hukou can be categorized into two related categories: Hukou type and Hukou registration place.
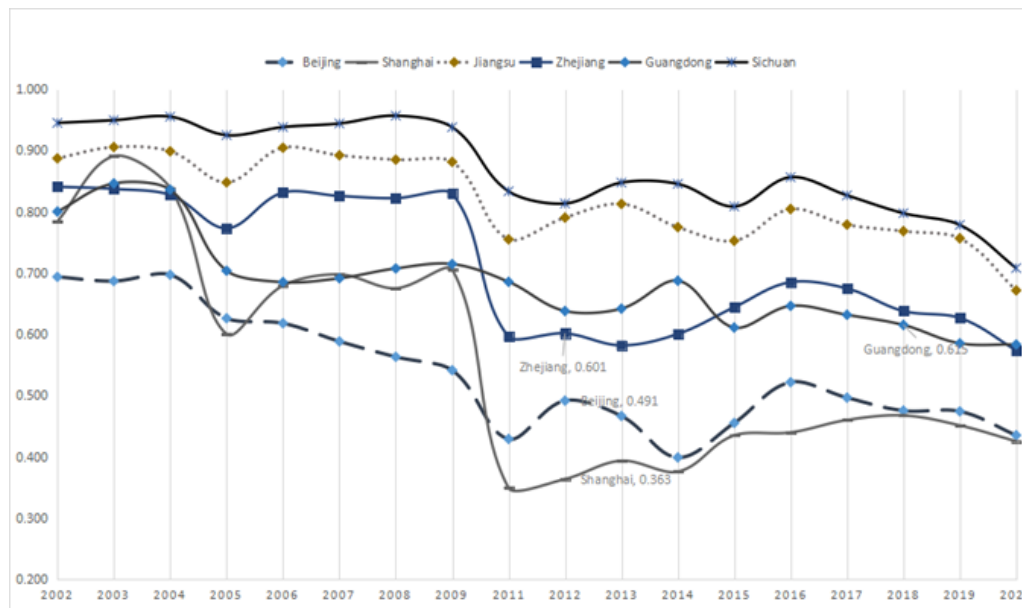
The "type" or "nature" of Hukou is divided into two types: "non-agricultural" and "agricultural" Hukou. The initial Hukou types marked the division of occupation in the Chinese economy (i.e., being engaged in agricultural or non-agricultural production). However, as the primary institutional pillar behind the deep rural-urban divide in China, nowadays, people prefer to use Hukou to distinguish between people from rural or urban areas. Therefore, the agricultural and non-agricultural Hukou are usually called rural and urban Hukou, respectively (Naughton, 2007; Song, 2014). This distinction in status defines a person's relationship to the state and eligibility for a range of benefits provided by the state. People with urban Hukou were entitled to housing, employment, food rations, education, health care, and other benefits provided by the state (Cheng & Mark, 1994), while people with rural Hukou were required to be self-reliant and contribute to the country without state support (Fu & Ren, 2010; Naughton, 2007). For instance, a rural Hukou holder generally cannot access an urban school.

In addition to the Hukou type, each individual is also classified according to the registration place of the Hukou, which is the official residence of the individual and the only "permanent" residence (Chan, 2009). Thus, it is not only the type of Hukou but also the registration place of the Hukou that a person inherits from their parents at birth. In other words, in addition to the Hukou types mentioned above, each person is distinguished by whether they have a local Hukou or a non-local Hukou based on the administrative unit. Local Hukou registration defines a person's right to engage in many activities and eligibility for services a specific local government provides. For example, if someone has a Beijing Hukou, but generally, they cannot access a Shanghai public school since they are not a Shanghai local Hukou.

Regardless of where an individual relocates, their Hukou status remains unchanged unless they undergo a formal Hukou conversion. For example, a person with an urban Hukou, regardless of their physical location, is automatically entitled to essential benefits as long as they are within their Hukou administrated area, as these benefits are distributed and funded by the government, which makes urban Hukou status highly desirable and sought throughout the country. At the same time, rural Hukou suffers from discrimination in all aspects of social life. Thus, Hukou was very much a social status and naturally an important consideration. For example, in the labor market, there exists labor market discrimination against rural Hukou holders in cities, especially in the urban high-wage sector, such as state-owned enterprises (Song, 2014).

The dual registration of Hukou type and Hukou registration place constitutes China's Hukou system, which deprives Chinese citizens of one of their main fundamental rights, namely, freedom of internal migration and residence. During Mao Zedong's era, this system significantly restricted rural Hukou residents, forcing them to tend the land at mostly subsistence levels of compensation and excluding them from access to social welfare and the ability to move to cities (Naughton,

2007). Consequently, before the 1980s, labor mobility was extremely rare, so the number of people residing in places different from where their Hukou registration place was relatively small. However, in current China, after a series of reforms to the Hukou system, labor mobility has become very common, such that non-local Hukou holders or migrants account for a large proportion of the total population in urban areas, especially in large cities such as Beijing and Shanghai. Figure 1 gives the proportion of local Hukou holders to the total population of five large cities in China. This ratio has shown a significant downward trend in the last 20 years, which, to some extent, reflects the relaxation of China's Hukou system in terms of restricting population mobility.

Figure 1. The ratio of local Hukou people in some mega provinces. Data source: The National Bureau of Statistics of China (NBSC)

Under the Hukou system in China, individuals are restricted from attending public schools for compulsory education outside their Hukou registration place but are permitted to attend private or informal schools. As a result, rural Hukou students typically attend rural schools, while urban Hukou holders have access to urban schools. On the other hand, migrants are required to attend rural, private, or informal urban schools. Although students may attend high schools outside their Hukou, they must return to their Hukou registration place to take the college entrance examination if they intend to enroll in colleges.

METHODOLOGY
Model
The most commonly used model of labor income in the literature is the Mincer-type human capital model (Mincer, 1974):

$$\text{Ln } Y_i = \beta_0 + \beta_1 S_i + \beta_2 E_i + \beta_3 E_i^2 + \sum_j \gamma_j X_{ij} + \varepsilon_i \tag{1}$$

in which Y_i is the income for individual i, S_i is the schooling years, E_i is the working experience, E_i^2 is working experience squared, X_{ij} represents other personal characteristics that may affect income and ε_i is a random error term.

In the Mincer model, the term representing schooling is intended to measure the impact of education attainment on income. However, education's effect on income depends not only on educational attainment; the educational resources the individual accesses are also critical. In China, the type of school essentially represents the number of educational resources available. Thus, to examine the relationship between educational resources and returns of education, we

follow Zhong's (2011) attempt to examine the effect of educational resources, which is measured by the type of school, on an individual's income can be incorporated into the traditional Mincer model:

$$\text{Ln } Y_i = \beta_0 + \eta S_i + \eta_1 T_i + \beta_2 E_i + \beta_3 E_i^2 + \sum_j \gamma_j X_{ij} + \varepsilon_i \tag{2}$$

where T_i is the type of school. The analysis in this paper is based on the estimation of Eqs. (1) and (2) to compare the effect of school type on individual earnings.

Data and variables

The data used for the analysis in this paper comes from the 2013 Chinese Household Income Project (CHIP), which was drawn from the large sample pool of the 2013 Integrated Urban-Rural General Household Survey of the National Bureau of Statistics of China. The latter covers 160,000 households in 31 provinces of China. The CHIP project team drew the CHIP sample using a systematic sampling method stratified by East, Central, and West regions. The 2013 CHIP consists of an urban, rural, and migrant survey in 14 provinces, including 7,175 urban households, 11,013 rural households, and 760 migrant households. The distinction among the three cohorts depends on their Hukou status and working place. Therefore, the urban group mentioned in this paper refer to those who have non-agricultural Hukou and working in urban area, the rural group refer to those who have agricultural Hukou and working in rural areas, and the migrant worker group refer to those who have agricultural Hukou and working in urban area. As the provinces covered by the sample are consistent across the three cohorts surveyed, it facilitates the comparison of results across the three cohorts.

There are some differences between the three 2013 CHIP surveys regarding the details of the data covering income. We sought consistency between the three surveys by measuring income from the main job in 2013 and income in kind, including meal allowance and housing benefits provided by that main job. While some previous work has used logs of hourly wages as an explanatory variable (e.g., Li, 2003; Zhong, 2011), here we use logs of monthly wages because our focus is on full-time workers and the accuracy of self-reported hours worked is uncertain, especially with questionnaire data (Aaronson & Figura, 2010; Otterbach & Sousa-Poza, 2010).

We considered two indicators of education in our analysis: years of schooling and level of education. The 2013 CHIP questionnaire offers direct information about each individual's years of formal education received by the end of 2013. In addition, a series of dummy variables were constructed for the level of education by using the question on the highest level of education: primary, middle school, high school, college, and university and above, with the primary school as the reference group.

In all three surveys, there was a question on school type and respondents with high school or higher education were asked to provide the type of school from which they graduated. We constructed several dummy variables using the six school types provided in the questionnaire, which we reduced to 4 categories: national key high schools, regional key high schools, county key high schools, and non-key high schools (including normal high schools, specialized high school/vocational senior high school/technical school, and others), with non-key high schools as the reference group.

Hukou restricts the education system in China, and citizens cannot enroll in pre-university general education outside their Hukou area; if they move outside their Hukou area, they can only study in private schools. With the expansion of the migrant worker community, a new type of school, the migrant worker school, has emerged to address the education of migrant workers' children. Private and migrant worker schools are not nearly as good as public and key schools due to the relative lack of educational resources. Assuming that most of the migrant population is educated in migrant cities, their Hukou significantly reduces their chances of attending a key high school. Limited by the lack of data, we cannot know whether the migrant workers in our sample completed their education in their Hukou area. We know this would bias the estimated results for

the migrant worker group. Supposing that the migrant worker group returns to their place of Hukou for education, the educational resources and opportunities they face are roughly equivalent to those of the rural group. The data show that there is little difference between the migrant worker group and the rural group in terms of the proportion of key high school education received (only a 1% difference), so we can assume that the migrant worker group in the sample does not have a large number of enrollments in urban areas other than the Hukou area and thus would not affect the estimates for the migrant worker group significantly. Within the Hukou enrolment, admission to key high schools in China is based entirely on competitive entrance examination scores. Typically, key schools require higher scores than non-key schools, and in key schools, the higher the geographical administrative level of the school, the higher the required score.

The control variables used in this paper include gender; work experience and its square; dummy variables for employer ownership: govern-institutions, state and collective enterprises, foreign enterprises, and private and other enterprises, with govern-institutions as the reference group; dummy variables for sectoral characteristics: Indus1 is the first industry, Indus2 is the second industry, and Indus3 is the third industry, with Indus1 as the reference group; dummy variables for regional characteristics: east province, central province, and west province, with the east province as the reference group; and controls for party membership and ethnic minority status. In addition, given that our objective was to compare workers with comparable characteristics, we only considered those currently in full-time employment, had income, were aged between 16 and 60 years, and reported health in the health report. Thus, our final sample data was left with 8,373 urban individuals, 13,096 rural individuals, and 1,096 migrant individuals. Table 1 provides statistics on the demographic and socioeconomic characteristics of people with different Hukou statuses.

The data in Table 1 shows apparent differences among the urban, migrant, and rural groups regarding income, education, and occupation. The urban group is significantly higher in income and education attainment than others. Specifically, the average monthly income of urban groups is 3,506 RMB, while migrant workers and rural groups are only about 90% and 85% of urban groups, respectively. Urban people have an average of 11.88 years of education, compared to 9.7 and 8.9 years for migrant workers and rural groups, respectively, and over 40% of urban people have had a college education or above, compared to 13% and 8% for migrant workers and rural groups respectively. The urban group has greater opportunities for accessing key high schools, with more than a quarter of all urban residents who have received high school education attending a key high school, compared to only 8.3% for migrant workers and 7.3% for rural residents.

It is a reasonable assumption that the quality of education in a school and an individual's learning ability determine whether an individual can get into a key high school. Logically, the higher the quality of education in a school, the higher the proportion of students from that school who will be admitted to a key high school and vice versa. Although we do not have access to data on the quality of compulsory education in rural and urban areas, the disparity between the rural and urban groups in terms of the proportion of students enrolled in key high schools and the inequality of educational resources between the urban and rural area that we mentioned before suggest that, excluding differences in individual learning ability, the low quality of compulsory education in rural areas may be responsible for the scarcity of access to key high school education for the rural and migrant worker groups. Previous empirical studies have also found that compulsory education quality differs significantly between rural and urban areas (Fu & Ren, 2010).

Regarding occupation type, urban residents are more likely to be employed in the 'iron rice bowl' occupations sought after by the Chinese people, such as government institutions and state and collective enterprises. At the same time, there are few migrant workers and rural residents in these workplaces.

Table 1. Demographic and socioeconomic characteristics of people with different Hukou status.

		Urban		Migrant		Rural	
		Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
Depend variable	Monthly income	3,506	3,599	3,218	2,458	2,987	2,820
Education variable	Schooling years	11.88	3.199	9.709	2.893	8.945	2.680
	Primary	0.041	0.199	0.138	0.345	0.162	0.369
	Middle	0.253	0.435	0.499	0.500	0.575	0.494
	High school	0.303	0.460	0.234	0.423	0.183	0.387
	College	0.196	0.397	0.088	0.283	0.051	0.219
	University above	0.206	0.405	0.042	0.201	0.029	0.167
Type of high school (%)	NK	0.026	0.160	0.005	0.074	0.007	0.081
	RK	0.096	0.294	0.024	0.152	0.017	0.129
	CK	0.130	0.337	0.054	0.226	0.049	0.216
	Key Schools	0.252		0.083		0.073	
	Non-key Schools	0.442	0.497	0.279	0.449	0.183	0.387
Type of job (%)	GE	0.249	0.432	0.040	0.196	0.055	0.229
	CE	0.219	0.413	0.090	0.287	0.066	0.248
	FE	0.030	0.171	0.023	0.149	0.022	0.147
	PE	0.502	0.500	0.847	0.360	0.857	0.350
Industry (%)	Indus1	0.018	0.133	0.012	0.108	0.041	0.199
	Indus2	0.255	0.436	0.295	0.456	0.518	0.500
	Indus3	0.727	0.446	0.693	0.461	0.440	0.496
Regions (%)	East Prov	0.379	0.485	0.376	0.485	0.334	0.472
	Central Prov	0.303	0.459	0.355	0.479	0.359	0.480
	West Prov	0.172	0.377	0.123	0.329	0.182	0.386
Other controls	Experience	21.72	11.07	20.39	10.88	22.07	12.59
	Male	0.562	0.496	0.599	0.490	0.650	0.477
	No minority	0.953	0.212	0.953	0.211	0.941	0.236
	Party	0.211	0.408	0.042	0.201	0.067	0.250
Observations		8,373		1,096		13,096	

Note: NK, RK, and CK refer to the National Key High Schools, the Regional Key High Schools, and the County Key High Schools, respectively. GE, CE, FE, and PE refer to Govern-institutions State, Collective, Foreign, and Private enterprises.

RESULTS
Normal mincer model results
We first use equation (1) to estimate the traditional Mincer model, which does not include school type. The results of the OLS equation are presented in Table 2. Columns (1) to (3) report the returns to education measured by years of schooling, and columns (4) to (6) report the returns to education at different levels of education.

The results for years of schooling show that the return to education for each additional year of schooling is 7.2% in the urban group. In contrast, in the migrant worker group and rural group, this value is only 2.8% and 2.9%, respectively. The return to education for migrant workers and rural groups with agricultural Hukou is approximately 40% of that for urban groups with non-agricultural Hukou, with a gap of 4.3% between the urban and rural groups and 4.4% between urban and migrant worker groups. These results suggest that the gap in returns to educational attainment between the urban and migrant worker groups has widened by 1.3% compared to the study using CHIP 2002 (Zhang, 2012).

When using the dummy variable of education level, column (4) shows that in the urban group, middle school education does not have a significant effect on the income of the urban group, with high school, college, and university and above having 15.2%, 37.3% and 66.4% higher returns than primary school respectively. For the migrant worker group, only university and

above education significantly affects earnings, with a 48.3% higher return than those who graduated from primary school. Among the rural group, all levels of education significantly affect income, with middle school, high school, college, and university and above having 5.9%, 9.6%, 29.5%, and 49. 9% higher returns than primary school, respectively. Overall, the urban group has higher returns to education at all levels from high school onwards than the migrant worker group and the rural group. The most significant gap in returns to education among the three groups occurs between the people with a college education in the urban and migrant worker groups, with a gap of 37.3%, much higher than in 2005 with 25.2% (Fu & Ren, 2010).

The effects of other control variables on earnings were, as expected, similar to the results of previous studies. Since we are concerned more with the relative returns to different school types across the three groups, we focus only on the analysis of education-related variables in the following analysis.

Table 2. Rates of returns to education in the traditional Mincer model

	urban	migrant	rural	urban	migrant	rural
Schooling years	0.072***	0.028***	0.029***			
	(0.000)	(0.002)	(0.000)			
Middle				0.015	-0.088	0.059***
				(0.675)	(0.137)	(0.001)
High school				0.152***	0.006	0.096***
				(0.000)	(0.934)	(0.000)
College				0.373***	0.092	0.295***
				(0.000)	(0.347)	(0.000)
University above				0.664***	0.483***	0.499***
				(0.000)	(0.000)	(0.000)
Observations	8,373	1,096	13,096	8,373	1,096	13,096

Note: p-values in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01

Results with type of school

Table 3 reports our results by including school type in the Mincer model. Columns (1) to (3) show the results for years of schooling, and columns (4) to (6) show the results based on education level. The coefficients for the school-type dummies in columns (1) to (3) are returns to total years of schooling. For example, suppose the average number of years to obtain a high school qualification is 12, for the urban group, in addition to an annual return to education of 6.4%. In that case, those who graduate from a national key high school earn 2.1% more yearly (0.252 divided by 12). Thus, individuals graduating from the key national high school will earn 6.8% (0.064 + 0.021 - 0.017) more per year for urban residents than for migrant workers and 4.7% (0.064 + 0.021 - 0.024 - 0.014) more per year for urban residents than for rural residents.

For the results on education level, the return to a particular level of education for a given school type is the sum of the coefficients for education level and school type. For example, the return to education for urban residents who graduated from university and had attended a key national high school was 83.6% (0.618 plus 0.218). It is important to note that because our data for school type is the type of high school, the individuals who provided data on school type cover all respondents with high school education and above, so the return to school type is an average return to high school education and above. Comparing the returns to education for urban residents and migrant workers who graduated from university and had attended a key national high school, the difference between them was 45.4%, and for the same situation, the difference between urban and rural residents was 36.7%.

Generally, the income of all groups is positively related to all levels of key high schools. For both urban and rural groups, the return to school type increases with the geographical administrative level of the school. In contrast, for the migrant worker group, only county key high school has a significant effect on earnings, and it has the most prominent effect on earnings of all school types for all groups. Although it is well known that rural schools have fewer educational

resources than urban schools do, it is less known that the effectiveness of the same type of school could be different for students. Most key high schools, especially the national and the regional ones, have a higher impact on the income of individuals in urban areas than in rural areas. The earnings gap between groups with different school types of education at the same level of education may be as high as 57.1%, which was calculated with the difference between urban residents who have a college education and have ever attended a national key high school and migrant workers who have a college education and have ever attended a regional key high school (or a national key high school). The difference in the annual return to years of schooling may be as high as 6.8%.

Table 3. Rates of returns to education with four types of school

	urban	migrant	rural	urban	migrant	rural
Schooling years	0.064***	0.017*	0.024***			
	(0.000)	(0.051)	(0.000)			
NK	0.252***	0.162	0.168*	0.218***	0.105	0.042
	(0.000)	(0.370)	(0.054)	(0.000)	(0.634)	(0.628)
RK	0.144***	-0.146	0.125***	0.108***	-0.189	0.074*
	(0.000)	(0.470)	(0.004)	(0.000)	(0.340)	(0.087)
CK	0.028	0.387***	0.062**	0.008	0.304***	0.035
	(0.204)	(0.000)	(0.022)	(0.712)	(0.002)	(0.200)
Middle				0.013	-0.083	0.059***
				(0.714)	(0.164)	(0.001)
High school				0.1418***	-0.0086	0.0878***
				(0.000)	(0.911)	(0.000)
College				0.353***	0.047	0.281***
				(0.000)	(0.623)	(0.000)
University above				0.618***	0.382***	0.470***
				(0.000)	(0.001)	(0.000)
Observations	8,373	1,096	13,096	8,373	1,096	13,096

Note: p-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Robustness check

One related empirical issue that may relate to reporting errors is associated with the type of school self-reported. Some may argue that the same high school can be classified differently according to different individuals. It is essential to be clear that key high schools in China are public and are strictly regulated by the education department of the jurisdiction in which they are located. A school can only be accredited as a key high school by the local education department if it meets the requirements for being assessed as a key high school. There are several very detailed and stringent requirements for the accreditation of key high schools, such as average schooling of teachers, test scores of students, student/teacher ratio, teaching technology, the physical condition of schools, the quality of student peers, and alums networks, % of teachers with advanced qualifications, teaching resources per student, and many other aspects of educational resources requirement. The allocation of educational resources and student recruitment are strongly linked to these school types. For example, in the process of admission to high schools, excluding the influence of Hukou, admission to key high schools depends entirely on students' high school entrance examination scores and, in China, the high school entrance examination is uniformly set by the Municipal Education Bureau, and even in some provinces, it is uniformly set by the Provincial Department of Education. In principle, the higher the school's geographical administrative level, the higher the admission line. It is, therefore, reasonable to assume that when respondents reported their type of high school, most had similar criteria.

To address questions about measurement error, we performed the following robustness checks. The four school categories were combined and later divided into only two groups. Table 4 reports the results using two types of schools: key high schools and non-key high schools. In particular, key high schools cover all types of key high schools, and non-key high schools include

schools other than key high schools. The results in Table 4 show that when we change the classification of school types, the returns to years of schooling and education levels are almost identical to those in Table 3, and the qualitative relationship between school type and income remains constant. Thus, the effect of school type on rural-urban returns to education is quite robust.

Table 4. Rates of returns to education with two types of school

	urban	migrant	rural	urban	migrant	rural
Schooling years	0.066***	0.018**	0.025***			
	(0.000)	(0.037)	(0.000)			
Key schools	0.095***	0.222**	0.085***	0.064***	0.147	0.044*
	(0.000)	(0.014)	(0.000)	(0.001)	(0.121)	(0.067)
Middle				0.013	-0.089	0.059***
				(0.724)	(0.134)	(0.001)
High school				0.137***	-0.015	0.087***
				(0.000)	(0.844)	(0.000)
College				0.356***	0.042	0.280***
				(0.000)	(0.655)	(0.000)
University above				0.633***	0.398***	0.471***
				(0.000)	(0.001)	(0.000)
Observations	8,373	1,096	13,096	8,373	1,096	13,096

Note: p-values in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01

DISCUSSION AND IMPLICATIONS

Table 5 shows the results for each pair of Hukou subgroups with the largest differences in returns to education with or without considering the four types of schools. We found that when we considered the school type, compared with the results of the traditional Mincer model, the gap in returns to education between urban and rural areas was widened. Specifically, the gap in the returns of the same level of education and the gap in the returns to years of schooling between the urban and rural groups receiving different types of school education widened by 20.2% and 1.8%, respectively, compared to the results estimated by the traditional Mincer model. In contrast, the gap between the urban and migrant groups was widened by 19.8% and 2.4% when we counted the impact of school types, respectively. In other words, the difference between the return to education of the urban group with non-agricultural Hukou and the other two groups with agricultural Hukou was significantly higher than that of the traditional Mincer model without considering the school type. The results considering only the two types of schools are similar to those in Table 5, which are not given in the paper to save space and are available to the author upon request.

Table 5. Comparison of returns to education under four types of school (%)

	Biggest gap	U-R	U-M	M-R
Schooling years	Normal Mince model	4.3	4.4	-0.1
	Adding the type of school	6.1	6.8	2.5
Education level	Normal Mince model	16.5	37.3	-29.5
	Adding the type of school	36.7	57.1	-35.5

Note: The biggest gap in returns to schooling years and education level for each hukou pair under the typical Mince model was calculated by comparing the coefficients of each hukou group in Table 2. For example, the biggest gap of 37.3 was observed between urban and migrant groups at the college education level. We used a similar method to calculate the biggest return gap by incorporating the type of school in Table 3.

Many studies have proved that the educational resource allocation gap between urban and rural areas is essential for the urban-rural income gap and education gap (Bianchi et al., 2022; Wang et

al., 2021; Zhang et al., 2018). From the policy support of local governments to the allocation of resources within schools, the educational resources of key high schools are significantly better than those of ordinary high schools. Our data shows that urban groups of people with non-agricultural Hukou have an easier chance of entering key high schools than those with agricultural Hukou. Therefore, we have reason to believe that if the inequality in the distribution of educational resources continues among various schools and the enrolment advantage of urban groups in key high schools continues, the gap between urban and rural areas will be further widened.

When we consider the impact of school types on the return to education, the trend of the gap in the return to education between migrant and rural is uncertain. In some cases, the return to education of migrants is significantly lower than that of rural, which goes against the original intention of most migrant parents to invest in their children's education since migration and education are considered essential ways for the rural poor to free themselves from the rural poverty trap (Zhang, 2017). This result provides a piece of new evidence for the persistent migrant disadvantage, where migrant workers do not receive the same benefits as local urban groups in terms of education, healthcare, and employment because of their non-local Hukou status (Goodburn, 2020; Yang & Bansak, 2020; Zhang, 2017), which may have trapped migrant workers in a new education-poverty trap (Zhang, 2017).

Our results are consistent with previous studies (Fu & Ren, 2010; Heckman, 2005; Zhou & Cheung, 2017); these results collectively highlight the prominent urban-rural gap in China under the Hukou system. How to efficiently allocate scarce educational resources between urban and rural areas to reduce the urban-rural divide is a worthwhile research question, and our findings may help inform individual education investment decisions and more equitable and efficient resource allocation. For individuals, especially those rural Hukou holders, investment in education should be strengthened to improve access to key schools. Providing equal access to quality education and reducing educational disparities between urban and rural areas is essential for the government.

LIMITATIONS AND FUTURE RESEARCH POSSIBILITIES

One limitation of our study is that CHIP 2013 does not provide enough control variables to make more accurate comparisons. For example, whether the area where the respondent received their education coincided with their Hukou location played a decisive role in the respondent's access to public education and key high school education. No suitable data in CHIP 2013 measures this information; therefore, it is not controlled for in our analysis. Theoretically, urban and rural groups are more likely not to have migrated and thus not to be restricted by Hukou, and the migrant worker group, which we are more concerned about, does not differ significantly from the rural group in terms of attendance at key high schools, so we assume that the vast majority of the migrant worker group in our sample completed their education before moving and that the Hukou system does not interfere too much with the educational status of the migrant worker group. Even so, our results may still be biased, and the impact of school type on returns to education among the groups with different Hukou status should be remeasured in the future when more comprehensive education data are available. At the same time, the change in the Hukou status of the agricultural Hukou group through such channels as higher education or competitive jobs may lead to an overestimation of the gap in returns to education between non-agricultural and agricultural Hukou groups. However, this change in Hukou status is minimal.

Furthermore, as with other studies on the gap in returns to education between urban and rural areas, our analysis only considers the impact of education on the main wage income gap, which may lead to an underestimation of the urban-rural gap in China, as there are significant differences in civic benefits and consumption of public services between urban and rural residents. These implicit benefits may have contributed to an even larger urban-rural gap (Sicular et al., 2008). Still, we cannot combine this part of the data with the wage income data due to data constraints.

CONCLUSION

Estimating returns to education between urban and rural areas based solely on education attainment can be misleading when there are significant differences in the allocation of educational resources between urban and rural areas. The type of school in China primarily represents the educational resources available. This paper examines the returns to education between urban and rural areas under different school types.

Firstly, we found that all levels of key high schools were positively associated with the income of each group. Mainly, the return to school type increases with the geographical administrative level of the school, and, for most key high schools, the impact on the income of the urban group is higher than that of the rural group. Secondly, when we consider the effect of school type on income, the gap in returns to education between urban and rural areas is widened compared to the results under the traditional Mincer model. The gap in the returns of the same level of education and the gap in the returns to years of schooling between the urban group and migrant worker group receiving different types of school education widened by 19.8% and 2.4%, respectively, compared to the results estimated by the traditional Mincer model, while the gap between the urban and rural groups increased by 20.2% and 1. 8% respectively. Finally, internal migration does not appear to make the desired difference to migrant work groups, with the returns to education for migrants being significantly lower than rural in some cases, which defeats the original intention of most rural parents who want to change their fortunes by moving to urban areas and investing in their children's education.

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CONFLICTS OF INTEREST

The author declares that no conflicts of interest are found in this research.

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