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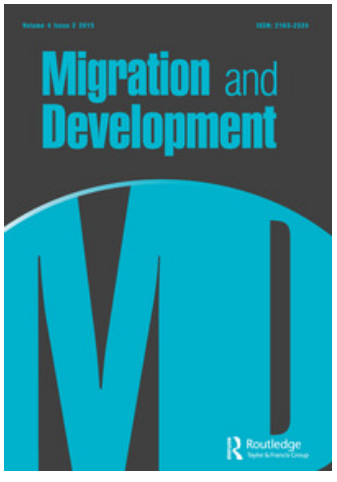

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Schooling institutions and academic achievement for migrant children in Urban China

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Schooling institutions and academic achievement for migrant children in Urban China

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Using data collected in Hangzhou, Zhejiang Province, this paper identifies differences in student backgrounds and levels of school resources accessed between migrant students in private migrant schools and those in public urban schools. We then quantify differences in academic achievement between students in these two different schooling systems and employ multivariate regression to examine the extent to which differences in student background and school resources explain differences in achievement. In terms of student background, being from a disadvantaged background is associated with attendance in privately run migrant schools. Migrant schools are also inferior to public schools in terms of school resources. We find that migrants attending migrant schools score 0.56 standard deviations in math achievement below students in public schools. We find that this gap is better explained by differences in school resources (instead of student background). Based on these results, we suggest that government efforts to improve education quality for migrant students should focus on increasing access to public schools.

Keywords: migrant students; academic achievement; schooling institutions; China

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1. Introduction

Having mandated free, nine-year compulsory education nationwide, China's government has taken measures over the past several years to improve the education of its populace. These efforts typically include bolstering teacher salaries, upgrading facilities, and reforming curricula. Chinese students, at least in some of the largest cities, do well in international comparative testing (Ramos, Duque, & Nieto, 2012).

Unfortunately, there is a growing segment of the population that does not fit neatly into the rural–urban dichotomy that has traditionally guided economic policy and the national school system. These are rural to urban migrants, who continue to move in large numbers to China's cities from rural areas (Sa, 2004).

Increasingly, migrants are bringing their children to the city with them. In the rest of this paper, we call the children of migrants *migrant children*. There are no official statistics on migrants in general and even fewer on migrant children. One study in Beijing suggests that in 2007, there were 400,000 school-aged migrant children in the city

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alone, up from around 60,000 in 1997 (Ma, Bai, Liu, Pang, & Rozelle, 2008). A separate, nationwide estimate put the number of school-aged migrants in China to 35.81 million (ACWF, 2013). Regardless of the exact number, it is clear that the school-aged migrant population is large and growing.

Unfortunately, these children have fallen into a gap in the provision of public services (Han, 2004). Without an urban *hukou*, or residence permit, migrant children and their families have had limited access to state-funded health care and other social services in urban areas (Ma et al., 2008). The same is true for urban public schools.

So, where do these migrant children go to school? Existing at the educational margins as they do, the paths that migrant children take in pursuit of schooling can defy easy classification. High-quality urban public schooling is only guaranteed to be available free of charge to the students with urban residency permits or *hukou*. It is more complicated for migrant children. Before 2000, most migrant children were not permitted to attend public schools in urban areas. A change in policy, however, allowed migrant children to attend public schools if (and only if) there was space available in urban schools (Goodburn, 2009). With declining urban cohort sizes, there were, in fact, increasingly more spaces available in urban schools. However, local education officials do not necessarily have an incentive to encourage migrant children to attend school in their districts. In sum, although a number of migrant students attend urban public schools, the opportunities are only available to those who know about and have means to attend.

Other migrant students have no option but to attend privately run, for-profit migrant schools (Sa, 2004). These migrant schools are often unregulated, appearing on ad hoc bases where the need arises. Migrant school principal-cum-entrepreneurs filled this gap by establishing and running migrant schools. The quality of migrant schools appears to vary widely, though very few, if any, are even remotely comparable to formal urban public schools in terms of facilities, staff, and quality of instruction (CCAP, 2009; Ding, 2004; Han, 2004; Human Rights Watch, 2006; Kwong, 2004; Liu, 2002).

Although there has been an increasing concern for the quality of education for migrant students in China (Sa, 2004), there are few empirical analyses examining the effect of the form of schooling on the academic achievement of the migrant students. There are exceptions, for example, the work of Chen and Feng (2012), Lai et al. (2013) and Song, Loyalka, and Wei (2010). These three papers all come to the same general conclusion. Students in migrant schools demonstrate far lower academic achievement than students in public schools, both urban and rural. The papers also suggest that migrant schools hold back the academic progress of migrant students. Access to public schools appears to be the key factor determining the quality of education that migrant children receive.

Although the results from these three papers suggest the Chinese government should allow migrants to enroll in public school, the evidence is not completely clear. First, these three studies rely on data collected from either Beijing or Shanghai that might enjoy a number of preferential educational policies that are not enjoyed by the other cities. In other words, the samples are all from China's large mega cities, which may have unique characteristics. For this reason, they are not representative of cities in China in general. A policy recommendation for China as a whole requires evidence from other urban areas, where there is also considerable migration. In this sense, our sample from Hangzhou might provide a more representative sample for studying migrant education. Second, most of the data were collected before 2010 and lack direct relevance to policy-making today. Third, none of these papers have been published yet (although one, at least, is forthcoming), and none of these papers claim that the public schools in their

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sample were randomly selected. Therefore, there might be some external validity concerns about the findings in these papers. In particular, Lai et al. (2013) mainly focuses on comparing between migrant children attending migrant schools and children in poor rural public schools to show that the quality and resources of Beijing migrant schools were even inferior to public schools in poor rural areas. The part that compares migrant schools and Beijing public schools used only four public schools, and thus, was solely descriptive.

The overall goal of this paper is to better understand the types of schools that migrant students attend and whether they benefit more from attending public schools or migrant schools. Specifically, this paper seeks to accomplish three objectives. First, we identify differences in school size, student–teacher ratios, and teacher qualifications (*school resources*) between public schools and migrant schools. Second, we identify differences in student individual and family characteristics (*student background*) between migrant students attending these two types of schools. Third, we quantify gaps in achievement between migrant students in these two types of schools and explain these achievement gaps in terms of differences in school resources or student background.

To empirically answer these questions, we use data-set containing measures of academic achievement, school resources, and student background. The data come from six migrant schools and ten public schools in Hangzhou, the provincial capital of Zhejiang province. There are data from 474 grade-4 students.

We use both simple comparison and multivariate regression in our analysis. We first compare school resources of public schools and migrant schools and the background of migrant students in these two types of schools. We then compare student test scores between the migrant students attending private migrant schools and those attending Hangzhou public schools. This will give a measure of the achievement gap between the two groups of migrant students. Finally, we employ multivariate analysis to explore how much each of the factors (school resources and student background) contributes to the measured achievement gap.

The rest of the paper is organized as follows. Section 2 introduces the data-set. Section 3 describes our empirical strategy. In Section 4, we present the results of the study. Finally, in Section 5, we discuss the implications of our findings and conclude.

2. Data

To answer the main questions of the study, we rely on a data-set that we collected ourselves from urban migrant and public schools in the Xiaoshan District of Hangzhou in 2010. Hangzhou is a mid-size city with a population of over 1.5 million. Although there are many migrants in Hangzhou, there is no official count. The study site itself is in Xiaoshan, the largest district in Hangzhou in terms of population and GDP. Among Hangzhou's eight districts and five affiliated counties, Xiaoshan district accounts for 18% of the population and 21% of the GDP (Statistics Bureau of Hangzhou, 2012). The number of primary students in the district of Xiaoshan accounts for about 25% of the total number of primary students in Hangzhou. By the end of 2009, there were 101, 939 primary students in Xiaoshan. According to district-level statistics, 32% of the total number of primary students were migrant students (Xiaoshan Education Bureau, 2010).

We took several steps to collect a representative data-set on migrant students in migrant and public schools in our sample site. First, we collected a comprehensive list of schools from the Education Bureau in the district of Xiaoshan, Hangzhou. The list included both private migrant schools and public schools. We randomly chose six

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private migrant schools in the list. In order to focus our study on schools with sufficient concentration of migrant students, among all of the public schools on the list, we only looked at the public primary schools where there were more than 10% of migrant students. We then randomly selected 10 public schools among all the 50 public primary schools on this sub-list. In total, then, we surveyed students in 16 schools (six migrant schools and ten public schools).

We decided to survey fourth-grade students in our 16 sample schools because we could measure their academic achievement using a standardized examination. Specifically, we chose our test questions from a question pool created by the Trends in International Mathematics and Science Study (TIMSS). TIMSS is an organization that runs an international assessment of the mathematics and science knowledge of fourth- and eighth-grade students around the world. The TIMSS test questions have been used previously in China to measure student academic achievement (e.g. Lai et al., 2013). However, at the elementary school level, the TIMSS tests are only designed for fourth-grade students, so our study focuses on fourth-grade students.

Due to limited funding, however, we were not able to include all fourth-grade migrant students in each of the 16 sample schools. Instead, we randomly chose one-third of the fourth-grade classes in the schools. In total, there were 19 fourth-grade classes included in our sample. In every sample class, we surveyed all the migrant students: a total of 474 fourth-grade students. Of the total, 341 were from the migrant schools and 133 were from the public schools.

In fact, we also surveyed all urban students in our sample classes in the public schools (there were 345 of them). As the focus of this paper is to examine the best venue to educate migrant students, for the main part of analysis in this paper, we only use observations from migrant students and report the relevant results. The subsample of urban students in the public schools in our sample is used to provide supplemental evidence to our main findings.

Our survey instrument included three parts. In the first part of the survey, we administered a 30-minute standardized math test to produce a measure of student academic achievement. There were 29 questions in this test. The study team closely proctored the test to avoid cheating and ensure that the time allowed for students to take the exam was standardized.

In the second part of the survey, we collected information on each student's personal and family characteristics (together called student background). Variables that measure student background include each student's *age* (measured in years), whether they were *female,* whether they were an *only child*, how many elder siblings they had (or *number of elder siblings*) and how many younger siblings they had (or *number of younger siblings*). We also asked questions about each student's schooling background, that is whether he or she had ever *attended any kindergarten* or *ever repeated a grade*. Variables that measured family characteristics include *father's education level* and *mother's education level.*

In the third part of the survey, we collected information about school size, student–teacher ratio, and teacher qualifications (together called school resources). This information was collected from the school principal. These measures include *school size* (the number of students in the school) and *student–teacher ratio*. Our measurement of school resources also includes teacher qualifications, based on the proportion of teachers with different rankings (which is based on a scoring/evaluation system implemented by the district education bureau). In our analysis, we use proportion of *Rank III teachers and above to* represent the number of high- quality teachers. In contrast, we use a variable

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that measures the *proportion of Rank I teachers and below* (that is, no ranking) to represent the number of poor-quality teachers. In addition, the survey asked about the *proportion of teachers with university degrees,* the *proportion of teachers with professional college degrees*, and *average years of teaching experience*. The above measures are the main indicators of school resources used in the study to help explain the academic achievement gap.

3. Empirical strategy

Our first analytical exercise is to compare two dimensions of migrant schools and public schools: school resources and student background. 'School resources' includes both school-level and teacher-level factors. The indicators of school resources include *school size* and *student–teacher ratio* and teacher characteristics (*female teacher share, share of Rank II teachers, share of teachers with Rank III and above*, *share of teachers with Rank I and below, years of teaching experience, share of teachers with university degree, and share of teachers with professional college degree*). 'Student background' refers specifically to student characteristics (*age*, *only child*, *number of elder siblings, number of younger siblings),* student academic background (*attended any kindergarten* and *ever repeated a grade*), family characteristics (*father's education and mother's education*) of students in migrant vs. public schools.

Our second exercise is to examine whether there is an achievement gap between migrant and public schools. We estimate the raw student achievement gap between migrant students attending migrant schools and public schools without controlling for any student and school characteristics that might affect academic achievement. The model is as follows:

$$y_{is} = \alpha + \beta \cdot \mathrm{mig}_i + \varepsilon_{is} \tag{1}$$

where y_{is} is the normalized math score from a standardized math test of student i in school s, and mig_i is a dummy variable equal to one for migrant students in public schools in Hangzhou and zero for migrant students in migrant schools. When we examine the differences in test scores between migrant students in migrant schools and those in public schools, the coefficient of the dummy variable, mig_i, β is equal to the unconditional difference in the mean standard deviation of math test score between the students in these two groups. We call this unconditional difference the achievement gap.

Our third analytical exercise is to examine two different factors that might explain this achievement gap. First, Hangzhou migrant schools and public schools might differ in terms of school resources. These differences in school resources may mean that students receive lower quality education and therefore demonstrate lower achievement. We term differences in academic achievement arising from school resources the *school effect*. Second, there may be what we call a *selection effect*. Parents of migrant students who are better able to provide a favorable study environment are more likely to send their kids to public schools in Hangzhou, rather than migrant schools. Therefore, students in private migrant and public schools could have systematically different student backgrounds before entering the schools, resulting in the observed achievement gap. Both of these groups of factors could potentially determine part of the achievement gap.

To empirically examine whether the selection effect or the school effect better explains the observed achievement gap between migrant school students and students in other schools, we add additional control variables to capture at least part of the selection

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effect and school effect due to observable factors. The regression model to perform this analysis is:

$$y_{is} = \alpha + \beta' \cdot \text{mig}_i + X_i\gamma + S_s\eta + T_s\theta + \varepsilon_{is} \quad (2)$$

where X_i is a vector of student and family characteristics of student i, S_s is a vector of school measures, and T_s is a vector of the average characteristics of all teachers teaching the fourth-grade students in school s.

In Equation (2), β' represents the achievement gap between migrant students in migrant schools and those in public schools conditional on students having the same student and family characteristics (measured by X_i) and attending schools of the same quality (measured by S_s and T_s). In other words, β' measures the remaining part of the achievement gap between migrant students in migrant schools and those in public schools that cannot be attributed to either the observable part of the selection effect (due to differences in observable student background,) or the school effect (due to differences in observable school resources, S_s and T_s).

In the case of the achievement gap between migrant students in migrant schools vs. public schools, if there is a significant decrease in the magnitude (absolute value) from β (the unconditional achievement gap from Equation (1)) to β' (the achievement gap conditional on the selection effect and school effect, from Equation (2)), we can infer that the achievement gap can be at least in part explained by the selection effect and/or the school effect.

In order to explore the determinants of the achievement gap and examine how the selection effect and the school effect each affects the achievement gap between migrant students attending two different types of schools, we control for student background (X_i) and the indicators of school resources (S_s and T_s) one set at a time in the model. The successive changes in the estimated achievement gap can be used to reveal how each of the two effects (self-selection and school effect) influences the student achievement gap. In order to gauge the statistical significance of each set of factors X_i and S_s, T_s in determining academic achievement, we also conduct F-tests of joint significance of the elements in each set of parameter vectors γ and (η, θ), respectively.

4. Results

4.1. Differences in school resources and student background

In terms of school resources, we find that migrant schools are inferior to public schools. The student–teacher ratio in migrant schools is more than 73% higher than that in public schools (rows 1 and 3). Specifically, the student–teacher ratio in migrant schools is 24.7. The ratio in public schools is 14.2. Moreover, our data show that public schools have better teachers than migrant schools. In migrant schools, 84% of teachers are either Rank I or below (Table 1, row 5, column 1), By contrast, only 18% of teachers in public schools are Rank I or below (row 5, column 3). Teachers in migrant schools also have lower levels of education than those in public schools. Only 9% of teachers in migrant schools have a university degree (row 7, column 1). In public schools, however, 47% of teachers do (row 7, column 3).

When comparing the characteristics of students in migrant schools vs. public schools, our data show that migrant students in public schools have more advantaged academic and family backgrounds than migrant students in migrant schools, suggesting that students tend to choose public schools whenever possible. From the whole sample, we find that

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Table 1. Summary statistics of different types of schools.

		Private migrant schools in Hangzhou (6 schools)		Public schools in Hangzhou (10 schools)		Difference b/w public schools and private migrant schools	
	Variables	Mean	SD	Mean	SD	Mean	SD
(1)	Student–teacher ratio	24.686	4.041	17.235	1.600	7.451***	1.82
(2)	# of students	1009.167	661.983	1030.500	487.512	−21.333	328.422
(3)	Proportion of rank III teachers and above	0.092	0.198	0.412	0.053	−0.320***	0.087
(4)	Proportion of rank II teachers	0.069	0.122	0.407	0.093	−0.338***	0.061
(5)	Proportion of rank I teachers and below	0.839	0.234	0.181	0.114	0.658***	0.108
(6)	Proportion of female teachers	0.667	0.338	0.589	0.321	0.067	0.184
(7)	Proportion of teachers with university degree	0.093	0.151	0.467	0.403	−0.389**	0.152
(8)	Proportion of teachers with professional college degree	0.722	0.361	0.522	0.413	0.196	0.208
(9)	Average years of teaching	6.864	8.317	15.953	6.355	−8.306*	4.536

Source: Authors' survey.
Note: Robust standard errors in parentheses.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

46% of migrant students in migrant schools had repeated a grade (Table 2, row 3, column 1); only 19% of migrant students in public schools had repeated a grade (row 3, column 3). In addition, on average, fathers of migrant students in public schools received 9.17 years (row 7, column 1) of education, which is significantly longer than the average years of education received by fathers of migrant students in migrant schools (8.36 years, row 7, column 3). This is also true for the mother's education level (row 8, columns1 and 3). Finally, migrant students in the migrant schools were less likely to have ever attended any kindergarten than migrant students in the public schools (row 9, columns 1 and 5).

Interestingly, the differences in student background between migrant students in private migrant schools and those in urban public schools are even more significant than those between migrant students in urban public schools and urban students attending the same public schools as these migrant students. Compared to migrant students in the same public schools, urban students are significantly more likely to be female, to have attended kindergarten, and to have never repeated a grade. Yet these differences are not so sharp as those between migrant students attending different schools (Table 2, rows 2, 3, and 9, column 7). Moreover, unlike the comparison between migrant students in migrant schools and those in public schools, there are no significant differences in the level of education of both parents between urban students and migrant students in the same public schools (Table 2, rows 7 and 8, column 7). This also highlights significant self-selection into different types of schools among migrant children.

4.2. Estimating the achievement gap and its determinants

According to our math test score data, migrant students in public schools significantly outperform migrant students in migrant schools by 0.56 standard deviations of the test score distribution (Table 2, row 1, columns 1 and 3). This result is consistent with the

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Table 2. Summary statistics of individual and family characteristics for different types of students.

		Migrant students in private migrant schools (341 obs.)		Migrant students in public schools (133 obs.)		Difference b/w migrant students in public schools and those in private migrant schools		Difference b/w migrant students in public schools and urban students in the same schools	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
(1)	Standardized math score	−0.16	1.03	0.40	0.79	0.556***	(0.109)	−0.104	(0.079)
(2)	Female	0.40	0.49	0.36	0.48	−0.038	(0.050)	−0.157**	(0.055)
(3)	Repeated a grade	0.46	0.50	0.19	0.39	−0.265***	(0.083)	0.128**	(0.040)
(4)	# of elder sibings	0.85	1.25	1.22	1.63	0.373	(0.229)	0.226	(0.168)
(5)	# of younger sibings	0.71	1.10	0.73	1.10	0.015	(0.107)	0.027	(0.101)
(6)	Only-child	0.24	0.43	0.26	0.44	0.013	(0.068)	−0.066	(0.063)
(7)	Father's edu (yrs)	8.36	2.29	9.17	2.22	0.808**	(0.288)	−0.196	(0.261)
(8)	Mother's edu (yrs)	7.51	2.29	8.47	2.38	0.960**	(0.357)	−0.244	(0.230)
(9)	No kindergarten	0.24	0.42	0.12	0.32	−0.119**	(0.055)	0.085**	(0.034)

Source: Authors' survey.
Notes: Robust standard errors in parentheses.
Difference b/w migrant students in public schools and those in migrant schools is calculated by regressing each of the row variables on the student type dummy variable.
Difference b/w migrant students in public schools and urban students in the same schools is calculated by regressing each of the row variables on the student type dummy variable controlling for the school dummies.
Summary statistics for urban students attending the same public schools as migrant students in urban public schools are not reported for brevity.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

findings of Song et al. (2010) and Lai et al. (2013). So, what explains this significant gap in academic achievement?

Our multivariate results show that the selection effect and school effect both explain this achievement gap. Specifically, the results from Equation (2) show that after controlling for student background and school resources, there is no significant difference in academic achievement between migrant students in migrant schools or public schools (Table 3, row 1, column 2). The *F*-tests of joint significance show that both school resources and student background are significant contributors to student academic achievement. The p-values are lower than 0.05. This implies that both school and selection effects explain the observed achievement gap between migrant students attending these two different types of schools (Table 3, row 1, column 2).

In order to better understand the determinants of the achievement gap between students in these two different types of schools, we run the model in Equation (2) again, but control for the selection effect and school effect separately. When we include only student background (X_i) as control variables in Equation (1), we find that the estimated achievement gap only drops by 0.02 standard deviations (from 0.56 to 0.54). The significance of the achievement gap is still significant at the 5% level (Table 3, row 1, column 3).

When we include school resources (S_s, T_s) alone into Equation (1) as control variables, the achievement gap declines and becomes indistinguishable from zero (Table 3, row 1, columns 4). This fact suggests that differences in school resources are the main driver of the academic achievement gap. If migrant students in the two different types of schools received the same resources, they might perform similarly. Therefore, one

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Table 3. Possible sources of achievement gap between migrant students in private migrant schools and those in public schools.

	Dependent variable: Standardized math test score	(1)	(2)	(3)	(4)
(1)	Type of the student (0 = migrant students in private migrant schools; 1 = migrant students in public schools)	0.556***	−0.028	0.543***	−0.035
		(0.115)	(0.259)	(0.114)	(0.269)
(2)	Female		−0.072	−0.048	
			(0.111)	(0.102)	
(3)	Repeated a grade		0.007	0.021	
			(0.110)	(0.118)	
(4)	# of elder sibings		−0.040	−0.024	
			(0.036)	(0.032)	
(5)	# of younger sibings		−0.048	−0.029	
			(0.043)	(0.045)	
(6)	Only-child		−0.173	−0.098	
			(0.107)	(0.102)	
(7)	Father's edu (yrs)		0.026	0.035*	
			(0.017)	(0.019)	
(8)	Mother's edu (yrs)		0.009	0.014	
			(0.021)	(0.022)	
(9)	No kindergarten		0.132	0.119	
			(0.097)	(0.096)	
(10)	Student–teacher ratio		−0.007		−0.009
			(0.014)		(0.014)
(11)	# of students		0.000**		0.000**
			(0.000)		(0.000)
(12)	Proportion of rank II teachers		−1.612		−1.486
			(0.965)		(0.923)
(13)	Proportion of rank I teachers and below		−1.427**		−1.366**
			(0.613)		(0.587)
(14)	Proportion of female teachers		0.051		0.031
			(0.127)		(0.129)
(15)	Proportion of teachers with university degree		0.744		0.728
			(0.443)		(0.427)
(16)	Proportion of teachers with professional college degree		0.547		0.545
			(0.409)		(0.397)
(17)	Average years of teaching		0.002		0.001
			(0.008)		(0.008)
(18)	The school has a computer room				0.000
					(0.000)
(19)	Observations	474	474	474	474
(20)	*F*-test of joint significance of individual and family characteristics		*F*-Stat: 2.60, *p*-value: 0.01;		
(21)	*F*-test of joint significance of school and teacher characteristics		*F*-Stat: 14.20, *p*-value: <0.001		

Notes: Robust standard errors clustered at the class level in parentheses.
Each column reports the results of one regression of the standardized math test score on the corresponding row variables in that column.
***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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interpretation of our finding is that the low quality of school resources in private migrant schools seems to be the main contributor to the achievement gap between migrant students in public and migrant schools.

This same results hold up when using an alternative estimation approach. Specifically, when we match student background characteristics between migrant students attending public schools and migrant schools and then estimate the achievement gap using different matching estimators, the point estimates of the achievement gap vary from 0.45 to 0.57 (Appendix 1). This estimated gap is not much different from the unconditional achievement (see results above). In all of the cases using matching methods, the coefficients (that measure the gap) are highly significant. All of these suggest that the achievement gap, is at most, only partly driven by the superior individual characteristics and family backgrounds of migrant students who attend public schools relative to those who attend migrant schools.

In order to further explore the importance of access to public schools to the education of migrant students, we also compare the academic achievement between migrant students in urban public schools and urban students attending the same schools. In doing so, in all of our regressions, we regress the standardized math test scores on the student-type dummy variable (0 = migrant students; 1 = urban students) and a full set of school dummies (which controls for all school-specific effects). Whether we control for student background or not, the achievement gaps between these two types of students are insignificant, with urban students slightly outperforming migrant students in the same school (Appendix 2, row 1). Therefore, once we control for school effects, there is no significant difference between students of different family backgrounds (urban students and migrant students). Of course, urban students who attend public schools with a significant proportion of migrant students (as the public schools in our sample) are often from disadvantaged urban population (China Youth International, 2010), and thus, might not represent the general urban students. Therefore, we cannot firmly conclude that migrant students could perform as well as urban students had they entered schools of the same quality. Nevertheless, this result – at the very least – is consistent with the argument that school effects, not the selection effects, are the main factors that are driving the achievement gaps among students from different family background and (or) attending different types of schools.

In summary, based on the empirical evidence above, we infer that both the selection effect and the school effect contribute to the achievement gap between migrant students in migrant schools and public schools. However, school effects appear to be the main contributor to the achievement gap.

5. Summary and discussion

We empirically examine the differences in school resources between migrant schools and public schools in Hangzhou, and the differences in student background and educational achievement between migrant students attending these two types of schools. We find that relative to public schools, migrant schools are inferior in terms of their school resources. We also find that migrant school students who have stronger background (e.g. parents are educated) are more likely to attend public schools. Furthermore, migrant students in public schools outperform migrant students in migrant schools by 0.56 standard deviations on a standardized math test.

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We then explore the determinants of the achievement gap between migrant students in these two types of schools. We find that, although both selection and school effects seem to have contributed to this achievement gap, school effects appear to be the main reason for the existence of this achievement gap. Indeed, we find that after control for the differences in school resources between migrant schools and public schools, the achievement gap is not statistically different from zero. In addition, migrant students in public schools even perform as well as their urban counterparts in the same schools.

Our results contribute to a broader policy debate about how to effectively invest in the education of migrant students: we show that public schools are the best way to educate migrant students. Students in migrant schools have low academic achievement largely because the schools are poorly resourced. While we cannot claim causality, the results suggest that if the government does not make enough efforts in facilitating access to public schools and migrant students have to attend migrant schools, they might be inadvertently causing such students to lose out on over 0.5 standard deviations in academic achievement.

As such, we recommend that institutional systems like the hukou system need to be reformed to facilitate access of the migrant students to urban public schools. Granted, in the short run, the expansion of the urban public education may not be able to meet the demand of migrant students. If so, private migrant schools may need to be used as a complementary venue for the education of migrant students. However, if migrant schools are allowed to continue operating, the government should consider investing more resources and establishing effective regulation and monitoring systems.

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Appendix 1. Achievement gap between migrant students in private migrant schools and those in public schools using matching methods

Dependent variable: standardized math score	(1) Kernel density (bi weight)	(2) Nearest five neighbors	(3) Propensity Score Matching	(4) Mahalanobis matching
Type of the student, =0 migrant students in private migrant schools; =1 migrant students in public schools	0.573***	0.449***	0.467***	0.552***
	−0.041	−0.056	−0.066	−0.116

Source: Authors' survey.
Standard errors in parentheses ***$p < 0.01$, $p < 0.05$, $p < 0.1$.
The two groups (migrant students in migrant schools vs. those in public schools) were matched on student individual and family characteristics including gender.

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Appendix 2. Estimates of achievement gap between migrant students in public schools and urban students in the same schools

	Dependent variable: standardized math test score	(1)	(2)
(1)	Type of the student (0 = migrant students in public schools; 1 = urban students in the same public schools)	0.104	0.078
		(0.079)	(0.090)
(2)	Female		−0.069
			(0.070)
(3)	Repeated a grade		−0.123
			(0.147)
(4)	# of elder siblings		−0.037
			(0.044)
(5)	# of younger siblings		−0.044
			(0.042)
(6)	Only—child		−0.079
			(0.105)
(7)	Father's edu (yrs)		0.036
			(0.024)
(8)	Mother's edu (yrs)		0.005
			(0.025)
(9)	No kindergarten		−0.109
			(0.112)
(10)	School fixed effects	Y	Y
(11)	Observations	478	478

Robust standard errors clustered at the class level in parentheses ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.
Each column reports the results of one regression of the standardized math test score on the corresponding row variables in that column.