

THE IMPACT OF SCHOOL CHARACTERISTICS ON ACADEMIC PERFORMANCE OF  
MIGRANT CHILDREN IN CHINA

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By

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# THE IMPACT OF SCHOOL CHARACTERISTICS ON ACADEMIC PERFORMANCE OF MIGRANT CHILDREN IN CHINA

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## ABSTRACT

For many years, Chinese internal migrants have constantly faced social inequalities and problems. Their children, known as migrant children, are particularly vulnerable to education inequality during the whole education process. This paper focuses on migrant children and examines the difference of academic performance of migrant children in public schools and in non-public schools. The analysis finds that there is a gap between academic performance of migrant children in different types of school, with academic performance of migrant children in non-public school significantly worse than those who in public school. The paper further explores how school characteristics, including school facilities, school administration and teachers, influence the academic performance of migrant children and the effect of each characteristic. The results show that controlling individual and family factors of migrant children, the effects of school characteristics on academic performance are significant and can remove the gap caused by school type. The effects of school facilities are the most substantive. The findings of this paper suggest that school quality, described by the school characteristics, accounts for the gap in academic performance of migrant children in different types of school. It is essential to improve school facilities, equally distribute education resources, and promote good practices of school administration across different types of schools in order to eliminate education outcome inequality among migrant children.

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The research and writing of this thesis are dedicated to everyone who helped, especially my advisor and my family, and to the migrant children who appear in my research.

Many thanks,  
Sophie

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## INTRODUCTION

The migrant population, also referred to as the floating population in China, are people who currently live in a place other than their registered residence. First being introduced during the 1950s, the household registration system, also known as *Hukou* in Chinese, records the original residence or birthplace of people in China and further divides all people into rural residents (agricultural population) and non-rural residents (non-agricultural population). Until the 1980s, there was a strict control over the internal migration of Chinese people. Rural residents were strictly monitored and were prohibited from moving into cities under the context of planned economy policies.

In the past decades, due to social and economic transformation, the rapidly growth of urbanization and the change of internal migration policies, there was rise of internal migration with a large number of rural labors migrating to cities to gain a better life (Yu 2012). It is estimated that the number of migrant populations mounted to 236 million, accounting for 17% of total population in China.<sup>1</sup> There are also a considerable number of migrant children among the migrant population. These children leave their original residence together with their parents, being the opposite side of left-behind children (children staying in rural areas separating from their parents), while they can easily transform into left-behind children once they are no longer allowed to stay in urban areas.

The migrant population are not entitled to the same opportunities and welfare as urban residents; thus, they are suffering from inequality of various aspects in the society. Migrant children, for example, are not able to be enrolled into urban public schools during the compulsory education period. While policies for the education of migrant children have evolved during the

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<sup>1</sup> Data from Migrant Population Service Center, National Health Commission, P.R.C.

past decades, and more migrant children can enter public schools, about 20% of migrant children were still not enrolled in public schools in 2019.<sup>2</sup> For compulsory education, these migrant children have to enter private schools and schools set up specifically for migrant children.

Many scholars have argued that the education quality and resources of private schools and migrant schools are inferior to those of public schools (Liu & Zhao 2018; Yu 2012; Wang 2008). The unequal education quality and resources lead to further inequality in the education process and outcomes (Jiang & Ren 2020; Wang 2017).

Prior research has examined the inequality of education process and education outcomes for migrant children and the education policies for migrant children. Focusing on education outcomes, studies covered academic performances, psychological well-being, and social integration. They also studied factors that impact education outcomes, such as family backgrounds and parental factors, personal and interpersonal factors, school factors in terms of teacher quality and class characteristics.

Academic performance of students (test scores and cognitive ability) is usually considered to be an indicator of education process quality and education result. Many studies showed that school type is significantly associated with academic performance of migrant children, indicating that migrant children in different types of school had significant difference in academic performance (Yuan 2019; Zhao 2016). However, little quantitative research explored what specific factors related to school types contributed to the difference in academic performance among migrant children. For example, hardly any research covered a whole package of school facilities, school administration, teacher quality and classroom characteristics and studied the overall impact on student academic performance.

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<sup>2</sup> Chinese Education Development Report 2019, issued by the Ministry of Education, P.R.C.

In this paper, my goal is to explore how school characteristics influence academic performance of migrant children. I try to answer the following questions: Since migrant children at different types of schools have been observed with a significant difference in academic performance, which school factors lead to the difference? How can schools improve the academic performance of migrant children through these factors?

Survey data from Chinese Educational Panel Survey (CEPS) collected by Renmin University in China form the data for this study. This survey is a large-scale, nationally representative longitudinal survey. The baseline survey was conducted during 2013-2014, and a following survey was conducted during 2014-2015. The survey covered a sample of around 20,000 middle-school students from 112 schools, 28 districts/counties across 20 provinces in China.

The survey data consists of mid-term test scores of each student in the fall semester. However, because the standards of tests vary across schools in different regions, I use the cognitive aptitude test score, which was designed for the survey, to represent academic performance. The test examined verbal reasoning, logical thinking and problem-solving abilities instead of knowledge and information from textbooks.

To study the influence of school factors on academic performances of migrant children, I apply a multivariate regression to analyze the effects. I include factors at the school level, class level and characteristics of teachers that can reflect school quality as independent variables. I also include as control variables, measures related to family backgrounds that affect behaviors of migrant children. The dependent variable will be the original score of cognitive aptitude test.

This paper will provide insights on how school factors, specifically school facilities, school administration, and teacher can impact the education outcomes of migrant children. The goal of the analysis is to provide implications to policy makers on how to allocate resources and improve

school qualities in order to enhance academic performance of migrant children, given that it is difficult to accommodate all migrant children in public schools under current circumstances.

## LITERATURE REVIEW

### Situation of Internal Migrants in China

Since a large number of rural laborers in China flooded into cities around 2000, many scholars started to study problems faced by migrant population in China. In general, these migrants are considered to be “marginalized” or “outsiders” in cities. Their main problems can be divided into four categories: social security and welfare, labor rights and interests, education for migrant children, and social isolation.

#### Social Security and Welfare

A large number of migrants are not covered by the social security and welfare system at their residency. In a national survey on migrant population conducted in 2011, only 16.4 % of migrant worker attended Basic Endowment Insurance, 9.5% attended Unemployment Insurance and 18.4% attended Basic Medical Insurance at their local residency (Duan et al. 2013).

While employers are required to cover these insurance fees for their employees, migrant workers are usually excluded by this rule in two ways. First, many migrant workers do not sign a formal contract of labor with the employer so that they are not provided with the insurances. Because of their fluidity, migrants usually do not have a stable job, and employers are not willing to sign contracts and provide insurances with them. Second, even if employers pay insurance fees for migrant workers, the insurance funds only apply to residents with local *Hukou*, thus migrant workers without a local residency cannot benefit from the insurances (Yang 2011).

## Labor Rights and Interests

Compared with urban labor forces, migrant workers generally work longer hours and receive lower income in informal jobs (Duan et al. 2013). Most of migrants are only capable of serving less technical or non-technical jobs, and they lack knowledge of their legal rights and interests (Wong et al. 2007). In addition, they lack a powerful organization to safeguard their rights (Gui et al. 2012).

Unemployment has also become a serious problem for migrants. In cities with relatively slow economic growth, fewer temporary jobs are available for migrants. Furthermore, with the urbanization trend in China, many rural residents no longer have arable lands to farm, and farming can hardly be the only source of living for a rural family. Since migrants are usually excluded from social security, unemployment poses huge threats to migrants as well as to the society (Duan et al. 2008 & 2012).

## Education for Migrant Children

The education problem for migrant children has attracted attention of numerous of scholars. First, migrant children have difficulties in enrolling local public schools. In urban areas of China, children are required to both reside in the school district and possess the *Hukou* at the school district to enter the public school. Therefore, migrant children without a local residency are prohibited to enroll in public schools (Liang and Chen, 2007). With the evolution of central policies on the education of migrant children, they are able to enroll in public schools with certain conditions. For example, schools demanded migrant children to submit up to 28 certificates, including documents of housing rental or purchase and parents' employment certification.

However, these conditions became barriers because it is very difficult for migrant families to provide all required documents (Zhang 2016).

Second, scholars report in qualitative research that migrant children have inferior education environment and quality. As a large number of migrant children could not enroll in public schools, they have to enter private schools and schools only established for migrant children. Some scholars describe these schools as unlicensed private schools based in used buildings or factories and vulnerable to closure. The facilities in the schools are poor, and teachers are far less competent compared with teachers in public schools (Goodburn, 2016; Zhang, 2016). Migrant students thus are not receiving equal education compared with their local peers while being educated in private schools.

### Social Isolation

Migrants are reported in many studies to face discrimination from urban residents. These migrants do not have the same accent, dress and manners as local residents, so that they can be easily distinguished from local residents. Adults often experience verbal disrespect, humiliation and deliberate avoidance. They are also considered to be threat to social stability, linked to crimes in cities and blamed to be the cause of urban problems (Wong et al. 2007). Migrant children are often discriminated against by urban children and suffer from relationship tension and sensitivity (Yu, 2012). In some cases, local parents express their bias and prejudice toward migrant children and they object to admitting them into the local public schools out of fear that the migrants will be a bad influence on their own children (Kwong, 2011).

These problems lead to maladaptation in the society, lack in the sense of belonging and psychological distress. Studies indicate that rural-urban migrants have suffered from poor mental

health caused by the stress experienced (Wong et al. 2007). Experience of discrimination can leave a long-term influence on migrant children and it is harmful for their mental health and personal development (Yu, 2012).

## **Policy Background**

### Household Registration Policy (*Hukou*)

The Household Registration Policy was first introduced in 1958 with *Regulation of Household Registration in P.R.C* as a means of social control. This system records the place of residence and the type of residence of all Chinese people. In particular, the type of residence separates agricultural population (rural residence) from non-agricultural population (non-rural residence).

Before the 1980s, the system served to strictly control internal migration. Citizens with rural residence were not allowed to migrate to urban areas, and it was almost impossible to change one's residence type (Guo & Zhao, 2019; Zhu, 2014). Starting from the economic reforms in 1980s, the control over migration has been loosened with several policies in the 1990s that allowed and encouraged rural people migrate to urban areas. Until 2000, there were over 100 million internal migrants in China. While the number of rural migrants has rapidly increased over the past years, the new household registration system reform implemented in 2014 imposes strict controls over the population growth in big cities and raise the bar of relocating the *Hukou*.

The system limits people's access to state-sponsored social welfare and benefits, such as education, medical services, employment, housing, etc. and resulted in a wide urban-rural dividend (Zhang, 2016). The place of residence recorded by *Hukou* separate the "outsiders" from "local residents," and the type of residence further separates rural residence from urban residence. "Outsiders" and "rural people" are not eligible for urban welfare and benefits. This is due to the

decentralized fiscal system in China, where local governments are responsible to manage local fiscal distribution. Urban governments arrange for their fiscal expenditure, including education expenditure, according to the number of registered populations in this area (Zhang, 2016).

Despite the directives from the central government, local governments still lack incentives and financial resources to meet the education needs of migrant children. The consequence of the *Hukou* system is that migrant children are not allowed to enter urban public schools, because they are not considered to be covered by the public expenditure on education. Cases reported that in big cities, although there were lot of spare spaces in public schools, the government would not offer the spaces to migrant children. They thus turn to privately-operated schools or are left behind in rural areas (Guo & Zhao, 2019).

#### Compulsory Education Policy for Migrant Children

The compulsory education policy for migrant children has evolved over time. The policies in the late 1990s applied to migrant children indicated that all children with custodies should receive compulsory education at the location registered on their *Hukou*. Children without custodies should be approved by both the governments of their original residence and destination to migrate with their parents in order to be eligible for receiving education at urban areas (Liu & Zhao, 2018). To solve the education problem of migrant children who were not officially permitted to study in urban schools, privately-operated migrant schools emerged in some big cities during the 1990s. These schools were considered to be “non-official” because they didn’t have officially recognized status. However, these schools have served as a main education provider for migrant children for many years (Yu & Crowley, 2020).

From 2000, the central government issued a series of policies that gradually promoted equal access to schools between migrant children and urban children. The *Decisions on the Reform and Development of Basic Education* issued in 2001, known as “Liang Wei Zhu” in Chinese, stated that the local government should take the responsibility of solving the education problems of migrant children, required that most migrant children should enter public schools for compulsory education, and emphasized that migrant children should have equal access to public schools with local students during the compulsory education period. In 2006, the edited *Compulsory Education Law* assigns the responsibility of ensuring education equity of migrant children to the local government, attaching importance to the compulsory education of migrant children. The *National Planning on Neo-urbanization (2014–2020)* issued in 2014 further required that all urban education development plans and fiscal budgets should include arrangements for education of migrant children (Liu & Zhao, 2018; Xu & Zhang, 2016).

Local governments, such as the Education Committee in Beijing, also issued policies around 2002 that allowed social forces to organize schools for migrant children and grant permissions for some migrant schools (Yu & Crowley, 2020). However, with the population control policies and *Hukou* reform from 2013, many big cities started to close unregistered migrant schools and prevented migrant children from receiving compulsory education in unofficial institutes (Han & Yu, 2020).

The evolution of education policies show that the national government has been determined to ensure equal access to schools for migrant children in the compulsory education period. However, restricted by the *Hukou* system and decentralized fiscal system, local governments often encounter problems in implementing the national policies. Furthermore, with the strict population control policies, it would be even harder for migrant children to receive education in cities.

## **Education for Migrant Children: Education Inequality During the Compulsory Education Period**

Migrant families face choices for the education of their children as well as tradeoffs in schooling and residency decisions. From the perspective of residency choice, parents have to choose between moving to cities or staying in rural areas. If they choose to move to cities, they need to consider whether they move together with the whole family or leave the children in their rural residency with their grandparents. Their children become migrant children in urban areas or left-behind children in rural areas (Wang et al. 2017).

From the perspective of child education, on one hand, parents always expect that their children can receive education of a higher quality, so that they tend to migrate to cities with their children and let them attend local public schools, which are supposed to have the best education resources. On the other hand, confined by their *Hukou* status, not all migrant children are able to attend urban public schools, so that they either choose to attend public schools back at their rural residency (becoming left-behind children), or attend private schools in cities (Wang et al. 2017).

Focusing on families that decide to migrate to cities together with their children, inequality of education appears along the whole process of education: inequality in school enrollment, process inequality concerning education quality, and outcome inequality in terms of academic performance and education attainments.

### **School Enrollment**

Although the central education policy aims to guarantee the enrollment in urban public schools for migrant children, the regional gaps in educational resources discourage local government from fully implementing the central policy (Zhang, 2016). Usually, municipal governments set some

conditions for public schools to accept migrant children. The reasons behind this may be first, urban governments tend to preserve the best education resources to local children (Zhang, 2016); and second, based on the National Planning on Neo-urbanization (2014–2020), large cities with population greater than 5 million are mandated to strictly control population growth. Consequently, cities such as Beijing decrease employment and educational opportunities to control population growth (Liu & Zhao, 2018). These conditions then become barriers for migrant children.

A large number of studies point out the local financial and administrative barriers posed for migrant children enrolling in public schools. First, during the 2000s, public schools demanded extra fees from migrant children. This method was approved by governmental policies and regulations from the 1990s until 2009 (Zhu, 2014). The fee, often referred to as “Ze Xiao Fei” in Chinese, ranged from 1200 RMB to 230,000 RMB a year depending on the quality of the public school. Given that a typical salary for a migrant family was around 1000 RMB, the fee was impossible for migrant families to afford. While the extra fees charged by public schools were rescinded officially by the Ministry of Education in 2010, researchers found evidence in field survey that some public schools were still demanding some forms of extra costs from migrant children (Zhang, 2016).

Second, migrant children were required to provide many documents and certificates to be enrolled in public schools. For most cities, migrant children were required to provide “five certificates,” including employment permits and an apartment lease in the district (Liu & Zhao, 2018). In some extreme cases, 28 certificates were required to be enrolled in public school. While many migrant families couldn’t afford housing in central urban areas and only have temporary jobs, there was little chance for migrant families to provide all required documents and send their children to urban public schools (Zhang, 2016).

As a result, about 2 million migrant children were not accepted by urban public schools and were forced to enroll in private schools or migrant schools with poor conditions (Liu & Zhao, 2018). Disparities still appear in school enrollment process between migrant children and their urban peers.

### Education Process

Education process inequality indicates disparities of education quality, school facilities as well as subjective factors such as the interaction with other students, teachers and parents. Overall, the characteristics of education process are generally described to be school qualities, which are evaluated by one of these factors or several factors combined. Studies about education process inequality between urban students and migrant students appeared in the beginning of the 2000s and thrived around 2010 (Feng & Luo, 2017). Most studies were qualitative studies or field research on learning conditions of migrant children and the problems they faced at school. Other studies used quantitative methods to evaluate how factors of education process impact education outcomes, and education outcomes were often considered as a reflection of school quality.

Education process inequality related with school types have been the focus of most academic scholarship. Schools can be generally divided into public schools and private schools, and scholars, especially qualitative scholars, found evidence of differences in education process between the two types of schools. Qualitative studies reported the poor conditions in private schools compared with in public schools, with particular attention given to the problems faced by migrant children. In private schools, children reported that they couldn't learn as much as children in public schools, and they felt that their schools were inferior to public school (Wang, 2008). Some migrant schools were described as being located in falling buildings, with unpleasant facilities, unhygienic

environments, small and somber classrooms. Some teachers in migrant schools didn't even have teaching qualifications (Goodburn, 2016; Wang, 2008).

Migrant schools are private schools in urban areas that particularly target migrant children when they are rejected by urban public schools. They grew rapidly in the 1990s in accordance with the trend of rural labor forces migrate to cities. As migrant children were not able to enter public school, the large number of private schools for migrant children helped to fill the gap of enrollment (Feng & Luo, 2017). Since 2006, governments in large cities started to close low-quality migrant schools and provide support to migrant children (Zhang, 2016). However, among the remaining schools, half of them still did not meet the basic standard set by the government. For example, in Beijing, 127 migrant schools existed in 2014, but only 65 were approved by the educational department (Liu & Zhao, 2018).

## Educational Outcomes

Educational outcomes refer to student academic performance (i.e., test scores, cognitive abilities), psychological well-being, and long-term attainments. Previous research has covered an array of comparisons in education outcomes among migrant children who choose different paths for education.

### *Academic Performance*

Academic performance inequality appears in migrant children and non-migrant children with local *Hukou*. Using the CEPS data, Ma and Wu (2019) showed that the education outcome, evaluated by the cognitive ability test score, of migrant children is worse than that of non-migrant

children. The disparity did not disappear when controlling for family social capital indicators and school ranking.

Other studies showed a difference in academic performance between migrant children and left-behind children in rural areas. Lai et. al (2014), using self-collected survey data, studied differences in academic performance between students in migrant schools in Beijing and left-behind students in rural public schools in Shanxi Province. Their result showed that migrant students in Beijing receive 2.7 more points on a standardized math test than rural students in Shaanxi (Lei et al., 2014). Zhu and Wang (2019) used CEPS data to study how migration affects education outcomes of children, showing that urban children have significantly higher cognitive test scores than migrant children and rural children, and migrant children have significantly higher cognitive test score than rural children and left-behind children. By contrast, Sun (2019) used Chinese Education Panel Survey (CEPS) data to study the difference in scores between migrant children and left-behind children in rural areas using parental accompaniment as an instrument variable. The result shows that migrant children have significantly lower test scores in Mathematics and English compared with rural left-behind children, while no significant difference exist in Chinese test scores.

With the mechanism impacting education outcomes being complicated, the association between academic performances and migrant children with different characteristics can vary according to different datasets and research methods. However, in most cases, the scholars suggested that school quality, including human resources and financial input, influences education outcomes of migrant children (Ma et al. 2018).

### *Psychological Well-Being*

Many studies have explored the psychological well-being of migrant children in different types of school (especially between public schools and migrant schools). Lu and Zhou (2013) compared the separation of schools to school segregation in the US, applying the modified theoretical frameworks of segmented assimilation to study the social experience of migrant children at different schools and the reasons behind it. The results showed that a significantly higher number of students in public schools suffered from a bad social experience such as discrimination, while migrant children in migrant schools were more likely to suffer from loneliness. Gao et al. (2015) used self-collected data to examine the mental status of migrant children in Beijing. While migrant children, overall, suffered from more mental health problems and lower life satisfaction than local peers, the mental health status of migrant children attending public schools were not significantly different from local children.

### **Academic Performance of Migrant Children: Factors that Impact the Outcomes**

There are a large number of studies on factors in many aspects that impact academic performance of migrant children. Previous research on this topic covered factors including family factors (family background, family migration, parents' interaction with school, etc.), school factors (school types, teacher's characteristics, school management, etc.), as well as individual factors (school adaptation and satisfaction, peer relation, self-expectation and motivation, etc.). In most research, these factors are interwoven with each other and together they can influence academic results.

## Family Factors

Studies illustrate how family factors influence children's academic performance from different perspectives. Among all the factors, variables related to family economic status and parents' education level are the most commonly used variables, even when the studies focus on other influences on children's academic performances.

Chen and Feng (2013) suggested that there is a self-selection bias for migrant family choosing schools for their children. The socio-economic status of the family could determine whether the child enters a public school or a private school, which can strongly affect academic performance. Sun (2019) included an interaction variable of migrant status and the weekly expense of the student which indicate family economic status. The result showed that migrant children performed worse than left-behind children, while the negative effect of migrant status could be reduced by family economic status.

Education level of the parents is also positively related to education outcomes of children, and the association of education level of the mother and education outcomes of the student are mostly significant (Wu et al. 2014; Gong, 2015; Wang & Chen, 2017). Meng and Yang (2019) applied propensity score matching method to study factors that influence test scores of children. Controlling for family factors including parents' education and family economic indicators, individual factors such as gender, together with school ranking, they found no significant difference in test scores between migrant children and urban children. Lu & Zhou (2013) showed that parents with postsecondary degrees positively affect the test scores of children, and parents' education input such as times spent educating the children and education aspiration also positively and significantly associated with the test scores of children.

## Individual Factors

Most studies include demographic characteristics of students in the research model. Characteristics of age, gender, and migration status are often significantly associated with academic performance, with girls outperforming boys, older students performing worse than younger students, and migrant children performing worse than non-migrant children (Gong, 2015; Wang & Chen, 2017; Guo & Zhao, 2019).

Zhang et al. (2011) suggested that migrant children with a higher expectation for their education level are more likely to receive better test scores. He et al. (2016) studied the impact of personality and mental resilience on students' academic performance. They compared the attitudes and motivation towards studies, anxiety and self-esteem among migrant students at different schools, finding that migrant students with more positive attitudes have better academic performances.

In the study of Yuan et al. (2019) on factors that influence academic performances of students, the authors concluded that individual factors can only explain a small part of the score difference on Math between migrant children in public schools and migrant children in private schools.

## School Factors

### *School Type*

A large number of qualitative studies on education inequality showed that school type can be a significant factor contributing the education outcomes disparity between migrants and nonmigrants. Feng and Chen (2012) showed in their research on migrant children in Shanghai that controlling for family and individual factors that may cause self-selection, school type still appeared to be a significant factor leading to disparities in tests scores among migrant children.

Wang and Chen (2017) showed similar results with CEPS data, concluding that student individual and family factors did not remove the significance of the school type indicator. Jiang (2017) applied an HLM model on CEPS data, showing that school type significantly associates with the cognitive test score of migrant children, controlling for family and individual factors. Yuan et. al (2018) provided evidence of an educational achievement inequality between migrant children and urban children in Beijing as well as an achievement disparity between migrant children in public schools and in private schools.

Although studies reported education outcome disparities between students in public schools and private schools, only a few of them further examined what differences between schools contributed to the inequality.

### *School Facilities*

Although scholars argue that poor school facilities may affect academic performance of students, there is, in fact, little quantitative research on *how* school facilities impact student performance, and which facilities tend to have larger effects.

Zhang et al. (2011) conducted a research on academic performance of migrant children in Beijing, adding a factor of satisfaction towards school facilities in the HLM regression. The result showed that this factor significantly related to students' ranking in class in all types of schools. Although in a different geographic context, a study examining physical facilities in high schools of Kenya also concluded that the qualities of laboratory and classrooms in a school are positively related with the mean score for the whole school in the Kenya Certificate of Secondary Education Exam (Ojuok et al., 2020).

Yuan (2019) studied the academic performance differences of children in rural public schools and urban migrant schools in China using an OLS regression. The researcher included indicators for certain school facilities such as library and computer rooms. The result indicated that the difference in academic performance among students in different types of schools were significantly magnified when controlling for school facility factors. This means that school facilities account for part of the score inequality among different types of schools.

A research study on the use of ICTs at schools in Turkey shows that access to Internet at home is positively correlated with the math score, and the access to internet at school improves student's test score in science (Erdogdu 2015). However, another study among primary school and secondary schools in Brazil showed that the frequency of use of computers had in general a negative effect on test results, and whether the teacher used a computer or internet as an education tool showed no effect on the test results (Wainer, 2008). This may be due to the fact that the Brazilian research only tested binary relationship between Internet access and test scores as well as computer use and test scores. Without controlling other factors, it is easy to report a biased result.

Class size also has a significant and negative impact on student academic performance. The research of Rivkin et al. (2005) indicated that class size had a significant negative effect on Math and Reading achievements, but the impact declined for students in higher grades. Other international evidence also showed that smaller class sizes improved educational attainments, indicating that a decrease in pupil-teacher ratio was associated with an increase in the graduation rate and a reduction on the proportion of high-school dropouts (Card & Krueger 1998).

### *School Administration*

School administration is considered to be a reflection of school quality in terms of management. School ranking reflects the quality of the school and explains part of the school type difference on academic performance of migrant children. School ranking was reported to have a larger effect on test scores compared to effects of family and individual factors (Meng and Yang, 2019; Ma and Wu, 2019).

In some previous research, the average expenditure per pupil at the state or district level was also a part of the school administration. These studies reported a positive association between spending per student and student education outcomes (future earnings), and most of them reported statistically significant results (Card & Krueger 1998).

The relationship between school discipline and academic performance was also examined by scholars. International studies on students from various countries suggested that students who were under the highest level of discipline have the best academic performance, and the excellence in academic performance correlates with high levels of disciplines in class. A combination of demanding and supportive teachers and school systems help the students to achieve the best academic results (Baumann and Krskova, 2016; Cohen et al., 2009).

### *Characteristics of Teachers*

Teachers' experience and qualification are the main characteristics of teachers. A study of Hanushek (2019) on international evidence of the relationship between teacher quality and academic performances found that the difference in teacher cognitive skills showed strong association with international difference in student performance. In another study of Rivkin et al. (2005), the analysis found that beginning teacher and second- or third-year teachers in Math

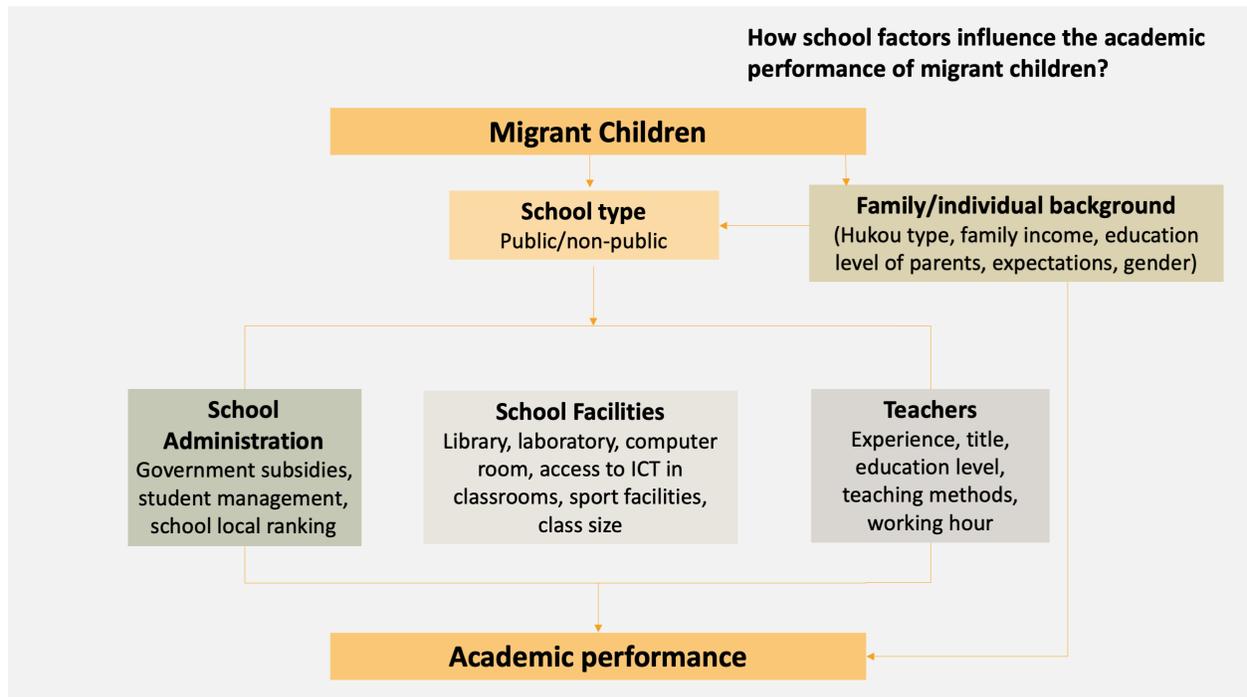
performed significantly worse than more experienced teachers, with students having lower scores in Math and Reading. However, in both studies, the education level of the teacher did not relate to the academic performance of students.

Teaching methods can also influence students' academic performance. The research of Bietenbeck (2014) compared students' cognitive skills based on traditional teaching method (lecturing, routine problem-solving and memorization of facts) and modern teaching method (small group work, discussion, real-life application), under the context of implementation of National Teaching Standards in the US. The results showed that modern teaching methods enhanced reasoning skills and logical thinking, while traditional teaching methods enhanced factual knowledge and ability in solving routine problems. The modern teaching methods were associated with even smaller test score gains because standardized tests seldom include reasoning skills.

Teacher turnover rate also proves to have effects on student academic performances. Hanushek (2005) showed that teacher turnover was significantly related to achievement gains in Math and Reading. With less frequent turnover, students achieved better results in Math and Reading. The research of Ronfeldt et al. (2011) further demonstrated that teacher turnover had a significant and negative effect on student Math achievement, and the effect was stronger in lower-achievement schools.

## CONCEPTUAL MODEL

Based on previous studies, we can conclude that there are many factors that influence the academic performance of a student. For migrant children, it is important to delve into what it is about the type of school the students attend that explains inequality throughout the education process. In the current study, I explore the effect of school type on academic performance of migrant students. Besides simply exploring the gap of academic performance between different types of schools and the effect of school type on the score of migrant children, I want to explore how specific characteristics related to schools can influence the school type effect. The conceptual model of my research is presented as Figure 1.



**Figure 1. Conceptual Model for the Thesis Research**

Referring to previous research, I consider factors of school administration, school facilities, teacher characteristics and class size influence academic performances of students. Among these factors, there are little research on how school facilities influence the academic performance of children, so effects of school facilities would be the main focus of my study.

Therefore, I can propose the following hypotheses:

- a.** Migrant children in non-public schools have worse academic performance than migrant children in public schools.
- b.** The gap in academic performance of migrant students in public school and in non-public school can be explained by differences in school-related characteristics.
- c.** School facilities, school administration and the quality of teachers positively influence academic performance of migrant children. Particularly, school facilities have the greatest effect to the academic performance of migrant children.

## DATA AND METHOD

### Data and Analysis Sample

The data used in this article is retrieved from Chinese Education Panel Survey (CEPS) conducted by National Survey Research Center, Renmin University of China. It is a longitude survey with a sample size of 19,487 grade-seven and grade-nine students in 438 classrooms of 112 schools in 28 county-level units in mainland China. The sample was collected through a PPS method from three levels, representing general education conditions in county-level areas in China, education conditions in metropolitans like Shanghai, and conditions in migrant-concentrated areas.

Although there are two waves of surveys under CEPS, I only use the data of the baseline survey. Based on the purpose of this study, I subset students who are identified to be migrant children from the full sample. I only retain samples for grade-seven students, because for grade-seven students, it is their first year entering this particular middle school. I consider that the academic performance of grade-seven students was only influenced by school factors collected in this certain year, while the academic performance of grade-nine students may be affected by school factors in the previous years.

Thus, I get a sample of 2,041 observations for migrant children with both rural and non-rural *Hukou* type, from 106 schools of different types, and 197 separate classes. From previous studies, we find that self-selection to schools and classes will lead to bias in the results. Therefore, I drop some observations according to the indicators of whether the family sought for any resources to get the children enrolled in the current school, and whether the school randomly allocated students into classes. The subset data eliminate some self-selection bias in schooling choice, so that I am able to extract the effect of schools on academic performance of children. I therefore drop 744

students who claimed to have self-selection behaviors for school enrollment and 105 students who were not randomly distributed to classes at school in order to eliminate self-selection bias. This brought me to a full sample of 1,192 observations.

However, when examining the data, I found that there were a lot of missing value, most of which are from data of public schools. While all the data are survey data, I chose to drop all the missing values rather than imputing them in the regression. After removing all the missing values, I have 973 observations in total remaining, with 162 observations from non-public schools, and 811 observations from public or government subsidized schools.

## **Variables**

### Dependent Variable

My dependent variable is the original score of the cognitive aptitude test that was conducted along with the survey. This cognitive aptitude test aimed to test logical thinking and problem-solving abilities instead of memorable knowledge, and the test was the same for all grade-seven students surveyed. I use this score instead of the test score of a certain subject because the textbook offered in class and exams designed in different school across the country can be totally different, so that the test scores cannot be compared.

Although the cognitive test score is not a direct result of school education, it can reflect the cognitive ability of a student which reflects the education process and education quality of a school. The top score of the test is 20 for all grade-seven students, and I choose to use the original score of the test because I want to see clearly how factors affect the actual scores of students.

## Key Explanatory Variable

My key explanatory variable is the type of school attended by migrant students. There are, in total, four types of schools for migrant children: public school, ordinary private school, private school subsidized by the government, and migrant school. Because the main difference between schools lies in whether it is school established or sponsored by the government, I rearrange the four types of schools into two: public or public subsidized schools and non-public schools. In the data set used for this study, I have 1,022 observations for public school students and 170 observations for non-public school students.

## Other Explanatory Variable and Control Variables

I also add other variables that describe the characteristics of schools to further reveal the differences among each type of school. The three categories of variables are: school administration, school facilities, and teacher characteristics. All these variables are corresponded with questions in the survey.

For school administration, I include fiscal distribution from the government, school ranking in the local area, and school management for students. These dummy variables indicate whether the school receives fiscal distribution from the government, whether the school ranks above average, and whether the school employs strict disciplines on students.

For school facilities, I identify whether the school has certain facilities (laboratory, computer room, library, student activity room, student cafeteria, playground and gymnasium) and the quality of the facilities. I also identify if the classrooms have access to ICTs (internet connections, the availability of computers, and other multi-media devices in classrooms). For class size, I use the actual number of students in class to represent this classroom characteristic.

In terms of teacher characteristics, I mainly select the characteristics of class teachers, because I consider that students spend most of their time with class teacher. Furthermore, the class teacher can teach any subject, which can be considered as a random selection of teacher in various subjects. I include variables of teaching experience (year of teaching) and weekly working hours, an indicator of whether the teacher has a senior professional title, and an indicator of whether the teacher received formal university education. Professional title is a national standard of teacher evaluation in China, which is designed and conducted by the Ministry of Education. The titles start from level-1 teacher to principal senior-level teacher, and teachers are considered to be highly competent with higher professional titles. I also include an indicator showing the teacher flow frequency as turnover frequency. I also examine the teaching methods of the teacher by including indicators for the frequencies of using lecture and group discussion in class.

Based on previous studies that indicate the selection bias (Feng & Chen 2013; Card & Krueger 1998), I control for family background related variables and individual variables that can affect school selection. In the school level, migrant children are not randomly allocated to different schools. In the class level, even if in the same school, students are not randomly distributed into different classes (Liu & Guo, 2020). Some family-related factors influence both the school selection of migrant children and their academic performance. If the factors are not eliminated, the effect will reflect the impact of family factors instead of true school factors.

Control variables for family include general indicators for family economic and social status, such as family income level and education level of the parents. I include whether the highest education degree of parents is college or above as indicator for parents education level. Control variables for individual characteristic include gender, *Hukou* type of the student and self-expectation for education level. Self-expectation is important because it is closely related to

motivation of study and the efforts spent in study, which can directly affect the academic performance of student and thus confound the effect of the school.

### **Data Description**

Detailed descriptions for each variable are presented in Table 1.

### **Data Limitations**

While the data is considered to be nationally representative, the data coverage is still relatively small. The survey drew samples from 15 counties out of 2870 counties in China, while drawing 3 counties from Shanghai and 10 counties from migrant-concentrated counties. We can see that samples drawn from general counties are relatively small compared with other samples.

Another limitation relates to the distribution of school types. In the full data set, there are only in total 7 non-public schools out of 112 schools surveyed. Non-public schools are not well represented by the data set, so that there are relatively few observations for non-public school students in my research data.

Meanwhile, there are about 20% of missing values in the variables. While the sample size is 1192, many values concerning school characteristics are missing. By dropping all the missing values, the sample size reduces to 973, meaning that the data of some schools is completely removed. This omission further limits the number of schools covered in the research, making the research even less representative.

Another shortcoming of the data is most variables are with classified categories instead of with absolute values. In the survey, questions were followed by options in order to simplify the process. The underlying problem is that the respondents have to find a fit in the categories instead

of giving the true answers. The categories can only give a general description of the fact, which can lead to an imprecise result. Particularly, some variables such as family income and teacher turnover rate with absolute values can make more contribution for the research.

**Table 1. Descriptive Statistics for Variables Used in Analysis of Academic Performance of Migrant Children, CEPS 2013**

| VARIABLES   | Obs.  | Mean  | Sd.   |
|---|-------|-------|-------|
| <b>1. Dependent variable</b>                                    |       |       |       |
| Cognitive test score  | 1,192 | 10.72 | 3.46  |
| <b>2. Main independent variable</b>                             |       |       |       |
| School type (Public school)                                     | 1,192 | 0.86  |       |
| <b>3. Other independent variables</b>                           |       |       |       |
| <b>School administration</b>                                    |       |       |       |
| Receiving government subsidy                                    | 1,192 | 0.94  |       |
| School local ranking (Above average)                            | 1,192 | 0.68  |       |
| Student management (Strict disciplines)                         | 1,192 | 0.73  |       |
| <b>School facilities (0=No, 1=Low quality, 2= High quality)</b> |       |       |       |
| Class size  | 1,192 | 45.80 | 14.27 |
| Laboratory  | 1,183 | 1.55  |       |
| Computer room   | 1,183 | 1.63  |       |
| Library   | 1,183 | 1.34  |       |
| Student activity room   | 1,137 | 1.12  |       |
| Cafeteria   | 1,183 | 0.99  |       |
| Playground  | 1,183 | 1.38  |       |
| Gymnasium   | 1,140 | 0.51  |       |
| ICT access in classrooms  | 1,189 | 1.72  |       |
| <b>Teacher characteristics</b>                                  |       |       |       |
| Bachelor's degree or above                                      | 1,192 | 0.63  |       |
| Senior professional title or above                              | 1,192 | 0.15  |       |
| Experience (years)  | 1,151 | 13.61 | 8.55  |
| Weekly working hour   | 1,184 | 50.58 | 15.84 |
| Frequent turnover   | 1,157 | 0.12  |       |
| <b>Teaching methods</b>   |       |       |       |
| Frequent use of lecture   | 1,161 | 0.78  |       |
| Frequent use of group discussion                                | 1,176 | 0.52  |       |
| <b>4. Control variables</b>                                     |       |       |       |
| <b>1) Individual Characteristics</b>                            |       |       |       |
| Gender (Male)   | 1,192 | 0.53  |       |
| Hukou type (Agricultural)                                       | 1,192 | 0.64  |       |
| Taking extra-curriculum courses                                 | 1,186 | 0.52  |       |
| Self-expectation for education (years)                          | 1,180 | 16.27 | 3.75  |
| <b>2) Family Characteristics</b>                                |       |       |       |
| Family income level (Above moderate)                            | 1,185 | 0.05  |       |
| Bachelor's degree of parents                                    | 1,188 | 0.10  |       |

## METHODOLOGY

### Empirical Model and Estimation Strategy

My variable of interest is the school type, and I use a multivariate linear regression to study the effect of school types in regards of cognitive ability of students. Because my dependent variable (score of the cognitive aptitude test) is a numeric and continuous variable, I can use ordinary least squares (OLS) regression. My model is presented below:

$$Score_i = \beta_0 + \beta_1 Type_i + \beta_2 Individual_i + \beta_3 Family_i + \beta_4 School_i + \beta_5 Admin_i + \beta_6 Teacher_i + \varepsilon$$

$Score_i$  is the cognitive test score of student  $i$ .  $Type$  is a dummy variable indicating the type of school a student enters, which equals 1 if the student  $i$  is enrolled in a public school and 0 if the student is enrolled in a non-public school. The coefficient  $\beta_1$  of  $Type_i$  will show the general effects of school types on cognitive test score.

Based on previous studies, we can conclude a list of factors that affect the academic performance of students besides school type, most of which are related to schools. I include other categories of explanatory variables and examine how each of the school-related characters influence the cognitive test scores.

$Admin$  indicates a vector of variables related to school administration. I only identify if the school has a relatively high ranking, strict student management, and whether it receives government expenditure.  $School$  includes a vector of variables for school facilities and resources. The quality of facilities is separated by indicators to show how quality of facilities effect academic performance of students.  $Teacher$  variables describe teacher characteristics. Indicators for senior title of the teacher, bachelor's degree of the teacher and the turnover frequency of teachers are

included. By adding each category of variable, we can identify how each kind of variable affect the cognitive ability of migrant children.

Although in the data selection process, I have set conditions to eliminate underlying self-selection problems. I only retain observations for schools randomly allocating students to classes and parents sending their children to schools without seeking shortcuts. However, self-selection bias may still exist when families influence the children in unobservable ways. Some individual and family factors are also associated with academic performance of students. To solve the problem of underlying self-selection bias as well as to control for these family and individual factors, I add a vector of variables for the family background (*Family*) and another vector of individual expectation (*Individual*) in the model. With all the control variables, we can obtain the “raw” effects of schools on academic performance.

### **Study Limitations**

The first limitation of the study lies in the data source. While this is a national representative survey data, the sample has a smaller proportion of observations for migrant students in non-public school compared to the national level (about 20%). The data used for the study contains nearly nine times more observations for public-school students, so that the difference between the two types of schools may not be significant because of the small sample of non-public school students.

Omitted variable bias may exist, since in the previous studies we found that factors such as interpersonal relationship can also associate with academic performance of students. More family and individual factors exist than included in my model as well. While I only select some factors related to school and control for the most important family background and individual factors, it is possible that I neglect some important factors in the regression that lead to a biased result.

Along with omitted variable bias, endogeneity bias can also occur. School-related variables can be correlated with the error term. While the education policy has changed across years, it is possible that a policy implemented in a certain area cause a sudden improvement in school facilities or a higher fiscal expenses per student. As we do not know where the samples come from and the exact date of data collection, we are not able to totally eliminate the endogeneity bias.

## RESULTS

### Differences in School and Student Characteristics

To identify how school relates with academic performance of migrant students, I first explore the differences between two types of schools. Table 2 shows the mean values of school characteristics according to school types. I also conduct t-tests for each variable, finding that all school-related characteristics are significantly different between public schools and non-public schools. The results show large and significant gaps between facilities, such as laboratory, library, student activity room and playground. The differences indicate that while public schools have at least some low-quality facility, non-public schools are not equipped with the facility. Although both types of schools have facilities such as computer room, gymnasium and classroom ICT access, these facilities in public schools are in significantly better conditions. Non-public schools have about 18 more students in each class on average compared with public schools. The only exception is student cafeteria, for student cafeterias appear in non-public school rather than in public school.

In terms of school administration, almost all public schools receive a subsidy from the government, while about 61% of non-public schools receive the subsidy. Public schools also have significantly higher local rankings and stricter student disciplines compared with non-public schools.

**Table 2. Are School Characteristics Different in Public Schools/Government-Sponsored Schools and in Non-Public Schools?**

| <b>School Characteristics</b>                           | <b>Public School</b> | <b>Non-public School</b> |
|---|----------------------|--------------------------|
| <b>Facilities (1=no, 1=low quality, 2=high quality)</b> |                      |                          |
| Class size  | 43.14                | 61.79                    |
| Laboratory  | 1.65                 | 0.92                     |
| Computer room   | 1.68                 | 1.32                     |
| Library   | 1.44                 | 0.78                     |
| Student activity room                                   | 1.17                 | 0.81                     |
| Student cafeteria                                       | 0.94                 | 1.31                     |
| Gymnasium   | 0.55                 | 0.28                     |
| Playground  | 1.47                 | 0.89                     |
| Classroom Access to ICTs                                | 1.78                 | 1.36                     |
| <b>School Administration</b>                            |                      |                          |
| Subsidy received from the government                    | 0.99                 | 0.61                     |
| School local ranking (1-5)                              | 3.77                 | 3.22                     |
| Rank above average                                      | 0.73                 | 0.36                     |
| School management (1-5)                                 | 3.87                 | 3.64                     |
| Manage students strictly                                | 0.77                 | 0.52                     |

Note: According to t-tests, p-values for all variables are below 0.000.

I next examine whether teachers are different in two types of schools. Table 3 shows the comparison of means for teacher characteristics in public schools and in non-public schools. T-tests are also conducted in all variables.

The results show that teachers in public school received significantly higher education than teachers in non-public schools. On average, public-school teachers hold a bachelor's degree through adult education, while teachers in non-public school only have junior college degrees. Over 70% of public-school teachers hold a bachelor's degree through regular higher education, while only 21% of teachers in non-public schools hold a bachelor's degree through regular higher education. Teachers in public schools stay significantly more stable than teachers in non-public schools.

Teachers are also more competitive in public schools than in non-public schools. In public schools, teacher have significantly higher professional titles, and 16% of them have senior titles.

They have 3.1 years more teaching experience compared with their peers in non-public schools. However, the working hour of teachers in non-public schools is 9.7 hours longer than teachers in public schools. Teachers in non-public schools also report to use more frequent lectures and group discussions in class compared with teachers in public schools.

**Table 3. Are Teacher Characteristics Different in Public Schools/Government-Sponsored Schools and in Non-Public Schools?**

| Teacher Characteristics                | Public School | Non-public School |
|--|---------------|-------------------|
| Education                              |               |                   |
| Highest level received (1-4)           | 2.74          | 1.56              |
| Bachelor's degree received             | 0.70          | 0.21              |
| Qualification                          |               |                   |
| Level of professional title (1-5)      | 2.51          | 1.00              |
| Senior title                           | 0.16          | 0.11              |
| Teaching experience (year)             | 14.06         | 10.98             |
| Weekly working hour                    | 49.19         | 58.85             |
| Turnover frequency                     | 0.05          | 0.55              |
| Frequency of lectures in class         | 1.89          | 2.00              |
| Frequency of group discussion in class | 1.63          | 1.86              |

Note: According to t-tests, p-values for all variables are below 0.000.

From previous studies, I have learned that individual and family factors play an important role in the academic performance of students. Therefore, I examine if there are differences between the controlled factors that may contribute to the difference in test scores.

Although there is still a significant gap between students in public schools and in non-public schools in terms of individual characteristics, the substantive difference is not obvious. Both types of schools enroll over half of migrant students with agricultural *Hukou*, and the proportion of students with agricultural *Hukou* in non-public school is about 13 percentage points higher than the proportion in public schools. More students in public schools take extra-curriculum courses. Students in public schools expect to receive slightly more years of education compared to their

peers in non-public schools. However, the difference indicates that public school students expect to complete a four-year college education, while non-public school students only expect to graduate from a three-year junior college.

Despite the fact that the average income of migrant families hardly exceeds a moderate level, the family economic condition of students in public schools is still significantly better than that of students in non-public schools. The education level of parents show more difference among students in different types of schools. The highest education degree received by the parents of public-school students reach senior high school, and 12% of their parents have a bachelor’s degree. By contrast, parents of non-public-school students receive their highest degree of education in junior high school, and only 1% of them have a bachelor’s degree.

**Table 4. How Do Control Factors Vary across Different Types of Schools?**

| <b>Control factors</b>               | <b>Public School</b> | <b>Non-public School</b> |
|--------------------------------------|----------------------|--------------------------|
| Gender (Male)                        | 0.51                 | 0.63                     |
| Hukou type (Agricultural)            | 0.62                 | 0.75                     |
| Extra-curriculum courses             | 0.54                 | 0.43                     |
| Self-expectation for education (ear) | 16.46                | 15.14                    |
| Family income                        |                      |                          |
| Income level (1-5)                   | 2.90                 | 2.73                     |
| Above moderate income                | 0.06                 | 0.01                     |
| Education level of parents           |                      |                          |
| Highest degree received (1-9)        | 4.50                 | 3.43                     |
| Bachelor’s degree                    | 0.12                 | 0.01                     |

T-test results show that the p-values for all variables are below 0.01.

## **How Do Student and School Characteristics Associate with Cognitive Test Score?**

Table 5 shows how the main explanatory variable, the school type, and control variables relate to the cognitive test scores of migrant children. The cognitive test score of students in non-public school is significantly lower than the score of students in public school. The difference between scores shows a disparity of cognitive attainment between school types. In terms of control variables, significant gaps of scores appear in gender, Hukou type, expectation of education, taking extra-curriculum courses, family income level and education of parents. The findings align with previous studies about factors that influence academic performance of students. Students who expect to receive a college degree have over one standard deviation of higher cognitive test scores than students who do not have this education aspiration. Students with better economic and social resources, which is reflected by the education level of the parents and the family income level, also tend to have higher test scores. Significant gaps in test score exist in other factors, though the differences are relatively small.

The binary analysis shows that there are significant differences in school characteristics and student backgrounds between public school and non-public school. Public schools have facilities in better condition, better school administration in terms of ranking and student management, and more competent teachers. Though both being migrant children, the families of students in public schools possess better socio-economic resources than students in non-public schools. The gap in cognitive test score also exists between migrant children in public school and in non-public school. Students in public school have higher average scores compared with their peers in non-public schools.

The two gaps identify that the quality of school-related characteristics relates with the disparity of test score among students in different types of schools. To explain, students in non-

public schools with facilities of lower quality, worse school management and less competent teachers tend to perform worse on the cognitive test.

**Table 5. How Does the Cognitive Test Score of Students Relate to the Key Explanatory Variable and Controls?**

| <b>Variables</b>                               | <b>Test Score</b> |
|--|-------------------|
| <b>School Type***</b>                          |                   |
| Public School                                  | 10.91             |
| Non-public School                              | 9.55              |
| <b>Control Variables</b>                       |                   |
| <b>Gender*</b>                                 |                   |
| Female   | 10.90             |
| Male   | 10.56             |
| <b>Hukou type***</b>                           |                   |
| Non-agricultural                               | 11.06             |
| Agricultural                                   | 10.52             |
| <b>Self-expectation for education***</b>       |                   |
| Indifferent/junior high school                 | 8.31              |
| Above college                                  | 11.84             |
| <b>Extra curriculum courses**</b>              |                   |
| No   | 10.48             |
| Yes  | 10.95             |
| <b>Family income level***</b>                  |                   |
| Moderate and below                             | 10.62             |
| Above moderate                                 | 12.83             |
| <b>Education of parents***</b>                 |                   |
| Below college                                  | 10.55             |
| College and above                              | 12.29             |
| T-test results: *** p<0.01, ** p<0.05, * p<0.1 |                   |

Table 6 supports the positive association between school facilities and the cognitive test score. The table reports the summary of school facilities classified according to whether they fall within the range of the mean plus or minus one half of one standard deviation. In all cases expect for student cafeteria, students with a higher score are more likely to study in a school with facilities in good conditions, while the probability of studying in schools with low-quality facilities falls when their score increases. The case of cafeteria is different, because policies issued by the Ministry of

Education stipulated that student cafeteria in primary and secondary schools should be non-profit and operated by the school.<sup>3</sup> A lot of schools do not have the capacity to operate a student cafeteria, so that some schools close the cafeteria and send the children back to home for lunch. Some school retain the cafeteria, but students can choose to eat lunch at home. The quality of student cafeteria, however, doesn't represent the nutrition level and health status of students.

**Table 6. Description of School Facilities According to Cognitive Aptitude Test Score**

| Facilities            | Cognitive aptitude test score    |         |                                  |
|-----------------------|----------------------------------|---------|----------------------------------|
|                       | Below average<br>(mean-0.5 S.D.) | Average | Above average<br>(mean+0.5 S.D.) |
| Class size            | 47.97                            | 45.45   | 43.68                            |
| Student activity room |                                  |         |                                  |
| Poor condition        | 0.51                             | 0.46    | 0.46                             |
| Good condition        | 0.24                             | 0.33    | 0.38                             |
| Student cafeteria     |                                  |         |                                  |
| Poor condition        | 0.34                             | 0.28    | 0.41                             |
| Good condition        | 0.26                             | 0.38    | 0.26                             |
| Computer room         |                                  |         |                                  |
| Poor condition        | 0.44                             | 0.33    | 0.27                             |
| Good condition        | 0.54                             | 0.66    | 0.73                             |
| Gymnasium             |                                  |         |                                  |
| Poor condition        | 0.11                             | 0.15    | 0.14                             |
| Good condition        | 0.14                             | 0.21    | 0.21                             |
| Laboratory            |                                  |         |                                  |
| Poor condition        | 0.41                             | 0.32    | 0.31                             |
| Good condition        | 0.50                             | 0.64    | 0.68                             |

<sup>3</sup> *Regulations for Food Safety, Health Control and Nutrition at school*, Ministry of Education, PRC. Retrieved from: [http://www.gov.cn/xinwen/2019-03/20/content\\_5375280.htm](http://www.gov.cn/xinwen/2019-03/20/content_5375280.htm)

## **School Type Effects on Cognitive Test Score**

While finding the positive association between school characteristics and cognitive test score, I want to further explore how school characteristics relate with the cognitive test score of students through school type.

To address the question, I apply several models that treat cognitive aptitude test score of migrant students as dependent variable. Table 7 reports the effects of school type on cognitive test score across different models in which control variables and school-related characteristics are included incrementally. I first focus on the school type effect and how the inclusion of school-related factors alters this effect.

Model 1 shows the total effect of school type on cognitive test score without any control variables. We find that public school has a significant positive effect on test score, with migrant children in public school receiving 1.41 more points in cognitive test on average than migrant children in non-public school. The result aligns with the findings from previous research, which reveal the education outcome disparity in students of different types of schools.

Model 2 includes control variables of family and individual characteristics based on the previous model. Though the effect of school type is still positive and significant, the size of the effect is reduced to 0.87. As expected based on previous studies, family and individual characteristics are significantly associated with academic performance of students, and the gap between schools can be largely accounted for by family education. However, the effect still has sizable significance, indicating that family and individual factors cannot eliminate the gap in cognitive test score among students from different types of schools.

In Model 3, I examine how school facilities as well as the quality of these facilities impact the effect of school type on test score. When including the variables of school facilities, the score gap

between students in public school and in non-public school is no longer statistically significant, indicating that school facilities can explain the effect of school type on test score.

The further inclusion of characteristics of school administration in Model 4 and the inclusion of teachers' characteristics in Model 5 keep the effect of school type on test score insignificant. The models indicate that the score gap of students in different types of schools can be explained by school-related characteristics, such school facilities, school administration and teacher characteristics.

**Table 7. Regression Results of the Cognitive Test Score on School Related Factors**

|                                    | <b>Model 1</b> | <b>Model 2</b>  | <b>Model 3</b>    | <b>Model 4</b>        | <b>Model 5</b> |
|------------------------------------|----------------|-----------------|-------------------|-----------------------|----------------|
| <b>Variables</b>                   | <b>School</b>  | <b>Controls</b> | <b>Facilities</b> | <b>Administration</b> | <b>Teacher</b> |
| <b>School type (Public school)</b> | 1.41***        | 0.87***         | 0.67              | 0.90                  | 0.43           |
| <b>School facilities</b>           |                |                 |                   |                       |                |
| Class size                         |                |                 | -0.02             | -0.04**               | -0.02          |
| Student activity room              |                |                 |                   |                       |                |
| Poor condition                     |                |                 | -0.60             | -0.57                 | -0.60          |
| Good condition                     |                |                 | 0.30              | 0.22                  | 0.22           |
| Student cafeteria                  |                |                 |                   |                       |                |
| Poor condition                     |                |                 | 0.49              | -0.07                 | 0.54           |
| Good condition                     |                |                 | 0.97**            | 0.83*                 | 0.00           |
| Computer room                      |                |                 |                   |                       |                |
| Poor condition                     |                |                 | 3.93***           | 3.29***               | 3.65***        |
| Good condition                     |                |                 | 5.13***           | 3.94***               | 3.69***        |
| Gymnasium                          |                |                 |                   |                       |                |
| Poor condition                     |                |                 | 0.51              | 0.80**                | 1.19***        |
| Good condition                     |                |                 | -0.34             | -0.83*                | -0.61          |
| Laboratory                         |                |                 |                   |                       |                |
| Poor condition                     |                |                 | 2.83**            | -0.17                 | -1.64          |
| Good condition                     |                |                 | 2.88**            | 0.25                  | -1.24          |
| Library                            |                |                 |                   |                       |                |
| Poor condition                     |                |                 | -2.95***          | -2.30***              | -0.71          |
| Good condition                     |                |                 | -3.17***          | -2.54***              | -0.40          |

|                                |  |         |         |         |         |
|--------------------------------|--|---------|---------|---------|---------|
| (Continued)                    |  |         |         |         |         |
| Playground                     |  |         |         |         |         |
|                                | Poor condition                         |         | 1.92*** | 1.87**  | 2.05*** |
|                                | Good condition                         |         | 1.40*   | 1.49*   | 1.60**  |
| Classroom Access to ICTs       |  |         |         |         |         |
|                                | Partly access                          |         | 3.32*** | 3.45*** | 2.52**  |
|                                | All access                             |         | 1.98**  | 1.54    | 0.85    |
| <b>School administration</b>   |  |         |         |         |         |
|                                | Receiving government subsidy           |         |         | -0.22   | 0.30    |
|                                | School local ranking                   |         |         | 1.06*** | 0.66    |
|                                | Student management                     |         |         | 1.11*** | 0.96*** |
| <b>Teacher characteristics</b> |  |         |         |         |         |
|                                | Received a bachelor's degree           |         |         |         | 0.88*** |
|                                | Holding a senior title                 |         |         |         | 1.09**  |
|                                | Working experience (Years)             |         |         |         | 0.03**  |
|                                | Turnover frequency                     |         |         |         | -0.76   |
| Teaching method                |  |         |         |         |         |
|                                | Frequency of lecture in class          |         |         |         | 0.25    |
|                                | Frequency of group discussion in class |         |         |         | -0.05   |
|                                | Working hour (Weekly)                  |         |         |         | 0.03*** |
| <b>Control variables</b>       | No                                     | Yes     | Yes     | Yes     | Yes     |
| <b>Constant</b>                | 9.57***                                | 6.14*** | -0.82   | 2.32    | 0.09    |
| <b>R-squared</b>               | 0.02                                   | 0.12    | 0.22    | 0.24    | 0.27    |

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 Control variables include: student gender, student *Hukou* type (agricultural), student self-expectation of education (years), extra-curriculum courses, family income level (above moderate), highest education level of parents (bachelor's degree).

## **School Characteristics and Cognitive Test Score of Migrant Children**

Given the results from Table 6, I next explore how school characteristics relate to the school type and influence the test score of students. Particularly, I focus on the effects of school facilities on academic performance of students and how the effects altered by other school-related characteristics.

### **Effects of School Facilities**

Model 3 in Table 6 only includes variables of school facilities. Indicators of the facility identify the qualities of these facilities as “poor condition” and “good condition.” The results show that effects of class size, student activity room and gymnasium are not significant. Student cafeteria with good condition has significant effect ( $p < 0.05$ ), which increases the test score by 0.97 points on average, while the effect of cafeteria in poor condition appears insignificant.

The effects of computer rooms in both good and poor condition are significant ( $p < 0.01$ ) and are substantive, which exceed one standard deviation of the test score. Having a computer room in good condition has an even larger effect (5.13 points) than having a computer room in poor condition (3.93 points). Having a laboratory in poor condition significantly raises the test score by 2.83 points ( $p < 0.05$ ) and having one that is in good condition significantly raises the test score by 2.88 points ( $p < 0.05$ ). The effect of having a playground in poor condition is positive and highly significant ( $p < 0.01$ ) which raises the test score by 1.92 points on average, while having a playground in good condition raises the test score by 1.4 points ( $p < 0.1$ ). Having part of classrooms equipped with ICT facilities leads to a significant and substantive increase in test score of nearly one standard deviation (3.32 points,  $p < 0.01$ ). By contrast, having full access of ICT facilities in all classrooms is significant but smaller, with only a 1.98-point average increase in test score ( $p < 0.01$ ).

Despite all the positive effects of facilities, effects for libraries in both conditions show sizable degrees of statistical significance ( $p < 0.01$ ) and are negatively related to test score. Controlling all other factors, students in schools with good quality libraries is about 90% of a standard deviation (-3.17 points) lower than students in schools without libraries or libraries with poor quality, while the effect of libraries in poor condition on test score is smaller, at about 85% of one standard deviation (-2.95 points).

The results make the point that it would be better for schools to update and improve most of the facilities to the best conditions, especially for computer rooms, which pose large effects on test score. In terms of ICT access in classrooms, the leap from zero to one is more critical than improvements towards higher qualities and a full coverage in all classrooms. Library may be a distraction for students, because they can only choose to read comic books or novels instead of using the library collection on their studies. Consequently, the effect of library is negative and libraries in good condition may possibly contain more books for recreation that are more accessible to students.

#### Effects of School Administration with School Facilities

A set of school administrative variables are included in Model 4. As expected, school ranking and student management both have positive and significant effects on score ( $p < 0.01$ ). Students in school that ranks above average earn 1.06 more points on test score, on average and students in schools with strict management receive 1.11 more points. However, whether the school receives a subsidy from the government is insignificant. School ranking is determined by the test scores and may be associated with a lot of factors both related to the school and the family of students. However, school management can be controlled by the school, and stricter disciplines contribute

to better study environment and fewer elements of distraction, which leads to higher cognitive test scores.

The inclusion of school administrative variables alters the effect of school facilities as well. Compared with Model 3, the effects of laboratory in both conditions and cafeteria in poor condition become statistically insignificant. The negative effects of libraries are diminished, but remains significant ( $p < 0.01$ ). The school with libraries in good condition lower the test score by 2.54 points on average, while the school with poor-quality libraries lower the score by 2.3 points. The effects of class size become significant and is negatively associated with test score by 0.04 points.

In terms of technical facilities, the effect of ICT facilities in all classrooms loses its statistical significance, while the effect of ICT access in part of classrooms slightly increases to 3.4 points while maintaining its significance ( $p < 0.01$ ). The effects of computer rooms decrease, and the reduction in the effect of high-quality computer room is larger than the reduction in the effect of low-quality computer room. However, the effects are still very large, near one standard deviation of the test score. In regards of physical facilities, the effects of having a gymnasium and having a playground are statistically significant. Having a gymnasium in poor condition raises test score by 0.8 points on average ( $p < 0.05$ ), but having a gymnasium in good condition reduces the test score by 0.83 points ( $p < 0.1$ ). Compared with Model 3, the effect of playgrounds in poor condition slightly increases to 1.49, while the effect of playgrounds in good condition slightly decreases to 1.87. The results show that partly coverage of ICT facilities in classrooms can be a huge support for students to improve their score, but a full coverage of ICT facilities in all classroom may serve as distraction that lower the test score. Similarly, a poor-quality gymnasium ensures that students have adequate exercise which help to increase the cognitive test score, while a high-quality gymnasium may serve as a distraction for students. However, compared with gymnasium that

provides spaces and equipment for ballgames and other sport activities, playground offers a running track with a lawn for basic exercise and has less recreational functions. Therefore, by controlling for school administrative variables, the effect of high-quality playground magnifies, for it guarantees the quality of exercise for students.

By controlling for school administration and student management, most effects of school facilities are reduced. The reduction indicates that the effects of facilities associate with the distinct in school administration. When all schools have the same level of student management and school administration, the score differences caused by school facilities are diminished.

#### Effects of Teachers with School Administration and School Facilities

In Model 6, I include another set of variables about teacher characteristics. Significant effects are found in terms of whether the teacher receives a bachelor's degree and holds a senior title. Having teachers with a college degree raises the score by 0.88 points on average ( $p < 0.01$ ), and having teachers with a senior title also increases the score by 1.09 points ( $p < 0.05$ ). Teachers who have 10 year more experience can raise the score of students by 0.3 points ( $p < 0.05$ ). The effect of weekly working hour is also significant, with one hour more time spent on their work raises the score by 0.03 points ( $p < 0.01$ ). However, other characteristics such as turnover frequency and teaching methods do not have significant effects on test score of students.

With the inclusion of teacher characteristics, the effects of class size, student cafeteria in both conditions, library in both conditions and high-quality gymnasium become insignificant. Only the effect of school management remains statistically significant among school administrative variables, with strict student management improving the score by 0.96 points.

The effects of computer rooms in good condition and ICT facilities in part of the classrooms diminish but are still significant and substantive. On the contrary, effects of computer rooms in poor condition, gymnasiums in poor condition and playgrounds in both conditions increase. While most effects of the facilities decrease by only controlling for administrative factors, effects of these facilities increase by taking teacher-related variables into control. The results indicate that apart from the strict disciplines, the instructions provided by teachers about how to use the facilities are also essential for students. Furthermore, the lack of certain facilities such as libraries and laboratories can be compensated by teachers' knowledge, dedication and experience.

## CONCLUSION

In order to study the academic performance of migrant children in different types of schools, I empirically examined the cognitive test scores of migrant children in both public schools and in non-public schools using the data from CEPS. I also explored how school-related factors are associated with the cognitive test score, and their effects on cognitive test score of migrant children by controlling for family and individual characteristics of the children. Specifically, I look at the effects of school facilities and analyzed how the effects can be influenced by other school factors.

The questions posed by this study were: a) Whether the academic performance of migrant children is different according to the school type? b) How do school characteristics relate to the school type and influence the test score of students? c) What are the effects of school facilities on academic performance of students?

My research confirms my first hypothesis that there is a gap between the academic performance of migrant children in different types of schools. Both the binary analysis and the regression show that migrant children in public schools receive higher cognitive test score compared with students in non-public schools. The finding aligns with previous studies on the gap in education outcome among migrant students in different types of schools. While the education departments put efforts in regulating non-public schools and promoting education equality, there is still a way to go in improving the education outcome in non-public schools.

Through answering the second and the third questions, my goal is to provide implications on how to improve education outcome in non-public schools. In answer to the second question, my analysis indicates that apart from the gap in test score, the gap also exists between the quality of public school and non-public school. Unlike other studies that only include one single variable

such as school ranking or school satisfaction to evaluate school quality, school quality in my study refers to a range of quantifiable school-related characteristics including the school facilities, school management and teachers.

My second hypothesis receives support based on my analysis. Similar to most of the previous studies, my results prove that individual and family factors cannot fully explain the score gap of migrant children in different types of school. School quality are critical factors related with the score gap and can compensate for the inadequacy of family socio-economic resources and self-motivation.

School quality, in general, positively associates with academic performance of students. The most essential factor of school administration is student management, suggesting that it is essential for schools to stipulate strict disciplines to prevent distractions and drive the students to commit more to their studies. The result corresponds with previous research that suggested students with higher level of disciplines have better academic performance (Baumann and Krskova, 2016; Cohen et al., 2009).

Characteristics of teachers' competence, including whether the teacher receives a college degree, the senior title and teaching experience, positively influence the academic performance of students. The result contradicts with the previous findings of Hanushek (2019) and Rivkin et al. (2005), for they found that education level had no effect on the academic score of students. This may be resulted from the difference in context, because the gap between high-school graduates and college graduates in terms of knowledge and skills is considered to be huge in China, compared to the United States. The number of working hours also increases test scores, but the effect is relatively small in size compared with other characteristics. It shows that while in some low-quality

schools, teacher's dedication on working can help to improve the academic performance of students, the effect is far below the influence of teacher's competence.

In terms of school facilities, I separate the effect of having a certain facility or not, and the effect of having a high-quality facility rather than low-quality facility. The analysis shows that not all facilities have a significant impact on cognitive ability of students, while the effects change according to other school-related factors. When controlling for all other factors, the effects of school facilities are positive, which confirm my third hypothesis. However, the implications of how the effects change are more valuable compared with the final results.

- 1) The effects of computer room and basic ICT access in classrooms are always significant and substantive, regardless of other school characteristics. However, the effects slightly diminish with more competent teachers and better school management. The evidence reveals the importance of the access to informative and technical facilities, which can greatly improve the academic performance of migrant children.
- 2) Sport facilities have strong and significant effects on academic performance of migrant children across different models. The existence of such facilities shows greater effect than emphasizing the quality of the facilities. It would be essential for schools to build a gymnasium or a playground if without one, and it is more necessary to renovate the playground rather than the gymnasium. The reason behind is that adequate physical exercises help to improve the academic performance of students, while excessive sport activities serve as distractions to their studies.
- 3) The effects of laboratories and libraries can be explained by the quality of teachers. It turns out that the experience and competence of teachers serve to make up the knowledge gap caused by the lack of laboratory, while the effect is important in the inevitable case of the inequality

in teachers and school management. Proper guidance of teacher can also eliminate the negative effect caused by distractions of recreational reading. However, the negative effects of libraries also suggest that without instructions, secondary school students may not be inclined to use the library appropriately. They might use the library more for entertainment purpose rather than study purpose.

- 4) Student activity room and cafeteria show little effect on academic performance of migrant children. The effect of student activity room is not significant in all conditions. The effect of a good cafeteria loses its significance when combined with more competent teachers, but the improvement in cafeteria is necessary when lacking competent teachers.
- 5) Class size, however, appears to weakly influence the academic performance of students. Though the effects are not significant, the negative impact on test score aligns with previous studies.

In conclusion, with the data from CEPS, I identified a gap in academic performance of migrant children between public school and non-public school. However, several factors related to school can effectively eliminate the gap. First, the establishment of school facilities, especially informative facilities such as computer rooms and ICT access in classrooms as well as sport facilities, can substantively eliminate the score gap between schools. This may be the most effective and the most convenient way to achieve education outcome equality for migrant children. Second, an equal distribution of teachers can be a critical step towards education outcome equality. Teachers with higher education level, longer teaching experience or a senior level can compensate the school type difference. Finally, strict school management towards students can also serve to remove the gap in academic performance between schools. This may require training for school

supervisors and best practices of school management that guide the design and implementation of school disciplines.

## BIBLIOGRAPHY

- Baumann, C. & Krskova, H. (2016). School Discipline, School Uniforms and Academic Performance. *International Journal of Educational Management*, Vol. 30 No. 6, 1003-1029.
- Bietenbeck, J. (2014). Teaching Practices and Cognitive Skills. *Labour Economics*, 30, 143-153.
- Card, D., & Kruger, A. B. (1998). School Resources and Student Outcomes. *The ANNALS of the American Academy of Political and Social Science*, 559(1), 39-53.
- Cohen, E.H., Kramarski, B. and Mevarech, Z. (2009). Classroom Practices and Students' Literacy in a High and a Low Achieving Country: A Comparative Analysis of PISA Data from Finland and Israel. *Educational Practice and Theory*, Vol. 31, No. 1, 19-37.
- Duan et al. (2008). Situation of Chinese Floating Population. Conference article for Conference of Chinese Social and Family Welfare Policy.
- Duan et al. (2013). Major Challenges for China's Floating Population and Policy Suggestions: An Analysis of the 2010 Population Census Data. *Population Research*. Vol. 37, No.2, 17-24
- Erdogdu, F. & Erdogdu, E. (2015). The Impact of Access to ICT, Student Background and School/Home Environment on Academic Success of Students in Turkey: An International Comparative Analysis. *Computers & Education*, Vol. 82, 26-49.
- Feng S. & Chen Y. (2012). School Types and Education of Migrant Children: An Empirical Study in Shanghai. *China Economic Quarterly*, Vol.11, No.4, 1455-1476.
- Feng & Luo (2017). Hotspots and Reflections on the Education of Migrant Children in China in the Past Fifteen Years. *Education and Teaching Research*, Vol. 31, No.8, 22-48.
- Gao, Q. et al (2015). The Mental Health of Children of Migrant Workers in Beijing: The Protective Role of Public School Attendance. *Scandinavian Journal of Psychology*, 56(4): 384-390.
- Goodburn, C. (2016). Educating Migrant Children: The Effects of Rural-Urban Migration on Access to Primary Education. In S. Guo, & Y. Guo (Eds.), *Spotlight on China: Changes in Education under China's Market Economy* (pp. 365-380).
- Gong, X., Zhang, H. and Yao, H. (2015). The Determinants of Compulsory Education Performance of Migrant Children in Beijing: An Analysis of Two Cohorts. *International Journal of Educational Development*, Vol. 45, 1-15.
- Gui et al. (2012). Migrant Worker Acculturation in China. *International Journal of Intercultural Relations*. 36: 598-610
- Guo, Y. & Zhao, L. (2019). The Impact of Chinese Hukou Reforms on Migrant Students' Cognitive and Non-cognitive Outcomes. *Children and Youth Services Review*, Vol. 101, 341-351
- Han, J. & Yu, J. (2020). Children's Educational Choices by the New Generation Migrant Workers' Families in the Trend of New-type Urbanization. *Beijing Social Science*, Vol.6, 4-13
- Hanushek, E. et al. (2019) The Value of Smarter Teachers: International Evidence on Teacher Cognitive Skills and Student Performance. *The Journal of Human Resources*, 54(4), 857-898.
- He, M. Yang, T. & Xin, T. (2016). Mindset and Resources: The Key to Primary School Mobility and Left-Behind Children'S Academic Achievement. *Primary and Middle School Management*, Vol.11, 27-31.
- Hu, F. (2018). Migrant Peers in the Classroom: Is the Academic Performance of Local Students Negatively Affected? *Journal of Comparative Economics*, 46, 582-597.

- Jiang Q. & Ren, J. (2020). Inequality of Opportunity in Educational Achievement: Evidence from CEPS. *Nankai Economic Studies*, No.4, 165-184
- Kwong, J. (2011). Education and Identity: The Marginalisation of Migrant Youths in Beijing. *Journal of Youth Studies*, Vol. 14, No.8, 871-883.
- Lai et al. (2014). The Education of China's Migrant Children: The Missing Link in China's Education System. *International Journal of Educational Development*, 37: 68–77
- Liang & Chen (2007). The Educational Consequences of Migration for Children in China. *Social Science Research*. 36: 28-47
- Liu, Z. & Guo, R. (2020) The Effect of Migrant Peers on Students' Academic Achievements: Evidence from Three Districts in Beijing. *Education & Economy*, Vol.36, No.1, 64-86.
- Liu, J. & Zhang, Y. (2020). Dialect Ability and Academic Performance of Migrant Children — — Evidence from the China Education Panel Survey. *Chinese Journal of Sociology*, Vol.40, 213-236.
- Liu, S. & Zhao, X. (2018). How Far Is Educational Equality for China? Analyzing the Policy Implementation of Education for Migrant Children. *Education Research Policy Practice*.
- Lu, Y. & Zhou, H. (2013). Academic Achievement and Loneliness of Migrant Children in China: School Segregation and Segmented Assimilation. *Comparative Education Review*, vol. 57, No. 1, 85-116
- Ma, G. & Wu, Q. (2019). Social Capital and Educational Inequality of Migrant Children in Contemporary China: A Multilevel Mediation Analysis. *Children and Youth Services Review* 99, 165–171.
- Meng, R. & Yang, X. (2019). The Effect of “Migrant” on Children's Academic Performance: An Evaluation from Propensity Score Matching Method. *Global Education*, Vol. 48, No. 7, 3-18
- Ojuok, J. O. et al. (2020). Influence of Physical Facilities on Academic Performance in Constituency Development Fund (CDF) Built Secondary Schools in Rachuonyo South Sub-County, Kenya. *African Educational Research Journal*, Vol. 8(3), 462-471
- Rivkin, S. et al. (2005) Teachers, Schools, and Academic Achievement. *Econometrica*, Vol. 73, No. 2, 417–458.
- Ronfeldt, M., Loeb, S., & Wyckoff, J. (2013). How Teacher Turnover Harms Student Achievement. *American Educational Research Journal*, 50(1), 4–36.
- Sun, D. (2019). Migrant Children, Left-behind Children and Their Academic Performance: Evidence from CEPS. *China Economics of Education Review*, Vol.4 No.5, 69-85.
- Wainer, J. et al. (2008). Too Much Computer and Internet Use Is Bad for Your Grades, Especially If You Are Young and Poor: Results from the 2001 Brazilian SAEB. *Computers & Education*, Vol. 51, No.4, 1417-1429.
- Wang, H. & Chen, C. (2017). The Influencing Factors of Compulsory Education Quality for Rural Migrants' children in Urban China: An Empirical Analysis Based on China Education Panel Survey. *China Economics of Education Review*, Vol.2, No.2, 102-114
- Wang, H. Cheng, Z. Smyth, R. (2018). Do Migrant Students Affect Local Students' Academic Achievements in Urban China? *Economics of Education Review*, Vol. 63, 64–77.
- Wong et al. (2007). Rural Migrant Workers in Urban China: Living A Marginalized Life. *International Journal of Social Welfare*. 16: 32-40
- Xu, X. Zhang, X. (2016). Incorporating the Family Angle into Public Policy — An Analysis Based on the Evolution of the Policy of Compulsory Education for Migrant Children. *China Social Science*, Vol.6, 151-169.

- Yang, J. (2011). Urban-Rural Divide and Inside-Outside Disparity: Unequal Access of Migrants to Social Securities in China. *Population Research*. Vol. 35, No.5, 8-25
- Yu, M (2012). Chapter 3: History, Struggle, and the Social Influence of Migrant Children Schools in Contemporary China.
- Yu, M. & Crowley, C. (2020). The Discursive Politics of Education Policy in China: Educating Migrant Children. *The China Quarterly*, 241, 87–111.
- Yuan, Z., Wang, X., Luo, R., Zhang, L. (2019) Troubles on Choosing School: Academic Gap between Migrant Children and Rural Children. *China Agricultural University Journal of Social Sciences Edition*, Vol.36, No.1, 128-136s.
- Zhang, H. Gong, X. Yao, H. (2011) The determinants of the Academic Performance of Migrant Children at Compulsory Education Level in Beijing. *Peking University Education Review*, Vol.9, No.3, 121-136
- Zhang, H. (2016) Literature Review on Educational Attainment of Migrant Children in China. *Open Journal of Social Sciences*. 4: 190-206
- Zhao, L. et al. (2016) Exploring the Environmental Variables for Migrant Children: Multilevel Analysis on the Variables Related to the Chinese Performance of the Migrant Children. *Journal of Educational Studies*, Vol.12, No.3, 54-67.
- Zhu, B. & Wang, Y. (2019). The Dividend of Migration: A Study on Migration of Children and Academic Achievement. *Population and Development*, Vol.25, No.6, 37-51.
- Zhu, J. (2014). Evolutionary Path of Migrant Children Education Policies and its Future Directions. *Education Research Monthly*, Vol.6, 49-53.