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EVALUATING THE CONSEQUENCES OF THE ENACTED SCHOOL DISTRICT REFORM OF 2014 IN CHINA

A Thesis in

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by

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ABSTRACT

This thesis is aiming at evaluating the consequence of China's enrollment reform of compulsory education's admission procedure that has been enacted in 2014. In order to improve the education equality, the Beijing Municipal Commission of Education issued restrictions on Nine-year Compulsory Education admission procedures among nineteen cities in 2014. The new admission strategy is using school district enrollment policy as well as the random assignment based on the area of residence instead of the score based admission method. The thesis is focused on Beijing as the target city. The data were collected from *Beijing Education Statistics Yearbook* of 2014 and 2016, and descriptive analysis is utilized in this thesis to present the changes in educational resources after the reform. A trend of reallocation in the educational resources is found, which indicates that the short-term effects of the reform is found. However, the effectiveness of this reform on improving educational equality might be limited.

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Introduction

Improving education does not merely benefit students themselves, but also their families and countries. The United Nations Secretary-General António Guterres has concluded: “Investing in education is the most cost-effective way to drive economic development, improve skills and opportunities for young women and men.” This conclusion well explained the importance of developing education.

While education has been spreading fast around the world, especially at the primary level, the educational inequity still presents a problem for educators and policymakers due to the limitation of resources and insufficient policy implementation. The United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics (UIS, 2017) published a report related to achievements of education worldwide, and the main standard is testing if students can finish the primary and secondary education. They found out that 617 million school-aged children are not learning the minimum literacy and math skills. The detailed data also provide a glimpse of the spatial differences around the world. For instance, in Sub-Saharan Africa about 90% of school-aged students did not qualify the math and reading proficiency requirement; In addition, Central and South Asia’s non-proficiency rate is about 81%. The UIS concluded that such disparity was caused by low accessibility, low attainment, and low educational efficiency. Surprisingly, there is no rate of change in reducing out-of-school children in recent years, about 61 million students have not been enrolling in school, and 62 million are not receiving a lower secondary education.

The UIS and Global Education Monitoring (GEM) Report clearly pointed out that developing countries shared the largest number of school-aged children that are not in school. In addition, the report indicates that if all children finished secondary education the poverty rate could be reduced by half. Therefore, changing the astringent education situation in developing countries is still urgent.

More attention has been paid to improving educational equality for developing countries. However, unlike the developed countries, which have abundant resources and financial support, the developing countries have to cautiously adopt the new educational policy. Understandably, challenges for developing countries to achieve educational equity are absolutely more astringent than in a developed country. Borrowing and transfer educational policy is feasible for developing countries to reduce educational inequity, however, the limited resources required for the reform must be based on the country's foundation. Understandably, policy borrowing shall fit a country's condition and needs; otherwise, it will unintentionally be devastating to the education system. Therefore, after the policy adoption, the policy reform is needed. Policy reform is a requisite procedure to better serve society and development of the country.

As developing country, China has implemented a reform toward nine-year compulsory education in selected cities to improve the educational equality by putting restrictions on public school admission. The reform is aiming at reducing educational inequity and improving the education quality in China. Under these circumstances, students who want to study in public schools have to follow the new regulation from local Municipal Education Commission. Generally, students have to study within their resident school district and no means of school choice for public school is allowed within the selected

cities. For school admission, no acceptance can be based on students' academic performance. Instead, random assignment and catchment area policy are officially adopted. Governors believe through that reform, students can receive basic education stress-free and be treated equally despite their academic abilities, most importantly, school accessibilities are guaranteed. The long-term goal for this policy is to achieve educational equality within all schools, which means all of the schools in selective cities should have same levels of educational resources and capabilities to provide the same quality of education for all of the school-age students. In that case, students can receive the same quality of education despite their backgrounds. Eventually, the educational equality would be achieved for compulsory education in China city by city. An evenly distributed trend of the educational resources within selective cities is crucial to achieving the success of this reform; in addition, a relatively high quality of the educational outcome is important as well. This study is trying to evaluate the effectiveness of the reform especially in balancing educational resources by using the descriptive analysis.

Literature Review

Equitable educational opportunities, educational process, and educational outcome are the three indicators of education equity (Castelli et al. 2012). In 2012, Bernardin (2012) used the education Gini coefficients to test the inequality in gender and space in Ghana, and she found out that the female tended to be a more significant victim resulted in educational inequality as well as in poverty, which means more equal opportunities were needed for students despite their location and gender. Recently, Devkota et al. (2016) used household data to calculate income-related inequality in education and found out that both Albania and Nepal shared the significance in education related to socio-economic, demographic, and geographic factors, and pointed out that income was the main obstacle for developing countries to reduce inequality.

Free basic education or compulsory education is well adopted worldwide as to improving the educational equality. Ngware et al. (2013) used African Population and Health Research Center and comprised a sub-sample of 4,325 first-graders' data to examine the effect of having a free public education. The results showed that the free education policy did have a positive effect on encouraging the students from the low-income family to enroll in school. However, the insufficiencies of this policy have been revealed by some studies. Even the cost to free education is lower than paid education, the expenditure on education is still high for the low-income family, and they would still need to buy textbooks, uniforms, or stationery (Bhattacharya, 2012). Apparently, the free education's

effect in improving educational equality is limited. Azarnert (2010) distinguished the effects of free education between the high and low level of parental human capital, and found out that when the fertility rate is low, parents' effect toward education is easy to detect. In other words, when the human capital is low, the education is the best way for students to accumulate the human capital. On the other hand, when the parents are rich, the effect of free education is not important, but rather that of private education is. The Same issue has also found in Argentine. Adrogue (2013) used the microdata from Argentine's National Education Assessment for the year 2000 and found that the inequality of basic education was due to the inequality distribution of educational resources at the sub-national level. Specifically, students' social economic status and unevenly funding by the same government unit were factors that caused the public school difference across the provinces.

Many issues related to compulsory education have been found by the researchers worldwide. By interviewing 64 families in the capital city of Turkey, Gokce (2009) found out that educational inequity is critical in Turkey, despite Turkey had been implementing compulsory education for decades. Therefore, Gokce (2009) suggested putting in effect on a reform that is more individual focused as to improving educational equity. In addition, In addition, Zuze et al. (2011) discovered that the free school could not promote an educational equality. They claimed that heavy teaching workloads for teachers have direct negative effects on students from the low-income family. In addition, students from low-income families cannot enjoy the private resources to help them gain extra help than students in wealthy families. Furthermore, Wang and Zhao (2014) used Theil index analyzed the pattern of funding inequality by using data from more than 2000 county-level units from all over the country during 1998-2005 as to study the situation of education

funding within China. They found the inequity in educational funding has worsened the education inequity in China. Moreover, a study by Ganimian (2016) pointed out that reducing the costs of going to school and expanding schooling options do increase attendance and attainment, but do not consistently increase achievement. Those findings were all related to the lack of financial support, and just as Devkota (2015) concluded that the urbanization could enlarge the education inequality, and the income could substantially reduce educational inequality.

More studies are aiming at finding an efficient policy to promote educational equality by studying from developed countries. Wößmann (2005) used the Trends International Mathematics and Science Study (TIMSS) studied the factors that contributed to high academic performance for East Asia students, and the result showed that the class size did not contribute to students' performances. However, the school policy such as autonomy over salaries and regular homework assignments played a heavy role in improving it. Moreover, Lewin et al. (2012) have studied developed countries' educational policies that have various degrees of decentralization in education in order to find out trends in disparities in terms of education spending. After using the Gini-coefficient to compare the impacts with the degree of decentralization in education finance, they found out that the formula of school funding is a critical factor to improve the educational equity. In other words, the "bottom up" policymaking is beneficial from the decentralization in education.

Specifically, decentralization in education is the federal government shifting its power to local governments in order to better serve the needs of the local. Local government in charge of public recourses' allocation could create a positive incentive to

individual performance. Indeed, the decentralization in education is believed to have more accountabilities in policymaking (Jeong et al., 2017). The local government has more knowledge about educational players' needs, and handing over the right to the local would help the local government (Galiani et al., 2008). Falch (2012) used the mixed data from PISA and TIMSS applied with panel fixed effects illustrated that decentralization, in general, does have positive effects on students' performances. However, this policy has transferred to developing countries as well, but it did not benefit equity of education as researchers expected. Galinani et al. (2008) studied PISA panel data, and analyzed the 42 countries' autonomy reforms in order to check the impact of decentralization on education. They concluded that there is a positive effect for students in the developed country, but not in developing countries. Indeed, the implement a well-established decentralization in education is not easy for developing countries. Moreover, Zhang et al. (2011) believed that developing countries have a large scale of students who have been benefited from the centralization in education, because the financial support is an important factor in financial equalization.

Indeed, implementing decentralization is more complicated than it was planned for developing countries. Narodowski et al. (2002) used Chile and Argentina's decentralization economic related reform in education to illustrate the relationships between segregation and school choice, and they pointed out that based on the socio-economic status, the school choice did create segregation. Moreover, Assaad et al. (2015) studied the free education in Egypt, and they concluded that even if the education was free, additional support was still needed in order to succeed in education, and, in the study, they pointed out that the additional spending, like tutoring, had enlarged the inequity. Recently,

Boex et al. (2016) claimed that a good decentralization system was established upon several different types of decentralization policies. Andersson et al. (2012) used commuting distances to school in order to evaluate the effects of having school choice in Sweden. They found out that the geographic school choice could not promote educational equity, but could increase social stratification. Understandably, the inequitable geographic locations of residence are also associated with students' out-of-school space (Milner, 2013). In addition, Jocson et al. (2013) used a mixed method as to map the effects of Literacy-rich environments (LREs) targeted at St. Louis. The LREs is related to libraries, museums, bookstores and other facilities that help residents study. By using spatial analysis methods, they believe that a geographic unevenness in the development of LREs, which have great effects on residents within the region. Similarly, Green (2015) used GIS to map two low asset neighborhoods in Detroit, and indicated that spatial inequalities are between low and high opportunities areas. A similar study was conducted by Xiao et al. (2014), who used GIS as to compare two provinces in China aiming at analysis the inequities in financing the basic education. Two selected provinces, one is the "poverty-stricken," and the other is the wealthiest province in China. The study was designed to show the how inequities had evolved over time, as well as the factors resulted from such situations. Findings have allied with scholar's assumptions that the issues in the educational financing were created by the centralized administration. Recently, Lens (2017) has published a review towards the research on segregation and neighborhood, and she believed that the scholar should pay more attention to neighborhoods' structural features.

Educational inequity in China

As a developing country, China is facing critical challenges in promoting educational equity, and those issues have been studied by researchers. China has started with 80 percent of illiterate in 1949. In 2014, Yang (2014) studied the China General Social Survey (CGSS) from 2006, and concluded that the educational policy in China has contributed to a remarkable progress in reducing educational inequality. However, the inequities in education remain.

Hannum (1999) studied the political changes and education agenda in China from 1949 to 1990 and found that social inequality is booting the urban-rural area. This region-based gap was tested using the 1990 census data, which shows that the " Great Cultural Revolution" implemented in the 1970s has enlarged the geographical gap. In 2006, Hannum et al. (2006) used 2000 census data as to further prove that the region-based gap is affecting students' educational attainment. More in-depth studies have provided concreteness knowledge about inequalities of education in China in the following years. Chunguang (2007) claimed that the educational gaps not only existed between rural and urban areas, but also different regions. However, Qian et al. (2008) studied the overall school year between the coastal and inland provinces they found out those disparities in access to education between rural and urban area is the main problem to tackle, rather than the gap between coastal and inland. In addition, Yang et al. (2014) who used the survey data from China General Social Survey (CGSS) from 2006, and who used Gini coefficient as to measure educational inequality as support, pointed out that the rural and urban disparity contributed the most to educational inequality.

As to better allocate limited resources and to relieve the economic burden on parents, China issued One Child Policy. This policy was legally implemented in the early 1970s, and has a great impact on the fertility rate. Hannum et al (1994) pointed out that the fertility rates declined sharply and they suggested that the lower birth rate indeed enhance gender equity. Bian (1996) uses the quantity-quality interaction model to analyze the data based on a survey of 4,000 Chinese children collected in 1990. The focus of this paper is to study the parents' investments for their children in four provinces, and the researchers found that the children number in one family is reversely proportional with the investments in each child. This finding positively proved that one child policy does have indirectly effect on educational equity. These findings have also tested by Lee (2012). Lee uses the data from individual-level from China Health and Nutrition Survey and the impact of the fertility policy as to exam the gender equality in education by using Ordinary Least Square Estimation. They found no significant gender difference toward education inequity for students who are the only child in the family; however, they found a significant gender gap in the multiple-children family.

The study on nearby enrollment policy has been long-time interests for researchers, and the effectiveness of this policy has tested by researchers. Liu (2002) has studied the fairness mechanism in China. He agrees that the Nine-year compulsory education guarantees each student's right to receive education. However, researchers have discovered the limitations towards this policy as well. Ding and Lu (2005) have studied the justice and efficiency about the nearby enrollment, and they are holding the idea that based on the unequal input, the admission based on location does not promote equality. On the contrary, it might enlarge the educational gap. They also pointed out that the private school is serving

the wealthy people, while the public school is serving the middle class. In 2009, Sun and Zhu analyzed the nearby enrollment regulations by utilizing important components in the regulations, they stated that the nearby enrollment policy in the legal regulations only puts emphasis on treatments, but does not pay enough attention to punishment, and they encouraged the government to put more restrictions on it.

The inequities of compulsory education in China are complicated, and researchers have stated their suggestions to improve it. Gang (2009) found out that the government should formulate basic standards for per-student' budgetary expenditure, in addition, Gang pointed out that the capital fiscal income has a significant and positive impact on students' expenditure. After that, Dan et al. (2011) found out that the small schools in the rural area of China have a great impact on delivering and improving educational equity, hereby, the government should put more efforts on supporting rural schools. In addition, Wang (2014) studied the inequality in compulsory education based on a provincial-level dataset collected from various issues of the *China Educational Finance Statistical Yearbook*, and China Data Online runs by All-China Data Center as to analyze the disparities of school funding in China during 1998-2008. The study is using the methods of factor decomposition and Gini coefficient, it showed that the inequality of school funding had not been reduced after governmental reforms in 2006, which aimed at reducing the educational fee, and suggested that more equalization shall be built as to further develop China. However, contradictory outcomes have found toward the policy reform happened in 2006. Shi (2012) has used the household expenditure in per-and post-reform data as to analyze the effect of the reduced fee in compulsory education and found out that the fee reduction was matched by increased spending on education. The Same phenomenon has also found by Xiao et al. (2017). Xiao

et al. (2017) studied the long-run effects of the free compulsory education reform issued in 2006 by using the difference-in-difference method analysis the data from the China Family Panel Studies in 2010 and 2012, and found out that the compulsory education's enrollment is increased for the short-term effects, and the long-term effects were accumulated in human capital.

School inputs and education outcome

The relationship between school inputs and education outcome is a critical aspect of the educational policymaking. Researchers have examined relationships between school inputs and educational outcomes.

Some studies have pointed out that the school factors may not as crucial as people expected. In 1966, the Coleman based on 4,000 schools and 645,000 students in the United States, showed that student background factors, such as family socioeconomic characteristics, mattered more for academic achievement than any school factors. Enlightened by Coleman (1966), in 1997, Hanushek analyzed 400 studies toward the relationship between student performance and school resources, and found that unlike family factors and peer effects, there was less consistent relationship between school resources and academic performance of its students. Hojo et al. (2012) interested in finding out the determination factors related to Asian students' high achievements, and they found that students' individual and family backgrounds are main determinates to students' achievements. In addition, the contribution from school recourse is limited. However, Hedges (1994) reanalysis the data that related to student achievement and a significance in

per-pupil expenditure has been noticed. Furthermore, Greenwald et al. (1996) used the data at the school district level and noticed some school factors, such as per-pupil expenditure, teacher/pupil ratio, and school size were all related with students' achievements. In addition, Greenwald et al. (1996) mentioned the importance of the family factor as well.

Holmlund et al. (2010) used the National Pupil Database between 2001/02 and 2006/07 in the UK which contains all pupils in State schools in order to analyze the effect from increasing the per pupil expenditure, and the result shows a positive significant effect existed, and the positive effects are even more significant for economically disadvantaged students. However, Cobb-Clark et al. (2016) analyzed the students' reading, math scores, and its relationship with the per-pupil expenditure. They reported that the financial support had little contribution towards students' academic performances. Moreover, In 2016, Hong et al. used data from Michigan school district and used a regression discontinuity design to estimate the relationship between capital expenditures on student achievement and school expenditures, the findings shown that the capital investment in school have a long-term effect on students' achievement, however, the short-term effect was unobserved.

The attitudes toward the effect of school size on students' academic achievement are inconsistent. Using the production function approach and data from one public school district in Baltimore, Lamdin (1995) found out that school size is shown a minor effect on the performance. In addition, "expensive but ineffective policies such as class size reduction, while valued by current school personnel, have not raised achievement." claimed by Hanushek et al. (2014). However, Lee et al. (1997) used data of the National Education Longitudinal Study of 1988 to analysis the ideal school size, and a significant strong effect has been found toward schools that have more low-SES students. In addition,

Gershenson et al. (2015) used the administrative records from North Carolina's public school system, and examined the school size effect on students' achievement. They claimed that there is no causal relationship between school size an academic achievement. However, the effects have been found on disadvantaged students. Recently, Crispin (2015; 2016) used data that based on the 24,600 10th grade's math score, the researcher found out the U-shaped relationship between class size and math achievement, in other words, the small class size and large class size both have a positive effect on students' achievement. This study proved that one-size is not fit for all.

Case et al. (1999) used the data from questionnaires and controlled the effects from the family factors to study the effects of pupil-teacher ratio towards students' outcome. They found out that the poor districts that have a high pupil-teacher ratio, have low-test scores, and low educational attainment, in the meanwhile; they also found that the reduction in class size has no effect on students' outcome. In order to examine the benefits of having a more qualified teacher, Ding et al. (2007) used the panel data from administration data in Jiangsu province of China, and they found out that the peer effects are positively related with students' performance. Moreover, Hojo and Oshio (2012) studied the five different Asia countries as to check the effect of class size, and by analysis the mathematics score, they claimed that there is limited effect toward class size on students' outcome. However, in 2015, Jones used test score data for over 250,000 children in Uganda, and he found out that classroom size is related to the outcome of students learning. In addition, overcrowded classroom size is a critical factor that caused the poor academic scores. Normore et al. (2006) admitted that reduced class size to improve

education outcome was the most cost-effective policy after studied the policy of class size reduction that issued in Florida.

School library resources also relate to students' achievement. "For children in school, library use positively impacts homework completion rates," Bhatt (2010) claimed. Haycock (2003) analyze all of the studies related with school library resources from 1900, and he concluded that the function of the school library resources can be summarized in several aspects, a positive impact on student achievement regardless of the SES or educational levels is one of them. Moreover, in 2011, Haycock (2011) analyze the data from private sources and school library survey in British Columbia, captured a positive and significant relationship from over 20 library predictor variables were statistically related to school and student achievement. In addition, by questioning the function of the school library, Ayanlola (2014) used descriptive analysis concluded that the utilization of school libraries have no significant effect on senior secondary school students' academic achievement. Alharbi et al. (2011; 2012) used the questionnaires from 792 students, 143 academics, and 121 administrators to examine the provision of the library, and minor effects have been found from the analysis. Nielen et al. (2015) found out that the enriched school library typically has positive effects on reading comprehension skills but not mathematics skills.

Financial expenditures relate to students' outcome as well. Flanigan et al.(1997) found that all of the monetary support is linked with the improvement of the students' performances, which included support from schools and families. Lin et al. (2014) used the data form Indiana school districts during 2009 to 2010 school year to examine the impact of the financial funding towards students' achievement. They found out that the local fiscal

tax has strong effects on public school students' achievement. Specifically, Cullen et al. (2015) studied the public school data in Texas, a significant effect had been found after compared with the districts that have high expenditure and low expenditure, and the district has high expenditure scored higher than the low expenditure district. However, some insignificant results towards fiscal expenditure have appeared as well. Huang et al. (2002) Analyzed data from the National Assessment of Educational Progress and the Common Core of Data to study the relationship between district's instructional expenditure and students' achievement, and no significant relationship has been found between it, which means that increase the instruction expenditure have limited effect on improving students' outcome.

Family support is a vital part that related to students' academic achievements. Dahl et al. (2012) found out that the family income has a causal effect on children in the low-income family, and it has significant effects on students' test score. The Same impact has also found by Luo et al. In 2017, Luo et al. (2017) used the data from 2009 National Children's Study of China and analyze the relationship between family SES and students' mathematics achievement, a strong and positive correlation have been found among urban, rural and migrate family. In addition, students that in advantage families scored higher on the test. However, Luo et al. (2017) did not include the family investment in the analysis. Unlike others, Shi (2013) used the data included the household expenditure from Gansu province of China, found out no significant efforts of household educational expenditures on the students' academic performances. Zhao et al. (2012; 2011) have found a quadratic relationship for the association between the mathematics score and students' social economic background by using the data from 10,959 primary school students among five

provinces in China, the findings suggested that individual form a disadvantaged family and higher SES background have higher score than average SES family. In addition, Cheng et al. (2016) used PISA data in 2012 combined with the two-level hierarchical linear modeling. Besides a positive and significant linear correlation among all six Asian countries, a negative and significant quadratic correlation was found from studying a sample of 15-year old students that were all from urban high schools in Shanghai, surprisingly, students from the highest SES did not achieve the corresponding performance level predicted by their SES background.

As Neymotin(2010) has pointed out that the availability and allocation of resources are not equal to student's ability, furthermore, it did not mean that the resources could effectively help students to gain success either. In addition, Chiu (2010) examined students' achievements linked with country, family and school characteristic, and varies outcomes have been found. Therefore, the measurement of school factors should base on the condition.

Context

In the last 20 years, China has had both free school choice and school district enrollment policies for primary and secondary schools. However, the Department of Education published an Act in 2014 that imposes restrictions on school choice. Students have to follow the school district enrollment policy if they want to study in the public schools.

In 2014, the Department of Education published an Act that required 19 relatively developed cities to enhance the nearby enrollment policy. In the Enhancement Act, the Department of Education reaffirmed that the nearby enrollment policy plays a critical role in improving educational equality. The Act required these 19 cities to carry out restrictions on school choice behavior. In other words, school-age students must follow school district enrollment policy if they want to study in public schools. The act also stipulated that the admission based on scores must be eliminated, as well as the extracurricular classes to prepare students to apply for schools. To make sure the Act can be implemented in a short time, the Act mandates certain deadlines that have to be fulfilled. Nineteen cities shall fully implement the nearby enrollment policy by 2015. At the end of the year 2015, 90 percent of secondary schools should have fully implemented the nearby enrollment policy. In the meantime, 90 percent of secondary students shall be enrolled by the nearby enrollment policy. The goal of 2017 is that 95 percent of secondary schools will be using the nearby enrollment policy, and 95 percent of secondary students shall be enrolled by this admission method.

The “Key school” system, the Compulsory Education law, and parents’ attitudes were reasons behind this reinforcement of educational reform. Unlike the United States, the school system in China was first created and led by the “key school” system. China had a long history of putting its limited resources into the most selective school to increase the scale of education in relatively developed areas. In 1952, in order to attract more students to contribute to the country, the Department of Education published guidelines to address the importance of setting up model schools. In 1962, the Department of Education published a law that legally required building up some “key schools.” After this law was passed, the school ranking system first appeared; in this system, a higher ranking meant more support. In 1978, under the consent of the State Council, the Department of Education enacted guidance to ensure that the selective schools could be well organized by the local government. In the 1990s, the National Education Council promised to build around 10,000 selective schools within China. After this, the “key schools” system was adopted by every city in the country. This school structure in China was built to accommodate the urgent need for developing education in China when the country was first formed. The key school system encouraged students to receive education; however, it could not guarantee that all school-age students were able to receive education. Unavoidably, the “model schools,” and “key schools” system increased the discrepancy between the regular schools and selective schools.

The Education Law is an incentive of the reform. In 1986, the Compulsory Educational Law came out; this legally empowers protections for students to receive the nine-year compulsory education. The law established a comprehensive system, and became the fundamental guidance for the developing of schools. Compulsory Education Law

established several principles for the nine-year schooling, declaring that compulsory education is fundamental, supportable, mandatory, tuition-free, and free of competition. These principals were aiming to make sure that students have no obstacles to receiving nine-year of compulsory education.

The "key school" effects and the Education Law inevitably affected parents' attitude toward education. Parents realize the importance and necessity of receiving education, and the "key school" effects made parents eager to send their kids to the most selective schools. Therefore, the school choice behavior appears.

In the past 20 years, the phenomenon of school choice has been widely welcomed by parents. However, educational policymakers have criticized the school choice method since it has brought up several societal issues. Economically speaking, one of the compulsory educations' principles is that school should be tuition free. Students who have school choice opportunities are either more talented or have more financial support. Parents either have to send their kids to attend extracurricular classes in order for them to be more outstanding or pay more tuition. This phenomenon neither narrows education gap nor eases economic pressures but slows down the speed of creating an equal educational system and enlarges the gap of educational outcome between students of different schools. The second issue is that school choice behavior adds unnecessary academic pressure on students. In recent years, the Department of Education has been trying to reduce the academic pressure on students. In order to enroll in the more selective schools, students must do excellent in all their courses and exams, and this brings extreme pressure to students. The Compulsory Education's goal is helping students to learn the basic knowledge rather than loading them with homework. In the past 10 years, the National People's Congress has added several

articles to the Compulsory Education Law in order to regulate the school choice phenomenon.

Nowadays, China's educational goal is improving the overall educational quality and achieving educational equity. In light of these goals, having the key school system is not enough. Having elite schools becomes a problem, which slows down the speed of achieving educational equality. Comparatively, the Act of 2014 is aiming to promote educational equality. As mentioned before, the key school system makes the educational resources not evenly distributed, and students with more help can choose to apply for better public school by paying tuition. Under such circumstances, the Act mandates that all school-age students must follow the nearby enrollment policy, which means, school-age students have no right to choose public school but can enroll in the secondary school without any score requirements as long as they register in nearby schools.

The nearby enrollment policy is mainly using two admission procedures as to achieve educational equity, the local Department of Education takes the full responsibilities on students' secondary school admission, and schools have no right to reject any assigned students. The main student assignment methods include catchment schools and lottery systems within the school district. For school districts that have fewer schools and fewer students, it uses a school catchment area system to randomly assign students to the school. In this case, students that belong to the catchment area have to attend schools within this area. The other method is the lottery system, which uses a computer to randomly assign students to a school. If there are several schools within the same distance, students have a preference of which school they want to attend. Students must hand in their preference, and then the computer randomly assigns them to a school. The lottery system first appeared

in 1991, and was designed by the vice admission chairperson in Guangzhou, Liu-Guang Chen. The lottery assignment system seems fair; however, it is unclear that this reform can bring equity and equality at the same time. The nearby enrollment policy neglects students' abilities, and treats each student the same despite their abilities. Because of this, students gain an equal education chance and are able to receive education with less pressure placed on them. In the long run, this could balance the educational resources, and achieve educational equity for nine-year compulsory education.

Beijing Municipal Commission of Education required each district to analyze certain factors such as number of students, distribution feature of schools, school quality, and traffic conditions in order to use the catchment area and lottery system to make sure that the enrollment process was empirical and impartial. Primary school graduates can apply to junior secondary school within the same district without taking entrance exams. For the area has more schools, students need to fill in application, and in their application, students put their ranked preferences for the schools in their district; a computer will then randomly assign them into one of the schools. If students failed to assign to their first choice, the system will continue to their second choice and so on. If a student is unlucky and not assigned to the school they want, students can reapply to a school that is not full, and the computer will rerun the same procedure.

In order to make sure that all students can receive equal opportunity, Beijing's educational policymakers have enacted two strategies. The first one seeks to improve the educational quality of all compulsory schools in the region. The second strategy is to establish a new kind of school, which offers students the nine-years of education without

changing schools, in other words, students can finish their compulsory education in one school that offers nine years of education containing primary and secondary education.

Beijing is adopting other strategies to achieve its goals based on its conditions. First, the administration tries to group schools so that each underdeveloped school has a more selective school as its partner. The outstanding school in the group is in charge of helping its partner to improve their quality of education. This corporation strategy not only reduces the gap between districts, but also schools.

Second, establish branches of elite schools in underdeveloped districts. Unlike partner schools, the branch schools are operated by the elite school. This way, students who are more selective while living in an underdeveloped area still have a chance to receive a similar quality of education as students in the developed area. Hence, the educational quality can be improved in a shorter time. In that case, the resources of education can eventually be evenly distributed.

The third strategy is to improve the teaching ability of teachers by training them with modern teaching methods. Before that, the training for teachers was to lecture them with theoretical knowledge of teaching while the new training method is to ask them to engage with new teaching methods. In the new training system, the education researchers from the professional institutions audit the teachers' lessons first, and then group teachers into small groups to train them by the group.

Data & Methodology

Beijing has implemented this reform promptly after it had been issued in 2014, thus, based on data availability, short-term effects on the educational resources after the reform can be evaluated by checking Beijing's allocation of educational resources' situation as well as students' academic performance after the reform.

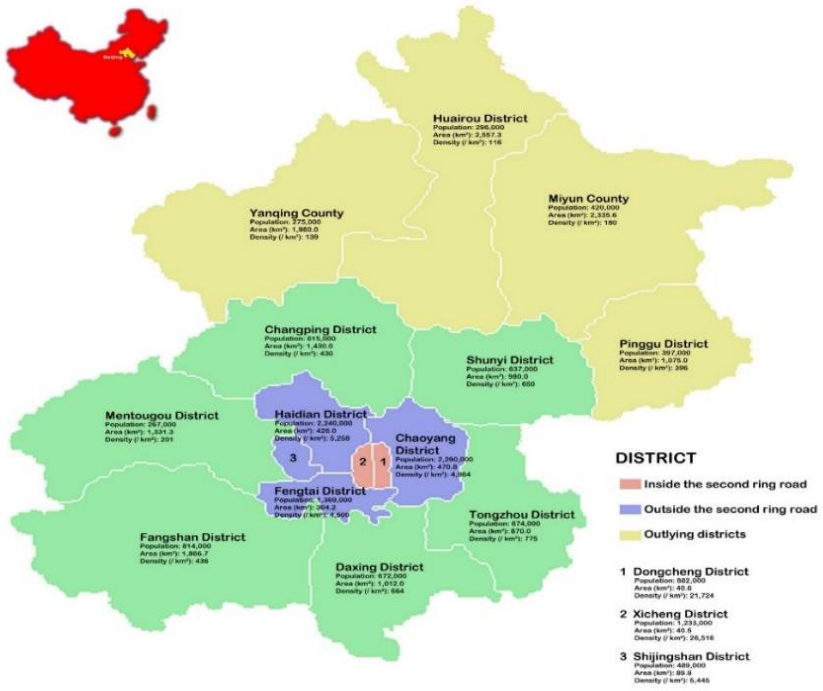
Data

Beijing Education Statistics Yearbook contains the most detailed information regarding Beijing's educational system. Under the Education Commission of Beijing Municipal Committee of the Communist Party of China (CPC) and the Beijing Municipal Education Committee's instruction, the Compiling Committee of Beijing Education Yearbook (Beijing Education Yearbook Editorial Office) is responsible for compiling this book. This Yearbook has been published annually since 1997 in order to give references for educational planning and development, and give the detailed information of Beijing's educational condition. The information contains not only the general information of Beijing, but also all kinds of school-related data of different districts under the central education ministry. In the yearbook, it contains the detailed numbers upon each districts school number, student number, and faculty number; in addition, it contains the detailed

information of some schools' footprints, property values, number of computer and graduates, enrollment number, and current students' number.

Beijing has 16 districts, namely, Dongcheng, Xicheng, Chaoyang, Fengtai, Shijingshan, Haidian, Fangshan, Tongzhou, Shunyi, Changping, Daxing, Mentougou, Huairou, Pinggu, Miyun, Yanqing. Chaoyang, Haidian, Dongcheng, Xicheng, Fengtai, and Shijingshan are located in the central city, and Changping, Mentougou, Fangshan, Daxing, Tongzhou and Shunyi are districts in near urban area. Yanqing, Huairou, Miyun and Pinggu are counties in the suburban area of Beijing.

Figure 4-1 The map of Beijing

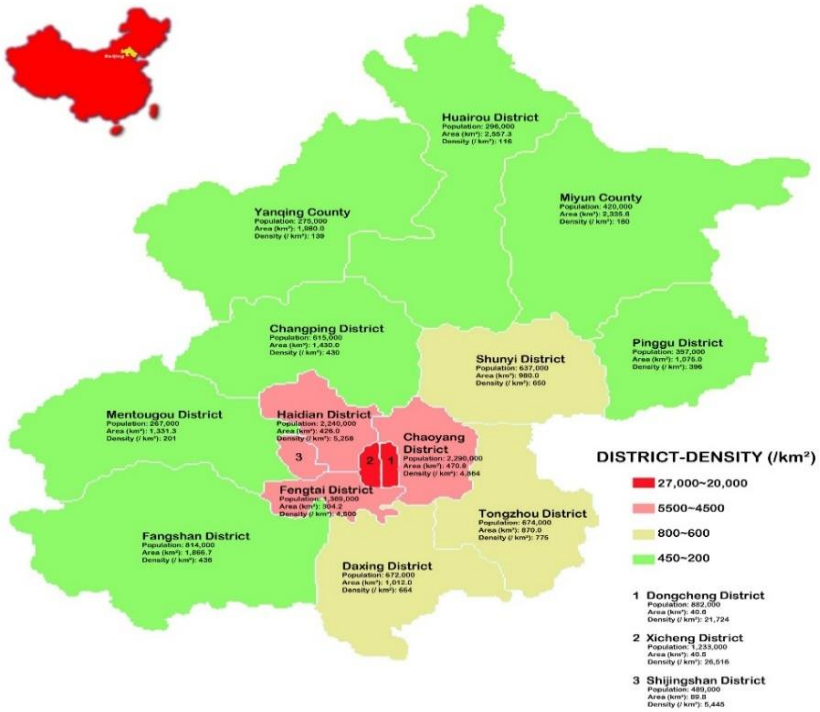


Sources: https://beijingconflict.wordpress.com/maps/

As shown in Figure 4-1, some districts are not enclosed Beijing, and the size of the districts varies. The map is the baseline of the spatial difference in Beijing, which can offer

a visual image of the differences in Beijing's urban and suburban areas. Not only does the diameter and size of each district vary, the population scale and density in each district are different as well. The difference in population is the result of city evolution; however, it does not mean that suburban area is less developed than the central city. Actually, due to the capacity limitations of the central area, most of the industries are located in rural areas.

Figure 4-2 Population density map of Beijing in 2011



Resource: https://beijingconflict.files.wordpress.com/

In Figure 4-2, the map shows the difference of population density in each district. The central area has the biggest density and the further away from the city, the smaller the population density will be. In a conclusion, suburban areas' population density is less that

of urban. However, Beijing is the capital city of China, and the overall density is larger than the rest cities in China

Comparing Figure 4-1and Figure 4-2, a visible geographic difference is present. Furthermore, the educational inequality between the rural and urban areas exists (Zhang et al.,2015). The data were collected from the *Beijing Education Statistics Yearbook's* Secondary education sections, from 2014 and 2016. The yearbook of 2014 and 2016 recorded the data for the year of 2013 and 2015, respectively.

Methodology

The thesis is aiming at analyzing the consequences of the reform that was enacted in 2014. Therefore, descriptive analysis is used in this study to show the changes of educational resources before and after the reform in Beijing. The leading hypothesis of this study is that there will be a more balanced allocation trend in educational resources after the reform.

Mapping

The analysis is done in two steps. The first step was to map out the general school resources of each district by using the MapInfo system to show the allocation of the educational resources between 2013 and 2015 and to present the visual changes of school resources. As well be discussed in the following chapter, the second step is descriptive analysis.

For a better visualization of the differences in allocation of educational resources in each districts. I made four groups of map using Beijing's geopolitical districts. Each group of maps contains one aspect of school resources. Each aspects has its unique color, and the darker color represents a higher number. In order to better present the changes, I have mapped out all of the data into five evenly levels illustrates of the changes related to educational resources among sixteen districts.

The first group of maps focus on class size. I calculated the class size by the reported total number of secondary schools students divided by the reported total number of the middle classes that each district has. A smaller class size is beneficial for cognitive and non-cognitive ability; in addition, it has positive effects on academic achievement as well (Freiksson et al., 2013).

For the second group of maps, I focused on the student- teacher ratio. I calculated this ratio by the total reported number of students divided the total reported number of teachers that each district have. The Student-teacher ratio is one of the strongest predictors that associated with the of parents' perceived school engagement efforts (Rodriguez et al., 2014)

For the third group of maps, I choose the funding per-student expenditure. This ratio measured by the total reported funding that one district has divided by the total reported number of students; this number is the average amount of funding that one student can receive from the government. Lastly, I choose the books' number as the last factor, this number is the average amount of books that each school library has. The library resource has a strong relationship with the students' academic outcome. Moreover, this factor is an indicator of the district feature as well (Jocson et al., 2013).

Descriptive analysis

For the second parts of the analysis, I used descriptive analysis to study the changes of education-related factors before and after the reform. In order to better examine the changes of Beijing's educational resources, I divided the analysis into two parts. The first pair of the comparison is the high school acceptance rate in 2013 and 2015. The acceptance rate is an adequate indicator to evaluate the students' academic outcome. The compulsory education is tuition-free and mandatory. However, the high school acceptance rate is based on student's academic performance on the high school entrance exam. A higher academic score a student gets, the better the high school the student can be enrolled in. Students who received an unqualified high school entrance score, can either go abroad or apply for vocational schools to further study.

Next, I made a descriptive analysis that includes school-related factors, and their correlations among other. This analysis is aiming at showing the relationships and changes among each variable through comparisons in different years. Two sets of factors are included, the first set is educational resources related factors, such as student-teacher ratio(ST), class size(CS), funding per student(FSt), funding per school(FSc), books per student(BS), school size(SC). The second set is district related factors. The district features are average income of each resident(IN), local housing price(HP), local per-pupil fiscal expenditure(PPE), the ratio of educational gross regional product to total per-capital gross region product(L/T), and the ratio of local expenditure and the total per-capital gross region product(E/T). Among all the factors, income (IN) and house price (HP) are included to examine the districts features of residents. A higher IN and HP represents the financial

situation of one district. Local per-pupil fiscal expenditure (PPE), educational gross regional product (EGRP) and total gross regional product (TGRP) are the indicators that related to the local decentralization of governments and development of the region. The Local per-pupil fiscal expenditure (PPE) is the ratio of total reported number of local fiscal expenditures on education for per students. It has a positive relationship with students' achievement (Flanigan et al., 1997). The correlations of each indicator are shown with the significance at .05 level. The insignificant ratios are left with blanks.

Findings

Educational resources comparison

Mapping

Figure 5-1 and Figure 5-2 are the first group of maps that focus on the average class size that each district had in 2013 and 2015, respectively. After mapping out the data of each district, I can visually observe the differences. The darker the color on the map means a larger class size. The legend in the map is showing each color's range. The color red is representing the largest number of the class size, and its range is from 33 to 36. The color orange is shown for the class size between 30 and 33, and it is the second largest size shown on the map. The color pink represents the range between 27 and 30, which is the median class size that shown on the map. The color tan is representing the class size from 24 to 27. Lastly, the color beige is representing the smallest class size that one district has.

Figure 5-1 is the average class size in each district of Beijing in 2013, central city has large class size than the suburban districts and the class size is generally around 30. The map shows that the darker color is mostly located in the city area. Districts located in central city, like Haidian, Xicheng, Dongcheng are having the highest-class size, moreover, districts located nearby the city, and like Shunyi and Tongzhou is having large class size as well. This pattern is allying with the population density shown in Figure 4-2. However, districts have large population density like Fengtai, Shijingshan and Daxing have relevant large class size. As I can calculate from the map, five of out sixteen districts are having

largest class size, and five districts are having a class size between 30 and 33, and five districts that are located in the suburban of Beijing are having relatively low-class size, the smallest class size is in Huairou district. In a conclusion, the range of the class size is about thirteen, and most of the districts are having a relatively large class size in 2013.

Figure 5-1 Students/class ratio in 2013.

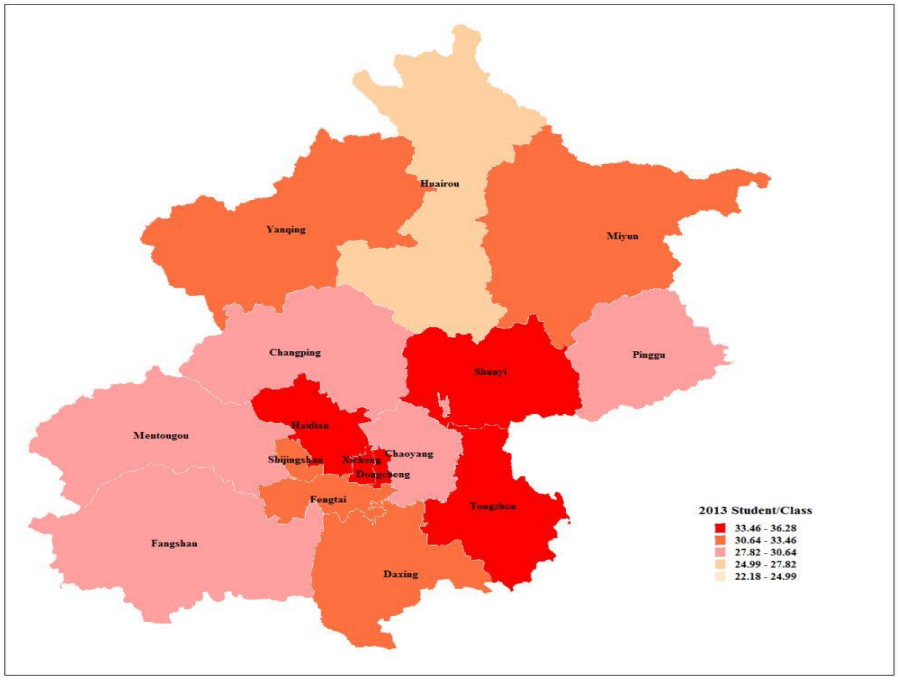


Figure 5-2 is the average class size in each district of Beijing in 2015, and the class size is smaller than it was in 2013. The map shows the overall situation of the class size. Comparing with the Figure 5-1, the color of Figure 5-2 is much lighter than it was in 2013. The most clearly change is that for the districts that used to have large class size, the color red disappeared, which means that range between the largest and smallest class size is smaller than before. In addition, the suburban areas, like Mentougou, Fangshan, Daxing, Miyun and Pinggu are keeping the same class size. Most of the districts are having

relatively small class size, and the majority districts are having class size about 27 to 30. Comparing the Figure 5-1 and Figure 5-2, the class-size is smaller, and the difference between districts is visibly reduced than before, which had shown a relatively good trend of changes in class size than before.

Figure 5-2 The student-class ratio in 2015.

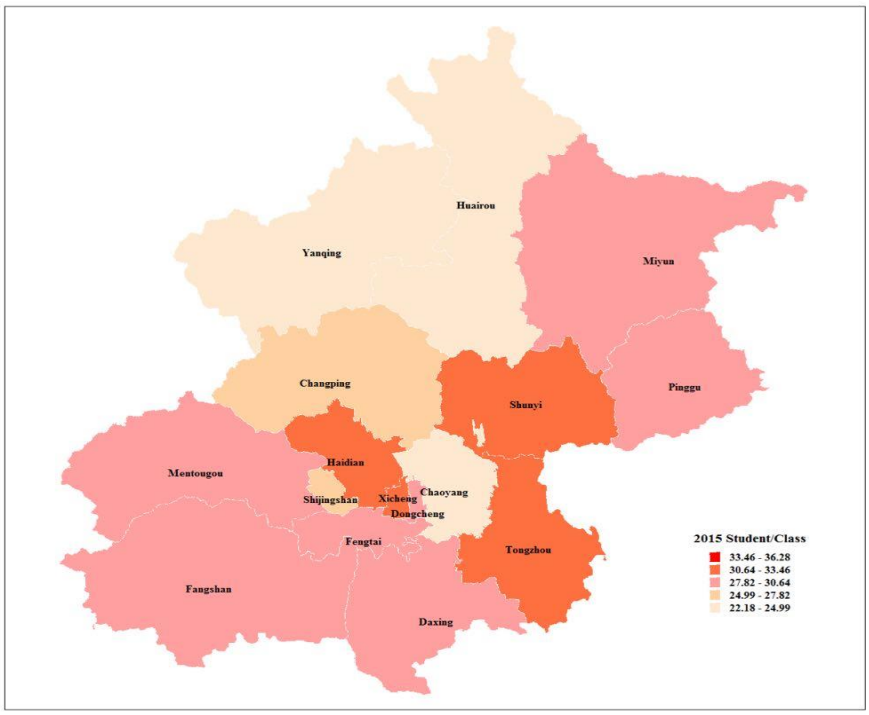


Figure 5-3 and Figure 5-4 is the second group of maps that make the comparison of the student-teacher ratio. Five ranks are shown on the map, the largest number is shown in dark blue, and the smallest ratio is represented by the color of light blue.

Figure 5-3 The student-teacher ratio in 2013

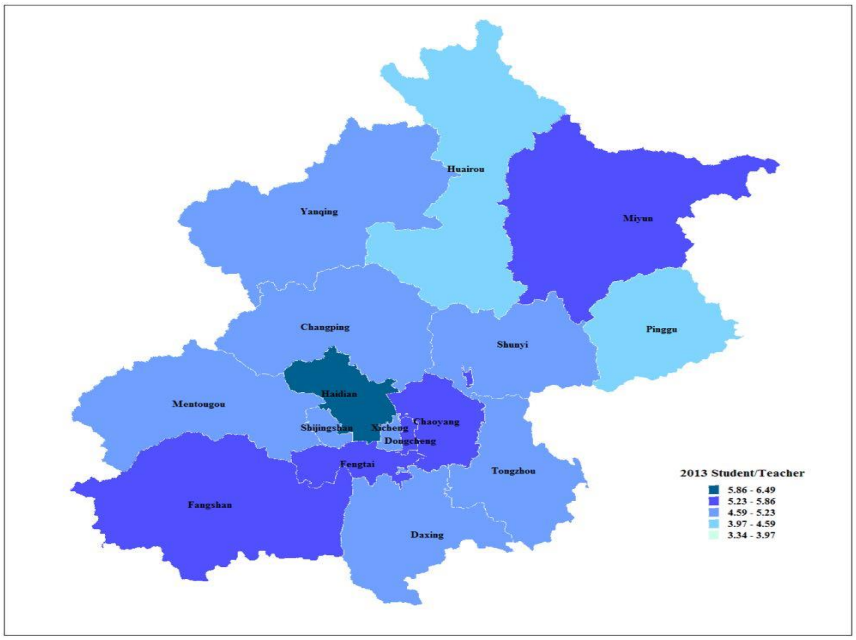


Figure 5-3 is the map of the average teacher-student ratio in 2013, the distribution of the student-teacher ratio has no clearly pattern by looking this map. However, only one district has the highest ratio. There is only one district that is shown in dark blue, it is Haidian district. Interestingly, even if Haidian is located in the central city, it is the only district has the number over six. However, the average teacher-student ratio is five, and there are six districts' student-teacher ratios are above five, namely, Miyun, Haidian, Chaoyang, Dongcheng, Fengtai and Fangshan districts. In addition, there is a pattern for the near urban districts, and they have a relatively same ratio. Those districts are Yanqing, Changping, Mentougou, Shunyi, Tongzhou, Daxing, Xicheng, Shijingshan and Dongcheng districts.

Figure 5-4 shows the map of teacher-student ratio in 2015, I noticed that the ratio is smaller than it was in 2013, and in addition, Haidian district is still keeping its student-

teacher ratio around six. Apparently, the changes are also easy to detect by the color of the map. However, the rest of districts have reduced their rank generally. Seven districts are turning into the lowest ratio, which means that the overall standard of the teacher-student is improved. Comparison of the Figure 5-3 and the Figure 5-4 shows that the student-teacher ratio is becoming smaller, which is a good indicator of the perception of the school resources. Moreover, the smaller teacher-student ratio is beneficial for students' academic outcome, since lower the ratio means more teachers are available for advising students.

Figure 5-4 The student-teacher ratio in 2015.

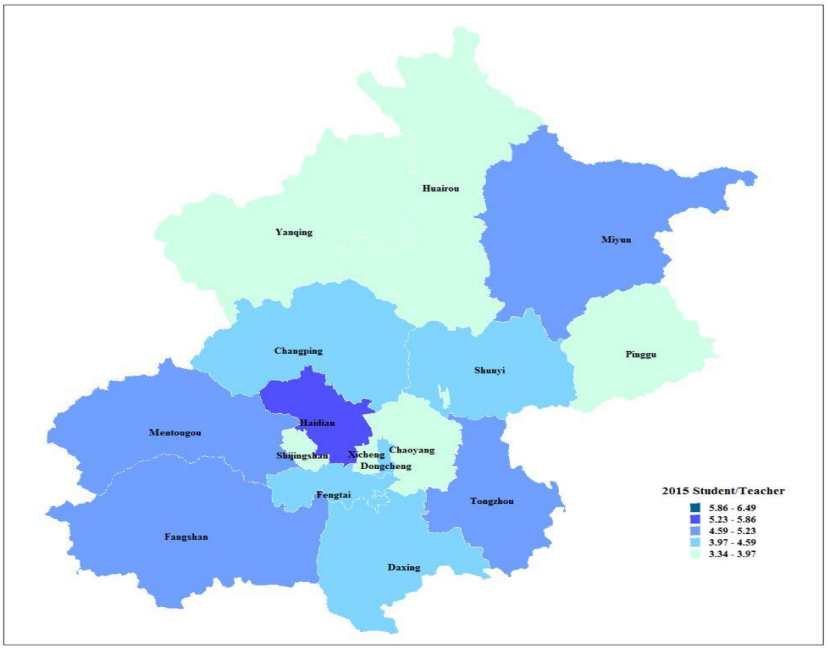
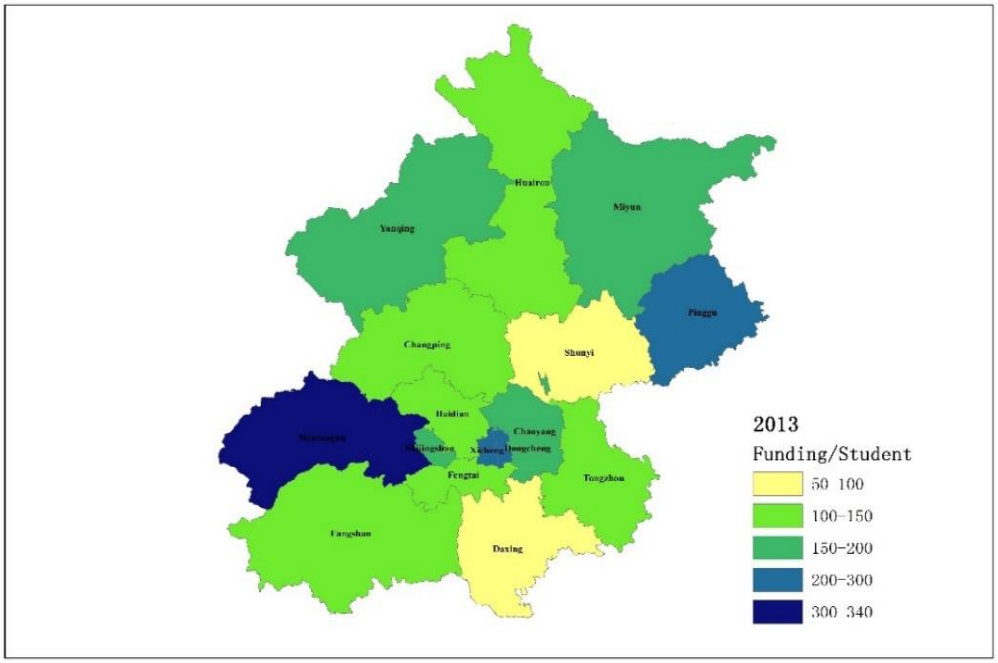


Figure 5-5 and Figure 5-6 consist the third group of maps to illustrate the average funding per student in each district. For the compulsory education, funding is the main support that student can receive from the government. In addition, the equal amount of funding for each student is critical to improving the educational equity.

Figure 5-5 is the map about the average funding for each student in 2013, and the funding amount vary in each district. As I can visually notice from 2013, the colors are distinctively different, which means that the funding is not equal for each districts' student. The color light yellow represents the lowest amount of funding per student. There are two districts receiving less than 100,000 RMB per year, which is about $2,000 per year. However, most of the districts in Beijing are receiving 100,000 to 150,000 per year. In addition, the funding per student amount is relative low, and only three districts are receiving support over 200.000 RMB per student each year.

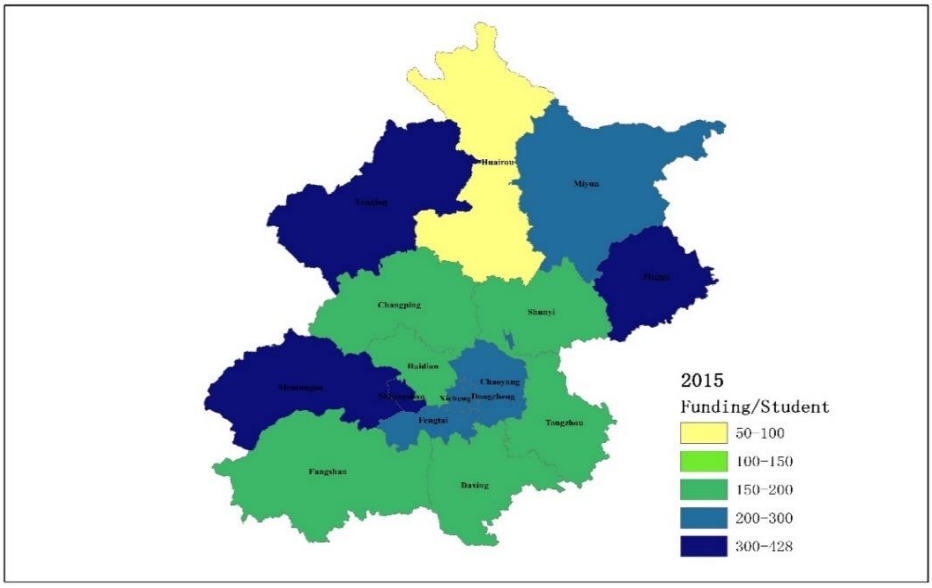
Figure 5-5 Funding per student in 2013



The Figure 5-6 is showing the general funding situation for each student in 2015, and I can see a noticeably increasing in funding. Comparing Figure 5-5 and Figure 5-6, it is visually shown a trend that most of the districts are receiving more financial support than it was in 2013. There are eight districts receiving 200,000 RMB this year, among them, three

suburban districts are receiving the largest amount of support, which is above 300,000 RMB per student. Surprisingly, Huairou district is the only district receiving the funding less than 100,000 RMB per student, and this number is smaller than it was in 2013.

Figure 5-6 Funding per student in 2015



I made Figure 5-7 and Figure 5-8 to show the average number of books in each districts in 2013 and 2015. In general, districts located in the central city do have absolute advantages over the rest of districts. Figure 5-7 visually shows the average amount of books that each school has in different districts. Interestingly, Haidian district is the only district that has the largest amount of books per students; moreover, its number is twice compared to Fangshan, Changping and Huairou district. The second largest books stocking district is Xicheng, which has an average of 10,000 to 12,000 books for each school. In addition, Dongcheng and Chaoyang are having a median number of books.

Figure 5- 7 Average number of books per school in 2013

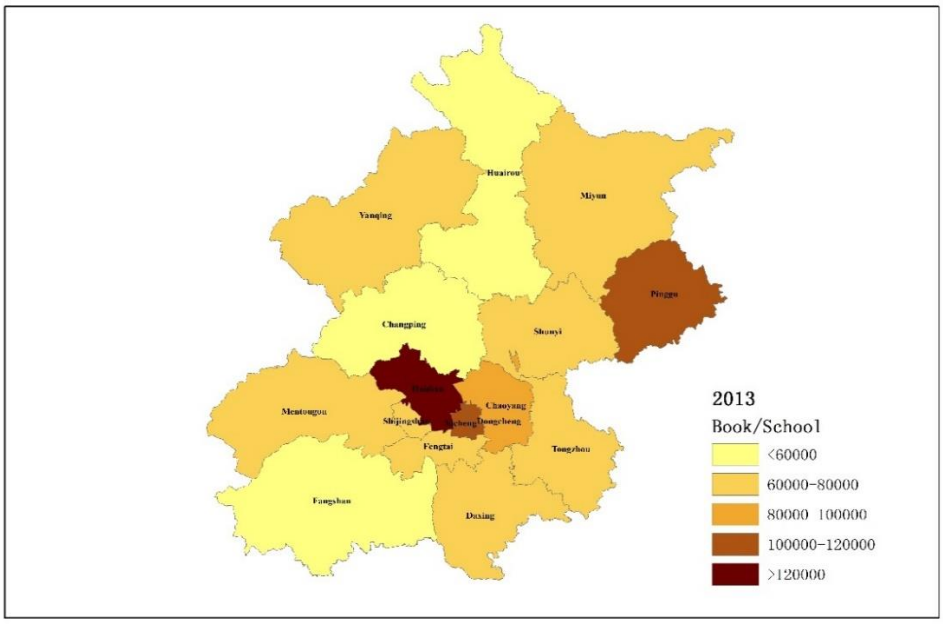


Figure 5-8 Average number of books per school in 2015

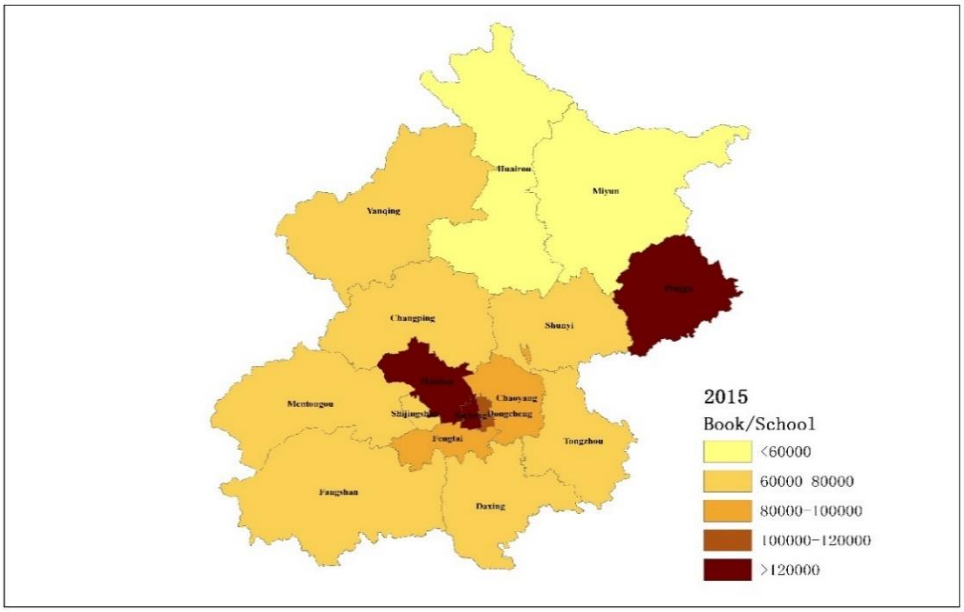
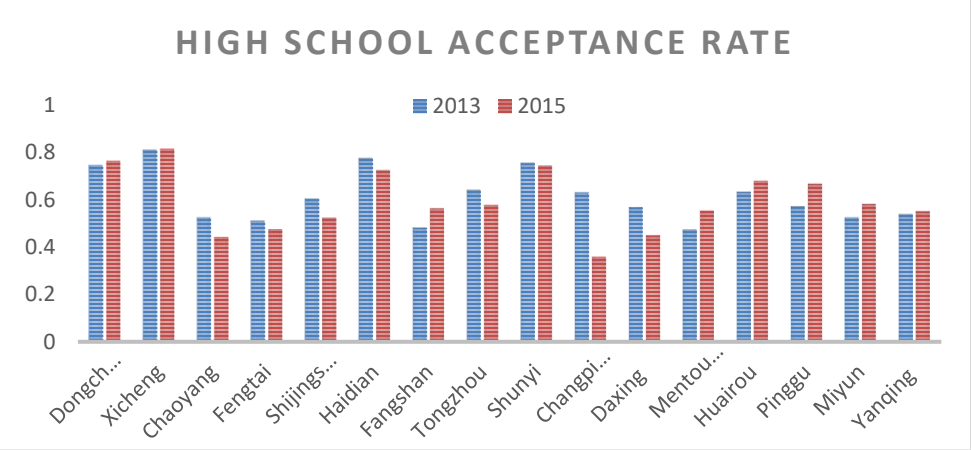


Figure 5-8 shows the average amount of books that each school has in 2015, the central districts equipped more books. In addition, comparing with Figure 5-7 and Figure 5-8, the book number is relatively stable, and 14 districts are equipping more than 80,000 books in each school. Figure 5-8 shows that the districts located in the central city are having the most number of the books than it is in Figure 5-7, and districts near the central city are having the same level of books. As I can see, the color in the central area is darker. In addition, for the suburban districts, like Huairou and Miyun, having fewer advantages over the books number

Descriptive analysis

School outcome is relatively same

Figure 5-9 The high school acceptance rate comparison between 2013 and 2015



The overall high school acceptance rate is relatively the same between 2013 and 2015. However, small changes happened in suburban areas. Figure 5-9 shows the visible changes that occurred in the year 2013 and 2015. In 2013, the average high school

acceptance rate is 61%, and the overall number declined by 2% in 2015. Four districts are keeping the relatively same acceptance rate; they are Dongcheng, Xicheng, Shunyi and Yanqing. Beside Dongcheng and Xicheng, the acceptance rate for the rest of districts that locating in the central city was declined by a visible amount. However, rates in Daxiang were sharply reduced almost half compared to 2013. Interestingly, for the suburban area, the acceptance rate was clearly increased, and those districts are Mentougou, Huairou, Pinggu and Miyun. The overall high school acceptance rate is decreased in 2015, but the increases in suburban areas are a good sign for the development of the rural area.

Descriptive analysis shows more balanced trends

The descriptive statistics shows in Table 5-1 shows improvements in educational resources. The student-teacher ratio (ST), class size (CS), funding per student (FSt) and books per school (BS) have shown above, all of the factors have improved in a certain degree. The average funding per school (FSc) is a supplementary indicator to exam the school input factors. In Table 5-1, the average funding per school has increased 27% compared to 2013, the minimum has increased by 18.72 thousand RMB, and the maximum has reached 161.1 thousand RMB. The school size (SC) is the next indicator belongs to the school inputs. The statistic measurements of mean, min, max, and range are all became smaller compared to 2013's number. However, the standard deviation has enlarged around 4 %. The school size of Beijing in 2015 has reduced overall. For district features, all of the measurements of income (IN) have increased as well as the house price (HP). The increase in the income and the house price shows a good feature of the developments for

the districts. By looking at the number carefully, I can notice that the minimum number of the income in 2013 and 2015 did not change too much. However, the range of the income has increased twice than 2013, which shows an income disparity exists. Local per-pupil fiscal expenditure (PPE) is increasing as well as the income and the house price. However, the range is increased by 57% compared to 2013's range. The educational gross regional product (EGRP) and total gross regional product (TGRP) are both increased as well.

Table 5-1 Descriptive Statistics in 2013 and 2015

2013	S/T	CS	FSt	BS	FSc	SC	IN	HP	PPE	EGRP	TGRP
N	16	16	16	16	16	16	16	16	16	16	16
Mean	5.07	31.91	162.77	181.82	71.48	445.38	36.22	29.27	132.70	4,546	109,703
St. Dev.	0.55	2.66	64.65	44.47	29.82	123.73	4.61	17.37	33.86	7,182	130,111
Min	4.09	27.11	76.78	143.31	32.90	299.62	31.13	11.75	79.48	606	9,224
Max	6.44	36.24	340.28	332.16	125.00	811.03	45.95	66.28	212.62	29,786	396,363
Range	2.33	9.12	263.5	188.84	92.1	511.82	14.82	54.53	133.13	29,180	387,139
2015	S/T	CS	FSt	BS	FSc	SC	IN	HP	PPE	EGRP	TGRP
N	16	16	16	16	16	16	16	16	16	16	16
Mean	4.17	28.67	236.61	234.65	90.94	380.48	44.84	30.89	235.2	5,848	4,232,890
St. Dev.	0.59	3.10	94.24	98.55	34.16	127.94	11.85	18.70	55.37	9,009	16,399,144
Min	3.35	22.18	53.38	107.98	51.62	243.76	33.25	13.55	168.07	719	10,735
Max	5.33	33.44	428.37	570.75	161.10	734.50	67.49	75.14	378.72	37311	65,727
Range	1.98	11.26	374.99	462.77	109.48	490.74	34.25	61.59	210.65	36,592	44,992

Table 5-2 Correlations in 2013.

	HAS	S/T	CS	FSt	BS	FSc	SC	IN	HP	PPE	EGRP
High school acceptance											
Student Teacher											
Class size	0.67	0.55									
Funding student											
Book student		-0.54		0.56							
Funding school				0.70							
Student school	0.63	0.72	0.70			0.58					
Income	0.53	0.57				0.76	0.85				
Housing	0.62		0.50			0.73	0.75	0.93			
PPE				0.69							
EGRP		0.68					0.88	0.72	0.51		
TGRP		0.52				0.56	0.82	0.85	0.76		0.80

Statically, In order to check the relationship between the students' achievements and variables, correlation matrixes are shown in Table 5-2 and Table 5-3, respectively. Table 5-2 represents a detailed information of the correlations in 2013, as I can notice, the class size, school size, income, and house are all having positive relationships with the High school acceptance rate (HAS). Interestingly, class size is positively related to the high school acceptance as well as the student-teacher ratio, which means that the high school acceptance increases when class size enlarges. However, a small class size is benefits for students (Jones, 2015). Understandably, large class size is related to large student-teacher ratio, and the correlation shown in Table-2 is a moderate positive relationship. Moreover, I can notice that the student-teacher ratio is positively related to school size, income, and the educational gross regional product (EGRP) as well as the total gross regional product (TGRP). However, there is negative relationship has

shown between the student-teacher ratio and the books per student (BS). Funding per student is positively related to books per student, funding per school and the local per-pupil fiscal expenditure (PPE). Unlike the funding for student, the school size, income, and house price are all positively related to the funding for school. Furthermore, the total gross regional product (TGRP) is positively related to the funding for school. The school size has strong relationships with the income, housing, educational gross regional product (EGRP) and the total gross regional product (TGRP). Book per student ratio is not significantly related to any of the existing indicators. Lastly, educational gross regional product (EGRP) and the total gross regional product (TGRP) are having the similar connection with other indicators, specifically, both of them have significant relationships with the school size, income and house price.

Table 5-3 Correlations in 2015

	HAS	S/T	CS	FSt	BS	FSc	SC	IN	HP	PPE	EGRP
High school acceptance											
Student teacher											
Class size	0.51										
Funding student											
Book student		-0.54		0.64							
Funding school	0.68		0.55	0.59							
Student school	0.54		0.70			0.62					
Income						0.70	0.62				
Housing						0.72	0.68	0.94			
PPE		-0.50			0.71		-0.64				
EGRP							0.79	0.55			
TGRP							0.79	0.74	0.73		0.81

Table 5-3 is the correlations relationship matrix made from the data of 2015, the main changes are happening among indicators such as the funding per school, income, and per-pupil expenditure. Comparing to Table 5-2, the High school acceptance (HAS) is no longer significantly related to the house price. For the student-teacher ratio, the per-pupil expenditure (PPE) is having a negative moderate relationship after the reform. Class size has a positive relationship with the funding per school and school size, but not the housing price. The funding per school has gained significant positive relationships with the high school acceptance rate as well as the class size; both of the correlations have reached a moderate level. However, the positive relationship between the class size and the funding per school indicates that the increase in the funding per school has a connection with enlarging the class size. The school size has lost its correlation with the student-teacher ratio, and its connection with high school acceptance rate, class size and funding per school is still significant in 2015. The income has lost all of its significance but the funding per school and school size. Per-pupil fiscal expenditure (PPE) has moderate negative relationships with student-teacher ratio and school size, while, it has a positive connection with the number of books per students. Understandably, the increase in fiscal expenditure does have a positive effect on the number of books per student. Unlike 2013, the educational gross regional product (EGRP) is gaining a moderate positive relationship with the house price. For the total gross regional product (TGRP), it lost the significate relationship with the student-teacher ratio, but gaining a positive relationship with the funding for school.

Chapter 6

Discussion

The enacted school district refrom of 2014 in Beijing does have effects on creating a more balanced education environment for students regardless of their residency.The goal of this reform was trying to evenly distribute the educational resources within selective cities to improve the educational equality. As such, the success of the reform can be tested by checking the trend of reallocation of educational resources. By mapping out the student-teacher ratio, class size, funding per student and books per students that related to the school factors, a trend of the more even reallocation of school resources appears. Moreover, the comparison of the high school acceptance before and after the reform shows a relatively same ratio, which means that the reform has certain effects on improving students' achievements. Most importantly, the high school acceptance rate in the suburban areas is increasing.

The descriptive analysis offered general information of the short-term effect on the educational resources. For the descriptive analysis, the correlations from different years have changed in several aspects, which offered some insights for the consequences of the reform as well. Firstly, the high school acceptance rate is significantly related to the class size, school size and funding for schools in both 2013 and 2015. It indicates that Beijing's high school acceptance rate is significantly related to school factors (Zhang et al., 2011; Wößmann, 2005). Unlike 2013, the housing price lost its significance in 2015. One the one

hand, this changes in correlation has proved that the student academic outcome does have a relationship with factors such as school size, class size, and funding. However, the positive relationship also indicates that the large class size is beneficial for the academic achievements (Chrispin, 2015;2016). Moreover, the housing price in the center city is higher than it is in the suburban area, and no significance found on housing price indicates that the residency has little effects on students' academic outcome. This is a good sign for the effectiveness of the reform. Secondly, income, housing price, per-pupil fiscal expenditure (PPE), the educational gross regional product (EGRP), and the educational gross regional product (TGRP) are district factors. By checking the correlation difference between 2013 and 2015, it is obvious that the district factors have lost all of its significance to the high school acceptance rate, which means that the geographic difference has fewer effects on the students' academic outcome. Furthermore, compared to 2013, the housing price is no longer significantly related to the educational gross regional product(EGRP), which has supported the assumption that more developed districts, like Dongcheng, Xicheng etc., have no advantage over the suburban area.

Policy implications

The reform of the compulsory education might improve the educational equity, especially for the disadvantaged student who used to live in the suburban area. The reform of school district is trying to fulfill basic needs of all the citizens, and aiming to create a society of educational equality. Based on the issues that existed in the compulsory education system, the restrictions of compulsory education admission seem to have

positive effects on creating a more balanced educational society. The reform aims to offer a chance for the student to enjoy an equal opportunity of education. As Ding et al. (2005) have mentioned, based on the unequal inputs, the nearby enrollment might enlarge the educational gap. After the reform, the differences between inputs become smaller, and the fairness for all school-age students could be achieved though this way. Most importantly, this reform does follow the principles of the Compulsory Education Law, which c education is supportable and accessible to all. However, Shao (2015) claimed that the restrictions on school choice in compulsory education were just one procedure of political attempt in order to make sure the educational fairness; unfortunately, they believed that the reform cannot solve the problem, and the government should do more about that.

The reform's effects could be limited, especially for the low-income family (Zuze et al., 2011). The non-score based entrance exam has led parents to take students' performance in school not as the sole factor to consider as excellence, but many other factors (participation in sports, arts or music) as well. The students have to equip themselves with extracurricular to be more outstanding than their peers. Therefore, the high SES family has more advantages over the low SES family. Under such circumstances, this shifting in extracurricular still creates the gap between students. The reformed nearby enrollment policy guarantees that each student has the right to receive compulsory education. However, the higher education is selected by students' numeric score, and that means students are still under tremendous pressure to succeed academically.

When take teacher's qualification into consideration, the advantage of some school exists in a short period, which means the balanced educational environment might still need some transition time to achieve. Teachers' qualification is important to improve students'

achievements as well. The reform is aiming at treating the student the same by offering students with equal educational resources. Teachers with higher qualifications contribute positive influence on students' achievement as well as the learning environment (Conner et al., 2005). However, the key school system that had long existed in the compulsory education had already hired all of the talented teachers to teach in more advanced schools, which means that some schools still have advantages over other non-key schools in a short period. Furthermore, the training that the reform is offering can only guarantee that some less skillful teachers can gain a better training, but they are still less competent to some skillful teacher.

Lastly, the reform is only enacted in the selected cities, which means that this restricted admission procedure needs strong economic or financial support to ensure the equality of education development. Beijing is the target city for this study; however, Beijing does have its educational strength over rest of the cities in China. According to the Sixth National Population Census of China, nearly 31.5% of citizens have a Bachelor or higher degree in Beijing (average 8.93% generally in China), and the secondary education student-teacher ratio ranks first as well. In addition, Beijing's primary and secondary schools have received more funds than any other municipality in the country. Therefore, the implementation and city selection itself already revealed limitations of the reform; in that case, this reform might be inefficient in the less developing area, and the re-productiveness of this reform is unknown.

Limitations

This study has several limitations. The first limitation is that the study only examined the overall effectiveness of the reform at the districts level; however, it does not contain information on the school, and the fairness of the random assignment system by using a computer. More research needs to be done to check the changes in private schooling. School choice method is not restricted to high SES families, and balanced educational resources may cause a gap in academic performances between private schools and public schools.

Secondly, the study can only show a short-term effect of the reform. The editor collected the data for compile *Beijing Education Statistics Yearbook* at the end of each year, and the education municipal commission released their data in the early October. In order to ensure the accuracy, the analysis is using the data from *Beijing Education Statistics Yearbook.* In that case, the study only contained data from 2013, 2014, and 2015, which means that there is only one year after the reform was acted. Because of the short period for which the reform took place, the outcome may not be fully realized. The long-term effects of its sustainability are unknown yet.

Lastly, the student level data was not included in this study. The high school acceptance rate offers a general concept about the students' achievements, and more accurate study can be done by using student-level data.

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