

The Impact of School District Segmentation Changes on Housing Prices in Selected Districts of Beijing

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Abstract: In China, school enrollment district segmentation changes often raise fluctuations of housing market. Once a house is segmented into a popular school district, its price will immediately skyrocket. To curb the hidden educational inequality caused by this phenomenon, many Chinese cities, including Beijing, are attempting to ‘cool down’ school district housing by adjusting existing school district segmentation. This paper aims to verify the impact of school district segmentation changes on housing prices in selected districts of Beijing. Through time-varying difference-in-difference method, this study found no significant correlation between the changes in school district segmentation and the fluctuation of housing prices in different administrative districts in Beijing. This study is significant for understanding the housing market situation in Beijing and the real-world effect of school district segmentation changes. Policy makers should take housing market prices into consideration when making school district policy decisions and make further researches to investigate the effects of new school district segmentation on neighborhood-level housing prices.

Keywords: Beijing, school district housing segmentation, housing prices, time-varying difference-in-difference

1. Introduction

School district housing segmentation refer to the required area in which school can recruit students. In China, this policy is implemented with domicile registration system. Chinese families tend to purchase school district houses to let their students enter top schools. With the continuous rise of housing prices in Beijing, changes in school district housing segmentation have had a significant effect on the whole housing market prices [1]. This study aims to research the real-world effect of changes in school district housing segmentation on housing prices in selected districts of Beijing.

1.1. Research Background

As the capital of China, Beijing is the political, cultural center and one of the economic centers of China. In the recent 30 years, the housing prices of Beijing have continued to grow rapidly, from ¥2,500/m² in 1990 to ¥100,000/m² nowadays in certain districts of Beijing [2]. Although housing prices all around China have experienced significant increases, different houses, even in the same city district of similar situation, may have distinct prices because of multiple factors [3]. Among all factors,

the role of housing location is greatly different from what it's like in other countries, for example, the U.S. It's because that in many cities in China, in order to prevent a few schools from becoming too popular, which may lead to school-age children in nearby communities having to go to schools that are relatively far away, local governments usually link the enrollment quota of primary and secondary schools to the location of family housing [4]. In addition, high school admissions are also influenced by house location [5]. Although schools select students based on their scores in the college entrance examination, students in nearby areas will be given preferential policies such as reducing the minimum admission line. Influenced by traditional Chinese conceptions, Chinese families see their children's education as one of the most important thing and are willing to invest for it[6]. In Beijing, once a utility room in a quadrangle was sold for 2 million yuan, just because it could be registered residence independently. Many families choose to purchase a smaller and less favorable housing for their children to attend school nearby, and then rent a house to live in the same community. Such phenomena have driven the continuous rise in housing prices in Beijing's school districts, and indirectly contributed to the overall rise in housing prices in Beijing.

To solve these problems arisen from school district housing segmentation, several districts of Beijing have adopted new multiple schools district enrollment policies [7]. Previously, various districts in Beijing generally adopted single school district enrollment, which means that one house corresponds to the only primary school within the school area of the district. Therefore, the prices of housing in popular schools have been skyrocketed. After re-segment the school zoning for enrollment, one house corresponds to a larger school district, and there are multiple schools within the school district, so parents will have more choices [8]. The implementation of this new segmentation method would undoubtedly greatly affect the housing prices in Beijing, resulting in a decrease in prices of popular school districts housing [9, 10]. In this context, this article mainly evaluates whether changes of the school district segmentation had a significant effect on the trend of housing prices in various districts of Beijing.

1.2. Literature Review

From the existing literatures, the overall trend of housing policy adjustment in Beijing's school districts is to shift from single school zoning to multi school zoning. This will undoubtedly affect Beijing's school district housing prices. Due to the difficulty in directly obtaining data of school-district and non-school-district housing prices, this study cannot directly evaluate the effect of changes in school district segmentation on school district housing prices in Beijing. This article will mainly evaluate the effect of changes in school districts segmentation on overall housing prices in various districts of Beijing.

2. Methodology

This study adopts time-varying difference-in-difference method [8] to evaluate this effect.

2.1. Experimental Data

Relevant data on housing prices and school district housing segmentation in selected districts of Beijing are collected from Anjuke website. For the sake of data integrity, this study selected monthly average house transaction prices from January 2014 to July 2023 in 13 districts of Beijing (please see Figure 1). Among them, Dongcheng District and Haidian District began implementing new segmentation method on January 1, 2019, and Xicheng District began implementing new segmentation method on August 1, 2020. The other districts have not started implementing new method before July 2023.

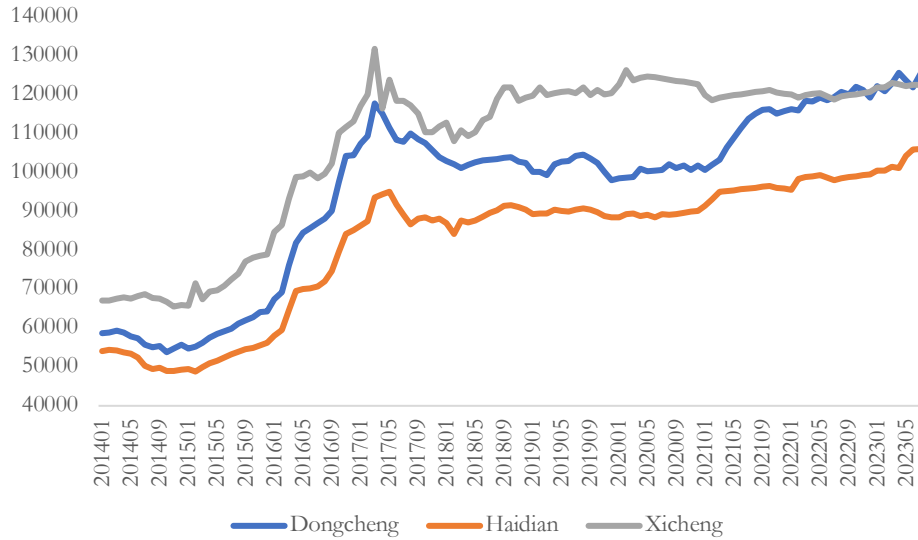


Figure 1: History Housing Prices of Dongcheng, Haidian, Xicheng District.

Data source: Anjue Website

Photo credit: Original

2.2. Time-Varying Difference-in-Differences Model

This study adopts time-varying difference-in-difference method to verify the impact of school district segmentation changes on housing prices in selected districts in Beijing.

Traditional difference-in-differences method is mainly used for evaluating policy effectiveness in sociology. This principle is based on a counterfactual framework for evaluating changes in factor y observed in both policy occurrence and non-occurrence situations.

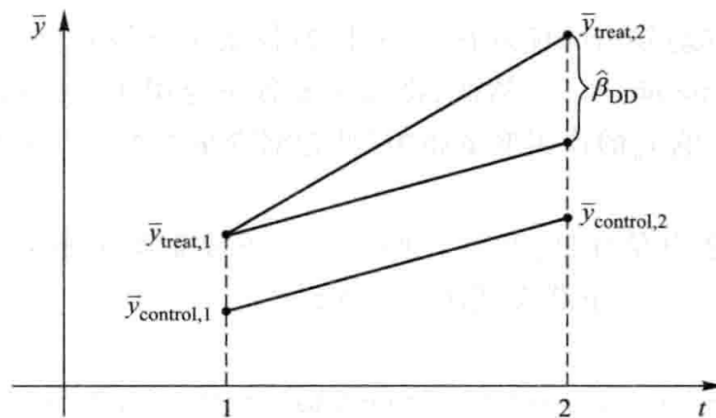


Figure 2: Difference-in-difference model.

Photo credit: Original

For an exogenous policy shocks, the samples are divided into a treatment group with policy intervention and a control group without policy intervention. Assuming there is no significant difference in y between the treatment group and the control group, then can consider the changes in y before and after the occurrence of policy in the control group as a counterfactual result when the treatment group is not affected by policy shocks. By comparing the changes in Treatment group y

($D1$) and Control group y ($D2$), then can obtain the actual effect of policy shocks ($DD=D1-D2$, please see Figure 2).

The prerequisite of the normal difference-in-difference model is that exogenous policy shocks simultaneously affect all samples within the treatment group. However, in this study, districts in the treatment group did not simultaneously implement the new school district housing policy. As mentioned earlier, Dongcheng District and Haidian District have been implementing new policies since January 1, 2019, while Xicheng District has only been implementing new policies since August 1, 2020. Therefore, the traditional difference-in-difference model is not applicable in this study. Based on this, this study adopts a time-varying difference-in-difference model suitable for multi-period samples. The formula of the model is expressed as follows:

$$P_{i,t} = constant + \beta_0 * s_{treat_{i,t}} + treat_i + \sum year_t + \varepsilon \quad (1)$$

Where P represents housing price; s_{treat} is an interaction term representing whether the exogenous impact have had effect on a sample. It equals 1 for treatment group once the policy has been implemented and 0 for treatment group before being treated and control group. In this case, $s_{treat} = 1$ since January, 2019 for each sample in Haidian and Dongcheng District and since August, 2020 for each sample in Xicheng District, $s_{treat} = 0$ for other cases. $treat$ is an indicator variable representing whether the sample is in treatment group or control group. In this case, it equals 1 for samples in Haidian, Dongcheng, Xicheng District and 0 for all other districts. $year$ is a dummy variable whose value that represents the time effect.

3. Data Analysis and Results

3.1. Benchmark Regression

The bench regression results are shown in Table 1.

Table 1: Benchmark regression.

	(1)	(2)	(3)
	OLS	OLS	OLS
VARIABLES	Price	Price	Price
S-treat	0.2460*** (0.0461)	0.2827*** (0.0295)	0.0285 (0.0197)
Treat	0.7532*** (0.1285)	0.7932*** (0.0141)	0.9148*** (0.0094)
Constant	10.5719*** (0.0890)	10.5100*** (0.0000)	10.1009*** (0.0173)
Observations	1,495	1,495	1,495
R-squared	0.5333	0.7721	0.9761
Region FE	No	Yes	Yes
Year Dummy	No	No	Yes

From the table, the interaction term $s-treat$ held significant when time effects were not controlled. However, when added the $year$ dummy variable, $s-treat$'s value approaches 0 and becomes

insignificant. It can be concluded that the new school district segmentation has little impact on housing prices in selected districts of Beijing.

3.2. Falsification Test

A falsification test was conducted to test the robustness of the empirical results. The test was done simply by adding a new dummy variable called *before*. Its value equals 1 only if current month is the last month before the policy shock. For Dongcheng and Haidian District, *before* = 1 for December, 2018. For Xicheng District, *before* = 1 for July, 2020. The idea is that news and grapevines might advance the policy shock in practice.

Table 2: Falsification test.

	(1)	(2)	(3)
	OLS	OLS	OLS
VARIABLES	Price	Price	Price
Before	0.2383*** (0.0146)	0.2541*** (0.0111)	0.0097 (0.0211)
S-treat	0.2496*** (0.0466)	0.2866*** (0.0299)	0.0287 (0.0195)
Treat	0.7496*** (0.1289)	0.9586*** (0.0095)	1.0415*** (0.0060)
Constant	10.5719*** (0.0890)	10.5100*** (0.0000)	10.1009*** (0.0173)
Observations	1,495	1,495	1,495
R-squared	0.5337	0.7726	0.9761
Region FE	No	Yes	Yes
Year Dummy	No	No	Yes

It can be seen from the table above that the *before* dummy variable is both close to zero and insignificant. The falsification results prove that the benchmark regression results are robust.

4. Conclusion

Based on the empirical results, it can be concluded that the new school district segmentation method has little impact on housing prices in selected districts of Beijing.

Due to various reasons such as data availability, this study cannot directly evaluate the impact of the new school district housing segmentation method on school district housing prices, and can only conduct a macro evaluation at the administrative district level. There may be multiple areas within the same administrative region that were not originally in popular school districts, but were included after the implementation of the new segmentation method, resulting in an increase in housing prices. It is also possible that some areas were originally located within popular school districts, but after the implementation of the new method, their location advantages have been weakened, resulting in a decrease in housing prices. In addition, the implementation of the new method may cause parents to give up chasing school district housing and instead purchase and live in non-school district housing, leading to an increase in non-school district housing prices. The mutual offset of multiple effects may eventually cause the effect of new method on administrative district level housing prices to be

insignificant. Therefore, it can not be concluded that the implementation of the new method has not led to a decrease of school district housing prices.

However, these do not mean that the study is meaningless. This study can at least prove that the new school district method has not caused turbulence in the entire real estate market. For China, real estate, as a pillar industry, is related to various aspects of society such as government taxation, residents' property value, living and producing costs, etc. As the capital of China, Beijing's policies have a reference and guiding role nationwide. This study indicates that the implementation of the new school district segmentation method has promoted educational equity without shaking the stability of the real estate market, and has a positive effect on society.

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