



The Effect of School District and Real Estate Policy on Second-Hand Housing Prices in Beijing Based on DID Model

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Abstract. Beijing is one of the major cities in China with soaring housing prices in the past decade, and speculators making price differences from real estate transactions have boosted prices of new house and second-hand homes in Beijing, so that most people with real housing demand cannot afford to own a house. In this case, Beijing has introduced a series of policies to regulate housing prices, among which, Beijing 317 New Policy impact is more extensive. This paper uses the transaction data of second-hand housing in the six core urban areas in Beijing from 2013–2022 to analyze the impact of the school district and the 317 New Policy on the second-hand housing price based on the DID model. The research results show that the 317 New Policy has effectively curbed the rapid growth of second-hand housing prices. Although the second-hand housing price in the high-quality school area has been in a growth state, the 317 New Policy also plays a positive role in the housing price in this area. As a bellwether of national policies, Beijing will have a directional impact on cities across the country. In the next few years, the Chinese government will continue to implement the nationwide slogan “houses are for living in rather than speculation”.

Keywords: Beijing 317 New Policy · second-hand housing · DID model · school district

1 Introduction

Policy plays an important role in China second-hand housing market, especially in economically developed cities such as Beijing and Shanghai. There are many factors that affect house prices, include the per capita GDP in Beijing, house area, and whether there are schools, hospitals, parks, and subways nearby and so on. Since 2015, with the growth of per capita income and economic development, Beijing’s real estate market has been particularly active, making house prices rise at an unprecedented rate. That’s why the relatively tight real estate policy was introduced in 2017, which called 317 New Policy.

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This policy contains the following three important provisions. First things first, the retransaction of commercial housing needs to be at least three years. If the transaction object is an individual, it shall be implemented in accordance with the purchase restriction policy. Secondly, for first-time house purchase, the proportion of down payment shall not be less than 35%, and the proportion of down payment for non ordinary self owned housing shall not be less than 40%. For those who have a suite, the down payment shall not be less than 60%, and for non ordinary self owned housing, it shall not be less than 80%. Last one is that suspend the issuance of individual housing loans with a loan term of more than 25 years. We want to further study its influence in a sufficient way.

In terms of the impact of school districts on house prices, Zhang et al. use the second-hand housing transaction data in Beijing. The empirical results show that the education quality represented by school material capital and teacher human capital explains 64.71% of the total housing premium in the whole school district. The balanced reform of compulsory education and the fair supply of high-quality public investment are the effective methods to curb the high housing prices in school districts [1]. Qiu et al. find that the school premium is significant in China [2]. Huang concludes that school districts have a positive impact on the rise of house prices through hedonic model analysis [3]. Hana et al. find that the average housing price in new SAZs increased significantly by 1.5%–3.5% after the SAZ changes, the changes in the SAZs caused significant but relatively small increases in housing prices, which proves that it takes time for the real estate market to react to educational resource distribution [4]. Zhang et al. find that the impact of policy on housing prices will increase house prices in primary school districts, but the impact of policy lasted only a year. Research shows that the policy will not make the school district housing prices continue to rise in the long run [5].

In terms of the impact of the policy on housing prices, Shao et al. use ARIMA time series model to analyse the relationship between real estate policy and real estate transactions. The results show that some real estate policies like purchase restriction policies have a certain impact on real estate transactions in a short time [6].

Qin applies difference in DID model to evaluate the actual effect of the real estate regulation policies in Langfang real estate market. The results show that house purchase restrictions don't reduce the growth rate of new housing prices and expected growth rate of second-hand housing prices [7]. Ha et al. estimates the average effects of the reform using linear fixed-effects model. The results shows that housing units associated with key primary schools experienced much stronger increase in prices rather than lower secondary education [8].

In terms of the impact of the around environment on housing prices, Chen studies that the factors that have a positive impact on housing prices include the number of bedrooms, ratio of elevators, whether there are elevators, and whether there are schools, hospitals, parks, and subways nearby [9]. Xu et al. find that there are obvious spatial positive correlation and spatial heterogeneity in the price of second-hand housing. And among all factors, the distance to the nearest school is the most important factor affecting house prices, and the house age has the weakest impact [10].

1.1 Objective

In order to have a more comprehensive understanding of the impact of policies on the real estate market, our research will focus on the short-term impact of the policies on house prices. This study is about to rule out the impact of other factors on house prices to get more objective and accurate information about the impact of per GDP, house area, school district policies on house prices. The difference in difference model is used to divide the data of the school district into two groups. This study focus on testing whether the policy of second-hand housing is effective. After the empirical analysis of the data, the policy is analyzed.

2 Data and Model Processing

2.1 Data Processing

This paper mainly adopts the DID policy evaluation model, and selects 6 regions in Beijing as the research objects. Since the impact of high-quality school districts on the second-hand housing price is far greater than the policy on the second-hand housing price, this paper takes Haidian District and Xicheng District as the control group of the classic DID model, with a value of 0. In contrast, the second-hand housing prices in Chaoyang District, Dongcheng District, Fengtai District and Shijingshan District which are in the core circle of city are less affected by the school district, and mainly affected by the policy. Thereby, this paper takes Fengtai District and Shijingshan District as the experimental group in the model, with a value of 1.

This paper mainly studies the real estate policy of Beijing in 2017, so the sample value from 2013 to 2016 is 0, and the sample value from 2017 to 2022 is 1, obtaining the following descriptive statistical results (Table 1).

2.2 Specification of Model

Firstly, Samples were tested for parallel trend. Before the occurrence of the 2017 policy, the trend of the experimental group and the control group was roughly the same. The trend of the two groups changed significantly in 2017 and after 2017, which means it is through the parallel trend test, so the DID model can be used (Fig. 1).

$$\ln price = \beta_0 + \beta_1 \ln GDP + \beta_2 \ln square + \beta_3 post + \beta_4 treat + \beta_5 did + \varepsilon \quad (1)$$

Specifically, *treat* is the factor variable that distinguishes the experimental and control groups, *post* is the factor variable that distinguishes before and after the policy occurs, and *did* is the product term of *treat* and *post*.

The treatment group factor variable β_3 controls the time effect of the treatment period (the inherent time trend before and after the treatment period), the treatment group factor variable β_4 captures the group effect of the treatment group (the inherent difference between the treatment group and the control group), while the interaction item β_5 represents the real effect of the treatment group during the treatment period (the effect of policy impact).

Table 1. Descriptive statistic

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
code	3,000	2	0.817	1	3
year	3,000	2,018	2.873	2,013	2,022
price	3,000	44,692	25,889	5,671	148,750
GDP	3,000	14.46	3.069	10.10	19.30
Square	3,000	116.0	45.44	35	191
treat	3,000	0.667	0.471	0	1
post	3,000	0.600	0.490	0	1
did	3,000	0.400	0.490	0	1
Ln GDP	3,000	2.648	0.217	2.313	2.960
Ln price	3,000	10.50	0.698	8.643	11.91
Ln square	3,000	4.659	0.463	3.555	5.252

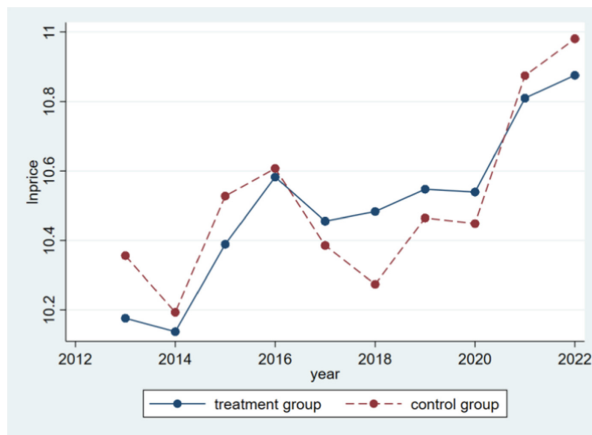


Fig. 1. Parallel trend test

3 Empirical Analysis

3.1 Model Processing Results

The regression results are as follows.

This paper mainly uses the conventional did model, which is mainly used to evaluate the effectiveness of a certain policy. According to the data of this paper, the per capita GDP unit is ten thousand yuan per person, the price unit is ten thousand yuan per square meter, and the unit of area is m^2 , variables named post, treat and did are factor variables, which have no specific unit (Table 2).

Table 2. Regression results

VARIABLES (Dimensionless)	(1)
	Ln price
did	0.147*** (3.60)
treat	-0.100*** (-3.31)
post	-0.510*** (-11.62)
Ln square	0.992*** (45.49)
Ln GDP	1.681*** (18.28)
Constant	1.742*** (7.30)
Observations	3,000
R-squared	0.525
F test	0
r2_a	0.524
F	659.2

Note: robust t-statistics in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1

$$\ln price = 1.742 + 1.681 \ln GDP + 0.993 \ln square - 0.1 treat - 0.51 post + 0.147 did + \varepsilon \tag{2}$$

$$N = 3000, R^2 = 0.525, F = 659.2 \tag{3}$$

Thus, the analysis of the data results are significant, we can think that the impact of the 2017 policy on Beijing housing prices is also significant, which can explain almost 53% of the impact of second-hand housing prices in Beijing (Table 3).

Table 3. Correlation coefficient

	Ln GDP	Ln square	did	treat	post
Ln GDP	1				
Ln square	0	1			
did	0.592	0	1		
treat	0	0	0.577	1	
post	0.888	0	0.667	0	1

Table 4. Endogenous test

VARIABLES (Dimensionless)	(1)
	Ln price
did	0.147*** (0.0376)
Ln square	0.992*** (0.0187)
o.Ln GDP	-
Constant	5.822*** (0.0890)
Observations	3,000
R-squared	0.538

Note: standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

3.2 Endogenous Analysis

Consider the impact of per capita GDP on per capita disposable income and second-hand housing prices. Then, this paper tests collinearity for lnGDP (Table 4).

The regression results showed complete collinearity between GDP per capita and house prices. To sum up, Beijing's real estate policy in 2017 has had an important impact on the housing price of second-hand housing, and the inhibitory effect of the policy on the housing price is also significant.

4 Discussion

In order to promote the steady and healthy development of the city's real estate market, Beijing issued 317 New Policies. The purpose of this purchase policy is to cool the real estate market, especially the second-hand housing market. Because house prices have risen too fast in the past few years, and many people have gone bankrupt since they can't

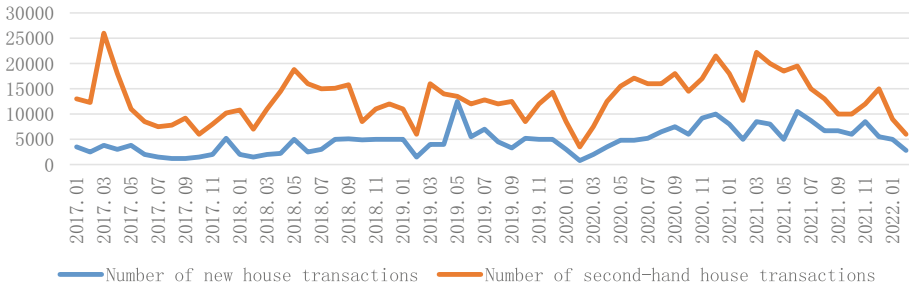


Fig. 2. The number of second-hand housing transaction in Beijing from 2017 to 2022

repay their loans for the house. This has led to social instability and a sharp increase in the risks faced by banks. The impact of the policy was very significant. In the first year, the decline of the second-hand housing market was 18%. The price of new houses has also dropped a lot. This conforms to the law of the market and makes China’s real estate market more healthy, safe and stable. Our research will further explore the impact of this policy reform on China’s real estate market, taking into account the influencing factors of GPS, school district housing and house scale.

The core reason why the “317 New Policy” is known as the “strictest policy in history” is that the cost of using leverage is greatly increased. The essence of the policy is to increase transaction costs and crack down on speculative speculation. Therefore, we are now difficult to hear the news about investors buying a whole piece of second-hand homes. Through two years of purchase restriction, price limit and other policies, the current market and home buyers’ expectations have gradually returned to rationality. Overall, investment speculation demand has been curbed, and the “panic chase up” sentiment has significantly subsided.

After several years of strict control, the transaction volume of the property market has also reversed. In March 2017, the transaction volume of second-hand houses in Beijing reached the highest point of 25,434 units, but the transaction volume of second-hand houses in February this year was only 6,246 units, shrinking significantly. About 50,843 new houses were sold in Beijing in 2019, down about 45%, from 92,281 units two years before the new policy introduced; Less than 280,000 units were sold in 2019, and about 480,000 units were traded in the first two years of the new policy (Fig. 2).

According to China’s National Bureau of Statistics (Fig. 3), the prices of new homes in Beijing rose 2.6% and second-hand homes fell 5.3% in 2017. Since the “317 New Policy” was introduced, not only the transaction volume has been sharply reduced, but also the housing prices have been significantly adjusted, and the overall real estate market in Beijing is in a downturn.

During the several years since the implementation of the policy, the increase in new house prices has always been under control. In March 2017, the price of new homes in Beijing was 38,873 yuan per square meter, and in February 2022, the average price was 48,428 yuan per square meter. New home prices rose 24.6% in five years, or an average of about 4.9%. The price of second-hand houses rose even more, with the latest average transaction price in 2022 again hitting a high price of 63,000 yuan/square meter. In general, the actual increase of the average price of second-hand housing transaction

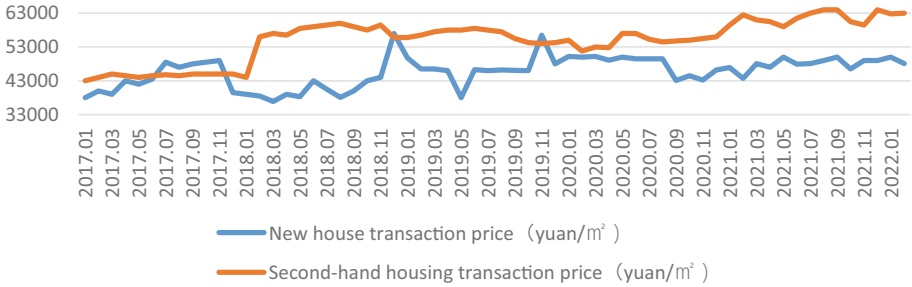


Fig. 3. The average price of second-hand housing transaction in Beijing from 2017 to 2022

is more than the new house, but the increase and the school district housing policy adjustment has a greater correlation.

From the overall changes of housing prices in Beijing in the past five years is still stable and upward, among them, new home prices gradually recovered to a stable range after bottoming out in 2018. In contrast, the second-hand housing situation is different, the hottest is the school district housing, the price increase is obvious. The price of second-hand houses in Haidian District has also risen from 70,000 yuan to 80,000 yuan per square meter in 2018 to 90,000 yuan to 100,000 yuan per square meter now.

In addition to the change in quantity and price, the “317 New Policy” has also brought about the change of buying mentality. The market has gradually entered a state of demand and improvement dominance and buyer dominance. Unlike owners frequently raised the price before the “317 New Policy”, the owners tend to be rational after the implementation of the “317 New Policy”, and the transaction cycle began to become longer. Second-hand housing market as a whole has maintained a stable trend in addition to the individual hot school districts.

5 Conclusion

Above is for the results of the 317 New Policy based on the DID model, clearly from the data results, the policy for difficult to solve the impact of secondary housing prices is significant and positive, and the policy to guide the subsequent housing market price trend stabilizing, it also means that the influence of the 317 New Policy is not only powerful, but also is sustained.

Across the country, housing prices in many first-tier cities and first-tier and super first-tier cities are rising rapidly. From the perspective of people’s livelihood, the government needs to reasonably regulate housing prices to ensure that people with real housing needs can afford a house. The effective implementation of Beijing’s 317 New Policy and the good market orientation mean that the policy can be gradually promoted from provincial capitals and then nationwide, in order to comprehensively curb the chaos of inflated housing prices.

The second-hand housing price in high-quality school areas has been less affected by the policy. The second-hand housing market in these areas is difficult to be regulated through the real estate policy, so the concept of “school district” can only be gradually

weakened from the education policy. This problem still needs to be considered and solved.

According to the government work report, the government should better solve the housing problem, reform and improve the housing market system and security system, and promote the steady and healthy development of the real estate market.

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