높은 품질의 교육 자원이 부동산 가격에 미치는 영향*

The Influences of High-quality Educational Resources on Housing Prices
- Evidences from Beijing's Fangshan district -

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── < Abstract > ──

In China, since the 21st century, due to the uneven distribution of educational resources and the growing demand for high quality educational resources, so in the process of school choices, the families who own good family background and high social position could send their children to better schools. Following the "nearby-enrollment policy", students have to enroll in the public primary and middle schools with the specific attendance areas that where their household registers are located. Given this, this policy encourages parents to prepare earlier and buy school-district housings at a whopping price in the neighborhoods corresponding to their preferred schools. "Sky-high school district house" has become a common phenomenon in China now because of the scarcity of school district houses.

This study makes use of the transaction price data of Fangshan's houses in Beijing and investigates the impacts of distance on housing prices of high-quality education resources using the method of multiple linear regression analysis. The regression result tells that explanatory variables representing distance to key primary school, distance to key secondary school, distance to key high school are the significant factors that affect the school district housing prices, and the shorter the distance is, the higher housing prices are. In robustness test, the variables of interest, including the number of primary schools, middle schools and high schools all exert positive significant effects on housing price, which means that the more schools around the residential areas there are, the higher housing prices are.

I. Introduction

1. Background of the Research

In recent years, people's living standards have been greatly improved. We no longer talk about food and clothing problems, but more energy has been shifted to the spiritual and cultural life. Under the circumstance of today's fierce competitive society, knowledge is power and higher education level means stronger competitive edge. Therefore,

almost all parents are willing to invest on education for their children, and the share of education spending in consumer spending has grown increasingly. Especially in China, most families have only one child that is the center of the family, in order to prevent children from losing at the starting line of the career lifetime, parents do their utmost to send their children to key primary and key secondary schools (Wen, Yang & Qin 2013).

The China's 2000 Housing Reform has led to an incredible boom in real estate market in recent years and the property prices were doubled by 2005 and tripled by 2009 named real estate craze. It is the Housing Reform that make the price disparities started to show up. The property values in China vary widely not only across different areas, but also across different neighborhoods within the same city. Meanwhile, an increasing amount of existing properties are being traded in China's real estate markets. It is discovered that family event is the most important factor for housing choices; this in the case of China, or even in some countries in Asia, is ought to be education (Norris, 1999).

Since Chinese admission policy is based on household registration, which means that students have to enroll in the public primary and middle schools with the specific attendance area that cover where their household registers are located. So, this policy encourages parents to prepare earlier and buy school-district housings in the neighborhoods corresponding to their preferred schools. However, the "key schools system" has been implemented since the 1970s, after several decades of development, there has a big gap between the key schools and non-key schools in terms of educational resources, hardware facilities and teachers, which is difficult to disappear in a short time, so key schools have a strong appeal for parents. Besides, under the "nearby-enrollment policy", in order to send

their children to their preferred schools, many parents have no hesitation to spend heavily in buying the school district houses.

Therefore, the parents have no choice but to buy the school district houses at a whopping price because the demand of school-district houses is much more than the supply in China's real estate market. According to the news from Information Times (2011), most banks even loosen their mortgage policy in order to support those buyers who plan to purchase school- district houses three to five years ahead and house price-to-income ratio in Beijing keeps the top highest of cities all over the world.

This thesis is among the first to inspect how the key schools are capitalized into the existing property prices in the Fangshan district of Beijing city using the method of multivariate linear regression analysis.

2. Research Objectives and Significance

Although it can be found in the literature that the school quality affects the housing market significantly, few can be found that there are causal relationships between the distance to key schools and the residence, especially little research regarding China has been conducted.

With the steep rise in school district houses' prices, it is of significance to research the intrinsic reasons of high prices, and what are the main factors that those buyers take into consideration. The data of Fangshan district's school district houses in Beijing city was collected through real estate company, to prove that the distance between key schools and residence has a significant impact on housing prices using Hedonic price model.

This thesis explains the impact of Chinese school-admission policies on family housing options, in favor to understand the phenomenon of current high price of school district houses.

Besides, governments often do research before making decisions, so the conclusion might give reference significance and a guiding role on how to make real estate control policies and education policies by local government department, which has important theoretical and practical significance.

II. Real Estate Markets and Existing Literature.

1. Real Estate Market in Beijing and Fangshan district

Beijing is the capital of the People's Republic of China and nation's political, cultural, and educational center, as the world's third most populous city, which has the most number of world's cultural heritage. Beijing is located in north of the North China Plain and is close to Tianjin city and surrounded by Hebei provinces, together the three divisions form the Jingjinji metropolitan region and the national capital region of China. Beijing is governed by Chinese national government as a direct-controlled municipality with 16 urban, suburban, and rural district.

By the end of 2015, the city's resident population reached 2170.5 million with an increase by 18.9 million over the end of 2014. Among them, the migrant population was 822.6 million, accounting for 37.9% of the whole resident population. In 2015, the GDP of Beijing has arrived to 2,296.86 billion yuan, with an increase by 6.9 percent over 2014. On July 31 of 2015, the International Olympic Committee President Bach announced that Beijing and Zhangjiakou will have the right to host 2022 Winter Olympic Games, so Beijing became the world's first city to host both the Summer Olympic Games and the upcoming Winter Olympics.

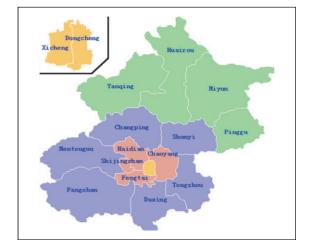<Figure 1> Geographical Location of Beijing

As China's capital, Beijing's housing prices in the country has always been in a leading position nationwide, especially entering the 21 century, and Beijing's housing prices are tremendously costly at an alarming rate. The soaring housing price in Beijing can not only reflect the status of capital, but also displays the impacts of educational resources of this city. As can be seen from the Figure 2, the housing price in Beijing saw a upward trend in recent years. From 2009 to 2015, Beijing's housing transaction price rose by nearly five times.
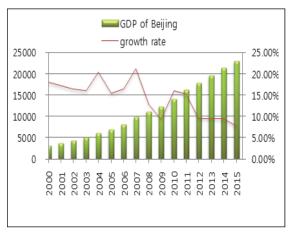
<Figure 2> Housing price in Beijing

In 2015, regional GDP of Fangshan District in Beijing city has achieved 55.47 billion yuan, with an increase by 7.5% compared with 2014. The added value of primary industry was 14.2 billion yuan, decreased by 20.4 percent over the previous year; the added value of secondary industry was 32.37 billion yuan, went up by 7.8 percent over the previous year; and the added value of tertiary industry was 21.68 billion yuan, rose by 9.6 percent over 2014. According to the resident population calculation, the per capita GDP of the region reached US $ 8,555 (calculated according to the average exchange rate of RMB 6.2284: 1). During the 12th Five-Year Plan period, the region's GDP grew at an average annual rate of 8.3%. The average annual growth rate of the three industries was -0.3%, 6.4% and 12.7% respectively and the three industrial structure changes from 3.9: 64: 32.1 in 2010 to 2.6: 58.3: 39.1 in 2015.

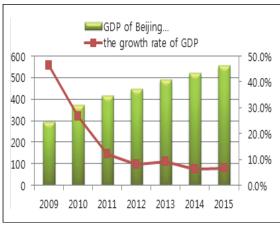<Figure 3> Administrative divisions of Beijing

By the end of 2015, in Fangshan District, there are 46 schools with 23000 students. Among them, the population of ordinary high school students is 8119, 14000 junior middle school students and 45000 students for primary school. For compulsory education stage, the enrollment,

consolidation and completion rate all remained at more than 99.9%, high school's penetration rate reached 99.1%, and college entrance examination rate was 97.98% in this region.

<Figure 4> GDP and growth rate of Beijing

Source: Beijing yearbook

Figure 4 shows Beijing's gross domestic product and its annual growth rate in recent years. It can be seen from the figure that although Beijing's GDP is growing year by year, its growth rate has been reduced. Referring to the historical experience of some developed countries, when the economic development is in the late stage of industrialization, especially in post-industrial stage, economic growth in normal period are generally maintained at between 2% to 6% fluctuations. In 2007, Beijing has entered the stage of post-industrial development stage, so economic growth rate saw a downward trend. Moreover, due to the pressure of resources and environment, Beijing should take the initiative to reduce economic growth. Figure 5 shows the GDP growth rate of Fangshan District of Beijing from 2009 to 2015. It can also be seen that the growth rate is slowing down, in line with Beijing's economic growth strategy.

<Figure 5> GDP and growth rate of Beijing Fangshan

Source: Beijing Fangshan statistical bureau

In this paper, we focus on the study of "school district housing", and try to find the relationship between house price and distance from the school. We chose Key primary school, Key Middle School and Key high School in Fangshan District of Beijing as the main research Object, respectively, to find the impact of distance between residence and those three key schools on housing prices.

2. Existing Literature and Collecting of Data

1) Existing Literature

In regard to this topic, the studies by western scholars are earlier and more abundant, but most is about he relationship between the quality of education and housing price, while the study about the impacts of distance between the schools and residence on housing prices is relatively deficient (Shi & Wang, 2014).

Clark and Herrin (2000) divided the factors that influencing the housing price into five categories: structure, neighborhood year sold, school district, and school attributes. The result shows that the elasticity coefficient of housing price to output variables is less than input variables, which indicates that the importance of output variable is less than input variable, and class size has the greatest influence on house price. Huston (2011) used a multiple regression model to study the relationship between the useful life of primary school infrastructures and single family housing prices in Orlando, Florida metropolitan areas. ThNin the residential area, the housing price will reach 13,381.19 USD, which is obviously higher than the average house price. if a new modern primary school is built in the residential area, the housing prices can reach 13,657.61 US dollars, which is also significantly higher than the average price. The final conclusion drawn from the study is that the school infrastructure program is a subject that must be carefully addressed. Brunner, Murdoch and Thayer (2002) researched the relationship between the reform of school policies and the surrounding housing prices, and their result indicated that the school policy reform and housing prices have a positive correlation. Brasington and Donald (2006) used the price characteristics of price model, the use of spatial statistics as a means of identification, found that the correlation coefficient between housing price fluctuation and school expenditure is 0.49. If it adds each additional standard deviation of the examination result, the house price will increase by 7.1%.

There are also many western scholars to study this area through school quality evaluation criteria (Sedgley et al. 2008). Hayes and Taylor (1996) conducted a study using students' test scores to represent the quality of the school, and their findings showed that the price elasticity of student performance on housing prices is 0.26%. Sedgley, Williams, and Derrick (2008) analyzed the 10 high schools, 18 middle schools, and 36 elementary schools using the characteristic price model and the spatial error spatial lag model, finally find that SAT scores had a significant effect on house prices. Jud (1985) used the data

from the Los Angeles and San Francisco metropolitan areas, proposed an assessment of community housing prices. The model includes both the measurement of students' achievement and the measurement of racial composition. The quality of public schools is assessed by the student's reading scores, and the quality of public schools is an important and statistically significant factor in determining the price of community housing, in addition to the effect of ethnic or socio-economic background of the students.

In summary, western research on characteristic price theory has formed a relatively complete system and has been relatively mature, which is an effective method to research heterogeneous goods and services.

By contrast, Asian scholars although did many researches about school-district house, using hedonic model to study the school district housing is not very mature, most of them only stay in the level of theoretical research, and few scholars do quantitative analysis through establishing of models at present.

In Korean research regarding school-district house, Park and Kim (2006) attempted to investigated the trends of the rents and sales of school-district apartment housing in Daechi-dong Kangnam-gu and Sangkye-dong Nowon-gu. They conducted the questionnaire research for the residents and real estate brokers to make a comparative analysis. The results showed that the educational policy can stabilize the rented school-district apartment housing market in the Kangnam district, but it is difficult to stabilize the apartment housing transaction market. Eom, Yoon and Lim(2006) tested empirically the hypothesis that housing price has a positive relationship with educational environments, they found that regional characteristics are more important than individual characteristics in determining housing prices and if A region

has twice as good as B region in educational environments, the housing everage prices in A region is 64% higher that that in B region. Kim and Hahn (2007) claimed that the housing price near the high quality high school has risen and the education quality exerts an effect on real estate prices, but the influence degree is rather smaller than expectation. Nam and Seo(2016) did a research and argued that if apartment housing is located near a senior high school, the resale price is decreased compared to that of far apart. Typically, the apartment housing resale prices would go to the highest if it is located between 901 and 1,000 meters away from a senior high school.

Chinese scholars also did massive researches on this area which can be roughly divided into two categories, one is qualitative analysis based on the perspective of market supply and demand, the other is quantitative study based on Hedonic price model.

Qualitative studies: These studies are mostly studied from the general market theory, focusing on the supply and demand of school district's housing market. Studies have shown that the changes of school district housing price are substantially in line with changes in market regulation. That is, when the market demand is greater than supply, it will show rising prices. Chen and Tang (2009) did the analysis from the perspective of supply and demand in microeconomics, and they identified that the strong demand and a serious shortage of supply are the main factors leading to the soar of school district housing prices, which is a reaction of a serious shortage of educational resources in China. Wen's (2011) Studies have demonstrated that school district housing price was influenced by the distance from the school, the lack and uneven distribution of quality education resources.

Quantitative studies: These research use the Hedonic price model as a main tool to explain

the change of school district housing prices. Nie(2011) divided the factors into four categories: locational characteristics, architectural features, neighborhood characteristics and other factors, and pointed out that there is only about 5% of the bargaining space between the listed price and the transaction price, so to a certain extent, listed prices can also reflect the true value of housing. Wang(2006) provided evidence that if there is middle school within 500 meters around residential district, the housing price will rise by 2.737% by analyzing Shanghai's housing market which is subdivided into three sub-markets. Wen, Yang and Qin (2013) used the method of Hedonic price to quantify the characteristics of variables, and found that the educational facilities have positive capitalization effects on housing prices.

2) Collecting of Data

In this paper, the data was obtained through real estate transaction data through a large real estate company located in Beijing city and the sample data was the deal registration information of newly-built houses from 2013 to 2015. The sample size is 4008 with the structure characteristics including transaction price, area, number of the balcony, number of the bathroom, floor, distance to CBD, distance to sorrounding schools, payment method and etc. All of these commercial data should be kept secret by appointment and only for academic study.

The data cannot be used directly before classification and filter. The data should be divided into two parts, one is the housing transaction price which was defined as the dependent variable of the model, the other part is the attribute data of housing, generally can be classified by location of the residence, architectural and neighborhood characteristics, which are the independent variables.

III. Descriptive Statistics and Analytical Method

1. Variable Selection

1) Independent Variables

This paper divided the variables into 14 control variables and 3 variables of interest because of the diversity of variables in this research. Control variables consist of number of elevators, decoration situation, housing floor, number of balconies, in which orientation that the air can be transparent, total housing area, distance between housing and bus terminal, distance between housing and subway, distance between housing and railway station, distance between housing and ordinary hospital, distance between housing and key hospital, payment method of buying houses, noise situation around the house and number of schools near the residence within 3kms.

Variables of interest are distance between housing and key primary school (unit: km), distance between housing and key middle school (unit: km), and distance between housing and key high school (unit: km).

2) The Dependent Variables

We researched how the dependent variable of housing price is influenced by the distances between a residence and key schools based on the study design.

It is important to note that all these above distances are measured by the real estate company which I collected the data from and these are all shortest actual distances from residence to destinations. Noise situation around the houses are measured through noise level milling meter by this real estate company.

2. Descriptive Statistics of Variables

<Table 1> Definition of Variables

Housing characteristics	Variable	Label
Structural features	ELEVATOR	Number of elevators
	FLOOR	Housing floor
	BALCONY	Number of balconies 1=One house with only one balcony , 2=One house with two balconies
	OREIN	In which orientation that the air can be transparent 1=southeast 2=southwest 3=south to north
	AREA	Total housing area (m2)
Education	DISKEYPRIMARY	Distance between housing and key primary school
	DISKEYMIDDLE	Distance between housing and key secondary school
	DISKEYHIGH	Distance between housing and key high school
	NUMBER	Number of schools near the residence within 3 kms
Location	DISBUS	Distance between housing and bus terminal
	DISSUBWAY	Distance between housing and subway
	DISTRAIN	Distance between housing and railway station
Neighborhood characteristics	DISGENHOSPITAL	Distance between housing and ordinary hospital
	DISKEYHOSPITAL	Distance between housing and key hospital
Others	PAYMENT	Payment method of buying houses dummy variable: 1=if full payment 0=if through loan
	NOISE	Noise situation around the house 1=noise (if the loudness of sound > 50 decibel) 0=noiseless (if the loudness of sound < 50 decibel)

<Table 2> Descriptive Statistics of Variables

Variables	N	Minimum	Maximum	Mean	Std. Deviation
lnPRICE	4008	13.50	16.45	14.7781	0.36249
UNITPRICE	4008	9.4529	11.175	10.10	0.34023
ELEVATOR	4008	0.00	1.00	.9479	.22235
FLOOR	4008	1.00	28.00	10.4511	6.74000
BALCONY	4008	1.00	2.00	1.2298	.42075
OREIN	4008	1.00	3.00	1.5002	.50106
NOISE	4008	0.00	1.00	.7849	.41092
DISGENHOSPITAL	4008	.36	4.60	2.2006	1.29269
DISKEYHOSPITAL	4008	.23	5.00	2.2730	1.38554
DISBUS	4008	1.50	10.50	5.7896	3.40992
DISSUBWAY	4008	2.00	13.70	7.6426	4.38795
DISTRAIN	4008	1.20	7.20	3.3388	1.54502
PAYMENT	4000	0.00	1.00	.2220	.41564
AREA	4008	34.27	284.15	97.8441	34.90244
DISKEYPRIMARY	4008	.14	5.00	1.4583	1.02583
DISKEYMIDDLE	4008	.38	4.80	1.8324	1.44730
DISKEYHIGH	4008	.23	5.60	2.5324	1.66764

Here, we did the test of multi-collinearity in order to test the multicollinearity problems between selected variables.

The table shows that the VIF values of these variables are all smaller than 10, which means that there are no multi-collinearity problems in choosing variables, so all of them can be analyzed in the model next.

<Table 3> Test for multi-collinearity

Variable	VIF	1/VIF
DISTRAIN	9.62	0.103975
DISSUBWAY	9.45	0.105795
DISKEYHOSPITAL	7.96	0.125585
DISGENHOSPITAL	6.03	0.165754
DISKEYMIDDLE	4.76	0.210121
DISKEYPRIMARY	3.75	0.266493
OREIN	2.25	0.444884
DISKEYHIGH	2.22	0.449726
NOISE	2.21	0.451580
BALCONY	2.21	0.452013
DISBUS	1.86	0.538954
AREA	1.78	0.560760
PAYMENT	1.67	0.599675
FLOOR	1.31	0.761648
ELEVATOR	1.01	0.987700

3. Analytical Method: Hedonic Model

The Hedonic Price Theory first appeared in 1922 and was applied by Hass to the paper on farmland prices, and then was applied to the price index compilation. In 1939, the American scholar Court compiled the price index of the automobile industry, then, Griliches who is in the study of the tractor industry price index, used characteristic price model too. In addition, the feature price model is also applied to the assessment of the effectiveness of the government's public policy, the improvement of the traditional economic model and the assessment of the value of non-market goods (Palmquist and Israngkura, 1999). Lancaster and Rosen put forward the housing hedonic price theory earliest with the point is that the attribute of each commodity determines the price of the commodity, and the consumer's willingness to pay for the price depends on the degree of consumer's satisfaction with all aspects of the commodity (Zabel, 2004).

Hedonic model is a model that reflects price of product or service through characteristic price, and it is the most commonly used model to research product's heterogeneity. The heterogeneity of these products is not easy to be directly observed, therefore, product heterogeneity cannot be directly reflected by the transaction price. In order to study the relationship between these characteristics and the transaction price, we must collect the data of the heterogeneous products or service and the market transaction, and use the characteristic price theory to establish the price model. After decades of efforts

from domestic and foreign scholars, the theoretical basis and practical experience of the characteristic price model has developed and perfected, and has become one of the most widely used models in real estate appraisal.

Compared with the traditional real estate valuation method, the hedonic method is based on the subjective feelings of the consumer to the commercial house, which can effectively compensate for the shortcomings and shortcomings of traditional assessment methods. The method reveals the relationship between commodity characteristics and price, and makes the price more accurate and scientific through regression analysis.

Through analyzing the influencing factors of the school district school, we divide the factors into four aspects: the structural features, the location factor, the neighborhood environmental factor, and the education factor(Chen, 2014).

In the existing empirical study, the most common form of hedonic functions are linear form and log-linear form, as (1) and (2) show below, respectively.

$$PRICE = \mu_i + \sum \omega_i \chi_i + \epsilon_i \qquad (1)$$

$$\text{Ln} PRICE = \mu_i + \sum \omega_i \chi_i + \epsilon_i \qquad (2)$$

In the two formulas, Price is the price vector of housing sample, LnPrice stands for the logarithmic vector of housing price, x means the housing feature vector, ω is the parameter to be estimated and ε is the residual item. It is found that the log-linear model has advantages over other models in that the coefficient of variation can easily be explained by a unit change in the characteristic that causes a change in the percentage of the price while helping to reduce the heteroscedasticity problem, thus this model has become the preferred model for hedonic empirical research.

IV. Empirical Research

1. Regression Model

This study is researched in four models based on 3 variables of interest and 14 control variables, besides, the regression analysis is carried out in <Table 4> and <Table 5>.

$$\begin{aligned}
\ln PRICE = {}& \mu_1 + \alpha_1 DISKEYPRIMARY \\
& + \alpha_2 ELEVATOR + \alpha_3 DECO \\
& + \alpha_4 FLOOR + \alpha_5 BALCONY \\
& + \alpha_6 OREIN + \alpha_7 DISGENHOSPITAL \\
& + \alpha_8 DISKEYHOSPITAL + \alpha_9 DISBUS \\
& + \alpha_{10} DISSUBWAY + a_{11} DISTRAIN \\
& + a_{12} PAYMENT + a_{13} AREA + \epsilon_1
\end{aligned}$$

$$\begin{aligned}
\ln PRICE = {}& \mu_2 + \beta_1 DISKEYMIDDLE + \beta_2 ELEVATOR \\
& + \beta_3 DECO + \beta_4 FLOOR + \beta_5 BALCONY \\
& + \beta_6 OREIN + \beta_7 DISGENHOSPITAL \\
& + \beta_8 DISKEYHOSPITAL + \beta_9 DISBUS \\
& + \beta_{10} DISSUBWAY + \beta_{11} DISTRAIN \\
& + \beta_{12} PAYMENT + \beta_{13} AREA + \epsilon_2
\end{aligned}$$

$$\begin{aligned}
\ln PRICE = {}& \mu_3 + \gamma_1 DISKEYHIGH + \gamma_2 ELEVATOR \\
& + \gamma_3 DECO + \gamma_4 FLOOR + \gamma_5 BALCONY \\
& + \gamma_6 OREIN + \gamma_7 DISGENHOSPITAL \\
& + \gamma_8 DISKEYHOSPITAL + \gamma_9 DISBUS \\
& + \gamma_{10} DISSUBWAY + \gamma_{11} DISTRAIN \\
& + \gamma_{12} PAYMENT + \gamma_{13} AREA + \epsilon_3
\end{aligned}$$

$$\begin{aligned}
\ln PRICE = {}& \mu_3 + \theta_1 DISKEYPRIMARY \\
& + \theta_2 DISKEYMIDDLE + \theta_3 DISKEYHIGH \\
& + \theta_4 ELEVATOR + \theta_5 DECO \\
& + \theta_6 FLOOR + \theta_7 BALCONY + \theta_8 OREIN \\
& + \theta_9 DISGENHOSPITAL \\
& + \theta_{10} DISKEYHOSPITAL + \theta_{11} DISBUS \\
& + \theta_{12} DISSUBWAY + \theta_{13} DISTRAIN \\
& + \theta_{14} PAYMENT + \theta_{15} AREA + \epsilon_4
\end{aligned}$$

SPSS estimation results are as below:

We did the regression using total price and unit price as dependent variable respectively. As can be seen from MODEL4 in <Table 4> and <Table 5>, the regression result tells that explanatory variables representing distance to key primary school, distance to key secondary school, distance to key high school and the control variables like DECO, OREIN, NOISE, DISKEYHOSPITAL and DISSUBWAY, all have negative effects on housing price. In MODEL1, 2, 3, the impacts of distance to key primary school, key secondary school and key high school on housing prices are also

negative. In the total equation (MODEL4), the variables representing the control variables ELEVATOR, FLOOR, BALCONY, DISGENHOSPITAL, DISBUS, DISTRAIN, PAYMENT and AREA all have positive effects on housing price.

From the overall model (MODEL4), the distance from residential buildings to key primary school, key middle school and key high school are significant at 1% level, which can be drawn that the nearer between residential building and key primary school, key middle school and key high school, the higher the housing price is, this is

<Table 4> Analysis Results for Total Price

LNTOTALPRICE	MODEL 1	MODEL2	MODEL3	MODEL4
	Coef.(Sd.E)	Coef.(Sd.E)	Coef.(Sd.E)	Coef.(Sd.E)
DISKEYPRIMARY	−0.0634418***			−0.020952***
	(0.003565)			(0.0044569)
DISKEYMIDDLE		−0.082988***		−0.118956***
		(0.003544)		(0.0047368)
DISKEYHIGH			−0.093898***	−0.152365***
			(0.00508)	(0.004854)
ELEVATOR	0.04610005***	0.0413715***	0.0398426***	0.0265916**
	(0.01826)	(0.018029)	(0.018650)	(0.017174)
FLOOR	0.002786	0.001391**	0.001655***	0.000231
	(0.000490)	(0.00048)	(0.000489)	(0.000445)
BALCONY	0.0778128***	0.140799**	0.150535***	0.115084**
	(0.011211)	(0.010033)	(0.010212)	(0.010431)
OREIN	0.267669***	0.269360***	0.227012***	0.274304***
	(0.008234)	(0.00798)	(0.008005)	(0.007341)
NOISE	−0.039181***	−0.049626***	−0.054649***	−0.068929***
	(0.008637)	(0.008448)	(0.008631)	(0.007742)
DISKEYHOSPITAL	−0.172540***	−0.1089209***	−0.016395***	−0.024111***
	(0.010597)	(0.009081)	(0.009768)	(0.010391)
DISGENHOSPITAL	0.134734***	0.1320026***	0.000819**	0.1518045***
	(0.010806)	(0.009729)	(0.008695)	(0.009643)
DISBUS	0.016007***	0.010658***	0.015668***	0.007754
	(0.003117)	(0.002986)	(0.003098)	(0.003130)
DISSUBWAY	−0.1689002***	−0.186950***	−0.158142***	−0.143123***
	(0.005087)	(0.004895)	(0.005203)	(0.004795)
DISTRAIN	0.164287***	0.1771979***	0.160837**	0.155571***
	(0.004256)	(0.004125)	(0.004272)	(0.003895)
PAYMENT	−0.006179***	−0.003106**	−0.004855***	−0.002141**
	(0.0079409)	(0.007767)	(0.007921)	(0.007076)
AREA	0.008569***	0.007044***	0.007459***	0.008300***
	(0.000132)	(0.000129)	(0.000136)	(0.000124)
_CONS	13.8585***	13.7755***	13.67735***	13.50881***
	(0.029683)	(0.029075)	(0.030673)	(0.028228)
R−squared	0.6719	0.6860	0.6734	0.7397

√ ***means significant at 1%, **means significant at 5%, *means significant at 10%

<Table 5> Analysis Results for Unit Price

LOGUNIPRICE	MODEL 1	MODEL2	MODEL3	MODEL4
	Coef.(Sd.E)	Coef.(Sd.E)	Coef.(Sd.E)	Coef.(Sd.E)
DISKEYPRIMARY	−0.0071054*** (0.00289)			−0.065671*** (0.00368)
DISKEYMIDDLE		−0.069464*** (0.00311)		−0.141824*** (0.00466)
DISKEYHIGH			−0.017714*** (0.00296)	−0.030526 *** (0.00351)
ELEVATOR	0.025689*** (0.001518)	0.027217*** (0.001441)	0.025032*** (0.001505)	0.025825*** (0.001393)
FLOOR	0.001087*** (0.00039)	0.000781*** (0.00037)	0.001091*** (0.00039)	0.000915*** (0.00036)
BALCONY	0.169832*** (0.00822)	0.136164*** (0.00796)	0.168049*** (0.00818)	0.122613*** (0.00766)
OREIN	0.173784*** (0.00647)	0.176667*** (0.00616)	0.187854 (0.00683)	0.160119*** (0.00647)
NOISE	−0.134875*** (0.00773)	−0.155514*** (0.00741)	−0.127589*** (0.00775)	−0.175604*** (0.00736)
DISKEYHOSPITAL	−0.076630*** (0.00806)	−0.116508*** (.007334)	−0.07661*** (0.00746)	−0.077592*** (0.00738)
DISKEYHOSPITAL	0.029307*** (0.00845)	0.108394*** (0.00775)	0.031525*** (0.00729)	0.069195*** (0.00783)
DISBUS	0.013767*** (0.000435)	0.008962*** (0.000454)	0.013729*** (0.000414)	0.007508*** (0.000448)
DISSUBWAY	−0.025941*** (0.00286)	−0.097158*** (0.00247)	−0.022907*** (0.00246)	−0.023684*** (0.00269)
DISTRAIN	0.126146*** (0.00382)	0.08088*** (0.00399)	0.126458*** (0.00353)	0.070404*** (0.00396)
PAYMENT	−0.018921** (0.006367)	−0.016901** (0.00606)	−0.018152*** (0.00634)	−0.016274*** (0.00582)
AREA	0.001294*** (0.00011)	0.00122*** (0.00010)	0.001314*** (0.00010)	0.00091*** (0.00009)
_CONS	9.616583*** (0.02863)	9.37096*** (0.02774)	9.58682*** (0.02781)	9.45235*** (0.02689)
R-squared	0.6102	0.6370	0.6120	0.7102

logical, which fully embodies the concept of "school district house", a possible explanation for this outcome that if the school is closer to the residence, the shorter the time it would take to get to school and the higher the safety factor of going to school for children, correspondingly it would raise the price.

The analysis results may be explained as follows:

Firstly, the current situation in China is the implementation of the nine-year compulsory education, so entrance requirements for primary and secondary schools depend on registered household, this policy encourages parents to prepare earlier and buy school-district housings in the neighborhoods corresponding to their preferred schools. In order to send their children to their preferred schools, many parents have no hesitation to spend heavily in buying the school district houses, so, the nearer between residential building and key primary school, key middle school and key high school, the higher the housing price is,

Secondly, the admission requirements for high school is based on test, which means only the test results was qualified, one has the right

to enter the corresponding high school, but due to the university entrance pressure of high school students, most of the high school students are required to attend night classes, so learning time is relatively compact. Moreover, the key high school has supplementary course in public holidays, which is conducive to improving academic performance. Living near the school can save much time and be benefit to study for high school students. So, it has a great appeal for parents to buy houses near the key high schools.

2. Robustness Test

SPSS estimation results are as below:

<Table 6> Robustness Test

LOGUNIPRICE	MODEL 1	MODEL2	MODEL3	MODEL4
	Coef.(Sd.E)	Coef.(Sd.E)	Coef.(Sd.E)	Coef.(Sd.E)
PRIMARY NUMBER	0.439706*** (0.009910)			0.033134*** (0.006333)
MIDDLE NUMBER		−0.046306*** (0.012402)		0.185343*** (0.048585)
HIGH NUMBER			0.281667** (0.094584)	0.036382*** (0.005078)
DISTRICT	−6.797823* (0.094399)	2.507903 (0.072582)	8.045697 (0.105299)	1.322468 (.1534299)
ELEVATOR	0.001531 (0.000282)	0.001257* (0.000255)	0.001068** (0.000232)	0.000919*** (0.000218)
FLOOR	0.002134*** (0.000490)	0.001215*** (0.000437)	0.000545*** (0.000462)	0.00676*** (0.000432)
BALCONY	0.1445173*** (0.010276)	0.097249*** (0.009253)	0.145853*** (0.009600)	0.096597*** (0.009122)
OREIN	0.225101*** (0.008043)	0.220068*** (0.007160)	0.274187*** (0.007623)	0.235711*** (0.007321)
NOISE	−0.010932*** (0.14713)	−0.074533*** (0.008244)	−0.0186612*** (0.008333)	−0.079991*** (0.008094)
DISKEYHOSPITAL	−0.147137*** (0.010013)	−0.164966*** (0.008474)	−0.113856*** (0.008690)	−0.121950*** (0.008775)
DISGENHOSPITAL	0.121042*** (0.010454)	0.188725*** (0.008781)	0.086956*** (0.008382)	0.13682*** (0.009268)
DISBUS	0.035151*** (0.003585)	0.045323*** (0.0028954)	0.0178959*** (0.002867)	0.024200*** (0.003164)
DISSUBWAY	−0.149879*** (0.005410)	−0.070777*** (0.005288)	−0.144355*** (0.004865)	−0.073527*** (0.005338)
DISTRAIN	0.137080*** (0.004744)	0.064144*** (0.004652)	0.135021*** (0.00745)	0.070184*** (0.00471)
PAYMENT	−0.006780*** (0.007953)	−0.008425*** (0.007086)	−0.00958*** (0.006850)	−0.008396*** (0.006929)
AREA	0.00674*** (0.000131)	0.007399*** (0.000118)	0.007197*** (0.000124)	0.007655*** (0.000117)
_CONS	13.51628*** (0.034697)	13.07899*** (0.0323031)	13.28158*** (0.032656)	13.11186*** (0.032026)
R-squared	0.6709	0.7387	0.7113	0.7503

As the definition of the school district house is residential area that has a distance from the school within certain range, so the numbers of primary, middle and high schools within 3 kilometers around the residence would have a certain impact on house prices respectively. Besides, due to the data was collected about 4008 households from 4 residential districts, so in order to solve the spatial autocorrelation problem, we create the dummy variable "DISTRICT", and the households in one residential district are set as "1", the other households which in remaining 3 residential districts are set as "0". Then we did the regression analysis again. In robustness test, we can see that interest variables representing the number of primary schools, middle schools and high schools all have significant effects on housing price. The coefficients of these three are all positive, which means that the more schools around the residential area, the higher housing price is, which is not defying logic.

Among the control variables of structure characteristics, ELEVATOR, FLOOR, BALCONY, and AREA have positive correlations with house prices. It should be noted that the selected samples in this paper are all small high-rise buildings. The reason for this outcome might be that more elevators in buildings means more convenient conditions, so the house prices with more than two elevators are higher than that with only two. Besides, the more floors and more balcony, then higher the price will be, the most likely reason is that the high-level vision is more open and well-lit, it also far away from the street and the dust, which can improve the quality of life. The house price is higher with bigger area. In our sample, the houses are basically two-bedroom and three-bedroom, which are more suitable for a family of three and in line with the wishes of buyers.

For transportation aspect in the variables of location, distance to subway has negative effect on residential price at the significant level of 1%, which means that the price of the residential building near the subway is correspondingly higher, the closer to the subway station, the more convenient for living, this result is similar with some western scholar's research, many results support the hypothesis that proximity to rail transit stations could increases housing prices (Kay, Noland & DiPetrillo, 2014). Besides, some Chinese scholars found that the distance to bus terminal has a negative significant influence on housing price while the distance to railway station has a positive significant influence on housing price. (Zheng & Liu, 2005). While in my study, the distance to bus station and train station in all the models has a positive significant impact at level 1%, the reason may be that bus and train station can make people's travel more convenient, but there are massive passenger around terminal in the capital of China, especially frequent floating of migrants from other districts, more mobile population always produce generally high crime rates, which cannot guarantee the security environment. Besides, railway stations are generally built in the outskirts of the city, or even remote areas because of the serious noise pollution which can disturb residents' living, so the farther away from the train station, the higher the housing price is.

For neighborhood characteristics, distance to key hospital exerts negative significant effect on housing prices. The closer to the key hospital, the higher prices are. Key hospitals have good medical facilities and conditions, so people's purchase desire might be relatively high near it. As for the general hospital, medical facilities are not perfect and the ancillary facilities are not complete, so people's purchase desire is not very high. Moreover, general hospitals are far from the downtown, so distance to general hospital has positive effect on residential price, which may be the reason for that the farther away

from general hospitals, the higher housing prices are.

For other aspects, noise has a positive significant influence on housing price, this is common sense, the lower noise stands for a more comfortable environment, so the housing price will be relatively high.

Ⅴ. Summary and Conclusions

School District Housing, as a real-life hot topic, is directly related to the government's policy of "nearby-enrollment policy" and "key school policy". Whether the phenomenon of school district house is fair or not is lack of factual basis. So, aiming at this, through the discussion in subjective and objective dimensions, this thesis arrived at the following conclusions:

First of all, the school district is the product of Chinese education policies historically, Due to the uneven distribution of educational resources and the growing demand for high quality educational resources, so in the school choice process, the families who owns good family background and high social position could send their children to good schools legitimately. In China, it is difficult to achieve full balance and fairness. The purchase of school district housing is the product of social construction under the circumstance of market principle, is a special school choice that exchanges quality education by money. (Huang, 2010)

Secondly, the hedonic model is an effective tool to analyze the influencing factors and mechanism of the housing price. Based on the collected data, this paper carried out empirical analysis on the real estate market of Fangshan District in Beijing. The results show that the distances to key primary, key secondary and key senior high schools all exert negative significances

on housing prices, which can explains that the buyers of school district houses are willing to pay more in order to send their children to their desired schools.

This paper reveals the mechanism of formation of the school district housing prices. "Sky-high school district house" has become a common phenomenon in China now because of the scarcity of school district houses, which means the demand is much more than the supply, the parents have to buy the school district houses at a whopping price. The local government should improve the educational policies and establish the education guarantee mechanism, strive to promote the quality level of education services of Beijing city, in order to equalize educational resources and perfect the localized real estate control policy.

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