What's the effect of urban villages on commercial housing price?

An Analysis Based on Second-Hand Housing Transactions in Beijing

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Abstract China's rapid urbanization, characterized by large-scale rural-urban migration and radial expansion of urban built-up areas, has produced a new type of urban neighborhood, namely the *chengzhongcun*. With access to an unique micro second-hand housing transactions database which the number of samples is more than 20 thousands during the period from 2006 to 2011 in Beijing, and the list of the 50 key villages which was announced by the government in 2010, we first develop a hedonic housing price model to investigate whether the proximity to urban villages affects the selling price of urban housing units, and then use a DID-Hedonic model specification to examine the effect of the redevelopment project on the surrounding housing price. Controlling for the structure, other characteristics of urban housing units, the time trend and the spatial fixed effect, we find that housing prices are lower the closer the buildings are from urban villages. Further, the housing units near the villages do enjoy a higher increase in price after the announcement of the redevelopment projects. Both of the results are significant at 1% level. This may indicate a significant negative externality of urban village to its neighbors.

1. Introduction

Behind the amazing prosperity and vitality of Chinese cities, and maybe just beside the towering landmark buildings, there are the urban villages inhabited by large numbers of migrant workers. On one hand, the urban villages have provided low-cost housing for large amount of immigrant in the city, and support the city's industrial development by maintaining low-cost labor. So someone regards the urban villages as "the patches of the city". But one the other hand, because of the lack of urban management and supporting public service, most urban villages are

suffering from the "dirty, noisy and disorder" living condition. Hence people also call these villages "the scar of the city".

The urban village can be regarded as a product of both rapid urbanization and the binary of the urban-rural land market in China (Song and Zenou 2012)[1]. And the topics about urban village cover many aspects of urban development, such as the population, land, housing, social integration and urban planning. Many scholars have focused on deciphering the urban villages, exploring the reason why migrants live there and investigating their living conditions and behaviors (Li 2002, Zheng et al, 2009, Lan and Feng 2012)[2,3,4], or criticizing the redevelopment polices for villages(Zhang et al, 2003)[5].

However, in the circumstance that urban villages are just embed in the modern urban landscapes and surrounded by residential or commercial developments, a very interesting question is what are the effects of these villages on urban housing markets? Specifically, if a standard house is moving near the urban village, will the transaction price change? Further, if a village is going to be redeveloped, what will the price trend of its surrounding houses be like? To our knowledge, these two questions have received little formal analysis by scholars. We attempt to answer these two questions in this study.

In this paper, with access to an unique micro second-hand housing transactions database during the period from 2006 to 2011 in Beijing, which is provided by the China Data Center at Tsinghua University, and the list of the 50 key villages which was announced by the government in 2010, we first develop a hedonic housing price model to investigate whether the proximity to urban villages affects the selling price of urban housing units. And then examine the effect of the redevelopment projects of urban villages on surrounding housing units' selling price, with a DID-hedonic model specification.

2. Externality of Urban Villages

Through background analysis and on-site survey, previous researches look deep into the externality of urban village from many different aspects. The village's negative externalities are presented in three aspects: urban spatial form, social security and rent income (Wen et al. 2007, Zhao 2011)[6,7]. The high criminal rate, which results from poor living conditions and high density of floating population with low income, destroy the city's image and cause severe social problems. The land value suffers much from such effects in two ways: on one hand, many workers would choose to live in the urban villages to cut their spending, though many of them can afford sharing commodity housing, thus undervaluing the neighboring commodity housing price through market competition ; on the other hand, urban economics studies show that high criminal rates and poor hygiene conditions would affect land value negatively since people, if possible, would choose to live away from such factors.

Previous studies also prove that urban villages can also have some positive effect on a city's development. The villages can provide much cheaper labor to support the urban development and help villagers to accumulate wealth. Zheng et al.

2011[8] document that in the early period of the urban development which labor-intense industries is dominate, urban villages provide large amount of low cost labors through the affordable houses to rural migrants so that help to sustain the rapid GDP growth. To some extent, the urban villages create public benefits: the villagers earn a lot from the house rent and improve their utilities without the subsidization from the city government, thus promoting the social stability and accelerating the city's development. Besides, in some southern areas, the urban villages, usually with local distinguishing features, act as cultural carriers (Wang, et.al, 2009) [9]. China's urban villages are far different from slums in the western countries in the way that they provide neighboring households with much convenience despite the dirty and chaotic living environment.[1]

2.3 The effect of Urban Village on Housing Market

The externality of urban villages will affect people's residential location choice behavior (both from the positive side and negative side) and further influence the commodity housing price.

However, the existing studies mainly focus on qualitative analysis and discussion of the externality to propose policy suggestions rather than analyzing the impact of it from the quantitative aspect. Recently, Song et al. 2012[1] apply Hedonic housing price model to empirically analysis the effect of urban villages in Nanshan District, Shenzhen. Their study reveals that the price of residential housing unit which locate closer to the urban villages is significantly lower than others. In this paper, we will study the effect of both the existence and redevelopment of urban villages on neighboring houses transaction price using quantitative methods with the data of 50 key urban villages in Beijing and a large amount of micro second-hand housing transaction units from 2006 to 2011.

3. Data

3.1 Definition of Urban Villages in Beijing and Study Area

What we studied in this paper are the villages locate in the urban fringe, which means the village samples are those urban villages[2] located far away from the city center and have gathered many immigrant settlements. To be consistent, we choose the areas within the 5th Ring Road to study.

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[1] Apart from the negative effects mentioned above, the citizens also approve of the positive functions of urban villages such as cheap daily commodities and services, such as cleaning staff and security guards.

[2] The urban villages in Beijing can be classified into two types: the first type refers to the nooks of the city which are in the built-up area with poor hygiene condition and social security; the second refers to the administrative villages in urban planning areas, most of which are located in rural-urban fringe zones. The differences of the two lie in the land ownership, size and location. The land of the first type is state owned while the second is rural collective owned. As for the size and location, the first villages are mainly small ones close to the center of the city (within 4th Ring Road or even 3rd Ring Road) while the latter are large ones where many immigrants are settled and are further form the city center (most are out of the 4th ring road of Beijing).

After the 2008 Olympics, Beijing started the renovation of urban villages in rural-urban fringe zone and takes more efforts to ensure the stability of villages with more immigrants and social security problems after the Xinjiang "7-5" event in 2009. The working list of 50 villages to be renovated was issued and the renovation began in the beginning of 2010[3]. The list contains detailed information of the names and locations of these villages and thus can be used as the potential samples in this empirical study after space processing. Since we have limited the study area within the 5th Ring Road, 28 remote ones were ruled out and 22 were selected (The detailed locations are shown in Figure 1). We can at least make sure that these urban villages have always existed by 2010, and the information that these villages will be redevelop is announced at the first quarter of 2010, it is feasible to base our empirical study on them.

3.2 Micro Data of Beijing Second-hand Housing Transactions

Another important source of data of our paper is the micro-sample data of Beijing stock housing transactions which is from "Wo Ai Wo Jia" (a housing agency in Beijing), the samples record in detail the micro-information[4] of each second-hand housing transaction from 2006 to 2011 in Beijing. The spatial distribution situation is shown in Figure 1.

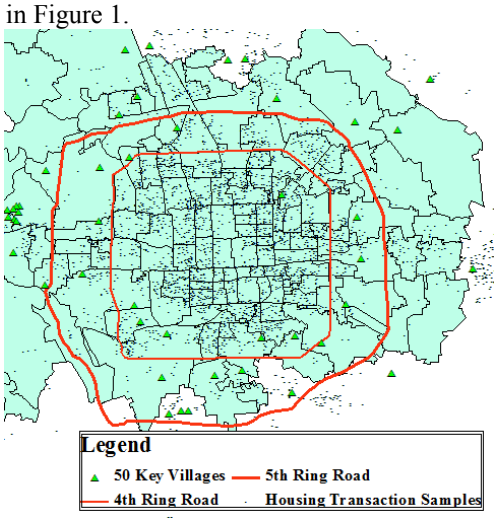

Fig. 1. Spatial Distribution of Urban Villages and Housing Samples, and The Range of the 5th Ring Road in Beijing

[3] Due to the lack of information, we cannot get detailed information about the location of all the urban villages in Beijing. According to the survey by Beijing Liquidity Management Committee in 2009, the number of villages with more than 10,000 immigrants has reached 81 (Feng 2010)[10]. Thanks to the vigorous promotion of renovation programs and news reports, we are able to collect some key facts of the villages.

[4] The information includes features like the transaction price, project name of the house, location, etc. and housing structural features like the area, house age, house type, floor, orientation, decoration, etc.

4. Methodology

In the first stage, we aim to capture the effect of the existence of urban villages on the nearby housing units price, which we expect to be significantly negative. The method of empirical study is based on Hedonic model and is shown in expression (1). By controlling other influential factors we can find out the influences of urban villages on the commodity housing price. The decisive factors of the urban housing price are as follow:

Log (Housing Price) (Average Price Per m^2)

= *f* (Influence of Urban Village, Housing Structural Feature, Housing Spatial Feature; Spatial Difference, Temporal Trend) (1)

Among the influential factors, the first is the housing spatial feature, like the distance between the house and working center/sub-center, the distance between the house and subway station, primary school, shopping mall, etc., which measures the house's spatial convenience. The second is the house's structural feature, like the house type, floor, area, orientation, house age, decoration, etc. The third includes some spatial differences that are hard to observe and quantify, like the influence of factors impossible to observe, for example the better administration or neighborhood environment. In the empirical study we control space-fixed effects through applying dummy variables to each jiedao. The fourth factor is the transaction time, and we add quarter dummy variables to capture the time trend of housing price. Controlling all the influential factors above, we can find the clear effect of urban villages on the commodity housing price, what effect will spatial proximity to urban village have on transaction price when other factors are fixed?

In the second stage, we set up a DID-Hedonic model specification to analysis what the price of the housing units near the urban villages will be like after the announcement that the villages will be redeveloped. And we expect the result to be significantly positive. The model specification is shown in expression (2). The dummy variable *D_In* indicates that whether the housing sample is near a urban village, which distinguish the experimental group (housing samples near the villages, within 1.5km around the urban village) and control group (housing samples out of the villages). And the variable *D_Govern* takes the value of 0 before 2010 and takes the value of 1 since 2010Q1, which indicates that whether the announcement of the redevelopment project is published to the society and help to distinguish whether the treatment takes places. After controlling for the two dummy variables and others the same as equation (1), we focus on the interact term of these two dummy variables *"D_In*D_Govern"*, this variable capture the difference of the housing transaction samples' price between both in/outside the urban villages and before/after the information of redevelopment is announcement. We expect the variable to be significantly positive, which means that the redevelopment of urban villages will help to increase the transaction price of the nearby housing units.

Log (Housing Price) (Average Price Per m^2)

= *f* (Dummy_In, Dummy_Govern, D_In*D_Govern; Other Controlled Variables) (2)

The main independent variables used in empirical study are shown in Table 1.

Table 1. The Independent Variables Used in the Empirical Study

Category	Main Variables (Properties of Housing samples)	Symbol used in the Model
1. Urban Village	Distance to Nearest Urban Village	Lnd_village
2. Spatial Feature	Distance to CBD	D_cbd
	Distance to the Working Sub-center (Beijing Financial Center)	Lnd_jrj
	Distance to the Working Sub-center (Beijing Yayuncun)	Lnd_yyc
	Distance to the Working Sub-center (Beijing Zhongguancun)	Lnd_zgc
	Distance to Subway Station	Lnd_sub
	Distance to Primary School	Lnd_school
	Distance to the Hospital	Lnd_hospital
	Distance to Shopping Mall	Lnd_shop
3. Housing Feature	Number of Parlour	Parlour
	Number of Bedroom	Room
	House Age	Age
	Area	Area
	Floor	Floor
	Total Floor of the Program	Total_floor
	Orientation	Towards
	Decoration	Decoration
4. Space-fixed Effect	*Jiedao* Dummy Variable	*Jiedao_id*
5. Time-fixed Effect	Quarter Dummy Variable	Quarter

Note:
(1) All the distances are calculated with the help of GIS.
(2) The Symbol Ln means calculate the logarithm of distance.
(3) Considering the construction process of Beijing subway, Distance to Subway Station represents the distance between the housing sample and the nearest subway station that has opened at the time of transaction.

5. Empirical results and analysis

5.1 Basic model results

The results of existence of urban villages on nearby housing price are shown in Table 3. In this stage, we using the micro housing samples which the transaction time is between 2006 and 2009, just before the start of the redevelopment in 2010Q1.

Column (1) indicates that the price gradient near urban villages is significantly positive under the control of urban spatial characteristics, housing structural characteristics, jiedao-fixed effect and quarter fixed effect. This result indicates that the closer housing units are to the urban villages, the lower are the housing prices. When the residential houses are 10% closer to the urban villages, the housing price will decrease 2.7%. Since many of the samples are located within the third

ring of Beijing while the urban villages are usually out of the third ring, we redo the regulation just using the housing transaction samples within 3 km of the urban villages in column (2). The results also indicate significantly negative effect of urban villages to the prices of residential houses that nearby. When the distance between the sample and the urban villages decreases by 10%, the housing price will decrease 2.1%.

Besides the analysis of housing gradient, we set the distance (1km, 1.5km, 2km) between the urban villages and the residential houses as dummy variables in columns (3)-(5). Take equation (3) for instance, the housing price will decrease by 2.6% when the house is located within 1km of the urban villages. This result shows more significantly negative effect of urban villages in Beijing to housing prices than the empirical result done by Song (2012) in studying the urban villages and housing value in Shenzhen.

Table 2. The existence of urban villages and surrounding housing units' price

Equation	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
	Total samples 2006-2009	***Subsamples within 3 km of the villages***	***Total samples 2006-2009***		
VARIABLES	Log(HP)	Log(HP)	Log(HP)	Log(HP)	Log(HP)
Lnd_village	0.027***	0.021***			
	(5.434)	(3.736)			
Dv1000			-0.026***		
			(-3.419)		
Dv1500				-0.028***	
				(-4.325)	
Dv2000					-0.016***
					(-2.919)
D_cbd	-0.013***	-0.037***	-0.012***	-0.013***	-0.011***
	(-4.794)	(-8.417)	(-4.626)	(-4.883)	(-4.281)
Lnd_sub	-0.017***	-0.022***	-0.015***	-0.015***	-0.016***
	(-5.719)	(-5.377)	(-5.211)	(-5.214)	(-5.337)
Urban Spatial Characteristics	YES	YES	YES	YES	YES
Housing Structural Characteristics	YES	YES	YES	YES	YES
Quarter Dummies	YES	YES	YES	YES	YES
Jiedao-fixed effect	YES	YES	YES	YES	YES
Observations	15968	7391	15968	15968	15968
R-squared	0.689	0.719	0.689	0.689	0.689

Note: T-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The results table is simplified by merging some controlled variables of the same type, and the list of all the independent variables are shown in Table 1.

5.2 DID-Hedonic Model results

Further, we examine whether the announcement of the urban village redevelopment project will affect the nearby housing units' value using the DID-Hedonic

model specification shown in Expression (2), and the micro housing samples from 2006 to 2011.

The results are shown in table 4. In column (6), the dummy variable D_In is significantly negative at 1% level, which also indicates that within the 1.5km of the nearest urban villages will significantly decrease the transaction price, and the dummy variable D_Govern is significantly positive at 1% level, after controlling for the quarter dummies, this shows that the housing price is significantly higher after 2010Q1 than before. What we most concern is the interact term of the two dummies, and the results prove to be significantly positive at 1% level. This means that the housing samples near the urban villages experience a significantly higher price increase after the announcement was published than the housing units further from the villages.

In the full regression results of equation (6), some of the variables of urban spatial characteristics are not significant and the signs are opposite to expect. We delete other urban spatial variables except the distance to the CBD and subway station, the results is shown in column (7) which is nearly the same as in column (6).

Table 3. The announcement of redevelopment and surrounding housing units' price

Equation	**(6)**	**(7)**
	Total samples 2006-2011	
VARIABLES	Lnhp	Lnhp
D_In	-0.022***	-0.022***
	(-2.638)	(-2.660)
D_Govern	1.120***	1.115***
	(65.566)	(64.986)
D_In*D_Govern	0.031***	0.032***
	(2.682)	(2.742)
D_cbd	-0.010***	-0.020***
	(-3.740)	(-11.192)
Lnd_sub	-0.007**	-0.019***
	(-2.404)	(-6.807)
Other Urban Spatial Characteristics	YES	NO
Housing Structural Characteristics	YES	YES
Quarter Dummies	YES	YES
Jiedao-fixed effect	YES	YES
Constant	12.183***	9.744***
	(56.903)	(205.399)
Observations	24521	24521
R-squared	0.721	0.718

Note: T-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1

5.3 Questions to be further discussed

We must admit that there are still some problems and shortcomings of this paper.

First of all, the samples chosen for studying urban villages do not cover all the villages in Beijing and may even miss a lot. The empirical study in this paper choose 50 key villages published in 2010 that located within the fifth ring in Beijing as its samples and indicates the significantly negative effect of urban villages to housing price. All of these 50 key villages share some typical characteristics, for example, there are many migrant populations in the village and the public security may sometimes be not guaranteed. These characteristics could also strengthen the negative effect in housing price. In this way, the housing price that negatively affected and decreased by other urban villages are taken as the basic price that are not affected by any villages in comparing with the samples in the empirical study. As a result, the study underestimated the real effect of urban villages—they should have more negative effects when the influence of other villages is controlled. Also, if there exists significantly difference between the key villages and other villages, there will be more uncertainty in the result.

Secondly, the influences of each typical village's characteristics to external effects are not considered in the study, for instance, the influence of area and migrant population are not taken into consideration subject to the availability of data. In this study, the village within the city is considered as a point when calculating the distance between the residential houses and the village.

6. Conclusions

The externality of urban villages has been the hot spot in academic study and both the negative and positive external effects have been pointed out, but quantitatively empirical analysis is not much. This paper empirically studies the effect of the urban villages on the nearby housing units from the perspective of both the existence and the redevelopment of urban villages, based on the micro housing transaction data and 50 key villages in Beijing. The empirical results in this paper indicate the significant negative effect of urban villages to the surrounding housing prices. What's more, the price of surrounding housing units show a significantly increase after the announcement that the nearby village will be redeveloped.

First, this paper proves that the existence of urban villages have significantly negative effect on the nearby housing price, and the residential housing units' price that locates within 1km of the village are 2.6% lower than those outside the village. This reflects the negative effect of urban villages decrease residents' willingness of buying the houses. Second, we also find the significant positive effect of the redevelopment of the urban village on the housing samples' price. After the information of the redevelopment is published, the housing units near the urban villages do enjoy a higher price increase than the further ones.

This empirical result could be used as reference in creating new method of gathering resources in the process of the redevelopment of urban villages. Developers have involved in redeveloping urban villages in some cities where market competitive mechanism has been introduced, while developers in Beijing are not that interested in that due to the strict planning constrain. The reconstruction of urban villages could help eliminate or alleviate the negative external effects so as

to increase the value of surrounding properties, which will be popular among owners. Under this circumstance, the owners of surrounding properties could be involved in developing the village jointly or they could help financing the project, for instance, use a portion of the property tax of surrounding properties as the construction capital resource. Furthermore, attentions should be paid to positive external effects that could not be capitalized in housing market. In the reconstruction of urban villages, the government should not focus on eliminating the villages but on protecting the rights of disadvantaged groups like local villagers and the migrant working populations. It is hoped that, the financing mode proposed in this paper could help in raising fund and increase the subsidy to disadvantaged groups in reconstructing the urban villages.

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