The Influence of Floating Population on Real Estate Prices: An Empirical Study of Beijing

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Abstract. Housing market of Beijing has been active in recent years with rapid price growth, though sequential strict housing policies were carried out by the government for stabilizing the price; further evaluation of them is needed. Large amount of population flowed into Beijing due to its superior city resources, stimulating diverse housing demands. The paper builds Panel Data models of Beijing’s housing price data in 2000-2016 and implements stepwise regression method for the measurement of the influence that floating population has on housing prices with comprehensive considerations of other factors. It reaches a conclusion that floating population has remarkably positive influence on housing prices, namely, when it grows by 1%, the average selling price of commercial residential real estate will have variation of 9158.023 Yuan/m². Based on the results, the paper proposes that the government should make a reasonable control of the city population, improve the integrity of the supplying system, produce to reverse pressure for relief of the excessive price growth.

1. Introduction

During the period from January to February, 2017, the area of real estates under construction and completed is 102 million and 1.50 million square meters respectively in Beijing. While the sales area for existing houses and forward-delivery houses is 1.34 million square meters, among which the residential area is 0.87 million square meters. According to the data from State Statistics Bureau, the housing price index of newly built and second-hand commercial residential houses in Beijing increased by 24.1% and 32.2% in the year to February, 2017. The February has seen an active real estate sales market and rapid growth in housing prices for every district except Shunyi, with the average commercial residential housing price for Xicheng District, Chaoyang District and Dongchen District is 84832 Yuan/m², 71770 Yuan/m², 78668 Yuan/m² each.

In March, 2017, Beijing Commission of Housing announced notifications about commercial houses sales optimization and loan policy differentiation as response for the orientation “Houses are for residence instead of investment” proposed in the Central Economic Working Conference, which aims at implementing more stricter commercial house trading policies in order to avoid economic risks brought by excessive growth of housing price and promote a stable and healthy real estate market. In fact, in order to build a sustainable and healthy real estate environment, the government began to regulate the market through measures like adjusting land supply, deposit reserve ratio, first real estate mortgage interest rate and property-purchasing limitation, etc. However, the concentrated control policies have limited effects, with the housing price of Beijing grows by 188% in half a decade. Therefore, research about the influential factors and the logic behind the growth of housing price has practical significance for the development of the market.

“Report for Chinese Floating Population 2016” implies that, the floating population in China reached 247 million in 2015, accounting for 18% of the total. In the “13th Five-Year Plan” period, super metropolises will continue to grow with their population. Factors like huge floating population, increased living stability, enlarged family size etc. will all contribute to the housing price changes. Though there are lots of factors related to housing prices, “the dominant behavioral agent is human and the fundamental demand of the real estate market is human demand, therefore, it is necessary to coordinate the relation between real estate market and population”. Beijing has an early-formulated and integrate real estate market and as the Political, Economic, Cultural center of China, it has large population inflow and great residential demand. Based on Beijing’s housing price and floating
population data in 2000-2016, the paper analyzes influential factors comprehensively with a focus on the influence that floating population has on housing prices.

2. Literature Review

In a long term, scholars around the globe have been paying attention to and conducting studies on the influential factors of housing price and the inner logic of housing price growth, for their important theoretical and practical meanings. Goodman [1], Kenny [2] and Mark Andrew [3] made researches on the effect of interest rate on housing price, Wachter [4] and Kauko [5] analyze the relationship between housing price and land supply and land price. Chinese scholars such as Yong Li and Yougui Wang [6], etc. have a conclusion that average net income and money supply are the primary factors of housing price through state space model while through empirical study. C. Li [7] et al. believes that average net income and speculation behaviors are main reasons of housing price growth. H. An and R. Wang [8] systematically summarize influential factors, including economic factors like population size, income, unemployment rate, inflation rate etc. and policy factors such as monetary policy, land policy, loan policy, tax policy, etc.

Population factors are usually used to explain and predict housing price variation and tendency in empirical study. Among the researches about the influence that natural population size variation has on housing price, Engelhardt and Poterba [9] study relationship between the housing price and housing demand change driven by population in Canada after World War II; S. Chen and Y. Zhu [10] observe the relationship between housing price and China urban population from 1991 to 2005; B. Du, Y. Zhang [11] measure the degree of association between the current comprehensive population and economic factor and housing sales price index (HSPI) in China; C. Sun [12] studies the effect of population, natural, social and regional factors on housing price taking Tianjin as an example. In studies on the relationship of population age structure and housing price, Mankiw and Weil [13] construct a housing demand function with age structure as variable, believing that the population size and structure change caused by post World War II baby boom propels the real estate market price growth in two decades. Robert’s work [14] demonstrates that baby boom and the population structure change it brings is the main force that propels the housing price variation, it also well predicts the housing price in America and Japan. H. Gao [15], F. Guo and E. Zhou [16], Y. Fang [17] et al. also make a conclusion that population age structure is an important factor in explaining housing price variation. As for the research work about the influence of regional population flow on housing price, statistical analysis by Albert [18] on the impact of American floating population has on housing price shows that when floating population grows by 1 percent, housing price of American cities will increase by 1.5 percent. Chen [19] conducts empirical research on urban-rural population migration, urbanization and housing price growth based on time series data and cross-section data, demonstrating that housing policy reformation propels supply marketization, and population migration stimulates the growth of housing price. Moos [20] studies the interior structure and housing demand changes of Vancouver brought by the immigrants. While Chinese scholars Y. Liu [21], W. Wang [22], M. Lu [23], Y. Wang [24] and J. Bai [25] et al. study the relationship between housing price and cross-regional floating population above large volume of samples. In addition, some scholars carry out empirical research on specific cities, for instance, L. Wu and Q. Liu [26] study the data of prefecture-level cities in Guangdong province in 1997-1998 and reach the conclusion that population migration leads to the hump-shape distribution of housing price in Pearl River Delta region; Y. Wu [27] uses Nanjing as an example and comes to the conclusion that the influence of metropolitan interior/exterior population flow on housing price is different. Based on the work of other scholars, we can find that population is an important explanatory factor among many influential factors for housing price variation. However, Chinese scholars mainly conduct qualitative research, there lacks quantitative analysis of the precise degree of influence floating population has on housing price. So, the author plans to conduct a quantitative analysis of the influence level of floating population has on housing price with comprehensive considerations of all factors. Detailed explanation of the results will also be given at last.
3. Empirical Research

3.1 Model and Variable Introduction

Variables in the paper have both time series and cross section characteristics. In spite of multiple influential factors, non-dominant and secondary factors can be effectively eliminated through Panel Data model analysis, and making the primary influential factors as variable will improve the model precision and clearly demonstrate the influence of floating population on housing price. In view of previous research and comprehensive consideration of data availability, the paper preliminarily selects average selling price of commercial residential real estate as dependent variable to represent average housing price in Beijing, floating residential population\(^1\) as independent variable for indication of floating population, and native residential population\(^2\), urban residents’ average net income, consumer price index, residential building construction area, residential building completed area and national loans for real estate company as six control variables, variable illustration is shown in table1, all the data is from “Beijing Statistical Yearly Book 2016”, National Statistical Bureau and People ’s Bank of China. We make the model as below:

\[
Y = a_0 + b_1K_1 + b_2K_2 + b_3K_3 + b_4K_4 + b_5K_5+b_6K_6 + cX + e
\]

\(Y\) is the average housing sales price, \(K_i\) represents the above five control factors, \(X\) is resident floating population, \(a_0,b_1,c\) are regression coefficients and \(e\) is random error.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Min.</th>
<th>Max.</th>
<th>Average</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native residential population (10 thousand)</td>
<td>1363.60</td>
<td>2172.90</td>
<td>1778.0353</td>
<td>304.39347</td>
</tr>
<tr>
<td>Floating residential population (10 thousand)</td>
<td>256</td>
<td>823</td>
<td>546.71</td>
<td>224.057</td>
</tr>
<tr>
<td>Urban citizens average net income (Yuan)</td>
<td>10350</td>
<td>57275</td>
<td>27517.93</td>
<td>14507.487</td>
</tr>
<tr>
<td>National loans for real estate company (100 million)</td>
<td>239</td>
<td>2368</td>
<td>1185.21</td>
<td>705.280</td>
</tr>
<tr>
<td>Consumer price index (last year=100)</td>
<td>239</td>
<td>2368</td>
<td>1185.21</td>
<td>705.280</td>
</tr>
<tr>
<td>Residential building construction area (10 thousand m(^2))</td>
<td>4083</td>
<td>9469</td>
<td>7293.65</td>
<td>1447.944</td>
</tr>
<tr>
<td>Residential building completed area (10 thousand m(^2))</td>
<td>1275</td>
<td>3024</td>
<td>2145.78</td>
<td>418.161</td>
</tr>
<tr>
<td>Average selling price of commercial residential real estate (Yuan/ m(^2))</td>
<td>4456</td>
<td>34700</td>
<td>12622.90</td>
<td>8233.057</td>
</tr>
</tbody>
</table>

3.2 Results

Through stepwise regression, the correlation between average price of commercial residential houses and five variables including Native residential population, Urban citizens average net income, Consumer price index, Residential building construction area, Residential building construction area and National loans for real estate company is studied, the regression analysis result is shown in Table 2. By observing the regression result of real estate price and initial control variables, we can find that the R Square value for three factors including Consumer price index, Residential building construction area, Residential building completed area is relatively low, and the respective P values of salient detection are all above 0.05, which indicates that the variables have low explanatory power, so these three factors are eliminated from the model. With a 0.05 salient level, it can be considered that there is linear relationship between Native residential population, Urban citizen average net income, National loans for real estate company and Average selling price of commercial residential real estate. VIF collinearity test leads to the conclusion that Native residential population and Floating

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\(^1\)Floating residential population refers to population coming from other provinces, autonomous regions or municipality except Beijing who does not possess citizenship of Beijing but has lived in Beijing for more than half a year.

\(^2\)Native residential population refers to the population which lives in Beijing for more than half a year.
residential population has strong collinearity, so they are merged for precision, and the model after elimination and optimization is illustrated as below:

\[ Y = a_0 + b_1K_1 + b_2K_2 + cX + e \]

Table 2. Regression result of housing price and initial control factors.

<table>
<thead>
<tr>
<th>Explanatory factors</th>
<th>R Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native residential population (10 thousand)</td>
<td>.811</td>
<td>64.173</td>
<td>.000</td>
</tr>
<tr>
<td>Floating residential population (10 thousand)</td>
<td>.919</td>
<td>169.914</td>
<td>.000</td>
</tr>
<tr>
<td>Urban citizens average net income (Yuan)</td>
<td>.027</td>
<td>.409</td>
<td>.532</td>
</tr>
<tr>
<td>National loans for real estate company (100 million)</td>
<td>.105</td>
<td>1.761</td>
<td>.204</td>
</tr>
<tr>
<td>Consumer price index (last year=100)</td>
<td>.185</td>
<td>3.395</td>
<td>.085</td>
</tr>
<tr>
<td>Residential building construction area (10 thousand m2)</td>
<td>.693</td>
<td>33.794</td>
<td>.000</td>
</tr>
<tr>
<td>Percentage of floating population</td>
<td>.725</td>
<td>39.633</td>
<td>.000</td>
</tr>
</tbody>
</table>

Among which \( Y \) is Average selling price of commercial residential real estate, \( K_1 \) represents Urban citizen average net income, National loans for real estate company while \( X \) is the percentage of floating population of the total population, \( a_0, b_1, c \) are regression coefficients and \( e \) is random error \((i = 1, 2, 3)\).

The paper focuses on the influence of floating population on real estate price, so coefficients of control variables will not be illustrated. Though literature review, we can find that there are multiple factors influencing real estate price and the analysis result of Panel Data model shows that above 70% of Average selling price of commercial residential real estate can be explained by Percentage of floating population, Urban citizens average net income and National loans for real estate company. Percentage of floating population has dominant positive effect, namely, when it grows by 1%, the average selling price of commercial residential real estate will have variation of 9158.023 Yuan. Statistical equation is given as follow:

\[
Y = -14395.946 + b_1K_1 + b_2K_2 + 9158.023X + e
\]

\[
T = (-3.253) \quad (6.295)
\]

\[
P = 0.005 \quad 0.000
\]

\[
R^2 = 0.725
\]

4. Conclusions and Policy Suggestions

4.1 Conclusions

The paper analyzes the relationship between floating population and housing price in Beijing from 2000 to 2016 through a simplified model. With stepwise regression statistical method, it reaches a conclusion that population; income and loan have significant effects on housing price which is coherent to previous study of influential factors for housing price. Compared with traditional statistical model, the paper not only considers floating population as a single factor for housing price, but also improves the precision and validity by controlling other important factors. The result shows that floating population has direct and salient influence on housing price. In short term, because of the low resilience of housing supply, the residential demand and investment demand brought by the increase of floating population will directly raise the total effective demand of Beijing real estate market; therefore, floating population can significantly stimulate housing price growth. In a long term, people’s demand of improving residential condition grows with their continually improving income and living condition, and the change of urban population age structure and family size driven by
floating population add diversity to real estate residential demand levels, therefore, the influence of floating population on housing price will grow gradually in long period of time.

4.2 Policy Suggestions

Beijing is the political, economic and cultural center of China. According to the growing percentage of floating population from the beginning of the new century, it has huge attraction for citizens because of its advantageous resources. The development of transportation and communication shortens people’s commuting time, accelerating inter-city population flow. Therefore, it is predictable that Beijing’s attraction for citizens will have steady increase in the future regardless of other factors. This is beneficial for both economic growth and social stability if the residential problem of floating population can be well solved. Considering the influence on housing price brought by floating population, it should be given sufficient attention when making proper residential policy in the future: by fulfilling diverse residential demand, we can avoid drastic price variation caused by supply-demand imbalance and promote a healthy real estate market.

First of all, proper control of population is needed for adjusting imbalance between house supply and demand. Due to limited land area in Beijing, there is low flexibility in house supply, on the other hand, house demand is population-centered, based on the conclusion that population factors have salient influence on housing price, the government should avoid rapid growth of house price driven by demand of large scale population inflow by restraining the increase of urban population in its house price control plan. Secondly, build an integrate house supply system and increase efficient house supply. In the future, the government should increase the construction of Public Housing such as Low rent houses and Economically-affordable houses and encourage real estate company to make small unit houses, fulfilling the residential demand of different income groups and various family structures, increasing efficient house supply. Thirdly, make full use of “Forced” mechanism by transferring residential demand to relieve the growth of housing price. For one thing, pay attention to the infrastructure building in the suburb area of the city. Through the construction of fast-track transportation, the commuting time between Beijing and its neighboring cities can be shortened, thus transferring the concentrated residential demand of Beijing; for the other, with high house prices, laggard industry will be eliminated which will result in the update and reformation of city industrial structure. And the industry transfer will drive the house demand transfer, eventually relieving the growth of Beijing’s house price.

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6. References


