

Article

The Impact of Population Migration on Urban Housing Prices: Evidence from China's Major Cities

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Abstract: With increasingly high housing prices, the urban housing problem has changed from an economic issue to a livelihood issue in China. Taking 32 major cities in China as an example, this paper employed data from 2007 to 2016 to build a panel data model to empirically study the impact of population migration on urban housing prices. From the two perspectives of the national level and regional level (eastern region, central region and western region), the results of this study showed that (1) on the national level, population inflow had a significant positive correlation with urban housing prices, where a population inflow rate increase of 1% increased urban housing prices by 0.31%; and (2) on the regional level, a population inflow rate increase of 1% increased urban housing prices in the eastern region by 1.34%, but population inflow had no obvious impact on the urban housing prices in the central and western regions. Based on the results, this study suggested addressing housing supply imbalances through housing product diversification and affordable housing system improvement, and addressing construction land supply imbalances by building a perfect system linking land-use planning to population; at the same time, it also suggested building more nationally central cities following the urbanization trend, and taking this as the key to developing urban agglomerations, reasonably decentralizing the population flow, promoting the healthy and stable development of the real-estate market and advancing sustainable urbanization. The above conclusions have practical significance for China and other developing countries to coordinate population and urban development in the process of rapid urbanization.

Keywords: migrant population; housing prices; sustainable urbanization; panel data model

1. Introduction

With the advancement of new urbanization in recent years, the level of urbanization in China has rapidly increased. According to national statistics, the resident population of China's cities and towns was 813.47 million at the end of 2017, accounting for 58.52% of the total population [1]. Compared with 44.90% in 2007, the urbanization rate has increased by 13.62% in the past ten years. Behind the rapid development of urbanization is the continuous growth of China's migrant population. Statistics from the National Health and Family Planning Commission show that China's migrant population was 244 million in 2017, accounting for 17.55% of the total population, of which 63.50% was inter-provincial [2].

When the population flows into the city, housing is the most basic demand, and the large-scale population migration has therefore also promoted the development of real-estate markets in the population inflow areas [3,4]. The average selling prices of residential housing in China rose from 3576 yuan/m² in 2008 to 7614 yuan/m² in 2017 (Figure 1), an increase of 113% in the past decade.

With the soaring housing prices, housing has gradually become the most concerning problem for people [5]. The CCP's 19th National Congress report proposed that we must not forget that housing is for living in, not for speculation [6]. The housing problem has shifted from an economic issue to a livelihood issue. In the *Report on the Work of the Government 2018*, it was proposed that China should accelerate the establishment of a multi-subject supply, multi-channel guarantee, and rent-and-purchase housing system so that broad masses of the people can live in a livable place at an early date [7], with regard to the aspect of safeguarding and improving the people's livelihood; in deepening the reform of the property tax system, it was clear that the local tax system should be improved and the real-estate tax legislation should be steadily promoted. In addition, in order to curb housing prices that were rising too quickly (due to an imbalance between supply and demand in the real-estate market and the mismatch of land resources) in recent years, local governments have frequently adopted regulation and control policies such as purchase restrictions, limit loans, price limits, and restrictions on sales [8], and constantly explored and improved the affordable housing mechanisms. Therefore, in the context of today's high housing prices and rapid urbanization, further exploration of the factors affecting housing prices, which will enable more scientific regulation decisions to be made, has a practical significance for the health and stability of the real-estate market and the livelihood of the people.

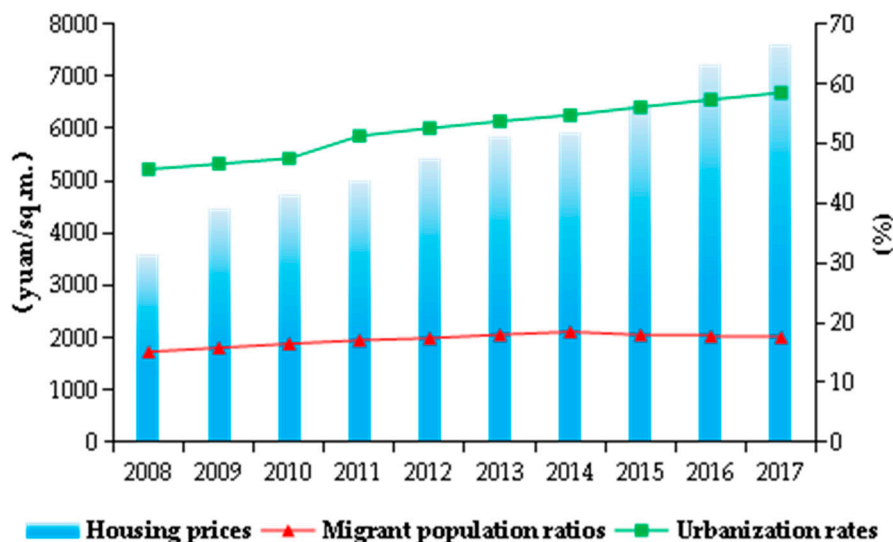


Figure 1. Trends in housing prices, migrant population ratios and urbanization rates (2008–2017). Data sources: housing prices come from the State Statistics Bureau; migrant population ratios come from the National Health and Family Planning Commission Migrant Population Service Center; the urbanization rates come from the Report on the Work of the Government.

With the booming development of the real-estate market and the rapid growth of housing prices, the factors influencing housing prices have attracted wide attention from scholars at home and abroad. Focused on the factors affecting housing prices, the existing research has achieved very fruitful results, including in macroeconomics (real-estate investment [9], economic growth [10,11], monetary policy [12,13] and inflation [14]), politics (urban hierarchy [15] and government policy [8]), society (population factors [16,17], social environment [18] and urbanization [19,20]), physical geography (geographical location [21], natural features [22] and environmental health risks [23,24]) and micro-aspects of real-estate characteristics (walled buildings [25], cost of construction and installation [26,27], house type [28,29], locational conditions [30], educational resources [31], infrastructure [32–34] and neighborhood factors [35,36]), and the household and individual characteristics of household buyers (income [37,38], the Dutch index of consumer confidence [39] and consumer expectations [40]). As the main subject of investing, consuming, using and disposing of real estate, the human factor has gradually become the research focus. With regard to the research into

demographic factors, the existing literature has focused on the demographic age structure [41–46], demographic scale [47], demographic density [48], family demographic characteristics [16], population migration [4,49–51] and other perspectives to explore the relationship between these and housing prices. For instance, regarding demographic age structure, studies by Levin et al. [41] and Saita et al. [47] have shown that the age of the population was negatively correlated with housing prices and positively correlated with population scale; in further exploration of the demographic structure, research by Hiller and Lerbs [52] showed that the price growth of apartments and small-sized houses was negatively correlated with the old-age dependency ratio, while aging was positively correlated with the actual rent growth; Choi and Jung [45] found that the proportion of the economically active population (aged from 15 to 64 years old) to the total population had a significant impact on housing price growth. As the most direct driver of housing demand, population migration has also received widespread attention. At the international level, a great deal of attention has been paid to population migration between countries. For example, Saiz [53] believed that immigrants in the United States have pushed up housing prices and rents in local cities. Empirical results showed that 1% of immigrant inflow was related to a 1% increase in housing prices and average rents; Gonzalez and Ortega [3] estimated the results of instrumental variables and showed that immigrants made the working-age population grow at an average annual rate of 1.5%, which led to an annual increase of about 2% in housing prices. In Forte et al.'s [54] empirical study of Castel Volturno, the results of a simple regression showed that there was a strong negative correlation between the average price trend in the residential submarket and the trend of the immigrant population. In China, due to the large population base, the impact of foreign immigrants was negligible, and migration was manifested more as inter-regional migration of the domestic population. The household registration system with Chinese characteristics has formed a group in the migrant population in the city. Wang and Xu [55] constructed the Beijing housing prices panel data model (2000–2016) to measure the impact of the migrant population on housing prices. The results showed that with a migrant population growth of 1%, the average selling prices of residential commercial housing increased by 9158.023 yuan/m²; Wang et al. [19] empirically studied the impact of population migration on urban housing prices in China from the perspectives of inter-regional mobility and urban-rural migration. The results of the cross-sectional data showed that a 1% increase in cross-regional population mobility and urban-rural migration resulted in a 0.701% and 0.343% increase in housing prices, respectively; Wang and Chen [56] used the Chinese provincial data to construct a panel vector autoregressive model (PVAR) to study the interaction between population migration and housing prices, and the results showed that the range of housing prices affected by population migration in the eastern region fluctuated more significantly than in the western region, and the population migration in the eastern region had a greater impact on the development of the real-estate industry.

To sum up, regarding the study of the relationship between population migration and housing prices, international research on immigration has yielded fruitful results. However, owing to the characteristics of the system in China, the situation is more complex to research, and the data is more difficult to obtain, and related research is still limited. In the early stage of research, qualitative research was the main focus of study. In recent years, there have been more empirical studies. The empirical data on the migrant population mainly came from the national census and the 1% population sample survey [19], and the two surveys are performed once in a decade and twice a decade, respectively. The limited sample size may not reflect the objective reality; as a result of the availability of data, the research level of the region was mainly based on the provincial level [56] and developed first-tier cities [55], and drew macroscopic conclusions or targeted conclusions for individual cities. Therefore, based on the existing statistical indicators, this paper utilized the difference between the permanent population and the registered population to measure the migrant population index innovatively. Taking 35 major cities (including 30 provincial capitals except Lhasa, municipalities and five cities specifically designated in the state plan including Dalian, Qingdao, Ningbo, Xiamen and Shenzhen, with samples covering China's eastern, central and western region) in China as examples, we employed

the data from 2007 to 2016 to construct a panel data model and further study the impact of the migrant population on housing prices.

The rest of the paper is organized as follows. Section 2 is a theoretical analysis of the impact of population migration on housing prices; Section 3 first introduces the panel data model used in this study, and secondly introduces the variable selection and data sources, and finally sets the model based on actual variables; Section 4 reports the results of the testing and regression; Section 5 is the discussion and analysis of the research results; and Section 6 introduces the research conclusions of this paper and presents the corresponding policy suggestions.

2. Theoretical Analysis of the Effect of Population Migration on Housing Prices

On the one hand, population migration directly affects the scale of the local population and changes the demographic age structure, thus causing changes in the urban real-estate demand [52]; on the other hand, population migration can help population flow in cities, increasing labor productivity and promoting the development of the urban economy [57,58], thus counteracting the development of the real-estate industry and indirectly affecting the changes in real-estate prices [59,60]. Hence, theoretical analysis explores the impact of population migration on housing prices from both direct and indirect perspectives (Figure 2).

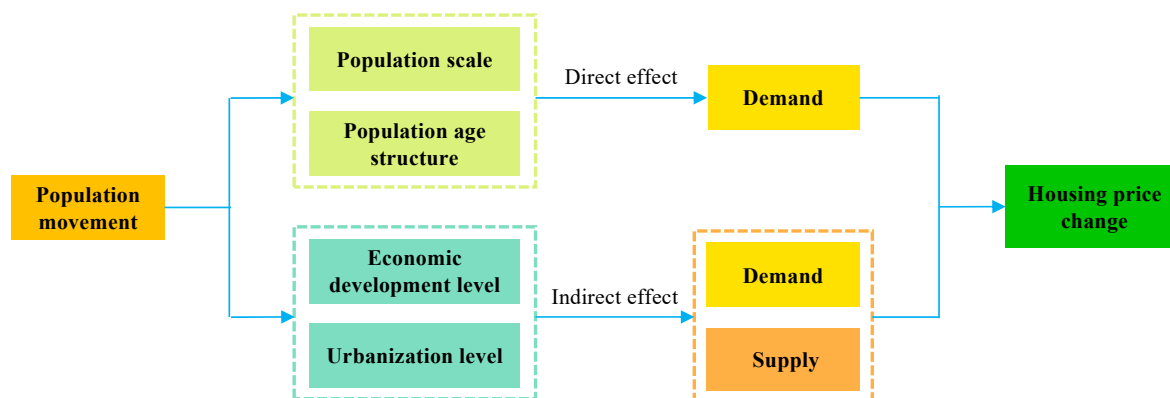


Figure 2. The effect path of population migration on housing prices.

2.1. Direct Effect of Population Migration on Housing Prices

Population migration mainly affects the demand of the real-estate market by changing the scale of the city and the demographic age structure, thus directly affecting housing prices. First, population migration would directly result in an increase or decrease in the total population. As the ultimate consumer of urban housing, the number of people directly causes changes in urban residential demand, while population migration is usually a short-term behavior, and the supply of urban housing is inelastic in a short period of time [61]. Therefore, when people flow into a certain city, the demographic scale will increase, and the demand for housing will rise. At this time, the housing market in the local area will be in short supply, which leads to the rise of real-estate prices; if the contrary were the case, housing prices would fall. Secondly, the age distribution of urban residents [52] also has a significant impact on housing prices, such as the proportion of the working-age population [45] and the age of the population [17]. It is reported by the *Report on China's Migrant Population 2017* that China's new generation (born in 1980 and later) accounted for 64.7% of the migrant population in 2016, becoming the main force in the migrant population. In addition, the highest proportion of migrants from 2011 to 2016 is the population aged from 25 to 34. People in this age group have a strong desire to purchase a house, and the purpose of purchasing is mainly to meet basic housing needs, and the elasticity of demand is weak. Thus, with the inflow or outflow of population, the number of young people in this

group in the city will also change, which affects the demand for rigid housing in the city, and thus affects the housing prices in the city.

2.2. Indirect Effect of Population Migration on Housing Prices

Population migration affects the real-estate industry indirectly by affecting the level of economic development and the level of urbanization. The influx of labor force and high-quality population increases the labor productivity of cities, driving the growth of urban consumption, and promoting the level of urban economic development [62]. The improvement in the level of economic development would also be counterproductive to the real-estate industry. For example, the accumulated wealth of urban economic growth could bring more investment funds to the real-estate industry, promote the supply of the real-estate industry, and thus affect real-estate prices; on the other hand, as the city's economic level improves, the income and purchasing power of urban residents will increase, thereby transforming the potential rigid demand or improvement demand of consumers into actual effective demand. Changes in effective demand will have a certain impact on real-estate prices. In addition, China is in a period of rapid urbanization [63]. With the continuously deepening household registration system reform, more of the agricultural population will flow to urban areas in the future, and the level of urbanization will be further improved. From the perspective of urban construction, the rapid development of urbanization puts forward higher requirements for urban construction, especially urban land and infrastructure construction, and the expansion of the urban land construction area will increase housing supply [64], thus affecting housing prices. Further improvement of infrastructure construction will provide a better living environment and may also promote the rise of real-estate prices to a certain extent. From a population perspective, a large portion of the agricultural population will enter the city in the future, and a large housing demand will affect urban real-estate prices.

3. Methodology and Data Sources

3.1. Panel Data Model

Panel data refers to taking a plurality of sections in a time series, and simultaneously selecting sample data composed of sample observation values from the sections. It is a data structure that contains all cross-section, time, and variable three-dimensional information. Using the panel data model, it is possible to construct a more realistic and effective behavior equation than time series data and cross-section data [65], to reduce the collinearity between variables, make the parameter estimation more accurate, and significantly increase the degree of freedom, making statistical inference more effective. At the same time, it is also possible to expand the sample size and control problems such as endogeneity and individual heterogeneity [66]. The general form of the panel data model is as follows:

$$y_{it} = \alpha_{it} + x_{it}\beta_{it} + \delta_i + \gamma_t + \varepsilon_{it} \quad i = 1, 2, \dots, N; \quad t = 1, 2, \dots, T. \quad (1)$$

where y_{it} is the observed value of the explained variable in the individual i and t period, α_{it} is a constant term, x_{it} is the k -order explanatory variable observation vector, β_{it} , δ_i and γ_t , respectively, represent coefficient vectors of explanatory variables, fixed or random cross-sectional effects, and fixed or random epoch effects. The panel data model requires the preprocessing of the raw data and a series of tests before estimation. Data and model tests include the stationary test, cointegration test, endogeneity test for variables, and Hausman test (determination of fixed or random effects).

3.2. Variable Collection

The factors affecting housing prices are various and complicated. This paper focuses on the impact of population migration on urban housing prices. Under the principle of high correlation, the feasibility and quantifiability of variable collection, based on the summary of the literature review combined with the availability of data, the model also considered the impact of real-estate development investment, economic development level, income level and other variables that affect the supply and

demand side of the real-estate market. Considering the multicollinearity problem, the study combined the results of the correlation coefficient matrix and the stepwise regression analysis to determine the following variables (Table 1).

Table 1. Variable definition.

Variable Symbol	Variable Name	Variable Definition	Unit
HOU PR	Urban housing prices	Expressed by the average sales price of residential housing.	yuan/m ²
MIPOP	Population migration	The population inflow rate is expressed as the ratio of the migrant population to the permanent population.	%
REINV	Real-estate investment	Expressed by the ratio of residential housing investment to fixed asset investment.	%
ECODE	Economic development level	Expressed by the ratio of the added value of the tertiary industry to GDP.	%
AVINC	Income level	Expressed by the per capita disposable income of urban residents	yuan

3.3. Data Source and Processing

Taking major cities in China as an example, this paper used the data from 2007 to 2016 to build a panel data model to empirically study the impact of population migration on urban housing prices. In the study, the raw data was derived from the National Data of the National Bureau of Statistics of China, the provincial and municipal statistical yearbooks, and the statistical bulletin of national economic and social development. Due to the lack of data on permanent residents in Dalian, Changchun and Harbin, the study conducted an empirical analysis in 32 cities with complete data. The migrant population was measured by the difference between the permanent population and the registered population. This study further used SPSS software to analyze the calculated migrant population value and the size of the migrant population in the 2010 nationwide census (28 cities). The results showed that the Cronbach's α was 0.898, which implied good reliability. In a further comparison of national statistics, the urbanization rate of China's permanent population in 2017 was 58.52%, while the urbanization rate of the household registration population was 42.35%, a difference of 16.17%. The value was very similar to the 17.45% of the migrant population counted by the National Health and Family Planning Commission, and so this method is feasible to measure the size of the migrant population. The population inflow rate was used in the model and was expressed as the ratio of the migrant population to the permanent population. Taking into consideration that price changes impacted the urban housing prices (HOU PR) and income level (AVINC) during the study period, this paper employed the CPI (consumer price index) (previous year = 100) to remove the price impact, and converted it to the base price in 2007. At the same time, taking the natural logarithm of HOU PR and AVINC to reduce the heteroscedasticity between the data, population migration (MIPOP), real-estate investment (REINV), and economic development level (ECODE) were ratio forms and were no longer processed. In order to further explore the regional differences in the role of population migration on housing prices, this paper divided the 32 cities into the eastern, central and western regions according to the economic regional division criteria of the National Bureau of Statistics, as shown in Table 2:

Table 2. Regional division of cities.

Regions	Eastern Region	Central Region	Western Region
Cities	Beijing, Tianjin, Shijiazhuang, Shenyang, Shanghai, Nanjing, Hangzhou, Ningbo, Fuzhou, Xiamen, Jinan, Qingdao, Guangzhou, Shenzhen, Haikou	Taiyuan, Hefei, Nanchang, Zhengzhou, Wuhan, Changsha	Chongqing, Hohhot, Nanning, Chengdu, Guiyang, Kunming, Xi'an, Lanzhou, Xining, Yinchuan, Urumchi

Comment: Shenyang City, originally owned by the northeast, was returned to the eastern region in this study.

3.4. Model Specification

This study employed the urban housing prices (HOUPR) as the explained variable, and employed the migrant population (MIPOP), economic development level (ECODE), real-estate development investment (REINV) and income level (AVINC) as explanatory variables to construct panel data models. Its basic model expression was as follows:

$$\begin{aligned} \ln \text{HOUPR}_{it} = & \alpha_{it} + \beta_{it} \text{MIPOP}_{it} + \beta_{it} \text{REINV}_{it} + \beta_{it} \text{ECODE}_{it} \\ & + \beta_{it} \ln \text{AVINC}_{it} + \delta_i + \gamma_t + \varepsilon_{it} \end{aligned} \quad (2)$$

$$i = 1, 2, \dots, N; t = 1, 2, \dots, T.$$

4. Results

In this study, four panel data models were constructed from different perspectives of the national, eastern, central and western regions, corresponding to models I, II, III and IV. Before estimating the panel data model, the stationarity test, cointegration test and Hausman test were first performed. The results of the panel unit root test showed that there were no unit roots in all the variables in the four models, and cointegration tests were passed, so the model can be estimated. The null hypothesis of the Hausman test was the individual random effect. The results of the Hausman test showed that models I, II, and III rejected the null hypothesis at the 5% significance level, thus the model should select the individual fixed effect; model IV did not pass the 5% significance test and thus selected the individual random effect model. Second, there was a need to examine and deal with the endogeneity of variables. Due to the lack of flexibility in the urban housing supply in the short term, a large migrant population would further increase the housing prices in the cities to which the population moved by increasing demand; at the same time, high housing prices mean higher living costs, which in turn will inhibit population inflow. Therefore, population migration (MIPOP) and housing price (HOUPR) volatility have a two-way causal relationship, and a simple ordinary least square (OLS) regression may underestimate the impact of population migration on housing prices [67]. This study utilized the instrumental variable [68] method to deal with the endogeneity of the migrant population variable: (1) Testing the correlation between the instrumental variable and endogenous variable. The endogenous variable was employed as the explained variable, and other exogenous variables and the instrumental variable were employed as explanatory variables for regression. If the F-statistic was greater than 10, the instrumental variables and endogenous variable were considered to be highly correlated; (2) the residual ε of regression step (1) was added as a new explanatory variable to the regression in the original model. If the coefficient is not significantly zero, MIPOP will be confirmed as an endogenous variable; (3) the two-stage least squares estimation (TSLS) would be used for models with endogeneity.

Following the principle of instrumental variable selection, this study utilized the number of students in colleges and universities (STUDENT) as an instrumental variable for the migrant population. On the one hand, STUDENT, as a part of MIPOP, will affect the number of urban migrants; on the other hand, the student population usually does not purchase local residences during the study period, and they do not logically affect the current housing prices [69]. It can be considered that the student population is not related to the current housing prices. The results of the MIPOP endogenous test are shown in Table 3.

Table 3. Endogenous test results.

Variable	Model I	Model II	Model III	Model IV
Research scope	National level	Eastern region	Central region	Western region
F-statistic	153.2970 ***	443.9256 ***	15.2139 ***	28.5913 ***
ε	0.0166	0.0103	−0.0405	0.0220 ***

*** Indicates significant at the 1% significance level.

Table 3 showed that, in all models, the F-statistic values were significantly greater than 10, indicating that STUDENT was highly correlated with MIPOP and could be used as an instrumental variable. The significance of the residuals indicated that the residuals of models I, II, and III did not pass the test at the 5% significance level, indicating that MIPOP did not exist endogenously in these three models, and OLS estimation could be employed. The residual of model IV was not significantly zero, and a 1% significance test was passed, indicating that in model IV, MIPOP was endogenous, so TSLS estimation should be used. The results of the panel data model regression are shown in Table 4.

Table 4. Panel data model regression results.

Variable	Model I	Model II	Model III	Model IV
C	1.0131 ***	−0.2926	0.5523	1.1213 ***
MIPOP	0.0031 ***	0.0134 ***	0.0029	−0.0046
REINV	0.0056 ***	0.0114 ***	0.0054 *	0.0052 **
ECODE	−0.0026	0.0025 *	−0.0030	−0.0058 *
AVINC	0.7610 ***	0.8426 ***	0.8010 ***	0.7521 ***
R^2	0.9670	0.8846	0.8832	0.7465
F-statistic	237.7284 ***	277.8541 ***	42.0115 ***	94.2941 ***
Hausman test	21.2601 ***	21.3962 ***	17.0175 ***	4.0877
Cointegration test	−6.7148 ***	−4.5508 ***	−4.2372 ***	−5.7987 ***
Sample capacity	320	150	60	110
Estimation method	OLS	OLS	OLS	TSLS

*** Indicates significant at the 1% significance level; ** indicates significant at the 5% significance level; * indicates significant at the 10% significance level.

From the results of the regression in Table 4, the R^2 minimum of the four models was 0.7465, indicating that the models fit the sample data well. The F-statistic values of the four regression equations were large, and all of them passed the 1% significance test, indicating that the overall effect of the model was better. Model I estimated the data for all sample cities, and the results showed that the population inflow was positively correlated with the urban housing prices, and passed the test at the 1% significance level, which was in line with theoretical expectations; with a population inflow rate increase of 1%, the urban housing prices would increase by 0.31%; in addition, real-estate investment (REINV) and income level (AVINC) also significantly promoted urban housing prices, and both passed a 1% significant test. The results of the regional model also reflected the objective differences that existed in different regions. Model II was an estimate of data for 15 cities in the eastern region, and the results showed that with a population inflow rate increase of 1%, the housing prices in the eastern cities would increase by 1.34%; the coefficient was estimated to pass the test at the level of significance of 1%. The increases in REINV, ECODE and AVINC were also powerful reasons for the rise in housing prices in the eastern cities. Model III and Model IV respectively estimated the central cities and western cities, and the impact of population inflow on housing prices in the central and western cities was opposite, but not statistically significant. For the central and western cities, the investment in real-estate development and the increase in the income level of urban residents could significantly promote the rise in housing prices. Real-estate investment accounted for the ratio of fixed assets increasing by 1%, housing prices in the central cities would rise by 0.54%, and western cities

would rise by 0.52%; urban per capita disposable income increased by 1%, and urban housing prices in central and western China would rise by 0.8% and 0.75%, respectively.

5. Discussion

With regard to the impact of population migration on urban housing prices, this paper discusses and analyzes three perspectives from the national level, eastern cities and mid-western cities according to the model regression results.

5.1. National Level: Population Migration Was Significantly Positively Correlated with Urban Housing Prices

The results of Model I showed that population migration was significantly positively correlated with urban housing prices, in line with theoretical expectations. The results can be analyzed from two aspects: the first is the constantly advancing trend of urbanization. In the past decade, China's urbanization rate has increased by 1.37% annually, and a large number of rural people have poured into urban to work or study every year. From the perspective of affecting the supply and demand of the real-estate residential market, the inflow of rural population is bound to stimulate housing demand by increasing the total population inflow and changing the demographic age structure, thereby promoting the rise of housing prices; for another thing, while the inflow of agricultural population has increased the demand for urban housing, it also left a large number of rural homesteads and agricultural land idle, and the phenomenon of 'occupying land on two sides' is a serious issue [70]. Due to the rigid constraints of the three basic systems (the 1.2 million km² of cultivated land red line, the land-use regulation system, and the land annual planning system) of land management in China, the annual land use index issued by the state has difficulty meeting the needs of the development of some local governments [71], and the land available for building houses in cities is even more scarce. From the supply and demand theory and the process of real-estate price formation, it is known that the shortage of residential construction land indicators will increase land prices and thus promote housing prices. Most of China's 32 major cities are political, economic or cultural centers of their respective regions. Except for a few cities in the central and western region, most of them are the cities into which population flows, and they are the main target cities for population migration in regions or across regions. Thus, for such cities, population inflow is generally positively correlated with housing prices.

5.2. Eastern Cities: Migrant Population Significantly Boosted Urban Housing Prices

Compared with 32 cities across the country, the impact of population inflow on housing prices in eastern cities has increased significantly. An influx rate increase of 1% promoted housing price increases of 0.31% in the 32 cities and 1.34% in eastern cities. The reason for this is that the selected eastern cities are not only the political, economic and cultural centers of the region, most of them are also national central cities and planned cities, such as the capital Beijing or the national economic and financial center Shanghai. Compared with the central and western cities, the eastern cities have a high level of economic development, many opportunities for employment and development, high levels of wages and benefits, complete social support services, and a strong population adsorption capacity. Due to the uneven development of the regional social economy, most of China's migrant population flows to eastern cities. It is reported in the *Report on China's Migrant Population 2017* that the migrant population in the eastern region accounted for 74.7%, the western region accounted for 16.6%, and the central and northeastern regions accounted for 8.7% in 2015. In addition, due to the household registration system with Chinese characteristics, the rights of migrants are restricted compared to the local registered population. Therefore, the demand for the migrant population to purchase houses and settle down is more urgent. In summary, the huge migrant population of the eastern cities, coupled with the urgent demand for home purchases, has caused the residential real-estate market in most cities in the east to be in short supply in the long term, thus pushing up housing prices.

5.3. Central and Western Cities: Population Migration Had No Significant Impact on House Prices

The results of the econometric model of the central and western cities showed that the impact of population inflow on housing prices was not statistically significant. Compared with the economically developed eastern cities, the capacity of the central and western cities to absorb the population is weak, and the flow of the population is mostly in the province or the city, and a few of the selected cities are still in a state of severe population outflow. On the other hand, in the process of promoting urbanization development, the state has clearly pointed out that it is focusing on urbanization in the central and western region, implementing differentiated settlement policies, and strictly controlling the population scale of megacities. Under the guidance of the policy, the threshold for the settlement of central and western cities is low, and the migrant population is easy to 'localize'. The above two points explain the facts and root causes of the small migrant population in the central and western cities. Therefore, for the central and western cities, the number of migrants may not have a significant impact on urban housing prices, and the impact may be greater on the number and actual needs of the local population. In addition, in order to promote regional balanced development, China's urbanization strategy is to restrict the development of large cities, encourage the development of small towns, and accordingly strictly control the land use of large cities, and supply land for small cities. In this context, the urban planning of the central and western region has expanded, and high-tech zones have been widely built. Land urbanization is faster than population urbanization [63,72]. The land price that constitutes the cost of real estate is relatively low, and it is difficult for the migrant population to promote the rise of urban housing prices.

6. Conclusions and Policy Implications

Taking 32 major cities in China as an example, this paper employed the data from 2007 to 2016 to build a panel data model to empirically study the impact of population migration on urban housing prices. The following conclusions can be made: firstly, from a national perspective, population inflow is significantly positively correlated with urban housing prices—with a 1% increase in population inflow, urban housing prices will rise by 0.31%. The result conforms to theoretical expectations, and can be explained from the inevitable trend of urbanization and the characteristics of the cities studied. However, due to the different sources of data, the degree of impact is slightly different from that of Wang et al. [19]. Secondly, from a regional perspective, the results of different regional models reflect objective differences between regions. Due to the high level of economic development, the eastern cities have many opportunities for employment and development, high levels of wages and benefits, complete social support services, and a strong adsorption capacity for the population, thus population inflow has significantly boosted urban housing prices. This is consistent with Wang L.'s [56] conclusions from the empirical study of provincial data. The results of the econometric model show that a population inflow rate increase of 1% will increase housing prices in the eastern cities by 1.34%. Due to the lack of attractiveness of cities in the central and western region, and the low threshold for settlement, the total size of the migrant population in these cities is small, and there is no significant relationship between population inflow and urban housing prices.

Based on the above research conclusions, this paper proposes the following policy implications:

- (1) The impact of population migration on urban housing prices, whether due to direct or indirect effects, ultimately leads to an imbalance in supply and demand in the real-estate market, further affecting housing price volatility. The imbalance between supply and demand in the real-estate market is reflected in both housing and construction land. In view of the imbalance between the supply and demand of housing, different levels of residential products should be provided according to the actual situation of the cities into which the population flows, combined with the family and individual characteristics of different groups. At the same time, the urban affordable housing system should be improved with a multi-channel guarantee and multi-subject supply to meet the increasing demand for housing in the migrant population;

in view of the imbalance in the supply of construction land, a perfect system of linking land-use plans to population should be established. The annual land use plan of the country should be dynamically adjusted according to the population of each city. For the cities where the population gathers, the construction land index should be increased, and the cities from which the population flows out should reduce their land supply accordingly. Furthermore, under the premise of ensuring the red line of 1.2 million km² of cultivated land, it is necessary to strengthen rural land remediation, scientifically addressing the problem of ‘occupying land on two sides’ for the agricultural population, and actively exploring the cross-provincial circulation of surplus land use indicators to increase construction land supply for the cities into which the population flows. From the supply side, to address the imbalance between supply and demand in the real-estate market, housing prices should be stabilized to ensure people have their own house to live in.

- (2) From the empirical results, it can be seen that economically-developed urban agglomerations and large cities strongly appeal to the migrant population by virtue of their high-quality social public resources and good employment opportunities. Combined with the experience of developed countries, it is an inevitable trend for people to continue to gather in central cities and large cities in the future [73]. Therefore, to address the problem of the insufficient attractiveness of the central and western cities and the ‘urban disease’ problem which exists in megacities, we must follow this trend. As it is ‘better to divert rather than block’, we should build more national central cities, considering the current situation in the central and western region, and take the national central cities as the core for developing urban agglomerations. To build emerging national central cities in the central and western region, we ought to take the development experience of developed cities in the world as a reference, and steadily advance with the current situation. Above all, we should first advocate urban planning, and eliminate the hidden dangers of ‘urban diseases’ in big cities at the source; then, we can combine the economic situation to upgrade the industrial structure, promote economic development, and enhance urban attractiveness. At the same time, we must improve the talent introduction mechanism, give full support to the creativity of high-quality talents, better serve the development of urban construction, and encourage economic development and the continuous inflow of talent to develop a benign interaction.

As the largest developing country, China has a vast territory and a large population. Due to the uneven development of the region, China has both international metropolises that are similar to those in western developed countries and poor cities with backward economic development. With the rapid advancement of urbanization in the world, China’s development model has typical significance for the coordination between the population and urban development in developing countries. This paper constructed a panel data model to study the effect of population migration on urban housing prices, and made some headway, but still had some limitations: (1) the selection of sample cities was not comprehensive enough, the distribution is uneven, and the central cities are lacking; (2) the spatial spillover effect of house prices was not considered, and the interaction between adjacent cities was ignored. As an exploration, future research can further expand the quantity of sample cities, taking into account the rational distribution of sample cities. At the same time, the spatial econometric model can be constructed to consider the spatial effects that may exist in adjacent or similar cities, thus improving the research.

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