ICIC Express Letters
Part B: Applications
Volume **12**, Number **1**, January **2021**

ICIC International ©2021 ISSN 2185-2766
pp. **43–49**

THE IMPACT MECHANISM OF URBANIZATION AND HOUSING PRICES ON REGIONAL ATTRACTIVENESS

Xiaojie Guo and Jian Xing*

School of Economics and Management
Dalian University
No. 10, Xuefu Street, Jinzhou New District, Dalian 116622, P. R. China
2873872157@qq.com; *Corresponding author: 632340240@qq.com

Received April 2020; accepted July 2020

Abstract. *In recent years, China's fierce competition for talents has reflected the urgent demand to enhance its attractiveness in the context of economic restructuring and upgrading in China. Therefore, we build an index according to the economic gravity model. Then, a panel model has been established to study the impact of urbanization and population migration on the attractiveness of the provinces. The empirical results show that: 1) Excessive housing prices will increase the cost of living for residents, which is not conducive to urbanization and regional attraction; 2) Urbanization promotes the attraction of the region. However, it is related to the original driving force of urbanization and the degree of the industrial system.*

Keywords: Gravity model, Comprehensive attraction, Urbanization, Panel data, House price

1. **Introduction.** Recently, various regions have issued a series of preferential policies to attract floating population which reflects the urgent demand for regions to increase their attractiveness. However, at present, local governments often focus on the competition for human resources, while ignoring the challenges of population aggregation. If an industrial system is not perfect in an area, it will not be able to guarantee people's production and living environment. Therefore, constantly improving the attractiveness of the city is the way to grasp opportunities. The third plenary session of the 18th CPC central committee pointed out that urbanization is an important driving force and the greatest domestic demand potential for economic development. However, with the continuous progress of urbanization construction, provinces should not only pay attention to the statistical level changes but also to the real impact of urbanization on their strength. Therefore, it is of great significance to study the influence of urbanization on the attractiveness of different regions for promoting the "people-oriented" new-type urbanization construction.

Regional attraction is a difficult concept to be quantified and analyzed. There is no agreement on its inner meaning and basic formula in academic circles. Most of the researches used physical theories to construct attractiveness indicators and analyze it. For example, Chen et al. [1] selected 48 indicators to construct a comprehensive evaluation of urban population attractiveness; Jiang and Pu [2] and other scholars calculated the attraction of Chengdu and Chongqing to Chengdu-Chongqing city agglomeration through the law of universal gravitation; Gen [3] constructed the expression of the influence of urban attraction through the tension principle in physics. From the three aspects of urban comprehensive strength, urban accessibility and population mobility, she analyzed the impact of the opening and operation of high-speed railway on the attractiveness of cities. Some scholars, selected relevant economic indicators and used the regression analysis to study the attractiveness of various places. For example, Hu and Huang [6] evaluated

DOI: 10.24507/icicelb.12.01.43

the investment attractiveness of urban real estate market by using grey comprehensive evaluation method; Li [4] selected indicators such as urban household garbage treatment rate, urban sewage treatment rate, newly built green coverage rate, and established panel data model to analyze the factors affecting the attractiveness of urban tourism; Li and Li [5] also used gravity model as the principle to calculate the attraction of Guangzhou and Shenzhen to 8 cities in the Pearl River delta region, etc.

After 2014, the construction of urbanization has been elevated to the level of national strategy. A large number of scholars have studied urbanization construction from multiple perspectives. Ren and Liu [7] estimated the two models and found that the urbanization level had a positive impact on the housing price; Tuo [8] proved that there is an obvious positive correlation between urbanization and housing price which is a nonlinear relation; Gu and Liu [9] pointed out that at present urbanization must transform from the previous stage of over-dependence on "factor-driven" and "investment-driven" development to the stage of "innovation-driven" development, so as to realize the intensive development from quantitative expansion to quality; Zhang [10] found that the urbanization level would change greatly under different status of floating population statistics; Zhao et al. [11] analyzed the impact of rural floating population's long-term settlement or household registration intention on urbanization from the perspective of urban housing price and believed that the impact of urban housing price rise on household registration intention was related to social and economic characteristics of the population, etc. It can be seen that few scholars quantitatively analyze urban attractiveness from the perspective of urbanization. Moreover, most scholars lack relevant empirical analysis after calculating the attractiveness index.

In summary, the organization of this paper is as follows. In the second section, we use the gravity model to construct and measure the attractiveness indicators of each region; in the third section, in order to empirically analyze the impact mechanism of urbanization, housing prices and local attractiveness, we construct panel models and incorporate regional attractiveness indicators; the last part is the conclusion and recommendation of the article. There are three main contributions to the research in this paper. First, it constructs the index to measure the attraction of each province and gives the concrete calculation formula. The attractiveness of cities is basically between prefecture-level cities and there is no precedent for calculating the attractiveness of provinces. Second, a panel model is constructed based on the quarterly data to analyze the impact mechanism of the housing price and urbanization on the attraction of various provinces. A large number of studies have used panel data to study similar problems but all of them use annual data. Third, exploring the impact of housing price on urbanization and urban attractiveness is a complementary to the previous studies.

2. **Constructing Regional Attractiveness Indicators.**

2.1. **The related theory.**

Gravity model is an important model to analyze spatial interaction, which has been widely used in many social science fields. The main content of the economic gravity model is that the individual trade flows between the two economies are directly proportional to their respective economies of scale and inversely proportional to the distance between them. The general form is

$$T_{ij} = K\frac{O_i * O_j}{D_{ij}} \tag{1}$$

T_{ij} represents the gravity between i and j; O_i and O_j represent the quality of two points; D_{ij} is the distance between two points; K is the gravitational coefficient, which is a constant.

2.2. **Design indicators.** According to the gravity model, the regional attraction index consists of economic quality and economic distance. According to the research questions in this paper, economic quality includes three aspects: population flow, economic development and ecological environment. The specific indicators are shown in Table 1.

Table 1. Construction of regional attractiveness indicators

Target layer	Domain layer	Element layer
Regional attractive indicators	Population	(Employed population ∗ number of people buying houses in each province)/permanent population at the end of the year
	Economics	New investment in fixed assets in culture, sports and entertainment + investment in health, social security and social welfare + investment in real estate development
	Environment	Newly built green coverage rate ∗ garbage collection volume

Firstly, each province needs people from all walks of life to provide impetus for operation. According to the population flow model, the expected income is the key factor affecting population migration. Generally, the more job opportunities there are, the greater the difference in the expected income. Therefore, the employed population is used to measure the employment market of a region. According to Keynesian theory, the rising incomes of the floating population will promote urban consumption which will increase the demand for labor in cities. However, only when a region transforms floating population into permanent population can it be meaningful. In China, if residents decide to live in a certain place, they tend to buy a house there. Therefore, the number of home buyers is used to judge the number of permanent residents.

Secondly, based to the theory of supply and demand, if a lot of people choose to move a place that will be produced demands. Considering the demand for house, education and other aspects are rigid needs, the new fixed asset investments are used to measure the attractiveness of economy. Finally, with the improvement of living standards, people pay attention to the quality of living environment. However, the accumulation of population leads to many household waste, which poses challenges to urban living environment. Recently, the annual growth rate is still as high as 8%. According to Li [4] method that analyzes the factors of urban tourism attraction, we use the product of newly built green coverage rate and garbage collection volume to measure the attraction of environment.

In China, the convenient traffic reduces the obstacles caused by spatial distance to population migration so it is improper to use the traditional geographical distance to calculate the attractiveness index of provinces. According to statistics released by the national development and reform commission, more than 90 percent of people travel by road and rail. Therefore, this paper adopts the sum of highway and railway mileage to simulate the economic distance between each province and node province.

2.3. **The index formula.** The expression of attractiveness index is as follows:

$$Z_{ij} = K\frac{O_i * O_j + M_i * M_j + S_i * S_j}{A_{ij} + B_{ij}} \tag{2}$$

K is the gravitational coefficient, which is a constant; O_i, O_j, M_i, M_j, S_i, S_j stand for population attraction, environmental attraction and economic attraction; A_{ij} represents the highway mileage of each province; B_{ij} represents the railway mileage of each province. In order to maintain a unified unit with the following empirical data, the logarithm of the comprehensive attraction of each region was calculated and then introduced into the panel model.

3. **The Empirical Analysis.**

3.1. **Selecting variables and unit root tests.** From the perspective of demography, urban population can be used to measure the urbanization process of various regions; Gross domestic product can undertake the comprehensive evaluation to economic condition of an economy. In addition, this paper also included the added tertiary industries, highway freight volume and other variables. The samples selected in this paper cover the quarterly data of 31 provinces and cities in China and cover the period from 2008 to 2017. To ensure the smoothness of data and the standardization of units, all data are introduced into the panel model after taking the logarithm. In addition, all the price class variables in the model are deflated by CPI. To reduce the probability of spurious regression, unit root test was carried out for all variables. The specific results are shown in Table 2.

TABLE 2. Stationarity test results of variables

	Specific indicators	Type of inspection	ADF-fish
$\ln Z$	Attraction index	$(c,0,0)$	262.772* (0.0000)
$\ln U$	The urban population	$(c,t,0)$	83.2389* (0.0373)
$\ln Y$	GDP	$(c,0,0)$	293.622* (0.0000)
$\ln E$	The added value of the secondary industry	$(c,0,0)$	275.656* (0.0000)
$\ln S$	The added value of the service industry	$(c,0,0)$	139.298* (0.0000)
$\ln G$	Road freight volume	$(c,t,0)$	49.0696 (0.8834)
$\ln H$	Residential house price	$(c,0,0)$	99.1061* (0.0019)
$\ln V$	Residents disposable income	$(c,t,0)$	60.6475 (0.5248)

Note: (c,t,k) represents whether ADF-fisher contains constant term, time trend and lag period; the parentheses are the statistical P values; "*" represents the rejection of null hypothesis at the significance level of 10%.

According to the test results of ADF, except for the road freight volume and the disposable income of the residents, the other economic variables are stable. So we discarded the two economic variables. Then, the logarithmic sequence of the remaining economic variables is introduced into the panel model.

3.2. **Building the model.** To sum up, 6 economic variables of 31 provinces in China were used to establish relevant equations. The specific process of building the panel data model is as follows:

$$1)\ \ln U_{it} = \beta_0 + \beta_1 \ln H_{it} + \beta_2 \ln Y_{it} + \varepsilon_{it} \tag{3}$$

$$2)\ \ln Z_{it} = \alpha_0 + \alpha_1 \ln U_{it} + \upsilon_{it} \tag{4}$$

$$3)\ \ln Z_{it} = \eta_0 + \eta_1 \ln U_{it} + \eta_2 \ln E_{it} + \eta_3 \ln S_{it} + \eta_4 \ln H_{it} + \zeta_{it} \tag{5}$$

Model (1) has studied the impact of housing price on urbanization. The housing price and GDP are the explained variables. The urban population is dependent variable. When building model (2) other control variables are not introduced at first to clarify the correlation between urbanization and the attractiveness of different regions. The attractiveness index is taken as the explained variable. Model (3) is the promotion of model (2). The

added value of the second and third industries and the housing price are introduced as control variables to deeply analyze the impact of urbanization on the attractiveness of various regions.

3.3. **Testing model form.** Generally, panel data model includes three types. When building panel model, it is necessary to pass F test to determine the type of panel data model. Then, to avoid the deviation of model setting, Hausman test is necessary. Specific test results are shown in Table 3.

Table 3. Test results of model form setting of models (1), (2), (3)

	Model (1)	Model (2)	Model (3)
F_2	430.905	11.559	2.336
	(1.49)	(1.39)	(1.22)
F_1	−0.418	−0.193	0.542
	(1.39)	(1.62)	(1.43)
Statistic (Prob.)	0.000	0.000	0.000
	(1.00)	(1.00)	(1.00)
Conclusion	Random effect	Random effect	Random effect
	Variable intercept	Variable intercept	Variable intercept

Note: F_2 is the statistic to test the assumption that intercept and coefficient are the same at different cross sections; F_1 is the statistic to test the hypothesis that intercept terms are different in different cross sections but they have the same coefficients; The parentheses are the statistical P value.

According to the estimate result of Eviews, the F_2 statistics of all models were greater than the critical value at a given level of significance, and F_1 statistics is the opposite of it so these adopt variable intercept model. According to the Hausman test, P values of all are greater than the significance level of 10%, so these accept the null hypothesis of the random effect model.

3.4. **The results of the analysis.** The estimated results are shown in Table 4.

Table 4. Estimation result of variable intercept models

	Model (1)	Model (2)	Model (3)
U		1.205*	−0.534
		(0.00)	(0.10)
Y	0.030*		
	(0.00)		
E			−0.782*
			(0.00)
S			2.085*
			(0.00)
H	−0.266*		−0.170
	(0.00)		(0.406)
Constant	9.329*	−6.277*	−2.422
	(0.00)	(0.00)	(0.12)
R-square	0.131	0.039	0.113
F Value (Prob.)	92.933	50.334	39.205
	(0.00)	(0.00)	(0.00)
Observation	1238	1240	1238

Note: The parenthesis is P value, "*" means significant at the significance level of 10%.

In view of the limitation of the data, the specific coefficients are not analyzed, and the coefficient symbols of each variable are considered. It can be seen from the estimation results in Table 3 that the F statistics of the three models are large which indicates that models are significantly valid.

According to the estimated results of model (1), it can be known that the excessively high housing price will be detrimental to the urbanization construction. On the one hand, high housing prices will increase the living cost of residents and bring difficultly for migrants. On the other hand, it amplifies the bubble risk of the real estate market and contributes to the hollowing-out of the economy. The estimated results of models (2) and (3) both show that there is indeed a causal relationship between urbanization and provincial attractiveness. Model (2) shows that the promotion of urbanization plays a significant role in enhancing the attractiveness of provinces. However, in model (3), the conclusion is contrary. One of the reasons is that the early urbanization of China excessively relies on cheap "land dividend" and "demographic dividend" [9]. Therefore, after enjoying the benefits of demographic dividend and human capital optimization, various regions have to face the after-effects of unbalanced land supply structure and insufficient infrastructure to meet the living needs of residents. Another reason is that local governments have not yet established a complete industrial system and public service system, which cannot carry large numbers of migrants. In addition, in model (3), there is a significant negative correlation between the added value of the secondary industry and the attraction of different places, and a significant positive correlation between the added value of the tertiary industry and the attraction. The negative correlation between the price of housing and the attractiveness of different places is not significant, which is consistent with the conclusion of model (1). In recent years, the growth rate of the service industry in China is obviously higher than the secondary industry. The rapid development of it is conducive to optimizing the industrial structure and promoting the development of service-oriented industries. Since there is a large demand for labor in the service industry, the prosperity of the service industry can encourage regions to attract more talents.

4. **Conclusions and Recommendations.** This paper analyzes the influence of urbanization and housing price on regional attractiveness by constructing regional attractiveness index. The empirical results show that: 1) The excessively high housing price will increase the living cost of residents and contribute to the hollowing-out of the real economy, which is not conducive to the improvement of urbanization construction and the attractiveness of regions. 2) Urbanization can promote the attractiveness of regions, but it is related to the original driving force of urbanization and the improvement of industrial systems. Specifically, urbanization plays a significant role in enhancing the attractiveness of provinces in the early stage. However, if the urbanization transition relies on cheap land "dividend" and "element" of "demographic dividend", the local will face imbalance in the structure of land supply and infrastructure cannot meet the needs of the residents of sequelae in the end. Moreover, if local governments have not yet established a complete industrial system and public service system, it cannot carry large numbers of migrants. And blinding urbanization may cause urban diseases. According to the results of the empirical analysis, the following suggestions are put forward. First, local governments should reasonably promote the construction of new urbanization and play sustainable development strategies. Second, strengthen the construction of the real estate market and adhere to the "house is for living, not for speculation" strategic positioning. Third, attach importance to the development of tertiary industry and constantly optimize the economic structure. However, due to the limitations of subjective and objective conditions, the following problems exist in the research. First, the construction of regional attractiveness indicators and the selection of panel model have subjectivity. Second, in

order to ensure the adequacy of data, we use quarterly data. However, some indicators, such as the permanent population at the end of the year and the urban population are available on annual dates. Therefore, this paper uses measurement software to achieve data, which reduces the accuracy of model estimation. There is no doubt that if these problems are solved, we will get more objective results.

REFERENCES

[1] M. Chen, S. Zhu, J. Li and B. Chang, Evaluation and analysis of population attractiveness in Ningbo based on multi-source data, *Ningbo Economy*, vol.3, pp.25-27, 2018.

[2] Y. Jiang and B. Pu, Study on attraction pattern of Chengdu-Chongqing urban agglomeration based on gravity model, *Soft Science*, vol.31, no.2, pp.98-102, 2017.

[3] X. Gen, *Research on the Difference of Influence of High-Speed Railway on Urban Attraction*, Master Thesis, Beijing Jiaotong University, 2015.

[4] H. Li, Comprehensive analysis of influencing factors of urban tourism attraction – An empirical study based on panel data, *Journal of Guangxi University for Nationalities*, no.8, pp.145-150, 2011.

[5] H. Li and S. Li, Study on spatial economic connection of urban agglomeration based on gravity model – An empirical study of Pearl River delta urban agglomeration, *Journal of South China University of Technology*, vol.13, no.1, 2011.

[6] F. Hu and F. Huang, Comprehensive evaluation of investment attractiveness of urban real estate market, *Statistics and Decision Making*, no.23, pp.46-49, 2013.

[7] M. Ren and B. Liu, The relationship between housing price and urbanization – An empirical analysis based on inter-provincial panel data, *Southern Economy*, no.2, pp.41-49, 2009.

[8] Y. Tuo, Impact of urbanization on housing price: Linear or nonlinear – An empirical analysis based on four panel data regression models, *Finance and Economics Research*, no.4, pp.135-144, 2011.

[9] S. Gu and J. Liu, Urbanization should move from "factor-driven" to "innovation-driven", *Population Research*, vol.36, no.6, pp.3-12, 2012.

[10] H. Zhang, Influence of floating population statistics on urbanization level, *Urban Planning*, no.3, pp.17-24, 2018.

[11] W. Zhao, C. Bian and L. Dong, Urbanization, urban housing price and migration of floating population, *Research on Financial and Economic Issues*, no.6, pp.123-130, 2018.

[12] D. Zhu, X. Wu and J. Zheng, Application review of gravity model in economic research, *Journal of Yunnan University of Finance and Economic*, no.5, pp.19-24, 2008.

[13] X. Wan and X. Liu, Index system and evaluation of sustainable development of urban ecosystem in Nanjing, *Journal of Nanjing Forestry University (Natural Science Edition)*, pp.23-26, 2002.