What Factors Lead to the Large Disparity of Housing Prices between Chinese Cities?

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Abstract

There is large disparity between China's urban housing prices. The disparity even reaches dozens of times and it is worth to explore the deep level reasons. In this paper, the Chinese 35 cities are divided into four groups according to cluster analysis on housing prices. Combining with panel unit root, panel cointegration, panel Granger causality test results, we analyze the equilibrium relationship between housing prices and household disposable income. Then we use FMOLS model to discuss on the problem of the stability of housing affordability. Analysis showes that: Generally speaking, there was long-term equilibrium relationship between housing prices and household disposable incomes in the 35 cities and housing affordability was stable, but the stability was very weak. There was bilateral causality between housing prices and household incomes. Meanwhile, the problem of housing affordability stability was not a common phenomenon, it only existed in the cities with higher housing prices. Besides income, the city's hardware and software facilities such as food consumption, health care, education, transport and communications are also important reasons for housing price's fluctuation. So the government should take targeted measures to regulate domestic prices and incomes to positive interaction according to local conditions. Simultaneously, the government should also improve the hardware and software facilities in cities with smaller affordability problems to guide the rational flow of housing demand, and ultimately to enhance the stability of affordability. The research perspective and method provided by this paper are universal to some extent.

Keywords: housing prices, household disposable income, housing affordability, FMOLS

JEL Classification: R23, R31

1. Introduction

Housing is one of the most basic elements to life requirement and development of human society. In the system of housing distribution monetization, residents, who want to achieve the "home ownership" ideal, must have the corresponding ability to pay. Housing prices and income are the most important factors that determines the capacity to pay housing. Housing prices and income can coordinate development, not only determines the housing payment ability, but also related to the improvement of living environment and residential market stability, social stability and harmony. However, housing prices continued to climb in the interests of all parties in the game relationship in recent years. Especially since 2004, housing prices rose too fast significantly more than the growth of per capita disposable income. It also seriously weaken the housing capacity to pay of the residents, and thus become the focus of attention of the community.

So, whether there exists equilibrium relationship between changes in housing prices and residential income? How is stability of the residents' housing payment capacity and whether there exists regional differences? In addition to residential income, whether there are other significant determinants of housing price fluctuations? How to alleviate housing affordability stability problems to some extent?

Thinking and Research on the above problems, we can not only observe the change trend of residents' ability to pay, but also can provide a new perspective to solve the stability problem of housing payment capacity.

Compared with the existing relevant research, potential contribution of this paper are as below: Firstly, the paper is not limited to a single or several indicators to measure housing affordability, instead, we use the binding interpretative framework on housing purchase defined by Gan and Hill (2009) to discuss stability of payment capacity; Secondly, given that house buying is behavior of the whole family, the use of per capita disposable income and housing price comparison is inappropriate, so we using family income distribution indicators; Thirdly, we abandon grouping the cities by geographical region and we adopt Markov (Mshalanobis) distance method to divide the 35 cities into groups. It can not only avoid the group does not reflect its true overcomes the problem of housing price, but also avoid the low pass rates of stability of macro-analysis test; Fourthly, we use heterogeneous panel data analysis methods to examine the relationship between housing price and income problems and stability of payment capacity through Panel unit root tests, Cointegration tests and Granger causality tests and FMOLS model. In addition, we add more fundamental factors as explanatory variables to the baseline model to carry out a more detailed analysis.

This paper is structured as follows: part II review of the relevant literature; part Ⅲ is the theoretical analysis to explain the formation mechanism of housing affordability and the econometric model used in this paper; part Ⅳ is data description and empirical analysis; the last part is conclusion and policy implications.

2. Literature Review

Since the housing affordability problem was paid attention by policy makers from 20th century 80 years, researchers study the housing affordability problem with different research methods from different research perspectives.

2.1 Research Perspectives

There are two main groups of study of literature according to angle of view:

One is based on the ratio of directly measuring the relationship between payment and family income, including RIR (ratio of income and rent), PIR (ratio of price and income). Mostafaet (2006) adopted this method to research on the housing affordability in China and some provinces and cities. Mimura(2008) and Eric Fong et al.(2015) set mortgage housing expense to income ratio as selection criteria used to judge the largest mortgage lenders the ability to pay. Although this type of research is simple and easy to understand, data collection fast, easy to trans-regional comparative advantage over time, its shortcomings should not be overlooked: firstly, these indicators reflect the overall level of capacity to pay and don't take into account quality changes of housing, consumer preference differences of family and structural reasons for housing affordability difficulty; Secondly, income used in these indicators is usually temporary income, but from the point of view of government decision-making, using persistent income to measure the households capacity to pay is more practical in long-term; Thirdly, this type of research is unable to accurately evaluate housing affordability problems of low-income urban households, and thus cannot provide scientific basis for development policy of low-income housing for the government.

The other one is residual income method which is indirectly to measure the relation between housing expenditure and household income with residual value paid. Chi-Chur Chao & Eden S.H.Yu (2015) etc. studied the problems of privatization of housing and housing affordability in China's housing system reform process, and found that due to changes in housing system, housing affordability varies between cities for demographic and occupational. Residual income method provides better guidelines for understanding the different income, different scales, different types of families in housing consumption, and also points out the direction for the government to solve different types of families, particularly low-income housing issues. However, the residual income approach focuses on a certain minimum income level for a family of non-housing consumption, the focus has shifted from housing consumption to non-housing consumption and can't effectively solve the other problems of ratios method.

2.2 Research Methods

Nowadays, more and more scholars have begun to use panel data methods to study this issue. Because this method could fully exploit the information behind the data and overcome numerous abuses of the past studies which research on individual indicators or individual time series analysis or individual areas.

Gallin (2006) did the cointegration test based on residual, but ended with the result that there's no cointegration between housing price and income. Mikhed Zemcik (2009), Christian Nsiah, Bichaka Fayissa (2013), Paul J. Welfens and Tony Irawan (2014) discussed that whether the house price reflects housing-related benefits by panel data unit root and cointegration. Hurlin(2004) and Jie Liu et al.(2014) found that there were obvious regional differences for the effect of urban comfort on housing prices and wages with empirical panel data analysis

2.3 Work to be Performed

This paper researches on the equilibrium relationship between the housing prices and the income of residents and discusses housing affordability problems in the 35 large and medium-sized cities in China through the unit root test, cointegration test, grainger causality test and FMOLS model. The reason why I choose the 35 large and medium-sized cities is that the high housing prices in their respective region and the housing prices rose faster than income growth. However, residents' income and housing prices are also different between different regions and different cities, taking them as a whole to analyze housing problems is inappropriate. Meanwhile, according to the natural region partition, we will delimit housing prices higher in western cities (such as Chengdu) and housing prices lower in eastern and central cities (such as Shijiazhuang, Hefei) to a wrong team. This will lead to the error analysis results. In view of this, this article breaks the natural boundaries of the region and divides the 35 large and medium-sized cities into 4 groups according to the housing price of clustering.At the same time, in view of the link between residents' income and house prices, this article analyzes the FMOLS model and discusses the equilibrium relationship between house price and the residents' income with panel data methods. This can avoid the disadvantages of study this complex problem with individual or several indexes. In addition, we analyze the model more detailed by adding education and entertainment, health care, employment and other fundamentals as explanatory variables to the benchmark model. Finally, we put forward the policy suggestions on strengthening the residential payment capacity from the perspectives of income distribution, construction, urban facilities, purchasing demand transfer, etc.

3. Theoretical Framework and Model Specification

3.1 Definition of Housing Affordability Stability

Gan and Hill (2009) proposed that we could define housing affordability at least from three angles, namely purchases, payments and receipts. Purchasing power aims to consider the resident's ability to raise sufficient funds to purchase a house through a number of channels. Repayment capacity aims to pay attention to the people's ability to repay the mortgage. Revenue aims to examine the fluctuation relativities of housing prices and residential income. This paper aims to explore revenue capacity. It's the result of relationship between housing prices and residential income changes and can reflect the changes in housing affordability from certain point of view.

However, if we only consider the ratio of housing prices to residential incomes, it is unsearchable, since buyers must have enough wealth and income to the mortgage payment and changes in wealth and income will lead to changes in housing prices and housing affordability (I-Chun Tsai, Chien-Wen Peng, 2010). So we need to impose constraints to this definition. Bourassa (1996) set two constraints for the family to buy their houses. The first one is called a wealth constraint, namely:

$$\mathrm{W} \geq \mathrm{D}$$

Where, W the flow of wealth held by households, D represents saving deposits for house buyers, its value for V, then

$$\mathrm{D} \geq rV$$

Where, r represents Deposit rate.

The second one is called income constraint:

$$pIncome \geq (V - D)i_m \qquad (1)$$

Where, $Income$ represents income, p represents the highest percentage of household income could be used to pay for housing mortgage loans, i_m represents the mortgage rates, HP represents housing prices. Calculate the logarithm of equation (1) on both sides, then the income constraint can be written as:

$$\ln p + \ln Income \geq \ln(HP - D) + \ln i_m$$

Therefore, the rate of change of the variables can be expressed as:

$$\Delta \ln p + \Delta \ln Income \geq \Delta \ln(HP - D) + \Delta \ln i_m \qquad (2)$$

Keeping the others constant, mortgage rates and the largest proportion of income can be used in mortgage payments should remain unchanged, that is $\Delta \ln p = 0$, $\Delta \ln i_m = 0$. Equation (2) can be written as:

$$\Delta \ln Income \geq \Delta \ln(HP - D)$$

Because $\Delta \ln Income > 0$, therefore

$$\frac{\Delta \ln(HP - D)}{\Delta Income} \leq 1 \qquad (3)$$

In equation (3), when deposits that used to purchase houses remain unchanged, the income elasticity of housing prices (HP) will be less than 1. Only in this way, housing prices can satisfy the income constraints. More this value greater than 1, more unstable of the housing affordability is.

3.2 Limitations of the OLS and FMOLS Model

As section (N) and time (T) increase, the OLS estimate converges of cointegrated variables will converge to the true value in the long term. Therefore, Panel data with cointegration can not be directly estimated using least squares (OLS).Due to the variables endogenous and correlation between error terms of medium-size sample. When cointegration test is applied to the panel, OLS estimator is biased and inconsistent.

Namely regressors of potential endogenous and serial correlation will make clear errors in the regression estimate. In view of this, this paper adopt fully modified OLS (FMOLS) model which was proposed by Phillips (1990) and completed by Pedroni (2000). So the estimation formula is:

$$\mathrm{HP}_{i,t} = \alpha_i + \beta_i \mathrm{Income}_{i,t} + \varepsilon_{i,t} \qquad (4)$$

Where, $t = 1, 2, \cdots, T$, $i = 1, 2, \cdots, N$, HP_i represents endogenous variable (housing price), Income_i represents the regression variables (income), T represents the period of observation, N represents the number of panel samples. Because FMOLS not only estimate the parameter β for consistent estimation with fairly small sample, but also successfully control the possible endogeneity of the relationship between the coefficient of regression and correlation coefficients. Meanwhile, obvious deviation problem of the OLS estimation of small sample is solved. The FMOLS estimator of sample i is:

$$\beta_i^* = (Income_i' Income_i)^{-1}(Income_i' HP_i^* - T\lambda)$$

Where, HP^* represents the endogenous variables after transpose, λ represents the adjustment parameters of the autocorrelation coefficient.

4. Statistical Grouping, Data Description and Empirical Analysis

4.1 Statistical Grouping

This paper use Mshalanobis-distance method to carry out the work of hierarchical clustering analysis for the Chinese 35 large and medium-sized cities based on the cluster variables of the average housing sales prices in the years 2010-2013. Then divide the 35 cities into four groups using group average link method of merging (table 1).

Table 1: Results of Cluster Analysis of the 35 Chinese Cities

Groups	Cities Included
Ⅰ	Beijing Shanghai Guangzhou Shenzhen Hangzhou
Ⅱ	Tianjin Ningbo Dalian Xiamen Fuzhou Nanjing Qingdao Chengdu Haikou Wuhan
Ⅲ	Shenyang Ji'nan Taiyuan Zhengzhou Harbin Kunming Hefei Nanning Xi'an Changchun Changsha Nanchang Lanzhou Urumqi
Ⅳ	Chongqing Shijiazhuang Guiyang Xining Yinchuan Hohhot

4.2 Data Description

The datum of house prices, employment, per capita food consumption expenditure, per capita health expenditure per capita, education and entertainment expenditure, per capita expenditure communications mainly come from the China City Statistical Yearbook or the city government website or statistical information website. The time span is from 2000 to 2013 and a total of 490 groups of data were consolidated. Based on the clustering results, the parameters related to group values were added to the total average. Therefore, there will be 40 groups of sample data in the panel analysis. The main description statistics of the four groups of cities and panel are as shown in table 2.

Table 2: Description Statistics of the Four Groups of Housing Prices and Household Income

Groups	Mean Value	Median	Maximum Value	Minimum Value	Standard Deviation	Skewness
Housing price (Yuan per Square Meters)						
Ⅰ	6258.90	5333.09	9842.90	3743.83	2578.84	0.48
Ⅱ	3382.369	3043.83	5163.83	2093.44	1273.39	0.36
Ⅲ	2533.18	2362.10	3518.66	1864.45	653.03	0.47
Ⅳ	1908.09	1695.22	2725.59	1381.28	532.07	0.54
Panel	3520.64	2707.09	9842.90	1381.28	2217.41	1.65
household Income (Yuan per Year)						
Ⅰ	57579.17	55093.89	82308.90	40892.05	13887.17	0.58
Ⅱ	38667.87	35410.91	60045.01	24506.33	12423.86	0.54
Ⅲ	29646.00	27277.37	46368.68	19158.29	9884.95	0.62
Ⅳ	29499.04	27361.83	46179.00	18087.67	9930.11	0.48
Panel	38848.02	36999.89	82308.90	18087.67	16054.14	0.82

4.3 Results of the Empirical Tests

4.3.1 Results of the Panel Unit Root Test and Analysis

Above all, we carry out the work on panel unit root test for the first-order difference of housing prices and household income in order to determine stability of the datum and avoid spurious regression. Meanwhile, we use various inspection methods presented in table 3 in order to ensure the robustness of the results. We can draw a conclusion from synthesis of all test results that housing prices and household income are non-stationary cross section sequence variables. However, they both reject the hypothesis for the null existence of unit root after the first order difference, namely they are first difference stationary variables.

Table 3: Results of Panel Unit Root Test

Method		Housing Prices		Household Income	
		HP	△HP	HI	△HI
LLC	a	-2.6773***	-3.5662***	5.5715	-1.9059***
	b	4.1482	-7.3800***	-0.3187*	-2.4220***
	c	1.4256	-3.1490***	3.7385	0.5495**
Breitung	b	-2.1237	-3.1590*	1.8116	1.6682**
IPS	a	0.0371	-0.8296**	3.6511	0.3133***
	b	0.6042	-0.7647**	0.9026	0.2820**
ADF-Fisher Chi-square	a	8.0337	11.7534**	0.1364	4.7926**
	b	4.3842	15.4012***	2.2722	7.5565**
	c	1.4412	14.3125**	0.1340	2.6184**
ADF-Choi Z-stat	a	0.1165	-1.2185*	4.5140	0.3164**
	b	1.1454	-1.6172**	1.9425	0.2906**
	c	2.0121	-1.6770**	3.6292	1.1807
PP-Fisher Chi-square	a	0.2297	5.9542*	0.0003	4.6650**
	b	0.5563	9.5564**	2.2017	11.5186***
	c	0.0371	10.3738**	0.0004	3.4818*
PP-Choi Z-stat	a	3.9518	-0.0448*	8.4889	0.3483**
	b	4.3312	-0.8088**	3.0079	-0.9126***
	c	5.6231	-1.1744**	7.8799	0.7752**
Hadri Z-stat	a	0.8001	3.3564***	3.7362***	2.7644***
	b	3.0357**	4.8292***	4.2888***	14.4285***

Note: In table 3, a, b and c respectively represent with intercept, with intercept and trend, no intercept and time trend; the values are the corresponding result of the statistic test; ***, **, * indicate that the statistical value is significant respectively in the confidence level of 1%, 5% and 10%; Except for the Hadri test, the null hypothesis of the hypothesis test has unit root for the rest test method.

4.3.2 Results of the Pedroni Panel Cointegration Test and Analysis

We will test the existence of cointegration in panel data after panel data tested for the I (1). From the cointegration test results shown in table 4, we know that the statistics between dimension are more significant than the statistics within dimension which means that there is strong cointegration relationship between housing prices and household income exists for one group of cities in the four groups at least. The statistics based on ADF test are strong evidence for cointegration between housing prices and household income. The statistics results are significant intra group and inter group, which means that housing prices and household income trends are overally related in the 35 large and medium-sized cities. However, the conclusions shown in table 4 are not consistent between different test methods, some statistic are significant while others are not significant. It indicates that the existence of heterogeneity between housing prices and household income among the four groups of city

Table 4: Results of Panel Cointegration Test

Test Method		Test Hypothesis	Statistics Name	Statistic Value
Pedroni检验	Intercept	H_0: $\rho=1$ H_1: $\rho<1$	Panel v Panel rho Panel PP Panel ADF	1.6927* -0.4169 -0.7254 -2.0408**
		H_0: $\rho_i=1$ H_1: $\rho_i<1$	Group rho Group PP Group ADF	0.8840 0.3849 -4.2422***
	Intercept and Trend	H_0: $\rho=1$ H_1: $\rho<1$	Panel v Panel rho Panel PP Panel ADF	-0.5317 1.0593 0.2268 -1.0760**
		H_0: $\rho_i=1$ H_1: $\rho_i<1$	Group rho Group PP Group ADF	2.1508 1.9140 -3.9540***
	No Intercept and Trend	H_0: $\rho=1$ H_1: $\rho<1$	Panel v Panel rho Panel PP Panel ADF	0.4015 -0.0261 -0.3547 -0.2824**
		H_0: $\rho_i=1$ H_1: $\rho_i<1$	Group rho Group PP Group ADF	1.3770 0.3063 0.2879**

Note: ***, **, * indicate that the statistical value is significant respectively in the confidence level of 1%, 5% and 10%.

4.3.3 Results of the Panel Causality Test and Analysis

As housing prices and household income are cointegrated, we can study the causal relationship between them. As the results of granger causality test given in Table 5, the F statistic and P value are significant reject the null hypothesis. Therefore, we can infer that housing prices rise (or household income growth) can lead to the following household income growth (or housing prices rise). That is to say, the causal relationship between the two variables is bidirectional. Therefore, we should not only see the negative impact of housing prices rise. Because there are many industries closely related to the housing market, a booming housing market system also promote the residential income increase and economic growth.

Table 5: Panel Granger Causality Test

Null Hypothesis	F-statistic	Prob.
Housing Prices do not Granger Cause Household Income	4.1467	0.0269
Household Income do not Granger Cause Housing Prices	9.2615	0.0009

4.3.4 Estimation of FMOLS Model

The related statistics estimation results of Equation (4) are given in table 6. The coefficient estimation of the panel is 1.2760, this result is not conducive for us to characterization of the stable relations between housing prices and household income. As we mentioned in Equation (4), keep other conditions unchanged, the elasticity of housing prices to household income in a stable housing market should be less than 1, which can meet the income constraint. In addition, the coefficient difference between different city groups is relatively large under the action of income growth promoting housing prices. Meanwhile, there are smaller effects for household income to housing prices.

Table 6: FMOLS Estimation Results of the Long-Term Equilibrium Relationship between Housing Prices and Household Income

Groups	Coefficient β_i	Standard Error	t -statistic
Ⅰ	2.1396	0.0183	9.7503***
Ⅱ	1.2096	0.0066	15.3686***
Ⅲ	0.8184	0.0033	20.6005***
Ⅳ	0.6372	0.0027	19.9730***
Panel	1.2760	0.0076	17.1691***

Note: housing prices as the dependent variable and the household income as variables in the estimation;*** indicates that the statistical value is significant in the confidence level of 1%.

As the test results shown in Table 6, one way may ease the seriously weak affordability stability in groups I and II is to transfer the partial housing demand in the groups I and II cities to the groups III and IV cities. While data can only show that the effect of household income on housing prices, if housing prices are more sensitive response to other fundamental factors, this conclusion is not sufficiently accurate. In view of this, we add the fundamental factors variables of household food consumption expenditure, expenditure on health care, education and entertainment expenses, transportation and communication expenses, the employment rate into the FMOLS and reestimate the coefficient.

Table 7: FMOLS Estimation Results of the Long-Term Equilibrium Relationship between Housing Prices and Multiple Factors

Variable Definition	Groups	Coefficient β_i	Standard Error	t -statistic
Dependent Variable: Housing Prices Independent Variable: Household Income	Ⅰ	1.7844	0.0422	3.5217**
	Ⅱ	1.0497	0.0144	5.6490**
	Ⅲ	0.7248	0.0077	7.8097***
	Ⅳ	0.5720	0.0074	7.5620***
	Panel	1.0912	0.0129	12.4208***
Dependent Variable: Housing Prices Independent Variable: Household Food Consumption Expenditure	Ⅰ	0.5612	0.1762	3.1839*
	Ⅱ	0.3181	0.0680	4.6803*
	Ⅲ	0.2451	0.0272	9.0133***
	Ⅳ	0.2450	0.0346	7.0840**
	Panel	0.6533	0.0538	12.1524***
Dependent Variable: Housing Prices Independent Variable: Expenditure on Health Care	Ⅰ	3.8524	4.8575	0.7931**
	Ⅱ	2.4080	0.3783	6.3652***
	Ⅲ	1.3368	0.2598	5.1457*
	Ⅳ	0.9138	0.1459	6.2616**
	Panel	4.7556	0.8895	5.3463***
Dependent Variable: Housing Prices Independent Variable: Education and Entertainment Expenses	Ⅰ	2.4735	0.6928	3.5701**
	Ⅱ	1.3544	0.1387	9.7671***
	Ⅲ	1.1112	0.2032	5.4671*
	Ⅳ	1.2699	0.2623	4.8407**
	Panel	1.3780	0.0762	18.0955***
Dependent Variable: Housing Prices Independent Variable: Transportation and Communication Expenses	Ⅰ	1.6900	0.5203	3.2478**
	Ⅱ	0.7206	0.1785	4.0378**
	Ⅲ	0.6198	0.1015	6.1045***
	Ⅳ	0.7332	0.1762	4.1612**
	Panel	0.9209	0.0545	16.8842***
Dependent Variable: Housing Prices Independent Variable: Employment Rate	Ⅰ	-387.4818	567.8297	-0.6824
	Ⅱ	-718.4471	877.9882	-0.8183
	Ⅲ	136.1124	236.1130	0.5765
	Ⅳ	-132.2466	118.1786	-1.1190
	Panel	771.0972	256.2884	3.0087***

Note: ***, **, * indicate that the statistical value is significant respectively in the confidence level of 1%, 5% and 10%.

As the FMOLS estimation results of multi factors shown table 7, rise of housing prices may also be caused by other reasons. Such as housing prices in group Ⅰ and group II cities link strongly with medical care, education and entertainment, transportation and communication. Although the food consumption and employment opportunities will affect the housing prices for the cities as the whole, rise of housing prices in group Ⅰ and group II cities are not caused by the factors of easily employment, food consumption, etc. Instead, it is probably mainly due to the more developed "software and hardware" facilities in the cities such as health care, education and entertainment, transportation and communication etc. These factors are attracting more and people to migrate to these cities, thus housing demand begins to rise higher and higher and leads to the increase in housing prices. So, it becomes easier to understand the differences in house prices rise between the city groups after we add the fundamentals factors into the base FMOLS model. Therefore, in view of the housing prices in group Ⅰ and group II cities can be easily driven by other factors than household income, policy makers can improve "software and hardware" facilities in the group Ⅲ and group Ⅳ cities where the housing prices are relatively low to reduce the purchase demand surging up to group Ⅰ and group II cities where the housing prices are much higher currently. Meanwhile, through the great improvement of city facilities in group Ⅰ and group II cities to attract the residential purchase demand flow to the cities where housing prices can be relatively little affected by the household income and the housing prices are relatively low. Therefore, in this way, we can solve the confusing problems on the housing prices continuing to rise rapidly and the asymmetric development between cities to some extent.

5. Conclusions and Policy Recommendations

This paper carries out the empirical analysis with the clustering non-stationary heterogeneous panel data of the 35 large and medium-sized cities in China to explore the equilibrium relationship between housing prices and household income, as well as the stability of affordability.

5.1 Conclusions

The following conclusions can be drawn from the empirical analysis:

Firstly, there is long-term and balanced relationship between household incomes and housing prices in the panel data, which means that the housing affordability is stable on the whole in the 35 large and medium cities in China, but the stability of affordability is fragile. The fragile steady-state can be easily broken if the affordability stability problem in the cities with high housing price can not be solved well.

Secondly, housing prices rise (or household income growth) can lead to the following household income growth (or housing prices rise). That is to say, the causal relationship between t housing prices and household income is bidirectional. Therefore, we should not only see the negative effects of housing prices rise to the affordability. Because there are many industries closely related to the housing market, a booming housing market system can also promote the residential income and economic growth.

Thirdly, although the average elasticity of housing prices to household income is close to 1 in the 35 cities, there are differences for the elasticity of housing prices to household income between different cities. Weakness of the housing affordability stability is not a common phenomenon, the housing prices can be easily driven up by household income in the cities where housing prices are high, but the driving force is relatively small in the cities where housing prices are lower.

Finally, the rise housing prices is not only directly related to household income, the "software and hardware" facilities in the cities such as food consumption, health care, education and entertainment, transportation and communication etc. are also important factors affecting the housing prices. Although employment opportunities will also affect housing prices on the whole, it can not constitute the main reason for fluctuation of housing prices to individual cities.

5.2 Policy Recommendations

This paper can provides three aspects of policy recommendations at least based on the analysis above:

Firstly, the housing affordability stability is different between cities. The government regulation policies of the housing market should pay attention to the different development stages and the different structure characteristics of various areas. The policies can not engage in "one size fits all".

We should make use of credit, tax and other measures to strengthen the regulation and control efforts to the cities with high housing prices such as Beijing, Shanghai, Guangzhou, Shenzhen, Hangzhou, etc. For the cities with relatively high housing prices, we should pay close attention to the development trend of housing prices and carry out timely and appropriately regulation to prevent the housing prices from rising too high and endanger the stability of affordability.

Secondly, we should support the moderate increases in housing prices, but simultaneously we should take directly or indirectly means such as increasing wages, difference in interest rates and so on to increase household income, so as to keep the benign interaction between housing prices and household income. Only in this way can we avoid the affordability stability been unilateral and deterioration by the housing prices rise.

Thirdly, we should perfectly upgrade the hardware and software facilities such as health care, education and entertainment, transportation and communication and so on in the cities with relative lower housing prices such as Guiyang, Xining, Yinchuan, etc. Moreover, we should take measures to attract more talents and labors to work here and live here, as well as it can transfer some housing purchase demand from Beijing, Shanghai and other cities with high housing prices to the cities with lower housing prices. In this way, it can not only solve the affordability stability problems for the cities with high housing prices, but also increase the household income where population inflow into.

Acknowledgements

This material is based upon work funded by Zhejiang Provincial Natural Science Foundation of China under Grant No. LQ14G030019. This is also a stage result for the China Postdoctoral Science Foundation under Grant No. 2013M540312 and Zhejiang Province Federation of Social Sciences project under Grant No. 2013B071. The author is grateful to their support. Meanwhile, the author would like to thank the anonymous reviewers and the editor for their hard work.

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