International Journal of Research in Humanities and Social Studies
Volume 6, Issue 2, 2019, PP 50-64
ISSN 2394-6288 (Print) & ISSN 2394-6296 (Online)

Research on the Relationship between Housing Price Increase and Employment

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ABSTRACT

The rapid increase in housing prices in China may have a strong impact on employment. This study uses panel data for 278 prefectural-level cities from 1999 to 2013, which effectively controlling for possible model estimation error arising from endogeneity, to examine housing prices as a driver of employment and employment structure growth. Household consumption and corporate investment intermediary variables are used as the mediators of housing prices to influence employment, to test the wealth channel and the collateral lending channel. The research finds that a rapid increase in housing prices that led to a rise in employment and the increase of the proportion of non-agricultural employment, but the impacts on the proportion of tertiary and secondary employment are not obvious. Finally, this study constructs a mediation model to test impact mechanism, and found that the impact of housing price increases on employment mainly through collateral lending channel of housing prices.

Keywords: *housing price, employment, employment structure, wealth channel, collateral lending channel*

INTRODUCTION

In the past decade, a major event in China's economic and social life has been the continuous rise in real estate price. At the same time, labor force has also undergone market-oriented reforms and rapid urbanization cause the dynamic changes. Then it is of strategic importance to find the key factors affecting employment and maintain steady and sustained growth of employment. So, under the background of the continuous progress of urbanization, the problems whether the rise in housing price affects employment and the industrial structure's transformation and upgrading urgently need to be investigated.

The study of the impact of housing price changes on employment in the academic community started late. Helpman (1998) proposed that based on the new economic geography, excessively high housing price in one region would inhibit the concentration of labor force in the area [1]. However, both domestic and foreign scholars have no conclusion on this matters (Dohmen, 2005; Rabe and Taylor, 2012) [2][3]. Gao Bo etal. (2012) pointed out that due to the existence of regional housing price differences, relatively high housing prices would result in the outflow of labor and affect industrial transfer and upgrading [4].GaoBo et al.(2014)[5] constructed an urban labor supply unemployment equilibrium model and pointed out that the increase in housing price would hinder the migration of rural labor to cities leading to a decline in urban unemployment rate. Charles et al.(2012) used the U.S. microdata from 2000 to 2007 to point out that although the decline in employment of manufacturing, the development of the real estate market could increase the employment of related industries, such as construction industry, to offset that impact[6]. In the context of the U.S. subprime mortgage crisis, Mian et al. (2013) found that the decline in housing price after the U.S. financial crisis from 2007 to 2009 led to a significant decline in household consumption [7]. Beyond that, Mian and Sufi (2014) used the research conclusion to point out that the phenomenon that housing price decline brought deterioration of household balance sheets would lead to a decline in household consumption demand, and then play an important role in the sharp decline of the number of employed people [8]. On that basis, Giroud and Mueller (2017) used corporate micro-data to point out that the decline in local consumer demand during the financial crisis led to a large number of companies being forced to

lay off workers, which caused a substantial decline in employment [9].

This paper mainly studies the impact of housing price changes on employment, including the impact of housing price changes on employment and the impact on employment structure. This paper also explores the theoretical mechanism of housing price affecting employment from two aspects: wealth channel and collateral lending channel., It empirically examines the impact of housing price changes on total employment and employment structure. Subsequently, it examines the influence mechanism through an intermediary effect model, and finds that collateral lending channel is the main way that the rise in housing prices affects employment. The contribution of this paper is the first study used panel data for 278 prefectural-level cities in China to examine the impact of rising housing prices on employment and employment structure, and to explore the rich heterogeneity and the practical transmission path of housing price changes' impacts from 1999 to 2013.

The structure of this paper includes review on the influence mechanism, and is followed by the model setting and the introduction of the main sample data. The outputs of regression analysis are discussed and tested prior the final analysis of influence mechanism and are followed by conclusion.

RESEARCH SETTING

Real estate is not only consumer goods but also investment goods. On the one hand, house is an important part of household assets for families with houses. Housing price changes affects the accumulation of household assets and consumer spending (Milosch, 2014) [10]. On the other hand, housing is a high quality collateral. The increase in housing price leads banks to relieve the constraints on credit financing and affects individual or corporate investment decisions (Yang Zan et al., 2014) [11]. Therefore, this paper mainly examines the influence mechanism of housing price changes on employment from two aspects.

Household Wealth Channel

Increase in housing prices adds the value of real estate wealth. Then homeowners enhance their consumption that helps to drive the development of industries and improve employment. The impact that changes in housing net worth affect employment through changes in household wealth is called "household wealth channel". Only the permanent changes in asset wealth will have an impact on consumption. As a kind of wealth, housing's price fluctuations are mainly permanent, and have a profound impact on household consumption (Lettau and Ludvigson, 2004; Sousa, 2008; Jiang et al, 2013) [12][13][14].

When housing price rises, for families having several houses, housing consumption and investment decisions can be made independently, so that household wealth can be maximized. For families that cannot separate consumption and investment, the accumulation of housing wealth is influenced by the sum of the housing use-cost and the opportunity cost of investing in housing. For non-home owners families, the effect of housing price increase on consumption is not the same. The rapid increase in housing price may cause families that will buy houses in the future to curb current consumption for savings, or choose not to buy a house and increase non-residential consumption in the current period.

According to the survey sample of *China Household Finance Survey Report (2016)*[1], the ownership rate of self-owned houses in China had reached 89.68%: urban households owned an average of 1.22 houses and rural households owned an average of 1.15 houses. As showed in *China Household Finance Survey Report (2017)*[2], Chinese wealth per capita of 2016 increased by 17.25% compared with that of 2015. The increase in the net real estate value made residents benefit from housing price increase. The report shows currently a vast majority of families in China own houses, and the rise in housing price leads to an increase in household wealth, which stimulates consumption (Benjamin et al, 2004; Yan Se, Zhu Guozhong, 2013)[15][16].

Collateral Lending Channel

For homeowners facing financial constraints, increasing in housing prices eases credit constraints on bank borrowers and makes users' credit scale expanded. This is an indirect channel of real estate wealth, known as the "collateral lending channel". Based on the financial accelerator model, Matteo and Iacoviello (2005) studied the relationship

[1]*China Household Finance Survey Report (2016)*is compiled by China Household Finance Survey and Research Center of SWUFE.

[2]*China Household Finance Survey Report (2017)* is compiled by China Economic Trend Institute of the Economic Daily.

between debt and asset from the supply and demand sides [17]. The rise in asset prices increases the borrowers' ability to borrow, and consumption and investment also increase. When housing price rise, the appreciation of the value of real estate alleviates formal credit constraints, reduces financing costs and further adjusts the debt structure for debtors who have houses. At this point the individual borrowers on the one hand can expand the size of capital scale, on the other hand invest in more profitable products (Cai Dongliang et al., 2015 ; Shim and Koo, 2015)[18][19], for instance, continuing to buy houses. For enterprises, appreciation of real estate reduces the cost of external financing, increases investment and expands production to promote employment while improving the company's balance sheet.

In addition, if a family wants to buy a house, the increase in housing price will add the family's burden and cause them to save money for buying a house (Deng Jian and Zhang Yuxin, 2011)[20]. This will also force adults who have the ability to work but staying at home to enter the job market, especially women(Wu Weiping et al., 2016)[21]. In China, even the parents who have already exited from the labor market would go back to work to save money for their children's houses (Chen Binkai and Yang Rudai, 2013)[22].

In summary, because the positive and negative effects of the increase in housing price coexist, the effects on the number of laborers employed and the employment structure are not intuitive. Therefore, an econometric model needs to be set up for inspection and analysis.

DATA AND METHODS

Measurement Model Setting

China has 287 cities, however, in China urban Statistical year book some data are missing. Therefore, cities with missing data were taken out and the 278 cities with complete data are included in this study. This study is used data from 1999 to 2013, during period of state-owned housing system reform started in 1998. Prior 1998, houses were allocated by government and after 2014, the stimulus policies caused house price bubble inflating and lead to data distortion and incompleteness. In rapid urbanization in China, this empirical study explores the relationship between housing price and employment. The core econometric model is set as follows:

$$Y_{it} = \alpha + \beta * \ln hp_{it} + \gamma * X_{it} + \varepsilon_{it} \quad (1)$$

Y_{it} ,$\ln hp_{it}$, and X_{it} are the employment, housing price, and a series of urban characteristic variables of City i in $t$year respectively. And,Y_{it} represents that employment and employment structure. As the core explanatory variable, when the factorβ is positive after controlling the characteristics of the city, the housing price has a positive effect on employment.

Selection and Explanation of Variables

Table 1 shows the descriptive statistics of the main variables. In order to ensure the availability of data, this article excludes cities with serious missing data like autonomous prefectures, regions and leagues, and finally selects a total of 4170 observations of 278 prefecture-level cities from 1999 to 2013.

It can be seen from the table that the variables are divided into four categories: (1) the core variables are employment and housing price; (2) variable of employment structure; (3) the characteristics variable of city; and (4)mediator variable. The change of housing price as a market diffusion mechanism accelerates the adjustment of industries and trades, and has an impact on the flow of labor among industries, and the impact of house prices on employment structure is actually the impact on the upgrading of industrial structure. Non-agricultural employment ratio (em32) and the ratio of tertiary industry to secondary industry employment (em3_2) are the important indexes to measure the industrial structure.

Table1. *Descriptive statistics of major variables*

Variable	Definition	Observed value	Average value	Standard deviation	Minimum value	Maximum value
Lnhp	The logarithm of the average housing price	3701	7.695	0.64	4.84	10.1
Lnemp	The logarithm of the total number of employment	3821	5.22	0.73	1.5	7.44
lnemp2	The logarithm of employment in secondary industry	3526	3.78	0.89	0.95	6.17
lnemp3	The logarithm of employment in	3527	4	0.72	-0.56	6.77

	tertiary industry					
em32	The sum of employment in secondary and tertiary industries / the total number of employment	3517	0.57	0.2	0.07	7.22
em3_2	Quantity of employment in tertiary industry /Quantity of employment in secondary industry	3526	1.37	0.68	0.079	10.4
lnpGDP	The logarithm of per capita GDP(Yuan)	4123	9.67	1.298	4.728	29.55
lnedu	The logarithm of the number of regular institutions of higher education	3702	1.245	1.076	0	4.488
lnhea	The logarithm of the number of beds in local hospitals and health centers	3755	9.144	0.72	4.91	11.655
depo	Deposit balance of residents(hundred million Yuan)/GDP (hundred million Yuan)	3407	0.741	0.31	0	6.817
lnpde	Population density（people / square kilometer）	4048	5.75	0.9	1.55	8.689
lnRTC	The logarithm of total retail sales of social consumer goods (ten thousand Yuan)	4161	5.12	1.21	-2.68	13.7
lnFI	The logarithm of fixed investment (ten thousand Yuan)	3956	5.37	1.37	1.24	9.31

Control a set of urban characteristic variables, which can minimize the error of missing variables.

The data comes from the China Urban Statistical Yearbook. This set of urban characteristic variables includes the following five items.

- Economic development (pgdp). Expressed by per capita GDP, since labor employment will increase with economic development, the sign of this variable should be estimated from empirical results.
- Education (lnedu). As a fast growing industry, the real estate industry needs a large number of diverse and professional talents. Therefore, the labor force will increase employment opportunities because of its education level. In view of the availability of data, the number of regular institutions of higher education is used.
- Medical (lnhea). Using the logarithm of the number of beds in local hospitals and health centers, a well healthy area means better public infrastructure, and relatively higher housing prices. Some of the working age workers who have withdrawn from the labor market have to choose to work for these qualities of life.
- Deposit rate (depo). Due to the rise in housing prices, residents will save a large amount of money for housing consumption, while non-housing consumption will be reduced, which is not conducive to economic growth and thus affect employment.
- Urban population density (lnpde). According to the population density data at the prefecture-level level, areas with high population densities will have higher housing prices and more labor supply per unit area.

Finally, in the mediation effect model, the total retail sales of social consumer goods at the end of the year and the fixed investment amount are used as indexes to measure "wealth channel" and "collateral lending channel" respectively, according to the theoretical basis of the second section of the article.

On the one hand, housing prices will affect the production of the industry through changes in social consumption and thus affect employment. So this paper uses the total retail sales of social consumer goods at the end of the year to indicate changes in social consumption. On the other hand, because of the rise in housing prices, the net worth of the property owned by the enterprises will increase, and the house as a high quality collateral will make the bank relax the credit. At this time, the amount of investment used by enterprises for production increases, and the scale of production expands to drive employment. Therefore, this paper uses fixed

investment amount to indicate the change in investment amount for production due to loosen the constraints on credit. The data on employment and housing price used in this paper come from *China Regional Economy Statistical Yearbook*. The housing price data are the average sale prices of commodity houses in prefecture-level cities over the years (Yuan/square meter). The employment data are the total numbers of employees and the numbers of employees in secondary and tertiary industries of the prefecture-level cities. The number of employees and the average housing price are processed logarithmically. The second category is the variable of employment structure, this paper adopts two ratios: the ratio em32 of employment in non-agricultural industries and the proportion of tertiary and secondary employmentem3_2. The third is the characteristic variable of city.

These data are mainly from *China City Statistical Yearbook* and the statistical yearbooks of various cities, including the level of urban economic development *pgdp*, the level of urban education *edu*, the level of urban medical care *hea*, the proportion of deposits *depo* and the population density *pde*. The four variables are processed logarithmically.

RESULTS

According to the analysis of the influence mechanism of housing price affecting employment, both the positive and negative effects of rising housing prices on employment have existed at the same time. So the role of housing price changes in China's employment needs to be judged through empirical tests.

Full Sample Regression of the Impact of Housing Price Changes on Employment

Impact of Housing Price Changes on Employment

Table 2 shows the full sample regression results of housing price to employment. Column (1) shows that with 1% rise in housing price, the total employment amount *lnemp* will rise by 0.054% overall, and be significant at the level of 1%, supporting the growth of macro total employment proposed by Cai Fang (2007)[23].In addition, columns (2) and (3) are the regression results for employment of secondary industry*Inemp2* and employment of tertiary industry *Inemp3*. The results demonstrate that the effect on the employment of the two major industries do not differ significantly, both of which notably increase the number of non-agricultural employment.

Table2. *Impacts of housing price changes on employment*

	Employment			**Employment structure**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
	Lnemp	Lnemp2	Lnemp3	em32	em3_2
Lnhp	0.0543***	0.1365***	0.1185***	0.0455***	-0.0512
	(0.0136)	(0.0324)	(0.0317)	(0.0114)	(0.0392)
LnGDP	0.0301*	0.1015**	0.1103**	0.0260	-0.0093
	(0.0168)	(0.0393)	(0.0479)	(0.0165)	(0.0267)
Depo	-0.0256	-0.0071	-0.0078	0.0110**	0.0102
	(0.0214)	(0.0264)	(0.0243)	(0.0048)	(0.0358)
Lnedu	0.0558**	0.0681**	0.0287	0.0028	-0.0172
	(0.0232)	(0.0334)	(0.0323)	(0.0060)	(0.0518)
Lnhea	0.1105***	0.2384***	0.1381***	0.0408***	-0.1128**
	(0.0348)	(0.0491)	(0.0507)	(0.0148)	(0.0519)
Lnpde	-0.0602	0.0225	0.0086	0.0863	-0.0067
	(0.0463)	(0.0409)	(0.0357)	(0.0745)	(0.0475)
C	3.8297***	-0.5979	0.7197**	-0.9085**	2.9341***
	(0.3377)	(0.3879)	(0.3474)	(0.4587)	(0.5323)
N	2880	2774	2775	2767	2774
R^2	0.2708	0.4160	0.3371	0.1017	0.0180

Note: *The value below coefficient in square brackets is the standard error, and *p< 0.1, **p< 0.05, ***p< 0.01 is significant at 1%, 5%, 10% respectively.*

Impact of Housing Price Changes on Employment Structure

Columns (4) and (5) show the influence of housing price on employment structure. There are two main categories: the employment ratio in non-agricultural industries *em32* and the proportion of tertiary and secondary employment*em3_2*. According to the measurement results, 1% increase in housing price will result in an increase of 0.045% in

em32. However, its effect on*em3_2* is not significant. This may be attributed to the fact that after the implementation of the land transfer system in 2004, the expansion of land finance has made the government increase its investment in preferred industries, like manufacturing. This may also cause that the "secondary-tertiary" model of labor force does not appear (Shao Chaodui et al., 2016)[24].

Robustness Test

The above empirical analysis proves that the rise in housing price has a positive effect on the increase in employment and the proportion of non-agricultural employment. Is this result due to different employment indexes or differences in core explanatory variables? The robustness of regression results has been tested by lagging house price index, indexing of employee and eliminating impact of provincial capitals.

Lag Housing Price Index

The time dimension in the housing price empirical study is very essential due to the rapid increase in the urban housing price in the past decade.

This paper uses lag housing price to perform regression on employment (Zhang Li et al., 2017) [25].

Table 3 displays that the increase effect of housing price rise on employment and non-agricultural employment ratio remains highly significant. With 1% increase in housing price, the total employment increases by 0.05%, the employment numbers of secondary and tertiary industries increase by 0.1% and 0.08% respectively, and the non-agricultural employment ratio rises by 0.04%. Similarly, the impact of housing price on*em3_2* is still not significant

Table3. *Impacts of Lag housing prices on employment*

	Employment			**Employment structure**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
	Lnemp	**Lnemp2**	**Lnemp3**	**em32**	**em3_2**
Lnhp	0.0461***	0.0959***	0.0761***	0.0369***	-0.0481
	(0.0135)	(0.0369)	(0.0272)	(0.0102)	(0.0409)
LnGDP	0.0389**	0.1391***	0.1258***	0.0320*	-0.0340
	(0.0174)	(0.0471)	(0.0474)	(0.0166)	(0.0272)
Depo	-0.0231	-0.0168	-0.0021	0.0098**	0.0324
	(0.0207)	(0.0276)	(0.0226)	(0.0048)	(0.0393)
Lnedu	0.0599**	0.0561	0.0387	0.0018	0.0080
	(0.0259)	(0.0361)	(0.0303)	(0.0060)	(0.0515)
Lnhea	0.1054***	0.2188***	0.1537***	0.0388**	-0.0742
	(0.0351)	(0.0551)	(0.0545)	(0.0163)	(0.0533)
Lnpde	-0.0620	0.0242	0.0097	0.0860	-0.0119
	(0.0469)	(0.0437)	(0.0361)	(0.0748)	(0.0470)
C	3.8611***	-0.4434	0.7417**	-0.8722*	2.7714***
	(0.3407)	(0.4172)	(0.3598)	(0.4626)	(0.5512)
N	2736	2655	2656	2648	2655
R^2	0.2643	0.4038	0.3178	0.0883	0.0196

Note: *The value below coefficient in square brackets is the standard error, and *p< 0.1, **p< 0.05, ***p< 0.01 is significant at 1%, 5%, 10% respectively.*

Index of Employee in Units

According to the current national statistical system for quantity of employment, only the required number of employees in different industries is presented as number of employees in units. required.

In order to ensure the accuracy of the data and the consistency of the sources, the employment index is replaced by the number of employees in unit to measure how the housing price influences unit employment.

Table 4 shows the regression result. Housing price still has a significant positive influence on employment.

When the housing price rises by 1%, the total number of employees in units *L nempd* increases by 0.27%, unit employment of secondary industry*Lnempd2* increases by 0.268%, and unit employment of tertiary industry *Lnempd3* increases by 0.093%.

As to the effect on employment structure of units, when the increase in housing price does not exceed 15%, it has a positive effect on the increase in non-agricultural employment ratio. The results are consistent with the original

conclusion.

Table4. *Impacts of housing price on unit employment*

	Employment			Employment structure	
	(1)	(2)	(3)	(4)	(5)
	Lnempd	lnempd2	lnempd3	emd32	emd3_2
Lnhp	0.2711**	0.2682***	0.0936**	0.0113*	-0.0509
	(0.1141)	(0.0555)	(0.0381)	(0.0069)	(0.0680)
LnGDP	-0.3466***	-0.3507***	-0.1161***	0.0082*	0.1867***
	(0.1011)	(0.0429)	(0.0236)	(0.0045)	(0.0511)
Depo	-0.0689	0.0321	-0.0533**	0.0002	-0.0487
	(0.0688)	(0.0268)	(0.0257)	(0.0038)	(0.0354)
Lnedu	-0.2480***	0.0578	0.0038	0.0125	-0.0888
	(0.0659)	(0.0392)	(0.0309)	(0.0089)	(0.0615)
Lnhea	1.1142***	0.2518***	0.2070***	-0.0085	0.0354
	(0.0843)	(0.0617)	(0.0668)	(0.0076)	(0.0781)
Lnpde	-0.0272	-0.0404	-0.0314	-0.0033	-0.0581
	(0.1208)	(0.0410)	(0.0286)	(0.0062)	(0.0506)
C	-5.5880***	1.5558***	1.2234***	0.8682***	0.0828
	(0.8658)	(0.5163)	(0.4497)	(0.0598)	(0.6540)
N	2953	2426	2694	2694	2426
R^2	0.0342	0.0599	0.0217	0.0368	0.0229

Note: *The value below coefficient in square brackets is the standard error, and *p< 0.1, **p< 0.05, ***p< 0.01 is significant at 1%, 5%, 10%respectively.*

Table5. *Impacts of housing price on employment in non-capital cities*

	Employment			Employment structure	
	(1)	(2)	(3)	(4)	(5)
	Lnemp	Lnemp2	Lnemp3	em32	em3_2
Lnhp	0.0405***	0.1380***	0.1073***	0.0480***	-0.0685*
	(0.0122)	(0.0340)	(0.0326)	(0.0103)	(0.0379)
LnGDP	0.0386**	0.1064**	0.1124**	0.0225	-0.0164
	(0.0175)	(0.0422)	(0.0500)	(0.0163)	(0.0262)
Depo	-0.0184	0.0048	-0.0054	0.0112**	-0.0066
	(0.0203)	(0.0248)	(0.0244)	(0.0055)	(0.0337)
Lnedu	0.0462*	0.0721**	0.0150	0.0028	-0.0401
	(0.0248)	(0.0353)	(0.0343)	(0.0065)	(0.0539)
Lnhea	0.0881**	0.2257***	0.1183**	0.0426***	-0.1193**
	(0.0365)	(0.0514)	(0.0533)	(0.0158)	(0.0513)
Lnpde	-0.0468	0.0749*	0.0268	0.1115	-0.0931*
	(0.0419)	(0.0397)	(0.0371)	(0.1037)	(0.0497)
C	3.9545***	-0.8743**	0.8075**	-1.0589*	3.6776***
	(0.3516)	(0.3867)	(0.3604)	(0.6211)	(0.5631)
N	2540	2453	2453	2446	2453
R^2	0.2480	0.4238	0.3053	0.0965	0.0323

Note: *The value below coefficient in square brackets is the standard error, and *p< 0.1, **p< 0.05, ***p< 0.01 is significant at 1%, 5%, 10%respectively.*

Eliminating the Impact of Provincial Capitals

However, in China, the increase in big cities or in provincial capitals is much higher than that in ordinary first-tier and second-tier cities. Therefore, the influence of provincial capitals with excessively high housing prices is eliminated to conduct tests. Table 5 shows the regression result. At this time, the result is lower than the full sample regression result, but is still significant on the whole and does not change the original conclusion.

Sub-Sample Regression

Impact of Housing Price Changes on Employment before and After 2004

Since China began to implement housing reform in 1998, real estate investment has been in an overheated state. To stabilize market development, the government implemented a series of policy adjustments including land

auctions and exchange rate reforms in 2004.This paper selects year 2004 as the time boundary to perform regression. Table 6shows the employment regression result shows the employment and employment structure regression result. It shows that the impact of housing price on employment after 2004 is generally higher than that before 2004, and there is a shift in the impact on employment in secondary and tertiary industries. According to the laws of economic development, the share of agricultural employment will decline with the increase of per capita income (Cai Fang, 2017) [26]. As a result of the transfer of large-scale agricultural labor, the proportion of non-agricultural employment will increase. After 2004, the impact of housing price on employment grows overall, which increase the total employment by 0.07%. Its impact on tertiary industry employment has exceeded that of secondary industry. With 1% increase in housing price, the employment of tertiary industry rises by 0.192%, which is about 0.05%higher than that of secondary industry.

Table 6.Impacts of housing price changes on employment and employment structure before and after 2004

1999—2004		2005—2013			1999—2004		2005—2013		
Employment		Employment			Employment structure		Employment structure		
(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
lnemp2	lnemp3	lnemp	lnemp2	lnemp3	em32	em3_2	em32	em3_2	
0.1222***	0.0269	0.0673***	0.1421***	0.1925***	0.0295***	-	0.0590***	0.0692	
(0.0310)	(0.0311)	(0.0229)	(0.0522)	(0.0412)	(0.0074)	(0.0639)	(0.0136)	(0.0559)	
0.1479***	0.2066***	0.0365	0.0825	0.0493	0.0514***	0.0762	-0.0051	-0.0498	
(0.0433)	(0.0394)	(0.0252)	(0.0568)	(0.0431)	(0.0135)	(0.0641)	(0.0257)	(0.0326)	
-0.0124	-0.0046	-0.0042	0.0226	0.0270	0.0030	0.0283	0.0210	-0.0048	
(0.0243)	(0.0176)	(0.0111)	(0.0199)	(0.0269)	(0.0051)	(0.0546)	(0.0228)	(0.0349)	
0.0633**	0.0311	0.0284	0.0408	0.0141	0.0087	-0.0374	-0.0202	-0.0423	
(0.0306)	(0.0306)	(0.0198)	(0.0379)	(0.0252)	(0.0086)	(0.0527)	(0.0242)	(0.0678)	
0.0992*	0.0555	0.0579**	0.1473***	0.0940***	0.0078	0.0299	0.0295	-0.0944**	
(0.0553)	(0.0474)	(0.0246)	(0.0382)	(0.0287)	(0.0117)	(0.0882)	(0.0218)	(0.0475)	
-0.1080	-0.1569*	-0.0285	0.0904**	0.0855**	0.0153	0.0152	0.0758	-0.0061	
(0.0915)	(0.0849)	(0.0324)	(0.0357)	(0.0366)	(0.0424)	(0.1294)	(0.0718)	(0.0175)	
1.1147	2.2271***	3.9737***	0.0054	0.6843*	-0.3185	1.7298	-0.5127	2.2448***	
(0.7086)	(0.6567)	(0.2457)	(0.3845)	(0.3650)	(0.2399)	(1.0759)	(0.4045)	(0.4198)	
1146	1146	1671	1628	1629	1146	1146	1621	1628	
0.1126	0.1026	0.1829	0.2822	0.2662	0.1242	0.0126	0.0209	0.0110	

Note: The value below coefficient in square brackets is the standard error, and *p< 0.1, **p< 0.05, ***p< 0.01 is significant

			(1)	lnemp	-0.0116	(0.0140)	0.0701***	(0.0228)	-0.0088	(0.0122)	0.0400**	(0.0157)	0.0717**	(0.0294)	-0.1491	(0.1065)	4.8354***	(0.6465)	1209	0.0945	
					Lnhp		lnpGDP		Depo		Lnedu		Lnhea		Lnpde		C		N	R2	

Impact of Regional Housing Price Changes on Employment

There are regional differences between the eastern region which developed earlier than the central and western regions. Its industrial level is much better than that in the central and western regions, and change in housing price is also acuter. Therefore, 278 prefecture-level cities are divided into the eastern region and the central and western regions to examine the impact of housing price changes on employment further. As can be seen from Table 7, housing price has a positive effect on employment and the proportion of non-agricultural employment in both the eastern and the central and western regions. Every 1% rise in housing price of the eastern region brings about 0.11% rise in total employment, that is 0.08%higher than that in the central and western regions.

Table7. *Impacts of housing price changes on employment in eastern, central and western cities*

	East			Central and western		
	Employment			Employment		
	(1)	(2)	(3)	(4)	(5)	(6)
	Lnemp	lnemp2	lnemp3	lnemp	lnemp2	lnemp3
Lnhp	0.1087***	0.1551***	0.1532***	0.0286**	0.1276***	0.0994***
	(0.0265)	(0.0459)	(0.0451)	(0.0139)	(0.0356)	(0.0318)
LnGDP	0.0125	0.1060*	0.1156**	0.0376*	0.0962**	0.1051*
	(0.0291)	(0.0562)	(0.0517)	(0.0202)	(0.0462)	(0.0600)
Depo	-0.0307	-0.0091	-0.0169	-0.0364*	-0.0147	-0.0130
	(0.0397)	(0.0516)	(0.0474)	(0.0216)	(0.0275)	(0.0247)
Lnedu	0.1196*	0.0855	0.0633	0.0270*	0.0602**	0.0131
	(0.0635)	(0.0902)	(0.0710)	(0.0146)	(0.0298)	(0.0349)
Lnhea	0.0947**	0.1858***	0.0908*	0.1047***	0.2754***	0.1693**
	(0.0455)	(0.0687)	(0.0508)	(0.0397)	(0.0607)	(0.0819)
Lnpde	0.0179	0.0909**	0.0591	-0.1448*	-0.0389	-0.0341
	(0.0143)	(0.0412)	(0.0383)	(0.0843)	(0.0590)	(0.0543)
C	3.3227***	-0.4035	0.6243	4.4123***	-0.6550	0.8039
	(0.3178)	(0.5125)	(0.5088)	(0.5252)	(0.5023)	(0.5262)
N	1068	1000	1001	1812	1774	1774
R^2	0.4362	0.4498	0.3502	0.2111	0.4014	0.3365

Note: *The value below coefficient in square brackets is the standard error, and *p< 0.1, **p< 0.05, ***p< 0.01 is significant at 1%, 5%, 10% respectively.*

In Table 8, there is little difference in the employment structure of the eastern region and the central and western regions. Every 1% increase in house prices, the proportion of non-agricultural employment increased by 0.042% and 0.039% respectively, but the impact on the proportion of tertiary and secondary is not significant. In terms of manufacturing in secondary industry, China's manufacturing has developed rapidly. However, compared with that in developed countries, even in the eastern region, fundamental problems such as low level structural and regional overproduction, low added value of product and large energy consumption still exist.

Table8. *Impacts of housing price changes on employment in eastern, central and western cities*

	East		Central and western	
	Employment structure		Employment structure	
	(1)	(2)	(3)	(4)
	em32	em3_2	em32	em3_2

Lnhp	0.0422***	-0.0065	0.0391***	-0.0782
	(0.0132)	(0.0689)	(0.0091)	(0.0496)
LnGDP	0.0395***	-0.0155	0.0160	-0.0083
	(0.0143)	(0.0658)	(0.0220)	(0.0295)
Depo	0.0138*	0.0041	0.0138	0.0076
	(0.0077)	(0.0523)	(0.0095)	(0.0503)
Lnedu	0.0056	0.0581	0.0025	-0.0489
	(0.0147)	(0.0908)	(0.0065)	(0.0630)
Lnhea	0.0221**	-0.1141**	0.0751**	-0.1171
	(0.0110)	(0.0521)	(0.0348)	(0.0893)
Lnpde	-0.0125*	-0.0392	0.1887	0.0280
	(0.0071)	(0.0454)	(0.1442)	(0.0807)
C	-0.2125*	2.4943***	-1.6596*	3.1518***
	(0.1198)	(0.8419)	(0.9344)	(0.8259)
N	993	1000	1774	1774
R^2	0.4043	0.0140	0.0878	0.0244

Note: *The value below coefficient in square brackets is the standard error, and *p< 0.1, **p< 0.05, ***p< 0.01 is significant at 1%, 5%, 10% respectively*

Impacts on Employment of Urban Housing Prices with Different Growth Rates

In order to explore the impact of the differences in urban dynamic housing price on employment, the median of 14.65% of the average housing price growth rate *psz* (= (average housing price of the year- average housing price of the previous year)/ average housing price of the previous year) is used as the boundary to divide the N for comparison.

Table 9and Table 10show the regression results. It can be seen that the promotion effect of employment starts to attenuate when the housing price reaches a certain value. After controlling a series of urban characteristic variables, urban housing price changes of less than 14.65% average housing price growth rate have a significant positive effect on employment below 1% level, and every 1% rise in housing price will bring about 0.1% rise in total employment.

Besides, the impacts on employment in secondary and tertiary industries have little difference, exhibiting both significant improvements. But, in the cities whose housing price growth rates are over 14.65%, the positive impact of housing price rise on employment begins to weaken.

Table9. *Impacts of urban housing prices with different grow thrates on employment*

	Growth rates<=14.65%			Growth rates>14.65%		
	Employment			Employment		
	(1)	(2)	(3)	(4)	(5)	(6)
	lnemp	lnemp2	lnemp3	lnemp	lnemp2	lnemp3
Lnhp	0.1011***	0.1449***	0.1679***	0.0312**	0.1322***	0.0876**
	(0.0304)	(0.0396)	(0.0428)	(0.0147)	(0.0444)	(0.0375)
LnGDP	-0.0092	0.0839**	0.0996**	0.0490**	0.1119*	0.1068
	(0.0313)	(0.0419)	(0.0405)	(0.0246)	(0.0611)	(0.0682)
Depo	-0.0450	-0.0287	-0.0101	-0.0040	0.0200	-0.0067
	(0.0368)	(0.0481)	(0.0398)	(0.0113)	(0.0187)	(0.0209)
Lnedu	0.0814***	0.0918**	0.0626*	-0.0306	-0.0050	-0.0972
	(0.0294)	(0.0405)	(0.0365)	(0.0185)	(0.0497)	(0.0644)
Lnhea	0.1385***	0.2698***	0.1058**	0.0327	0.1879***	0.1221*
	(0.0481)	(0.0665)	(0.0497)	(0.0373)	(0.0663)	(0.0674)
Lnpde	-0.0966	-0.0376	-0.0430	0.0192	0.1397*	0.1223**
	(0.0673)	(0.0477)	(0.0397)	(0.0163)	(0.0747)	(0.0613)
C	3.8402***	-0.3978	1.0525**	4.0015***	-0.9353	0.4857
	(0.4812)	(0.4816)	(0.4069)	(0.2212)	(0.6655)	(0.4857)
N	2011	1933	1934	869	841	841
R^2	0.3122	0.4455	0.3873	0.2520	0.3753	0.2759

Note: *The value below coefficient in square brackets is the standard error, and *p< 0.1, **p< 0.05, ***p< 0.01 is significant at 1%, 5%, 10% respectively.*

Table10. *Impacts of urban housing prices with different grow thrates on employment structure*

	Growth rates<=14.65%		Growth rates>14.65%	
	Employment structure		Employment structure	
	(4)	(5)	(9)	(10)
	em32	em3_2	em32	em3_2
Lnhp	0.0618*	0.0327	0.0411***	-0.1010**
	(0.0329)	(0.0842)	(0.0129)	(0.0470)
LnGDP	0.0151	-0.0189	0.0303	-0.0197
	(0.0352)	(0.0613)	(0.0207)	(0.0257)
Depo	0.0160**	0.0499	0.0026	-0.0428
	(0.0070)	(0.0711)	(0.0055)	(0.0323)
Lnedu	0.0031	-0.0014	0.0050	-0.0930
	(0.0076)	(0.0607)	(0.0119)	(0.1097)
Lnhea	0.0352**	-0.2073***	0.0357	-0.0629
	(0.0137)	(0.0718)	(0.0236)	(0.0703)
Lnpde	0.1259	0.0184	0.0130	-0.0321
	(0.1147)	(0.0704)	(0.0110)	(0.0572)
C	-1.1234*	3.0547***	-0.4369***	3.2189***
	(0.6700)	(0.6863)	(0.1483)	(0.7341)
N	1930	1933	837	841
R^2	0.0806	0.0147	0.5059	0.0434

Note: *The value below coefficient in square brackets is the standard error, and *p< 0.1, **p< 0.05, ***p< 0.01 is significant at 1%, 5%, 10% respectively.*

Further Investigation from the Perspective of Subdivided Industries in Cities

From the above regression results, it has been found that in consideration of its impacts on nationwide employment structure, the housing price increase has mainly promoted the transfer of agricultural labor to non-agricultural employment, and the "secondary-tertiary" model of labor force has not appeared. In order to better understand the response of industries or trades to the housing price, industries will be further subdivided.

The manufacturing industry and the other secondary industries are selected concerning the employment of secondary industry, and tertiary industry is classified into three categories according to *Classification of Services*: producer service employment, consumer service employment and public service employment. The data mainly come from the unit employee numbers of different industries according to *China City Statistical Yearbook*, table 11shows the regression results. Overall, the positive effect of housing price on employment of secondary industry is more obvious than that of tertiary industry.

In tertiary industry, producer services are in close contact with the high-end manufacturing, because manufacturing needs knowledge and technology as support in the process of development, which requires large-scale producer services to cooperate with it. As a result, the number of employed people in productive services has increased

Table11. *Impacts of housing price changes on employment in cities' subdivided industries*

	Employment of secondary industry		Employment of tertiary industry		
	(1)	(2)	(3)	(4)	(5)
	Manufacturing	others	Producer services	Consumer services	Public services
	LnMFE	LnSECE	LnPSE	LnCSE	lnPSIE
Lnhp	0.2361***	0.2984***	0.1381***	-0.1500	0.1161***
	(0.0638)	(0.0566)	(0.0354)	(0.1278)	(0.0391)
LnGDP	-0.4358***	-0.2789***	-0.1648***	-0.5526***	-0.0133
	(0.0494)	(0.0468)	(0.0200)	(0.1426)	(0.0224)
Depo	0.0237	0.0471	0.0258	-0.0114	-0.0933**
	(0.0265)	(0.0443)	(0.0211)	(0.0490)	(0.0375)
Lnedu	0.0395	0.0991**	0.0361	-0.0458	0.0168
	(0.0402)	(0.0494)	(0.0309)	(0.0595)	(0.0352)
Lnhea	0.2827***	0.1835***	0.0929	0.1293	0.2023***
	(0.0777)	(0.0584)	(0.0590)	(0.1104)	(0.0738)

Lnpde	0.0310	-0.1107*	-0.0938**	-0.1665	-0.0702
	(0.0503)	(0.0598)	(0.0385)	(0.1056)	(0.0624)
C	1.3623**	0.5595	1.0131**	6.7073***	-0.1297
	(0.5701)	(0.6484)	(0.4577)	(0.9751)	(0.5598)
N	2425	2426	2694	2693	2694
R^2	0.0921	0.0406	0.0241	0.2376	0.0523

Note: *The value below coefficient in square brackets is the standard error, and *p< 0.1, **p< 0.05, ***p< 0.01 is significant at 1%, 5%, 10% respectively.*

TEST OF THE INFLUENCE MECHANISM: WHY IS THE HIGH HOUSING PRICE CONDUCIVE TO EMPLOYMENT?

The main finding of this paper is that the rise in housing prices has not hindered the improvement of employment. So what effect does housing price have on employment? The research on this issue will not only help deepen people's understanding of the relationship between housing price and employment, but also provide new ideas for the optimization and adjustment of China's housing price policy in the future.

Combined with the analysis of theoretical mechanism in the second quarter and the empirical analysis in the fourth quarter, because the overall regression results show that housing price increase has a significant positive effect on employment, two variables that have a positive effect have been introduced—"wealth channel" and "collateral lending channel" are used as intermediary variables to build the mediation effect model to examine the possible transmission mechanism. Referring to Wen Zhonglin and Ye Baojuan (2014)'s "three-step method" for constructing an mediation effect model, "the total retail sales"C_{it} and "fixed investment of social consumer goods at the end of every year"I_{it} are mainly used to measure "wealth channel"and "collateral lending channel"respectively [27].

The mediation effect model consists of three parts: the regression of the dependent variable (Y_{it}) to the independent variable, the regression of the intermediary variables (C_{it} andI_{it}) to the independent variable, as well as the regression of the dependent variable (Y_{it}) to the independent variable and the intermediary variables simultaneously. The mediation effect model models in this paper are structured as follows:

$$Y_{it} = \alpha + \beta * \ln hp_{it} + \gamma * X_{it} + \varepsilon_{it} \quad (2)$$

$$C_{it} = \alpha + \beta * \ln hp_{it} + \gamma * X_{it} + \varepsilon_{it} \quad (3)$$

$$I_{it} = \alpha + \beta * \ln hp_{it} + \gamma * X_{it} + \varepsilon_{it} \quad (4)$$

$$Y_{it} = \alpha + \beta * \ln hp_{it} + \delta * C_{it} + \theta * I_{it} + \gamma * X_{it} + \varepsilon_{it} \quad (5)$$

Table 12shows Mechanism test result test results of housing price affect employment. The model (2) is the full sample regression model (1), which is the columns (1)-(3) in Table 2and is the basis for comparison. Columns (4) and (5) of Table 13 are the results of regression estimation of the models (3) and (4), respectively. Columns (6)-(8) report the regression results of the model (5),in which the intermediary variables C_{it} and I_{it} are added simultaneously.

As can be seen in column (4) in Table12, the coefficient of housing price is positive and passes the significance test of 1% level, which indicates the rise in housing price significantly increases household consumption. That means increase in housing equity contributes to the accumulation of household assets and the relaxation of the budget constraint line makes residents more motivated to consume.

The result in column (5) shows that the estimated coefficient of housing price is positive, which indicates the increase in housing price has significantly improved the investment level of enterprises. This is mainly because real estate appreciation has improved the companies' balance sheets, and the reduction in financing cost has helped to increase investment.

Columns (6)-(8) display the results of the regression of dependent variable to the independent variable and the intermediary variables. We can see that the significant decline in housing prices on the total amount of employment, after adding the intermediary variablesC_{it} andI_{it} at the same time, especially after the inclusion of the intermediary variableI_{it}. In particular, the wealth channel C_{it} has no significant impact on employment in the secondary industry and employment in the tertiary industry, just the collateral lending channel can affect employment of the secondary and the tertiary industry. This shows that the rise in housing prices has promoted the accumulation of family wealth and banks are more willing to increase their loan quotas,

which have enabled enterprises to expand production investment and accelerate the adjustment of industrial structure, thereby stimulating the increase in employment. Therefore, the rise of housing price will have a significant positive effect on employment through collateral lending channel.

Table12. *Mechanism test result test results of housing price affect employment*

	Employment			Wealth effect	Collateral lending channel	Employment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Lnemp	lnemp2	lnemp3	C	I	Lnemp	lnemp2	lnemp3
Lnhp	0.0543***	0.1365***	0.1185***	0.3269***	0.5405***	0.0313**	0.0853***	0.0652***
	(0.0136)	(0.0324)	(0.0317)	(0.1168)	(0.2034)	(0.0145)	(0.0212)	(0.0209)
C						0.0373**	0.0233	0.0426
						(0.0189)	(0.0147)	(0.0274)
I						0.0208*	0.0826***	0.0751***
						(0.0126)	(0.0195)	(0.0248)
lnpGDP	0.0301*	0.1015**	0.1103**	0.4653***	0.8652***	-0.0047	0.0217	0.0281
	(0.0168)	(0.0393)	(0.0479)	(0.1429)	(0.2661)	(0.0176)	(0.0239)	(0.0399)
Depo	-0.0256	-0.0071	-0.0078	-0.0395	-0.0795*	-0.0218	0.0018	0.0013
	(0.0214)	(0.0264)	(0.0243)	(0.0512)	(0.0477)	(0.0199)	(0.0238)	(0.0223)
Lnedu	0.0558**	0.0681**	0.0287	0.0967***	0.1369***	0.0492**	0.0568*	0.0138
	(0.0232)	(0.0334)	(0.0323)	(0.0238)	(0.0403)	(0.0231)	(0.0336)	(0.0334)
Lnhea	0.1105***	0.2384***	0.138***	0.4343***	0.4761***	0.0831**	0.1827***	0.0782**
	(0.0348)	(0.0491)	(0.0507)	(0.0919)	(0.1569)	(0.0323)	(0.0446)	(0.0370)
Lnpde	-0.0602	0.0225	0.0086	0.0091	0.0043	-0.0633	0.0218	0.0059
	(0.0463)	(0.0409)	(0.0357)	(0.0364)	(0.0487)	(0.0461)	(0.0390)	(0.0331)
C	3.8297***	-0.5979	0.7197**	-5.9817***	-11.564***	4.3144***	0.5200	1.8722***
	(0.3377)	(0.3879)	(0.3474)	(0.5207)	(0.6835)	(0.3524)	(0.4110)	(0.3841)
N	2880	2774	2775	2968	2954	2863	2759	2760
R^2	0.2708	0.4160	0.3371	0.6853	0.8642	0.2835	0.4283	0.3531

Note: *The value below coefficient in square brackets is the standard error, and *p< 0.1, **p< 0.05, ***p< 0.01 is significant at 1%, 5%, 10% respectively.*

Table 13shows Mechanism test result test results of housing price affect employment structure (house prices has no significant effect on the proportion of tertiary and secondary employment, so no impact mechanism is tested), Column (1)is the results of regression estimation of model(2), the regression results are the same as column (4) in Table 2, and is the basis for comparison. Columns (2) and (3) are also the results of regression estimation of the models (3) and (4), respectively. Column (4) reports the regression results of the model (5), and the significant of housing prices on the employment structure declines after the intermediary variables C_{it} and I_{it} areadded simultaneously in the model (5). It is also verified that the house prices have not played a role in employment through wealth channels, mainly through the collateral lending channel plays a role. Among them, the estimated coefficient of intermediary variableI_{it} is positive on the whole. With each additional unit of enterprise investment, the proportion of non-agricultural employment increases by 0.03%. However, the relationship between the intermediary variable C_{it} and the dependent variable is not obvious. Maybe because the increase in household consumption still needs to affect employment through the development of new industries or the adjustment of industrial structures of enterprises. But overall, due to the existence of partial mediating effect, the rise of housing price will have a significant positive effect on employment and employment structure through the intermediary channel of collateral lending.

Table13. *Mechanism test result test results of housing price affect employment structure*

	Employment structure	Wealth effect	Collateral lending channel	Employment structure
	(1)	(2)	(3)	(4)
	em32	C	I	em32

Lnhp	0.0455***	0.3269***	0.5405***	0.0321***
	(0.0114)	(0.1168)	(0.2034)	(0.0076)
C				0.0034
				(0.0041)
I				0.0234***
				(0.0069)
lnpGDP	0.0260	0.4653***	0.8652***	0.0050
	(0.0165)	(0.1429)	(0.2661)	(0.0170)
Depo	0.0110**	-0.0395	-0.0795*	0.0133***
	(0.0048)	(0.0512)	(0.0477)	(0.0050)
Lnedu	0.0028	0.0967***	0.1369***	-0.0004
	(0.0060)	(0.0238)	(0.0403)	(0.0064)
Lnhea	0.0408***	0.4343***	0.4761***	0.0265**
	(0.0148)	(0.0919)	(0.1569)	(0.0116)
Lnpde	0.0863	0.0091	0.0043	0.0865
	(0.0745)	(0.0364)	(0.0487)	(0.0747)
C	-0.9085**	-5.9817***	-11.5640***	-0.6143
	(0.4587)	(0.5207)	(0.6835)	(0.4232)
N	2767	2968	2954	2752
R^2	0.1017	0.6853	0.8642	0.1043

Notes: *The value below coefficient in square brackets is the standard error, and *p< 0.1, **p< 0.05, ***p< 0.01 is significant at 1%, 5%, 10% respectively.*

CONCLUSION

Based on the theoretical mechanism of housing price affecting employment, this paper analyzes macro data of 278 prefecture-level cities from 1999 to 2013 to investigate the impact of housing price changes on employment and employment structure and its heterogeneity. It shows that: (1) Nationally, increase in housing price has a significant positive impact on employment, which is reflected by that 1% rise in housing price brings about 0.054% increase in total employment. Among them, the increase also has a positive effect on the employment of secondary and tertiary industry. (2) Increase in housing price contributes to the increase in non-agricultural employment ratio. Every 1% rise will bring about 0.045% increase in the proportion of non-agricultural employment. (3) For different periods, different regions, different housing price growth rates and different industries, the impacts of urban housing price increase on employment exhibit obvious heterogeneity.(4)

The test of mediating effect model shows that the increase in internal investment by enterprises has important influence on housing price increase driving employment.

The research in this paper helps to deepen the understanding of how the real estate market affects the employment of China's labor force, and comprehensively understands the impact of China's real estate market on the real economy. On the one hand, the rise in housing prices has promoted the employment of urban labor in China, but it has inhibited the rationalization and upgrading of the employment structure of China's labor force. This prompted us to deeply understand the structural problems in this important proposition and to pay attention to the impact of rising housing prices on economic structural issues.

The policy design should not only see the increase in housing prices, but also the structural restraint of housing prices, which has a particularly important practical significance in the context of current supply-side structural reforms.

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Citation: *Yajin Li.”Research on the Relationship between Housing Price Increase and Employment”. (2019) International Journal of Research in Humanities and Social Studies, 6(2), pp. 50-64*