Asia Pacific Academy of Science Pte. Ltd.

City Diversity 2022, 3(1), 1928.
https://doi.org/10.54517/cd.v3i1.1928

Article

The impact of cultural diversity on urban housing prices in China

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CITATION

Zhuang Y, Wang W. The impact of cultural diversity on urban housing prices in China. City Diversity. 2022; 3(1): 1928.
https://doi.org/10.54517/cd.v3i1.1928

ARTICLE INFO

Received: 19 September 2022
Accepted: 1 December 2022
Available online: 30 December 2022

Abstract: Using the commercial housing price data of 254 cities at prefecture level and above in China, this paper measures the cultural diversity by the diversity of Chinese dialects, and studies the impact of regional culture represented by dialects on urban housing prices. The research shows that after controlling the economic development level of the city, the urban ecological environment and other factors, the cultural diversity measured by dialect types has a significant negative impact on the price of urban commercial housing, that is, the more diverse the culture, the lower the house price, and the cultural diversity will restrain the house price by hindering the inflow of local population.

Keywords: Chinese cities; housing price; cultural diversity; dialect types

1. Introduction

While China's housing prices are rising rapidly as a whole, the differentiation between different cities is becoming more and more serious. Beijing, shanghai, guangzhou, shenzhen and other cities that attract a large number of floating population is also among the highest in the country in terms of house price growth while their economies are developing rapidly. In 2013, the house prices in the above four cities were 428 times, 381 times, 450 times and 467 times higher than those in 2003 respectively, while the house prices in small and medium-sized cities such as Chengde and Hengshui increased by only 66% and 85% respectively compared with 2003 a. Although most small and medium-sized cities are relatively backward in economic development and have a large population outflow, due to the administrative restriction policy on land, the proportion of land supply in small and medium-sized cities is higher than that in large cities with more developed economy and more population inflow [1]. Excessive differentiation of housing prices will bring many serious risks to the economy and society. To mitigate this negative impact, it is necessary to clarify various factors affecting the rise of housing prices.

Domestic researches on housing price differentiation are mostly conducted from two aspects: demand and supply. In addition to the supply and demand factors of housing, some foreign studies believe that regional cultural diversity will have an impact on local housing prices [2–4]. However, most of these foreign studies measure cultural diversity by the diversity of the country of birth or ethnic diversity. The characteristics of regional cultural differences in China are concentrated in the differences of dialects, because language is a symbol to maintain cultural identity [5]. Therefore, from the perspective of cultural diversity, this paper discusses the informal institutional factors behind the imbalance of urban commercial housing prices in China, selects dialect diversity as the proxy variable of cultural diversity, and establishes research hypotheses to test whether urban cultural diversity will restrain housing prices,

so as to provide new ideas and empirical basis for the healthy development of real estate in small and medium-sized cities.

2. Theoretical mechanism and research hypothesis

2.1. Theoretical mechanism

Theoretical research shows that the impact of cultural diversity on housing prices mainly plays a role through two aspects. First, cultural diversity reduces the level of trust between groups. Alesina et al. [6] pointed out that in culturally diverse areas, residents' participation in social activities will decrease, their sense of alienation will increase, and their sense of trust will decrease. Individuals tend to trust people with the same cultural background. Zak et al. [7] also pointed out that diverse cultures will reduce personal trust, thus hindering residents' large-scale consumption and investment behavior, increasing potential transaction friction, and greatly reducing their enthusiasm to participate in physical and financial investment. Elattar [8] found that the lower the level of trust, the lower the family's desire to invest in physical assets (including the real estate market). Guiso et al. [9] found that there is a positive correlation between the degree of trust and the proportion of investment behavior. The lower the level of trust, the weaker the residents' sense of belonging to the city, and the lower the investment participation rate. This shows that the mistrust caused by cultural heterogeneity increases the transaction cost, thus restricting the consumption and investment of housing, and the willingness of residents to participate in housing investment also decreases. Second, cultural diversity will inhibit the development of individual undertakings. Dai Yiyi et al. [10] pointed out that if senior executives come from different regional cultural backgrounds, the cultural disagreement between them will increase the agency cost, which is not conducive to the development of the enterprise. Chen et al. [11] found that the existence of multiple cultural backgrounds has led to an increase in communication and interaction barriers encountered in the process of integrating into urban development, which will hinder the promotion and salary increase of individuals and is not conducive to the acquisition of high-end positions. Consumers of housing such as social grass-roots personnel, enterprise executives and highly skilled talents will have their own career and income limited due to cultural differences. For this reason, it is reasonable to believe that cultural diversity will also restrain the rise of house prices due to the insufficient ability of consumers to purchase houses. It can be seen that cultural diversity has a negative impact on housing prices, both from the perspective of trust level and the development of individual undertakings. The greater the cultural difference, the weaker the purchasing power and willingness to consume and invest in urban housing, and ultimately affect the urban housing price, thus reducing the housing price level.

2.2. The national

Culture and language coexist for a long time. Language promotes the emergence and rapid development of culture. In turn, the development of culture will enrich the form of language. Dialect is the most obvious feature of local culture [12]. When Gao Xiang and others [13] studied the impact of culture on regional economy, they used

dialect as a proxy indicator to measure regional culture. Panyue et al. [14] also believe that individuals growing up in a specific dialect environment will be imperceptibly impressed with the brand of local culture, which will exist for life and become a part of personal human capital. Therefore, the number of urban dialects can be used to measure urban cultural diversity. Based on this, this paper uses dialect diversity as the proxy variable of cultural diversity.

Xuxianxiang et al. [15] counted the number of Chinese dialects in different regions according to the atlas of Chinese language and the dictionary of Chinese dialects, and compared the data of house prices in different regions. They also found that the cultural diversity represented by the diversity of dialects was negatively correlated with house prices. The relationship between the dialect types of several cities listed in **Table 1** and the corresponding average annual house prices from 2004 to 2013 also reflects this law, that is, the urban house prices decline with the increase of dialect diversity.

Table 1. Negative relationship between dialect diversity and urban housing price.

City	Shanghai	Guangzhou	Xiamen	Nanjing	Zhanjiang	Xuancheng	Yan'an
Dialect types	1	1	1	2	3	4	5
Average house price from 2004 to 2013/yuan	10,984	9611	8279	7014	3475	2853	2289

Based on this, this paper puts forward the following assumptions:

Hypothesis 1 urban cultural (dialect) diversity has a certain inhibitory effect on the rise of housing prices. Culture has an important influence on population migration, and dialect, as the carrier of regional culture, embodies this influence. The more diverse urban dialects are, the higher the cost of mutual communication may be. Potential urban immigrants will reduce their willingness to migrate due to the increased difficulty of cultural integration, which is detrimental to urban population migration. Population migration mainly affects urban housing prices from two aspects: on the one hand, the growth of housing demand caused by population inflow to destination cities will have a positive impact on housing prices13; on the other hand, people think that house prices will continue to rise due to the expectation that the actual demand for housing will continue to rise, resulting in the rising demand for investment, leading to the rise of housing prices. Therefore, this paper argues that there is an intermediary mechanism of "cultural diversity - affecting population migration - affecting housing prices", that is, urban cultural (dialect) diversity will inhibit population inflow and thus have a negative impact on housing prices. To this end, the following assumptions are made:

Hypothesis 2 population migration is the intermediary variable of cultural (dialect) diversity affecting urban housing prices.

3. Variables and data sources

3.1. Variable description

3.1.1. Explained variable: urban housing price (HP)

By calculating the ratio of the annual sales of commercial housing to the sales

area of commercial housing from 2004 to 2013, the price of commercial housing per unit area in each city in China within 10 years can be obtained.

3.1.2. Core explanatory variable: dialect diversity index (DIV)

The dialect diversity index constructed by Liu yuyun et al. is used as the core explanatory variable. This indicator first obtains the dialect data of each county and city from the brief list of Chinese dialects of each county and city in China reported in the dictionary of Chinese dialects, and then sorts out the number of sub dialects used in each city. According to the administrative division in 1986, the brief table records the dialects of 2113 observation units, involving 17 dialects and 105 sub dialects. The brief table matches the dialect data with the census data of China in 2000, obtains the dialect data of various regions under the administrative divisions of China in 2000, and then takes the cities at or above the prefecture level as the geographical unit, and sums up the number of sub dialects in all districts and counties of each city to obtain the total number of sub dialects in the corresponding cities, which is used as the dialect diversity index of the region. For example, tianjin uses Baotang dialect and Chenghuai dialect in its districts and counties, so the dialect diversity index of Tianjin is 2.

3.1.3. Control variables

To solve the possible error caused by the omission of variables, add the control variables that affect the urban house prices in the model (all control variables use the data of the municipal districts). Referring to previous research results and considering the availability of data, the greening coverage rate of built-up areas, fiscal expenditure income ratio, land supply area, house price expectation, resident income and basic education conditions are selected as control variables. Green coverage rate of built-up area (green) is used to measure the ecological environment of a city, which is obtained by the ratio of the green area of the built-up area of the municipal district to the area of the built-up area of the municipal district; the ratio of fiscal expenditure to revenue is obtained from the ratio of local fiscal expenditure to local fiscal revenue; the land supply area (land) is used to measure the scale of land supply, and is expressed by the sum of the land areas sold through bidding, auction and agreement; house price expectation (zhhp) reflects the expectation of current house price, which is measured by the house price lagging behind the first period; the income of residents (wave) is used to reflect the ability of consumers to purchase houses and is obtained from the average wage of employees; the number of ordinary middle schools (EDU) is used to measure the degree of difference in basic education conditions between cities at different levels, and is measured by the number of ordinary middle schools in the municipal area.

3.1.4. Intermediary variable: change in the proportion of population migration (MIG)

Referring to the research of Luming et al. [16], the population who lives in the city but whose registered residence is not in the city is defined as the immigrant population of the city. First, calculate the proportion of the urban migrant population in 2000 and 2010 in the total urban population of that year, and then use the proportion of urban migrant population in 2010 minus the proportion of urban migrant population in 2000 to obtain the change value of the proportion of population migration.

Table 2. Descriptive statistics of variables.

Variable	*Average* value	Standard deviation	*Minimum* value	Maximum
hp/yuan m^{-2}	2739.771	1858.570	146.635	18,049.379
div	1.764	0.808	1.000	5.000
green/%	36.004	9.445	0.360	91.030
finance/%	59.122	25.120	2.281	258.705
land/ha	1177.162	6853.800	0.780	229,152.000
zhhp/yuan m^{-2}	2488.268	2027.700	142.244	34,077.318
wave/yuan $person^{-1}$	24,789.210	9730.790	1916.012	145,913.220
edu/piece	74.776	86.610	4.000	780.000
mig/%	0.0488	0.0555	−0.0971	0.2831

3.2. Data source

According to the availability of data, this paper collates the data of housing prices and other control variables in 254 cities at prefecture level and above in China from 2004 to 2013, matches them with the dialect diversity index of each city, and then obtains the panel data composed of 2540 samples. The price data of commercial housing in each city comes from the statistical yearbook of China's regional economy (published by China Statistics Press). Among the control variables, the land supply area comes from the statistical yearbook of China's land and resources from 2004 to 2013 (published by China Dadi Publishing House), and the data of other control variables come from the statistical yearbook of China's cities from 2004 to 2013 (published by China Statistics Publishing House). The intermediary variable population migration data are from the 2000 and 2010 China census data published by the National Bureau of statistics of China.

Using the consumer price index (CPI) of the provinces where the cities are located, this paper adjusts the three nominal variables of house price, house price expectation and resident income to constant price variables based on 2004. See **Table 2** for the descriptive statistics of the constant price of each variable. In **Table 2**, the measured sample number of Min variable is 246, and the sample number of other variables is 2540.

4. Empirical test model

4.1. Model for testing hypothesis 1

According to the characteristics of the surface data, in addition to the core explanatory variables and control variables in this paper, there may also be non observed individual effects that do not change with time. Therefore, in order to better control the impact of missing variables, the individual fixed non observed effect model shown in formula (1) is constructed:

$$\mathrm{hp}_{it} = \alpha_0 + \alpha_1 \mathrm{div}_i + \alpha_2 \mathrm{green}_{it} + \alpha_3 \mathrm{finance}_{it} + \alpha_4 \mathrm{land}_{it} + \alpha_5 \mathrm{zhhp}_{it} + \alpha_6 \mathrm{wage}_{it} + \alpha_7 \mathrm{edu}_{it} + u_i + \varepsilon_{it} \quad (1)$$

In equation (1): *I* represents the city; represents the urban heterogeneity, that is, the individual non observational effect that does not change with time; the random

disturbance term represents the unobservable error that changes with time and affects the house price.

If there is no non observed effect in equation (1) and the explanatory variable is not related to the error term, the mixed least squares estimators of the model parameters are consistent. However, panel data should consider the robust statistical inference of estimators. The standard error of OLS estimator is usually calculated on the assumption that the error term is independent and identically distributed. However, for each city, the error term of each year is generally sequence related, and the error variance may change from point to point at any time, resulting in the standard deviation of OLS estimation being often underestimated, affecting the accuracy of statistical inference. Therefore, the use of mixed OLS estimation requires the use of robust standard errors that allow "cluster correlation" (and heteroscedasticity) to make correct statistical inference.

If it is a panel data model with non observed individual effect UI, when the non observed effect is related to the explanatory variable, the fixed effect estimation method (FE) can be used to eliminate the impact of the non observed effect, but at the same time, any explanatory variable that does not change with time will also be eliminated. The core explanatory variable of this study is the urban dialect type div, which does not change with time. Therefore, the estimation method used to eliminate the individual fixed effects that do not change with time and are not influenced by observation effects is not applicable.

When the main control variables are included in the equation and it is assumed that the non observed individual effects are independent of all explanatory variables, the unobserved urban heterogeneity will only cause the sequence correlation in the composite error term. Therefore, it is only necessary to use (where, it is the time length of panel data) to make a generalized difference to the model in formula (1), the random effect estimators (RE) of parameters can be obtained by using the feasible generalized least square estimation (FGLS) to estimate the non observed effect model with sequence correlation. Individual random effect estimators are not only consistent estimators, but also more effective than fixed effect estimators. Of course, the premise of using the random effect method to estimate equation (1) is that the non observed effect is independent of the explanatory variables in the model. However, in the process of equation transformation using FGLS for random effects, the weight of non observation error is $(1-\theta)$, even if the correlation with the explanatory variables in the model leads to the inconsistency of random effect estimators, the correlation will be weakened to the original $1/(1-\theta)$, more importantly, the random effect estimation method allows to consider explanatory variables that do not change with time. Therefore, it is reasonable to use the random effect estimation method (RE) to estimate the individual fixed non observed effect model in formula (1).

If the non observed effect is a time fixed effect that does not change with the individual, in order to avoid the impact of the possible correlation between the non observed factors that change with different time points but do not change with the individual and the explanatory variables of the model on the estimation, this paper uses 254 urban panel data to build a time fixed non observed effect panel model to control the long-term trend that has not been observed and to study the impact of cultural (dialect) diversity on urban house prices. The construction formula of the

panel model of time fixed non observed effects is:

$$hp_{it} = \alpha_0 + \alpha_1 div_i + \alpha_2 green_{it} + \alpha_3 finance_{it} + \alpha_4 land_{it} + \alpha_5 zhhp_{it} + \alpha_6 wage_{it} + \alpha_7 edu_{it} + \gamma_t + \varepsilon_{it} \quad (2)$$

In equation (2), γ_t the time fixed effect that does not change with individuals is used to control the long-term trend that has not been observed and affects the rise of house prices. The fixed effect estimation method (FE) can be used to estimate the time point fixed non observed effect model.

4.2. Model for testing hypothesis 2

The intermediary effect test is used to test whether population migration has become an intermediary variable of cultural (dialect) diversity on housing prices, and to what extent it can play an intermediary role. Excluding the intermediary variable of population migration, the influence coefficient of cultural diversity on housing prices represents the total effect of cultural diversity on housing prices. After controlling the intermediary variable "population migration", the effect of cultural diversity on house prices is the direct effect between cultural diversity and house prices. Cultural diversity mainly affects house prices by affecting population migration, so population migration is the intermediary variable of cultural diversity affecting house prices. The role of mediating variables is also called mediating effect. Referring to the practice of linjianhao et al., this paper establishes the following intermediary effect model:

$$mig_i = \gamma_0 + \gamma_1 div_i + \boldsymbol{\gamma}_2 Z_i + \varepsilon_{1i}, \quad (3)$$

$$hp_i = \beta_0 + \beta_1 div_i + \boldsymbol{\beta}_2 \boldsymbol{X}_i + \varepsilon_{2i} \quad (4)$$

$$hp_i = \varphi_0 + \varphi_1 div_i + \varphi_2 mig_i + \varphi_3 \boldsymbol{X}_i + \varepsilon_{3i} \quad (5)$$

In formula (3)–(5): hp_i is the housing price of each city in mig_i 2010; it is the change of the proportion of population migration in each city in 2010 compared with that in 2000, z_i and it is the intermediary mig_i variable of the model; it is the control variable that affects the intermediary variables, including greening coverage, average wage, number of ordinary middle schools, GDP, fixed γ_2 asset investment and total passenger volume; is the X_i coefficient vector of the control variable; is the existing control variable β_2 vector in model equation (1) and is the corresponding control div_i variable coefficient vector; it is the dialect diversity index of each city in 2010. If div_i it is true that part of the inhibitory effect on house prices is produced through intermediary mechanisms, the following three conditions must be met at the same time: (1) In formula div_i (3), it has a significant negative mig_i impact on the change of the proportion $\gamma_1 < 0$ of population migration, namely; (2) In div_i equation (4), the coefficient of is significantly negative, i.e β 1＜0; (3) In equation (5), the change in

the mig_i proportion of population migration has a positive impact $\varphi_2 > 0$ on house prices, i.e.

5. Analysis of empirical results

5.1. Regression result analysis of empirical test model

The model regression results of the impact of cultural diversity on housing prices are shown in **Table 3**.

Table 3. Impact of cultural diversity on housing price.

Explanatory variable	Explained variable: hp			
	Equation (1) model mixed OLS estimator	Equation (1) model mixed OLS estimator (clustering robust standard error)	Equation (1) model random effect estimator	Equation (2) model time fixed effect estimator
Div	−116.2430***	−116.2430***	−131.0358***	−122.4703***
	(−4.9514)	(−2.6300)	(−3.4783)	(−5.2544)
Green	0.0732	0.0732	0.0388	0.0347
	(0.2705)	(0.5000)	(0.1729)	(0.1293)
Finance	937.5892***	937.5892***	772.3923***	1081.3667***
	(11.4250)	(5.2400)	(7.6508)	(12.5731)
Land	−0.0013	−0.0013	−0.0009	−0.0011
	(−0.4504)	(−0.5600)	(−0.3644)	(−0.3851)
Zhhp	0.4818***	0.4818***	0.3178***	0.4774***
	(39.8433)	(4.2500)	(28.7410)	(38.8919)
Wage	0.0477***	0.0477***	0.0582***	0.0379***
	(19.8897)	(4.2200)	(27.8750)	(12.1870)
Edu	4.1662***	4.1662***	5.2516***	4.4894***
	(17.1097)	(4.0400)	(14.7703)	(17.6980)
_ cons	−303.4793***	−303.4793	−112.3164	−145.7718*
	(−4.0429)	(−1.5700)	(−1.1051)	(−1.7704)
R^2	0.7376	0.7376	0.8130	0.7430

From **Table 3**, it can be seen that the regression results of the mixed OLS estimator in equation (1) and the div coefficient of the robust standard error that allows "cluster correlation" are negative, and both have passed the 1% significance test, which verifies hypothesis 1, that is, cultural diversity will significantly negatively affect housing prices. However, due to the autocorrelation of disturbance terms between different periods in the same city, clustering robust standard deviation can be used for more accurate statistical inference. Compared with OLS standard deviation and clustering robust standard deviation, the latter is about twice as large as the former. Compared with the mixed OLS estimator of formula (1) model and the mixed OLS estimator of clustering robust standard error, the random effect estimator of formula (1) model takes into account the error sequence correlation caused by individual non observed effects, the div coefficient is significant and the absolute value becomes larger, indicating that in fact, cultural (dialect) diversity has a greater impact on house

prices. Equation (2) shows that after controlling the time trend, the absolute value of div regression coefficient is 1,224,703, which is between the coefficient values of mixed OLS estimation method and random effect estimation method, and the significance level is improved. The regression results of div coefficients estimated by the three methods are basically the same, both negative and significant, indicating that there is a significant negative correlation between urban cultural (dialect) diversity and urban housing prices under other conditions unchanged, and the cultural diversity represented by the number of urban dialects has a significant inhibitory effect on urban housing prices.

As mentioned above, cultural diversity may reduce the attraction of cities to foreign populations, so that cities with low dialect diversity can attract a larger number of immigrants, while cities with high dialect diversity have a smaller number of immigrants, leading to differences in housing prices. The intermediary effect is analyzed through the intermediary effect model of formula (3)–(5), and the results are shown in **Table 4**. The regression coefficients of control variables are omitted due to space limitation.

Table 4. Relationship between cultural diversity and housing price with population migration proportion as the intermediary variable.

Explanatory variable	Equation (3) model (explained variable MIG)	Equation (4) model (explained variable HP)	Equation (5) model (explained variable HP)
Div	−0.012*** (−3.5014)	−258.1348* (−1.7917)	−168.5056 (−1.1535)
Mig			6995.4938*** (2.6891)
Control variable	Remarkable	Remarkable	Remarkable
R^2	0.431	0.543	0.556

It can be seen from **Table 4** that the coefficient of the model div_i of formula (3) (the explained variable MIG) is significantly negative, that is, $\gamma_1 < 0$ in the intermediary effect model of formula (3), it is consistent with research hypothesis 2, indicating that dialect diversity significantly inhibits population migration after controlling other factors; the coefficient of equation (4) model (the explained div_i variable HP) is significantly negative, that is, in $\beta_1 < 0$ equation (4), it shows that dialect diversity significantly inhibits the rise of house prices; in the model (5) (the explained variable HP), the impact of the change in the proportion of population migration on house prices is significantly positive, that is, $\varphi_2 < 0$ in the model (5), it shows that the intermediary effect is significant, and compared with the model (4), when the change in the proportion of population migration is introduced into div_i the model (5), the coefficient of becomes insignificant, so it can be considered that there is a complete intermediary effect [19]. Therefore, the regression results verify hypothesis 2, that is, cities with high cultural diversity will lead to the reduction of the inflow of foreign population, which will make the housing price of the city lower than that of cities with low cultural diversity.

5.2. Robustness test

There may be some errors in measuring the diversity of dialects by using the number of Chinese sub dialects. The dialect diversity measured by div assumes that the number of people who speak each sub dialect in the city is the same, and does not take into account the different number of people who use the dialect. Referring to the research methods of xuxianxiang et al. [15,16], this paper constructs a revised dialect (div_2) diversity index and re regresses to test the robustness of the impact of dialect diversity on urban housing prices. The modified formula of dialect (div_2) diversity index is

$$\mathrm{div}_2 = 1 - \sum_{j=1}^{n} S_{ij}^2 \tag{6}$$

In formula S_{ij} (6), it represents the proportion of the population using dialect J in city I; n is the total number of sub dialects used in city I. If there are various dialects in a city and the number of people who speak each dialect accounts for a S_{ij}^2 small proportion, the smaller the value, div_2 the larger the corresponding value. Compared with using the number of dialects to measure the diversity of dialects, it S_{ij} is more reasonable to use. It is assumed that both regions a and B have two dialects and 2million people respectively, of which 100,000 and 1.9 million people speak two dialects in region a and 1million people speak two dialects in region B. According to the statistics of dialect types, the diversity of dialects in both regions a and B is 2, but it is obvious that the population in region B uses different dialects more differently. Therefore, the original dialect diversity index (DIV) is modified according to formula (6), and the modified dialect diversity index in region a is 0095 and div_2 that in region div_2 B is 0500. It can be seen div_2 from equation (6) that the construction of takes into account the population size of each dialect, which div_2 is more reasonable. The value of is between 0 and 1. The closer it is to 1, the greater the difference of urban population using different dialects, reflecting more obvious cultural diversity.

Table 5. Impact of the revised dialect diversity index on housing price.

Explanatory variable	Equation (I) model mixed OLS estimator	Equation (1) model Mixed OLS estimator (clustering robust standard error)	Equation (1) model random effect estimator	Equation (2) model time fixed effect estimator
Div2	−351.8716*** (−4.2500)	−351.8716** (−2.0032)	−394.2070*** (−2.9697)	−353.1080*** (−4.2995)
Green	0.1043 (0.3900)	0.1043 (0.7524)	0.0485 (0.2155)	0.0676 (0.2512)
Finance	927.0219*** (11.2800)	927.0219*** (5.2832)	768.1405*** (7.6067)	1063.0621*** (12.3458)
Land	−0.0017 (−0.6000)	−0.0017 (−0.7914)	−0.0010 (−0.4208)	−0.0015 (−0.5300)
Zhhp	0.4833***	0.4833***	0.3186***	0.4795***

	(39.9400)	(4.2452)	(28.7910)	(39.0356)
Wage	0.0480***	0.0480***	0.0583***	0.0387***
	(20.0000)	(4.2245)	(27.8753)	(12.4588)
Edu	4.0074***	4.0074***	5.0972***	4.3071***
	(16.3700)	(3.8349)	(14.2603)	(16.9041)
_cons	−400.5077**	−400.5077**	−218.5322**	−262.2576***
	(−5.9400)	(−2.1396)	(−2.4916)	(−3.5147)
R^2	0.740		0.812	0.742

Table 5 reports the results of re estimation by replacing the original dialect diversity index div with the modified dialect diversity index div2 in model equations (1) and (2). Compared with **Table 3**, the results in **Table 5** are basically the same as those in **Table 3** except that the absolute value of the regression coefficient is significantly different due to the change of the value of the core explanatory variable div2. The coefficient sign and significance of random effect and time fixed effect estimates have little difference, both of which are significantly negative when the significance level is 1%, and the explanation is strong. Therefore, after replacing the construction method of dialect diversity index, cultural diversity still has a significant inhibitory effect on urban housing prices, which also proves that the research hypothesis of this paper is tenable and the model method used is robust.

6. Conclusion and enlightenment

Based on the theoretical mechanism of cultural (dialect) diversity affecting housing prices, the mechanism of population migration as an intermediary variable and the observed data analysis, this paper uses an empirical model to verify two hypotheses: first, urban cultural diversity has a certain restraining effect on the rise of housing prices; second, cultural diversity will hinder population inflow and thus have a negative impact on housing prices. Empirical research shows that after controlling the indicators of urban economic development level and urban ecological environment, cultural diversity has a significant negative impact on housing prices, that is, the more culturally diverse cities, the lower housing prices, which indicates that cultural diversity does reduce the regional housing price level. The intermediary effect shows that cultural diversity not only directly hinders the rise of housing prices, but also has a negative impact on housing prices by hindering the inflow of regional population.

The excessive differentiation of housing prices will have a negative impact on all aspects of economy and society. This study shows that the culture of small and medium-sized cities is more diverse, and cultural diversity inhibits the level of housing prices by hindering population migration. Therefore, complying with the law of urban development and strengthening regional cultural exchange and integration can fundamentally reduce the lack of trust, obstacles to communication and prejudice of local society caused by different cultural backgrounds. On the one hand, it promotes the development of personal undertakings in small and medium-sized cities with diverse cultures and improves the income level, so as to improve the ability to buy housing; on the other hand, it can attract the inflow of labor. The supply of labor constitutes the support of economic development, forms a demographic dividend, realizes sustainable economic development, and further attracts the inflow of

population to drive housing demand. The original high proportion of land supply but insufficient demand in small and medium-sized cities has been improved. The increased demand for housing consumption and investment matches the land supply, which can promote the healthy and sustainable development of the local real estate industry.

Conflict of interest: The authors declare no conflict of interest.

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