

Talent New Deal on the Impact of Housing Price Differentiation in the Yangtze River Delta

-- Empirical Analysis based on PSM-DID Method

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Abstract

Based on the urban characteristic data of The Yangtze River Delta region from 2015 to 2020, this paper constructed a theoretical model of housing price differentiation among cities. Through DID regression model and propensity score matching method, the influencing factors and mechanism of housing price differentiation are verified. The results show that, in the sample period, there is a significant positive correlation between the implementation of the new talent deal and regional housing price differentiation, that is, the implementation of the new talent deal has intensified the housing price differentiation in the Yangtze River Delta region. This paper puts forward policy suggestions to restrain regional housing price differentiation from three aspects: adjusting measures to local conditions, classifying regulation, balancing education, optimizing school districts, standardizing industries and rational investment.

Keywords

Talent Relative Mobility; Housing Price Differentiation; PSM-DID.

1. Introduction

1.1. The Research Background

As a Chinese saying goes, "it is urgent to run a country with talents", talents are the driving force of urban innovation and development. In recent years, more and more cities have issued policy documents on talent introduction. By 2020, nearly 90% of cities (municipalities directly under the central Government and prefecture-level cities) have issued "new policies" on the introduction, training, development and utilization of talents. As a result of the "talent New Deal" significantly reduce the settlement standard, resulting in a large inflow of talent into the city and settled, and this part of the inflow of talent will lead to the real estate purchase policy of these cities since the abolition of military power, coupled with the housing policy of this part of the people, immediately after settling down can buy housing in these cities. The demand for real estate increases, which affects local housing prices. The real estate price in China was not strongly impacted by the 2008 world financial crisis. On the contrary, a large amount of capital was injected into the market, resulting in a trend of rapid rise. To stabilize the real estate prices, on December 31, 2020, the central bank and bank insurance regulatory commission issued "on establishing the management system of the banking financial institutions in real estate loan concentration notice" (hereinafter referred to as the "notice"), through the provision of real estate loans accounted and the personal housing loan proportion, mortgage of commercial Banks accounted for the proportion of total lending delimit the red line. To avoid the coexistence of rising housing prices in first-tier cities and destocking pressures in second-tier and third-tier cities, regional housing price differentiation becomes more significant.

Throughout the domestic research on the causes of housing price differentiation, scholars mainly explain it from the following two aspects: (1) supply. Some scholars believe that

differences in land supply strategies between cities will cause housing price differentiation. Liu Cheng and Yang Jidong (2019) [1] Starting with the land supply strategy of local government, this paper analyzes the influence of regional endowment on land supply strategy, and then tests the effect of land supply strategy on housing price differentiation. It is concluded that the differentiation choice of local government's land supply strategy leads to the differentiation of local housing price increase, and the driving effect of land supply strategy on housing price is heterogeneous according to different city endowment. Han Libin, Lu Ming (2018) [2] It is concluded that the real reason for housing price differentiation among different cities is the mismatch between land supply and land demand. Its research shows that between 2004 and 2013 housing prices in cities with relatively tight land supply were 10.6% higher than those in cities with relatively loose land supply. (2) Demand. Scholars mainly explain the reason of housing price differentiation from the demographic factor, mostly from the population flow. LAN Feng, Wu Di (2018) [3] This paper analyzes the relationship between population flow and housing price, and points out that after controlling related factors, the housing price of cities with large population inflow proportion is higher, and the difference of urban population inflow proportion will lead to the housing price differentiation among cities. Kuang Da-da, Li Lijun, Zhong Xiaoyang (2017) [4] Population inflow and economic growth contribute to destocking, but high housing prices are not conducive to destocking. In the third, fourth and fifth tier cities with greater elasticity of supply, the more serious the problem of destocking is, and the more unfavorable it is to play the role of floating population.

However, previous studies failed to take into account the large inflow of human capital caused by the talent introduction policy in cities and the impact on housing prices in this region. The Yangtze River Delta region is one of the most active regions in China's economic development and plays an important strategic role in the overall situation of national modernization and all-round opening up pattern. In August 2020, General Secretary Xi Jinping presided over a symposium on steadily Advancing the Integrated development of the Yangtze River Delta in Hefei, Anhui Province, reiterating the main goal of high-quality integrated development in the Yangtze River Delta region. In view of this, this article from the perspective of human capital and the Angle of policy guidance prices differentiation mechanism of the Yangtze river delta region is analyzed, and based on the Yangtze river delta region of the housing price to income ratio data of 26 cities by PSM - DID method, analysis of the regional integration under the background of price differentiation regularity, discusses effect of talent flow relative to regional house prices differentiation effect, In order to promote the healthy and sustainable development of urban real estate and regional high-quality integration construction to provide targeted policy suggestions.

1.2. Research Significance

The research on the influence of talent relative flow on the differentiation effect of inter-city housing price has the following three theoretical significance:

First, this paper compares the housing price to income ratio of 26 cities (municipalities directly under the central government and prefecture-level cities) in the Yangtze River Delta region with or without the talent introduction policy, analyzes the common factors of housing price differentiation in different types of cities, and provides a theoretical basis for the next differentiated regulation.

Second, through the study of the impact of talent relative flow on housing price differentiation in the Yangtze River Delta region, the formation mechanism of housing price differentiation in the Urban agglomeration of the Yangtze River Delta is clarified, which is further extended to the whole country. Combined with the empirical analysis method of PSM-DID, the relevant research system of housing price differentiation is enriched.

Thirdly, taking the Yangtze River Delta region as an example, the research results are extended to major urban agglomerations in China to understand the current trend of differentiation of the real estate market among cities in China, and to effectively master the differentiation of housing prices among cities in China at the present stage, so as to provide theoretical basis for the necessity of city-specific government policies, classified guidance and differentiated regulation. Grasp and guide the flow of talent and the sound development of real estate.

2. Mechanism Analysis and Research Hypothesis

A perfect city should be able to meet all aspects of the needs of residents living in the city. Besides the material needs such as food, clothing, housing and transportation, it should also be able to meet the spiritual needs such as culture, sports, science and education to the maximum extent. From this point of view, this paper constructs an indicator system of urban resource allocation, and measures various aspects of the city from four indicators: total GDP, number of primary and secondary school students, urbanization rate and investment amount of real estate development enterprises.

Total URBAN GDP The total price of consumption in a country or region in a certain period. If China's housing price rises appropriately and within the range acceptable to consumers, consumption will be promoted and GDP will rise. Statistics show that real estate contributes about 23% to GDP growth every year. Studies have shown that GDP has an inseparable relationship with housing price. From the perspective of housing price differentiation, the total GDP of a city is an important indicator to measure the comprehensive economic capacity of a city. The first and second tier cities usually have a higher total GDP, and the housing price is naturally higher, while the third and fourth tier cities have a smaller size and lower housing price. This has led to a divergence in property prices.

The number of primary and middle school students is mainly due to the existence of "school district housing" set. In ancient China, there was a saying that Meng's mother moved three times. And now is also the case, all parents in order to children go to school, also need to keep looking for school district housing, school district housing. The fundamental reason lies in the uneven allocation of resources. Although China has a complete compulsory education system, high-quality educational resources are often concentrated in a few schools. For the Yangtze River Delta region, high-quality education resources are mainly concentrated in Shanghai, Nanjing, Hangzhou, Suzhou and Hefei. Migrant workers are also concentrated in these areas and want their children to attend good schools. The simplest way to get into these schools is to have a school district room. Therefore, many parents choose to buy school district housing in order to get better education for their children, causing school district housing prices to rise. However, third - and fourth-tier cities lack quality education resources by comparison. This creates a continuous divergence in real estate prices between cities.

The Outline of the Yangtze River Delta Regional Integration Development Plan clearly stated that by 2025, urban-rural integration and rural revitalization should achieve significant results. The income gap between urban and rural residents in the central region should be kept within 2.2:1, the gap between the per capita GDP of the central region and that of the whole region should be narrowed to 1.2:1, and 70 percent of the permanent urban population should be urbanized. This means more people will become "city slickers". This means, on the surface, that the urban population will rise substantially and the demand for urban real estate will increase. However, by reviewing the process of urbanization in China, it is not difficult to find that a large number of people in China realize urbanization through household registration trading or government demolition. This group of people has already met the housing demand, will not create a new housing demand. Their presence may slow the divergence of property prices between cities.

Real estate development enterprise investment land cost, construction and installation cost, various taxes and fees cost, marketing management cost. Among them, land cost accounts for the largest proportion. From the perspective of the government, a large part of the government's fiscal revenue comes from land transfer income, and the government has the tendency to increase the land price naturally to expand fiscal revenue. For real estate developers, land price corresponds to the real estate development cost, and the increase in cost is bound to be compensated by the increase in sales price, so land price has a positive stimulus effect on the real estate price. After, on the other hand, taking into account factors expected, if the current house prices are rising, development chamber of commerce form positive expectations rising home prices, in the land auction would like to bid at a higher price, increase investment, to pull up land prices, and rising land prices through the transmission mechanism mentioned above cause the rise in the price of real estate, Land price and housing price depend on each other to form such a circulation transmission mechanism. From the perspective of differentiation, the land price of real estate developers varies greatly due to the difference in land price between different regions. The land price in first-tier and second-tier cities is high, while the land price in third-tier and fourth-tier cities is low. The land price affects the production cost of real estate developers and then the sales price of commercial houses, resulting in the price differentiation in the real estate market.

3. Empirical Research based on PSM-DID

3.1. Study Area and Method

3.1.1. Study Area Overview

The Yangtze River Delta includes Jiangsu, Zhejiang, Anhui and Shanghai, with 26 cities and 200 districts and counties. It covers an area of 217,700 square kilometers, accounting for one-sixth of China's total population and one-fourth of its economic size. The Yangtze River Delta region is one of the regions with the strongest comprehensive strength, the most developed economy, the most densely populated and the highest degree of urbanization in China. It is highly representative of urban agglomerations in China and can better reflect the growth and evolution law and spatial heterogeneity characteristics of housing price, income and housing price to income ratio in urban agglomerations. (1) In terms of the characteristics of urban development stage, the Yangtze River Delta contains not only Shanghai, an international metropolis, but also economically developed cities such as Nanjing, Hangzhou and Suzhou, as well as relatively underdeveloped cities in northern Jiangsu, northern Anhui and southwest Zhejiang. The urban system is relatively complete, and the urban type structure and development mode are diverse. (2) From the perspective of housing price and income characteristics, the overall housing price and income level of the Yangtze River Delta are relatively high. For example, the average housing price of Shanghai in 2020 has reached 56 518 yuan /m². In addition, the spatial heterogeneity of housing prices in different types of cities within the region and even between different districts and counties in the same city is significant. For example, the housing price difference between Jing 'an district and Chongming District in Shanghai is 72,873 yuan /m²; (3) from the point of view of regional integration, the integration of Yangtze river delta urban agglomeration degree is higher, such as population, capital, industry resources flow is frequent, house prices and incomes in the region is conduction can better embody the space pattern of differentiation, club or convergence properties, the house price income compared different pattern and evolution path can provide a reference for other urban areas.

3.1.2. The Research Methods

The purpose of this study is to investigate the impact of talent relative flow on housing price differentiation. Referring to previous studies, cities that implement talent introduction policy

are regarded as the experimental group, while cities that do not implement talent introduction policy are regarded as the control group, and the effect of talent introduction policy on housing price differentiation is evaluated by differential method. Shanghai, Nanjing, Hangzhou, Hefei and Suzhou in the Yangtze River Delta region were selected as the experimental group of implementing the talent introduction policy, and 21 other cities were selected as the control group. In addition, the implementation of talent introduction policy is mainly implemented in 2017, so 2017 is taken as the separation point. The basic form of the model is:

$$Hir_{it} = \alpha + \beta Per_{it} + \lambda_n Con_{itn} + \gamma_t + \xi_i + \varepsilon_{it} \quad (1)$$

In Formula (1), is the ratio of housing price to income of each city, is the first city, is the first year. Hir_{it} indicates whether the talent introduction policy is implemented; indicates that the first city implements the talent introduction policy in the first year; otherwise, it is 0. $Per_{it} = 1$ indicates that the first city implements the talent introduction policy in the first year; otherwise, it is 0. Con_{itn} Represents the control variable, represents the time, represents the individual, represents the control variable category, represents the random disturbance term. β As the coefficient of housing price to income ratio, it should be the object of emphasis. If it is positive, it indicates that the implementation of talent introduction policy intensifies housing price differentiation in the Yangtze River Delta region, otherwise, it alleviates housing price differentiation.

3.2. Variable Selection and Data Sources

(1) Explained variables

Price-to-income ratio (Hir). The price-to-income ratio refers to the ratio of the total housing price to annual household income. The ratio of housing price to income is mainly used to measure whether housing price is at a reasonable level that residents' income can support, which directly reflects the degree of matching housing price level with residents' demand for self-living. The larger the index is, the greater the divergence degree of standard housing price is.

(2) Core explanatory variables

Talent introduction policy (Per). Since 2017, large and medium-sized cities across China have implemented policies on talent introduction to inject vitality into urban development.

(3) Control variables

Considering that total GDP, number of primary and secondary school students, urbanization rate and investment in real estate development will all have an impact on housing price, these four indicators are selected as control variables.

Total GDP (GDP). It is the final result of production activities of all resident units in a region in a certain period and an important indicator to measure the economic status and development level of a region. Higher GDP tends to lead to higher house prices and per capita income.

Number of primary and secondary students enrolled (Stu). Due to the existence of "school district housing", the real estate market, when the permanent population of a place is reduced or growth is lower than natural growth, but the registered population and primary school students grow significantly, the purchase demand in this area does not necessarily decline, and may even rise.

Urbanization rate ($Urban$). A higher urbanization rate tends to mean that the proportion of rural residents becoming urban residents is increasing, so more rural residents will engage in

non-agricultural activities and move into urban life. That increases demand for housing, which in turn affects prices.

Investment in real estate development (Lnv). The investment amount of real estate development consists of land cost, construction and installation cost, various taxes and fees, and marketing and management cost. Development enterprises often price their products according to these costs and the price comparison of surrounding real estate.

(4) Data sources

Data in this paper are collected from China Housing Price Platform (www.creprice.cn), statistical yearbook of cities and statistical bulletin of national Economic and social Development of districts and counties from 2015 to 2020. The missing values of individual data are supplemented by mean method to obtain balanced panel data.

Table 1. Descriptive statistics of variables

The variable name	Variable symbol	Sample size	The minimum value	The maximum	The mean	The standard deviation
Price-to-income ratio	Hir	156	0.148	0.879	0.290	0.113
GDP	GDP	156	569.940	38700.580	6665.973	6971.010
Number of primary and secondary students enrolled	Stu	156	6.995	130.763	53.381	29.931
Urbanization rate	Urban	156	0.249	6.976	0.653	0.533
Investment in real estate development	Lnv	156	74.700	4422.015	860.021	952.588

3.3. Analysis of Empirical Results

3.3.1. Common Trend Hypothesis Testing

The premise of dual difference is to meet the common trend hypothesis, that is, before and after the implementation of talent introduction policy, the housing price to income ratio of the control group and the treatment group should have the same trend, so as to observe the difference caused by the implementation of talent introduction policy to the two groups.

Accordingly, this paper uses interaction term significance test method FIG. 1 to draw a common trend test diagram to test whether the sample data meets the premise conditions of the DUAL difference estimation method. As can be seen from the figure 1, before the implementation of talent introduction policy began in 2017, the treatment group and control group parallel to the trend of housing price to income ratio has obvious, 2017-2020 and parallel trend is no longer obvious, explain the change of price differentiation is indeed adopted a policy of introducing talents, thus can be empirically by double difference method.

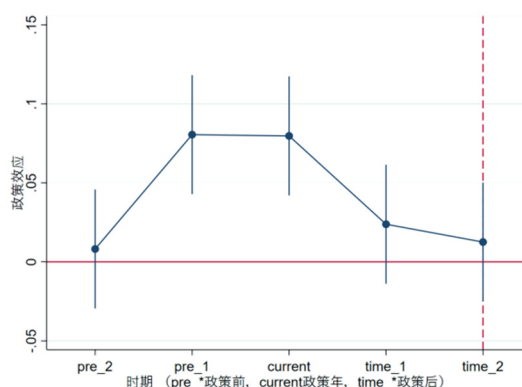


Fig 1. Common trend test diagram

3.3.2. DID Model Test

DID model is used to investigate the impact of the new talent deal on housing price differentiation in the Yangtze River Delta region. As can be seen from the estimation results in Table 2, when no control variables are added, the DID test coefficient of column (1) is 0.015 but not significant, while the DID test coefficient of column (2) to column (5) remains around 0.058 and is always significant in the process of gradually increasing THE four control variables including GDP, number of primary and secondary school students, urbanization rate and investment in real estate development. The coefficient values of control variables are close to those of univariate analysis, and the empirical results are robust. From the statistical significance of regression results, compared with cities without talent introduction policies, the housing price to income ratio index of the implementation of talent New Deal increased by 5.8% on average, indicating that the implementation of talent New Deal and housing price differentiation is significantly positive correlation, that is, the implementation of talent New Deal has aggravated housing price differentiation in the Yangtze River Delta region.

Table 2. Influence of talent introduction policy on housing price differentiation (full-sample DID test)

	(1)	(2)	(3)	(4)	(5)
<i>Hir</i>	0.015 (0.411)	0.058 * (2.294)	0.059 * (2.319)	0.057 * (2.287)	0.058 * (2.321)
<i>GDP</i>		0.257 ** (13.576)	0.185 ** (11.635)	0.203 ** (11.758)	0.227 ** (7.064)
<i>Stu</i>			1.050 ** (1.354)	1.020 ** (1.475)	1.005 ** (1.385)
<i>Urban</i>				0.013 * (1.464)	0.013 * (1.469)
<i>Lnv</i>					0.834 * (1.178)
Constant term	0.228 ** (17.118)	0.182 ** (18.855)	0.194 ** (14.506)	0.204 ** (13.725)	0.201 ** (13.388)
Time effect	Have control	Have control	Have control	Have control	Have control
Individual effect	Have control	Have control	Have control	Have control	Have control
Sample size	156	156	156	156	156

Note: the figures in brackets are the estimated values of the coefficients of each explanatory variable, ** and * are significant at the significance level of 1% and 5% respectively, the same as in the following table. $t(z)$.

In terms of control variables, the regression coefficient of total GDP is positive at the significance level of 1%, indicating that a larger total GDP expands the differentiation degree of housing price among cities. This is because GDP is an important indicator of a region's economic status and development level, and a higher GDP often leads to higher housing price and per capita income. First-tier cities, on the other hand, have seen better economic growth, raising people's expectations of local housing prices. The regression coefficient of the number of primary and secondary students was positive and significant at the 1% significance level. This

shows that the increase in the number of primary and secondary school students exacerbates the degree of housing price differentiation. The reason is that in the first and second tier cities, the increase in the size of migrant workers' school-age children brings more demand for housing in school districts, resulting in a situation of short supply and further housing price differentiation. The study also found that the regression coefficient of urbanization rate was negative when the significance was 5%, indicating that the conversion of more rural residents to urban residents did not aggravate the degree of housing price differentiation among cities in the Yangtze River Delta region, because the current way for rural residents to become urban residents in China mainly relies on household registration trading or government demolition. Through the former, only rich rural residents have the ability to buy commercial houses, while the latter generally have houses to live in, which will not affect the local housing demand. Finally, the investment of real estate development enterprises has a positive and significant impact on housing price differentiation, which means that the increase of investment intensifies the housing price differentiation in the Yangtze River Delta region, which is caused by the rise of real estate development costs. Because the material cost between different cities is not the same, and then lead to the differentiation of housing prices.

3.3.3. Robustness Test

(1) Placebo test

Undeniably, while some cities in the Yangtze River Delta implement the talent introduction policy, there may be other unpredictable factors leading to the divergence of housing prices among cities. To confirm that the widening divergence in house prices is indeed caused by this policy, a placebo test is needed. Conduct a time counterfactual test by changing the timing of the talent acquisition policy. Here, the policy implementation time of the prefecture-level cities that have implemented the talent introduction policy from 2015 to 2020 is advanced by one year respectively, that is, the policy implementation time is assumed to be 2016, and then DID regression is made for the virtual policy implementation time. If the regression coefficient is not significant, it indicates that the fact of housing price differentiation between cities is entirely due to the talent introduction policy, and there is no other factor affecting income distribution. The regression conclusion of DID benchmark is relatively robust; otherwise, it proves that there are indeed other factors affecting the degree of housing price differentiation, and the regression result is not reliable. The placebo test results in Table 3 show that the interaction coefficients in 2015 are not significant, indicating that the expansion of housing price differentiation in the Yangtze River Delta region after the implementation of talent introduction policy is not caused by other factors, and the conclusions of the previous study are relatively stable.

Table 3. Placebo test

<i>t</i>	<i>GDP</i>	<i>Stu</i>	<i>Urban</i>	<i>Lnv</i>	Constant term	Time effect	Individual effect	Sample size
0.042 (2.321)	0.027 (3.043)	0.865 (0.358)	0.014 (0.579)	0.344 * (0.878)	0.851 * (14.848)	Have control	Have control	156

(2) PSM-DID test

Although in the above research data through a parallel trend test and regression, DID identify the price differentiation between cities in Yangtze river delta in the talent introduction policies relative difference before and after, and effectively inhibit the endogenous problem of the model, but is still likely to exist in the process of the sample selection bias caused by regression result is wrong, Therefore, it is necessary to test the robustness of the core conclusions based on pSM-DID (propensity score matching). In this paper, total GDP, number of primary and secondary school students, urbanization rate and investment amount of real estate

development were selected as the matching variables of PSM. One-to-three nearest neighbor matching method was used to construct the control group, and then DID method was used to estimate the matched samples. The results in Table 4 show that after avoiding the sample selection bias, the talent introduction coefficient reaches 0.24, passing the significance test at the level of 5%. There is no significant difference between the estimation result of PSM-DID and the previous DID regression result, which still supports the research conclusion that talent introduction policy exacerbates the housing price differentiation in the Yangtze River Delta region.

Table 4. PSM-DID test

<i>Hir</i>	<i>GDP</i>	<i>Stu</i>	<i>Urban</i>	<i>Lnv</i>	Constant term	Time effect	Individual effect	Sample size
0.018 * (1.826)	0.212 ** (1.064)	0.865 * (0.235)	0.042 (0.639)	0.234 * (1.118)	0.851 * (10.238)	Have control	Have control	156

4. Main Conclusions and Policy Connotation

Based on the relevant data of 26 cities and 200 districts and counties in the Yangtze River Delta region from 2015 to 2020, this paper takes the prefecture-level cities that implement the new talent deal as the experimental group and those that do not implement the new talent deal as the control group, and uses the differential difference method to evaluate the impact of the implementation of the new talent deal on the housing price differentiation effect in the Yangtze River Delta region. The results show that: (1) in the sample period, there is a significant positive correlation between the implementation of the new talent deal and regional housing price differentiation, that is, the implementation of the new talent deal has intensified the housing price differentiation in the Yangtze river delta region. This conclusion was still valid after placebo test and PSM-DID test. (2) From the perspective of control variables, the increase of urbanization rate has no significant impact on housing price differentiation, while total GDP, number of primary and secondary school students and investment in real estate development all have a significant positive effect on housing price differentiation in the Yangtze River Delta region.

Based on the research conclusions of this paper, the following suggestions can be made:

First, we should adjust measures according to local conditions. Local governments shall formulate supporting housing policies for talent introduction according to local actual conditions. In order to attract talents, to leave the high-end industry development of talent for the purpose of urgent need. The housing policy for all kinds of talents shall be regulated and regulated according to different categories, and the talent reserve shall be realized through various forms and ways. From the perspective of supply side, while meeting the demand for human capital for local innovative development, the impact of human capital inflow on the real estate market should be reduced. Establish the long-term mechanism of real estate regulation and control, so as to realize the balanced development of regional economy.

Second, balanced education and optimized school districts. We will implement the central government's policy of "housing, not housing," and prevent resources for compulsory education from being distributed based on wealth. The existence of "school district housing" plays a significant role in housing price differentiation. Some speculators also aim at the rising space brought by the imbalance between supply and demand of "school district housing", making the house obtain a premium far beyond its living value, seriously deviating from the policy of "housing does not speculation". The fundamental reason for the existence of "school district housing" is that if you buy "school district housing", you can go to "one radish, one pit",

so the direction of policy making should break this system. Can take the "multi-school partition" way, famous schools and ordinary schools corresponding to the same "school district room". When the purchase of "school district housing" can no longer ensure that children into elite schools, do not buy the same may be assigned to elite schools, around the "school district housing" hype will naturally lose the "core drive".

Third, standardize the industry and make reasonable investment. Reasonably plan the development of real estate industry, and make clear the significant impact of real estate investment on housing price differentiation. Strengthen the supply-side reform of the real estate industry, the imbalance between supply and demand is an important reason for the rise of housing prices. For areas with high housing prices, the real estate industry has investment demand, so the government should increase supply and encourage real estate enterprises to increase investment. For areas with medium and low housing prices, the policy of destocking commercial housing should be strengthened to speed up the sales of commercial housing.

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