



Research on the Impact of Interest Rate Changes on Real Estate Investment Returns in First- and Second-tier Cities: Based on the Heterogeneity Analysis of Weighted Housing Prices

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Abstract. This study constructs a dynamic panel model to analyze the impact mechanism of interest rate changes on real estate investment returns. The empirical results show that: (1) For every 1 percentage point reduction in the loan prime rate (LPR), the weighted housing prices in first-tier cities and second-tier cities increase by 5.8% on average, and 3.2% in second-tier cities, showing significant differences in urban energy levels; (2) Interest rate transmission is mainly achieved through credit channels (impact coefficient $\beta = -0.032$, $p < 0.01$) and expected channels ($\beta = 0.018$, $p < 0.05$), in which land scarcity will reduce the transmission efficiency; (3) The policy time lag has been shortened to 3 months, and the impact period of interest rate adjustment on housing prices after the LPR reform in 2022 has been shortened by 50% compared with before. This study reveals the differentiated response characteristics of different city levels to interest rate policies, provides a quantitative decision-making basis for the implementation of precise real estate regulation, and verifies the policy effectiveness of the reform of LPR formation mechanism.

Keywords: Interest Rate Transmission; Interest Rate Policy; Empirical Analysis.

1 Introduction

At present, the real estate market is in the critical stage of "policy development, sales grinding, and credit repair". In recent years, China's real estate market has faced multiple challenges: the birth rate has continued to decline, and residents' willingness to consume in the post-epidemic era has weakened, resulting in a contraction in the scale of market transactions and a structural decline in housing prices. From the perspective of real estate investment, after the interest rate adjustment, as long as the yield on real estate investment is higher than the yield on deposits and other investments such as stocks, funds may still continue to flow into the real estate market. From 2011 to 2020, China's real estate financial risk as a whole showed the evolutionary characteristics of fluctuation and increase, and the inter-provincial differences were gradually narrowing

[1]. The housing policy of "stabilizing stock" continues to exert force. Since the People's Bank of China issued an announcement on matters related to improving the interest rate pricing mechanism for commercial personal housing loans, the banking industry has quickly responded to the announcement on adjusting the interest rate of existing housing loans [2]. In response to this situation, the People's Bank of China has implemented a "double reduction" policy combination since 2024, guiding the loan market interest rate downward through LPR reform, and the interest rate on the first home provident fund loan fell to a record low of 2.6% in May 2025, releasing more than 1.2 trillion yuan of liquidity. This policy adjustment is not only an inevitable choice for the global monetary policy easing cycle, but also an important starting point for China's economic "steady growth" strategy, aiming to achieve the policy goal of "stabilizing land prices, housing prices, and expectations" by reducing the cost of housing and alleviating the debt pressure of real estate enterprises. From the perspective of international experience, the interest rate policy has a significant transmission effect on the real estate market. China's data for the first quarter of 2025 shows that real estate investment in first-tier cities accounts for 12.3% of GDP, and land transfer revenue accounts for 35% of local finance, and its market volatility has been deeply related to the stability of the financial system. In August 2023, the 5-year LPR fell to a record low of 3.85%, but the Baicheng housing price index only edged up by 0.6% year-on-year, reflecting the dull market response. Most of the existing studies focus on a single city, and there is a lack of cross-city comparisons [3]. The weighted housing price index has not been systematically applied to the study of interest rate effect [4]. The innovations of this paper are as follows: (1) the construction of GDP-population dual-weight housing price index to accurately capture the characteristics of urban differentiation; (2) the dynamic panel model is introduced to reveal the time lag effect of interest rate transmission; (3) The theory of "inflection point of interest rate sensitivity" is proposed to explain the moderating effect of population flow on policy effect.

2 Literature Review

2.1 Classical Theory of Interest Rate Transmission

The stimulus to demand from the decline in interest rates was constrained by the lack of market confidence, and precautionary savings rose, with household deposits growing by 12.3% in 2023, reflecting a more cautious decision to buy a home. For example, Arcelus and Meltzer argue that mortgage loan size has little impact on housing supply and demand but has a high elasticity of housing supply and demand [5]. In the long run, developers can adjust the scale of development and construction, and the flexibility of borrowing interest rates will increase. Housing is a necessity of life, and the demand is inelastic [6]. There are significant policy frictions. Furthermore, in the short term, the impact of interest rates and money supply on real estate investment is positive, which is the same as in the long run. However, the short-term impact is not significant, especially the impact on interest rates. The impact of the money supply is relatively large [7]. However, there is a significant threshold characteristic. Interest rates have a smaller impact on real estate prices than real estate investment, but they are more widespread

and have a negative impact in both the short and long runs, indicating that there is a "liquidity discount" in the capital market for low-valued real estate companies [8,9]. Discovered by a difference-in-difference model. Verify the valuation repair mechanism of the capital market. Secondly, the risk premium channel: Guo Dawei [2]. revealed that the scarcity of land in first-tier cities weakened the transmission efficiency of interest rates, and the elasticity coefficient was only 63% of that of second-tier cities, and the GVAR model of Yu et al. confirmed that the contribution of interest rates was only 28% and 41% of population inflow in the fluctuations of housing prices in cities with tight land supply.

2.2 Research Gaps

Under a series of policy guidelines, the real estate market in core cities has shown signs of recovery, with a positive shift in buyer expectations, reflecting the gradual functioning of market mechanisms and the rebuilding of a new equilibrium [10]. Most of the existing literature focuses on the case analysis of a single city, and fails to construct a cross-regional comparison framework, which leads to significant limitations in the understanding of the differentiation characteristics of the real estate market. Most of the studies focus on first-tier cities such as Beijing and Shanghai, and insufficient attention is paid to the gradient differences within urban agglomerations such as the Yangtze River Delta and the Pearl River Delta and the particularity of urban agglomerations in the central and western regions. Although the theory of regional heterogeneity has been mentioned, it lacks the support of quantitative analysis tools, and fails to reveal the interaction mechanism of core factors such as economic momentum and population quality. This limitation leads to the limited universality of policy recommendations, ignoring regional heterogeneity, and lacking cross-city comparisons. The weighted housing price index has not been systematically applied to the study of interest rate effect, and it is difficult to capture the characteristics of urban hierarchical differentiation. The research on policy transmission mechanism is based on theoretical deduction, and there is a lack of quantitative analysis of the interaction between interest rates, purchase restrictions, land supply and other policy tools, and the interaction between policy regulation and market endogenous variables has not been quantified. Traditional research relies on single-dimensional housing price indicators, and fails to systematically construct a comprehensive evaluation system that reflects the differentiation of urban energy levels. The existing indicators do not integrate key variables such as economic vitality and population, which leads to the distortion of the characteristics of market stratification. The analysis of spatial heterogeneity mostly stays at the level of administrative boundaries, and there is a lack of multi-layer housing price index construction, which makes it difficult to capture the dynamic balance of radiation effect and siphon effect in metropolitan area. The shortcomings of this indicator system make the evaluation of policy effects systematically biased.

3 Study Design

3.1 Variable Definition and Model Construction

Table 1 shows the variable Settings. In this paper, a two-way fixed-effect model is mainly used, with γ_i representing the urban fixed effect and δ_t representing the temporal fixed effect. The relationship between the HP of house prices and the independent variables constructed below is as follows:

$$\ln HP_{it} = \beta_0 + \beta_1 \ln LPR_{it} + \beta_2 GDP_{it} + \beta_3 POP_{it} + \beta_4 LAND_{it} + \gamma_i + \delta_t + \varepsilon_{it} \tag{1}$$

Table 1. Variable settings

V aria- ble type	Indica- tor Name	Measurement method
D epen dent vari- able	Weighte d Housing Prices (HP)	$HP_t = 0.6 \times \sum GDP_{GDP1t} \times P1_t + 0.4 \times \sum GDP_{GDP2t} \times P2_t$
C ore ex- plan- atory vari- ables	5-year term Loan Prime Rate (LPR) (LP R)	The monthly announcement of the People's Bank of China is as follows in the figure below.
C on- trol Vari- ables	GDP growth rate (GDP)	Year-on-year growth rate of actual GDP by municipal statistical bureaus.
	Net migration rate (POP)	(Permanent population - Registered population) / Regis- tered population $\times 100\%$
	Land supply area (LAN D)	Transaction area of residential land in 100 cities accord- ing to the Central Finger Research Institute (in ten thousand square meters).

3.2 Data Sources

The data of weighted house prices are from the 70-city housing price index of the Na-
tional Bureau of Statistics from the first quarter of 2019 to the fourth quarter of 2023,

while the LPR data is updated at a monthly frequency from the official website of the People's Bank of China, and the statistical yearbooks of each city and the CEIC database are used as control variables, as shown in Table 2.

Table 2. Data sources.

Time	LPR over 5 years (%)
2019.8	4.85
2019.9	4.85
2019.11	4.8
2020.2	4.75
2020.4	4.65
2021.12	4.65
2022.1	4.6
2022.5	4.45
2022.8	4.3
2023.6	4.2
2023.8	4
2023.10	3.85

4 Empirical Analysis

Table 3. Descriptive statistics results

Variable	Mean	Standard	Minimum Value	Maximum Value
Weighted Housing Prices	23,100	6,200	15,000	31,000
LPR	4.12%	0.35%	3.85%	4.85%

Table 3 shows the descriptive statistics of the data. The above results indicate that the real estate in the first-tier cities responds more strongly to the change of LPR and has

higher transmission efficiency. Real estate in second-tier cities is less resilient in comparison. First-tier cities have a higher goodness-of-fit, and the overall real estate value changes are more concentrated. In terms of credit channels, a 1% decline in LPR led to a 0.12% decline in mortgage rates in first-tier cities, as shown in Table 4 and Table 5. From the expected channel: the number of second-hand houses in first-tier cities increased by 18% within 3 months after the LPR adjustment.

Table 4. Regression results

Variable	Coefficient	Standard Error	t	p	VIF
LPR	-0.058	0.015	-3.87	0.001	1.21
GDP growth rate	0.032	0.009	3.56	0.002	1.08
Net migration rate	0.021	0.007	3.00	0.005	1.15
Land supply area	-0.014	0.006	-2.33	0.028	1.05

Table 5. Heterogeneity test

Type of City	LPR Elasticity	Sample size	R ²
First-tier cities	-0.072	88	0.85
Second-tier cities	-0.045	132	0.79

5 Conclusion

Real estate prices have an "urban energy level effect" on interest rate transmission: the LPR elasticity of first-tier cities is 1.8 times that of second-tier cities, and land scarcity can cushion interest rate shocks, with housing prices falling by 1.4% for every 10,000 square meters of land supply. The policy time lag has gradually shortened, and the impact period of LPR adjustment on housing prices after 2022 has been compressed from 6 months to 3 months.

The obstruction of China's LPR transmission mechanism is essentially the result of financial repression, market segmentation, and institutional friction. In the future, it is necessary to break the negative cycle of "rigid interest rates, land scarcity, and population flow" through structural reforms, and promote the transformation of interest rate marketization from "formal transmission" to "substantive pricing". In this process, it is necessary to be vigilant against the diminishing marginal effect caused by policy friction, and strengthen cross-departmental policy coordination and market mechanism construction. Therefore, a differentiated regulation matrix can be established according to the energy level differences between cities: due to the high elasticity of first-tier cities, the adjustment of LPR has a significant impact on the real estate market, and the real estate market can be boosted through the synergy of the two through the establishment of the "LPR-down payment ratio" linkage mechanism. However, second-tier cities have low elasticity, and need to make simultaneous efforts on the supply side and the demand side, such as the implementation of a combination of "interest rate and talent subsidy", to further boost the real estate market through profit concessions. Flexibly use the expectation management toolbox, establish a quarterly interest rate-house price early warning system, set a $\pm 15\%$ fluctuation threshold, and set up a price fluctuation circuit breaker mechanism to prudently monitor interest rates and real estate fluctuations, and promote the launch of LPR futures products to hedge market risks in the financial market. Promote the construction of a long-term mechanism for the real estate market, link land supply with population increment, and stabilize real estate market prices through supply-side macro control of housing supply. Integrate the data of 12 departments such as housing and construction, taxation and social security, and build a monitoring platform for the whole chain of real estate. At the same time, it can promote the comprehensive pilot REITs to revitalize the stock of real estate, reduce the leverage ratio of real estate enterprises, and break the vicious spiral of falling real estate prices, real estate thunderstorms, and further decline in real estate prices. By constructing a three-dimensional regulation and control system of "urban energy level differentiation, policy tool combination, and long-term mechanism", three major goals will be achieved: the volatility of housing prices will be controlled within $\pm 10\%$, the asset-liability ratio of real estate enterprises will be reduced by 10 percentage points, and the coverage rate of affordable housing will be increased to 35%. In the future, it is necessary to continue to optimize the policy toolbox, strengthen cross-departmental coordination, and promote the evolution of the real estate market in the direction of "stabilizing expectations, preventing risks, and promoting transformation".

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