Study on the Transmission Effect of Interest Rate Decline on Housing Price in Structural Deflation Cycle (2023-2025)

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Abstract. During economic downturns, particularly deflationary periods, the transmission of interest rates to real estate prices poses a complex and challenging issue for central banks worldwide. The intertwining of various economic issues and black swan events continuously hinders this transmission mechanism, repeatedly weakening the effectiveness of interest rate policies and making it difficult for single-rate measures to effectively break the downward spiral in housing prices. This paper focuses on the specific context of China's economic downturn since 2019, examining the transmission effect of interest rate policies on real estate prices through regression analysis. It explores how interest rate policies interact with property values while simultaneously influencing investment and consumption patterns. The research finds that during structural deflation, interest rate cuts have a short-term positive impact on housing prices, with current and one-period lagged rates showing significant effects. However, the transmission mechanism is severely weakened in the long run. This inefficiency is attributed to three key bottlenecks: high household debt saturation, liquidity traps for developers, and self-reinforcing deflationary expectations. The research concludes that traditional monetary policy is systemically ineffective in this environment, necessitating more targeted, integrated policy measures. It extends the financial accelerator model and provides empirical support for targeted monetary policies.

Keywords: structural deflation, interest rate policy, transmission effect.

1. Introduction

In historical research on interest rates, scholars have established a traditional theoretical framework explaining how interest rate changes influence housing prices. First, the credit channel plays a central role. The financial accelerator theory proposed by Bernanke and Gertler laid the microeconomic foundation for this transmission mechanism [1]. Monetary policy alters corporate balance sheet conditions, triggering nonlinear shifts in credit terms that amplify their impact on asset prices.

Secondly, asset substitution and the supplementary role of expectation channels also influence housing prices. The asset rebalancing effect causes nominal interest rates to decline, which reduces savings yields and prompts households to shift deposits into real assets like real estate, thereby driving up their equilibrium prices [2]. Meanwhile, as a signaling tool for central banks, interest rate policies can affect housing prices by altering market expectations. Simulations using Williams' DSGE model demonstrate that expectation channels contribute up to 30% to housing price fluctuations, with this contribution being particularly pronounced in low-interest-rate environments [3].

However, these historical studies share a fundamental limitation: they are all based on mature market economies and fail to account for the constraints of high debt levels and structural deflation [4]. For contemporary China, where market mechanisms differ significantly, the transmission blockage mechanism in interest rates differs from historical research, giving rise to numerous new considerations.

First, debt saturation in the household sector creates a disincentive effect. When the household leverage ratio exceeds the 85% threshold, interest rate cuts lose over 50% of their demand-stimulating efficiency [5]. Second, real estate developers face structural bottlenecks from liquidity traps. A transmission blockage occurs when bond default rates exceed 15%, making it difficult for lower interest rates to improve their financing capacity [6]. This happens because rising risk premiums offset falling funding costs, while the pressure to complete housing projects forces companies to prioritize cash flow on project completion rather than land acquisition. Finally, deflationary cycles distort interest rate transmission mechanisms. Continuous negative GDP deflation suppresses households' leverage capacity through two channels: suppressed real debt burden growth via interest rate cuts and self-reinforcing housing price decline expectations [7]. Impulse response analysis using the TVP-VAR model shows that in deflationary conditions, the positive impact of interest rate cuts on housing prices shortens by 60% in duration.

Building upon previous research, this study optimizes the original theoretical framework. Theoretically, it establishes an extended financial accelerator model incorporating debt-deflation cycles, thereby refining conventional interest rate transmission theories. Policy-wise, the research provides empirical support for central banks to implement targeted interest rate cuts and fiscal leverage expansion, facilitating the development of more scientifically grounded monetary policies.

2. Research Technique

2.1. Data Sources and Descriptions

This study examines the transmission mechanism of interest rate declines during structural deflation cycles on housing prices, focusing on two key variables: housing prices and interest rates. To comprehensively analyze this deflationary cycle, we first analyzed housing price data from 70 Chinese cities over the past three years, including three indices: new residential sales price index, new commercial residential sales price index, and second-hand residential sales price index. Subsequently, we collected year-on-year and month-on-month change rates for these indicators from the official website of China's National Bureau of Statistics [8].

Secondly, regarding the core variable of housing prices, this study sourced data from the Monetary Policy Department of the People's Bank of China and cross-verified it using the CEIC Global Economic Database [9]. Since October 2019, mortgage rates have been anchored to the Loan Prime Rate (LPR), with commercial banks setting final rates by adding basis points to the LPR. Therefore, the research ultimately analyzed loan interest rates for terms exceeding five years starting from 2019.

2.2. Method Introduction

To analyze the stimulating effect of mortgage rate reductions on home purchases, this study constructs a systematic empirical framework. The core focus is to capture how mortgage rate changes influence housing prices, thus employing a panel regression model to control for city and time fixed effects while avoiding omitted variable bias. Specifically, the model treats housing price changes as the dependent variable and mortgage rates as the core independent variable, simultaneously controlling for city fixed effects and time fixed effects to account for fundamental differences across cities and macroeconomic cycles. The basic model structure demonstrates a linear relationship between housing price changes and interest rates, incorporating lagged interest rate terms to examine policy dynamics. When data frequency permits, monthly analyses can be further segmented to more accurately capture both immediate and delayed effects of rate adjustments.

This study ultimately employs monthly panel data from 70 Chinese cities spanning January 2023 to June 2025, constructing a dynamic fixed effects model to empirically examine the transmission effect of interest rate declines on housing prices. Considering the time lag characteristics of monetary policy impacts on the real estate market (such as home purchase decision cycles and credit approval processes), the model incorporates both current and multi-period lagged interest rates as core independent variables. Using city-level housing price indices as dependent variables, the current mortgage rate reflects immediate policy shocks, while the first-period lagged rate captures short-term adjustment effects, and the second-period lagged rate identifies medium-to-long-term transmission trajectories.

To address inherent urban heterogeneity—including location characteristics and long-term policy environment effects that may distort estimation results—the model incorporates city-level fixed effects. The Hausman test results reject the random effects assumption, confirming the necessity of a fixed effects framework. For estimation, we employ PanelOLS estimators for parameter fitting while using city-level clustered robust standard errors to mitigate intra-group autocorrelation and heteroskedasticity issues. The final model specification is as follows:

$$HousingPriceIndex_{it} = \beta_0 + \beta_1 MortgageRate_{it} + \beta_2 MortgageRate_{it-1} + \beta_3 MortgageRate_{it-2} + \alpha_i + \epsilon_{it} \quad (1)$$

Where: $HousingPriceIndex_{it}$ represents the housing price level indicator of city i at time t; X denotes the current mortgage interest rate; X_1 is the lagged one-period mortgage interest rate (used to study lag effects); X_2 is the lagged two-period mortgage interest rate (representing an earlier period); the fixed effects term controls for constant urban characteristics such as geography, institutional systems, and cultural factors; the error term describes other unobserved time-varying factors.

This framework eliminates fixed effects by group transformation, ensures the consistency of parameter estimation, and verifies the overall significance of the model with F-test, which provides a rigorous measurement basis for identifying the transmission efficiency of interest rate policy under structural deflation.

3. Research Results and Discussion

3.1. Descriptive Statistical Tests

This study's dataset comprises 2,100 observation records, employing a dynamic fixed effects model to systematically examine the transmission effect of interest rate declines on housing prices during structural deflation cycles. Descriptive statistics reveal that the housing price index has a mean of 97.21 (standard deviation: 2.97), with a fluctuation range of 89.7–108.6. The mortgage interest rate averages 3.98% (standard deviation: 0.28), spanning 3.5%–4.3%. These data distributions align with real-world economic conditions, establishing a reliable foundation for subsequent analyses.

The dataset constitutes a typical balanced panel data set with two key structural features. At the individual level, each of the 70 cities serves as an independent cross-sectional entity. In terms of time, it spans 30 consecutive months from January 2023 to June 2025.

Each city has a complete housing price index and mortgage interest rate observation at each time point, ensuring the continuity and consistency of the data.

3.2. Data Visualization

As shown in Fig. 1, China's national average housing price index experienced a modest upward trend from early 2023 to late 2023, reaching localized peaks. Subsequently, the index entered a significant downward trajectory starting from late 2023, with particularly rapid declines observed between late 2023 and early 2025, hitting a low of around 94.7 points. In early 2025, the index showed signs of stabilization or even mild recovery, though it remained at relatively low levels overall.

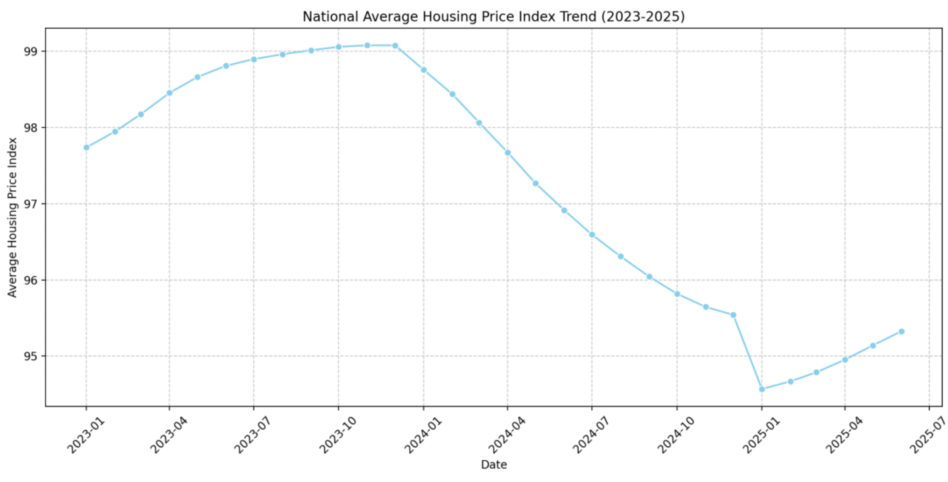

Fig. 1 Changes in the national average housing price index from 2023 to 2025 (Photo/Picture credit: Original).

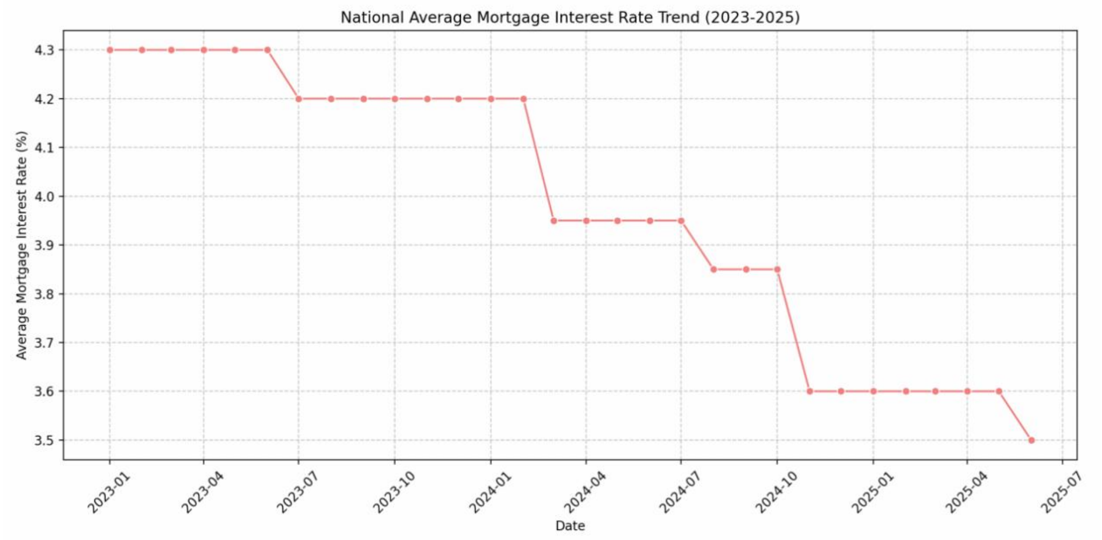

Fig. 2 National average mortgage interest rate trend from 2023 to 2025 (Photo/Picture credit: Original).

As shown in Fig. 2, the national average mortgage interest rate remained at a relatively high level of 4.3% from early to mid-2023. Since mid-2023, mortgage rates have shown a clear and sustained downward trend, accompanied by multiple rounds of tiered reductions. By mid-2025, the average mortgage interest rate is expected to drop to 3.5%.

Notably, while the national average housing price index has shown a significant downward trend, mortgage interest rates have demonstrated sustained and multi-stage reductions. This phenomenon suggests that there may be complex correlations between housing prices and interest rates, indicating that their causal relationship might not be unidirectional. The observed co-directional movement requires deeper analysis through advanced econometric models to clarify the underlying dynamics.

3.3. Regression Model and its Results

This study employs a fixed effects panel data model to examine the impact of mortgage interest rates and their lagged terms on housing price indices. The fixed effects model effectively controls for city-specific heterogeneity that does not vary over time, such as geographical location, cultural factors, and long-term policies, thereby yielding more consistent estimates. The final model specification is presented in Equation (1).

The PanelOLS estimator was used to regress on the fixed effects model, and Table 1 fully displayed the results of the linear regression.

Table 1. Linear regression results and tests

Entities	70
Time periods	28
R-squared	0.4631
R-squared (Between)	0.3996
R-squared (Within)	0.4631
R-squared (Overall)	0.3997
F-statistic	542.62
P-value	0.0000
Distribution	F(3,1887)
F-statistic (robust)	115.99
P-value	0.0000
Distribution	F(3,1887)
F-test for Poolability	51.254
P-value	0.0000
Distribution	F(69,1887)

Table 2. Parameter estimation results

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
Mortgage rates	3.7299	0.4067	9.1708	0.0000	2.9323	4.5276
Mortgage interest rate_lag1	0.9656	0.1489	6.4847	0.0000	0.6735	1.2576
Mortgage interest rate_lag2	0.7895	0.5622	1.4043	0.1604	-0.3131	1.8920

In Table 1, the F-statistic represents the test whether the explanatory variables equals to 0 and the Distribution of each test showcases the degrees of freedom. In Table 2, mortgage interest rate (lag1) represents the mortgage interest rate with a one-period lag; mortgage interest rate (lag2) indicates the mortgage interest rate with a two-period lag. Parameter denotes the parameter estimation results. Standard Error (SE) measures the precision of coefficient estimates. The T-statistic (t-value) equals the coefficient estimate divided by the standard error, used to test whether individual coefficients are significantly different from zero. P-value corresponds to the p-value in t-tests. Lower CI and Upper CI represent confidence intervals.

The analysis reveals a significant positive correlation between current and first-period mortgage rates with housing price indices, after controlling for urban characteristics. However, the impact of second-period mortgage rates on housing prices is not statistically significant, indicating that these rates exert no additional substantial influence on housing prices when accounting for current and first-period rates. Given this lack of statistical significance, the study focuses on cumulative effects from current and first-period mortgage rates. The cumulative effect is calculated as:

$$Cumulative\ Effect\ =\ Current\ Period\ Coefficient\ +\ First-period\ Coefficient\ =\ 3.7299\ +\ 0.9656\ =\ 4.6955. \quad (2)$$

In terms of model fit and robustness, the R-square (Within) is 0.4631, which falls within the acceptable range, indicating that the model performs well in explaining urban housing price fluctuations. The overall F-statistic (robust) of 115.99 and a P-value close to 0 demonstrate high statistical significance. The F-test for poolability rejected the pooled ordinary least squares (OLS) hypothesis, further confirming the necessity of the fixed effects model.

In summary, the model results demonstrate a positive correlation between interest rates and housing prices, further validating previous explanations regarding the endogeneity of policy. First, when housing prices face downward pressure, central banks tend to lower interest rates to stabilize the market. Second, when prices rise too rapidly, central banks may raise interest rates to curb bubbles. This explains why we observe that rising interest rates correlate with increasing housing prices.

3.4. Hausman Test

In this study, the Hausman test is used to determine whether to use the fixed effect model (FE) or the random effect model (RE) in panel data analysis. The core of the test is to check whether individual effects are related to explanatory variables.

First of all, this study adopts the fixed effect model. The coefficient estimate of the current mortgage interest rate is 3.9138; the coefficient estimate of the mortgage interest rate lagged by one period is 1.542, and its covariance matrix is shown in Table 3.

Table 3. Covariance matrix of fixed effects model

variable	Mortgage rates	Mortgage interest rate_lag1
Mortgage rates	0.281032	-0.264023
Mortgage interest rate_lag1	-0.264023	0.264056

Then, this study also uses the random effects model for research. The coefficient estimate of the current mortgage interest rate is 20.8070; the coefficient estimate of the mortgage interest rate lagged by one period is -0.0632, and its covariance matrix as Table 4.

Table 4. Covariance matrix of random effects model

variable	Mortgage rates	Mortgage interest rate_lag1
Mortgage rates	2.472077	-2.455492
Mortgage interest rate_lag1	-2.455492	2.469350

Based on the Hausman statistic calculation formula

$$H = (\hat{\beta}_{FE} - \hat{\beta}_{RE})'\left[Var\left(\hat{\beta}_{FE}\right) - Var(\hat{\beta}_{RE})\right]^{-1}(\hat{\beta}_{FE} - \hat{\beta}_{RE}) \tag{3}$$

The value of H=17578.1104 was obtained, and the degree of freedom of Hausman test was 2. The P value was 0.0000, which was far less than 0.05. Therefore, the null hypothesis was rejected, indicating that the fixed effect model was better.

4. Conclusion

This study utilizes panel data from 70 Chinese cities between 2023 and 2025, employing a dynamic fixed effects model to empirically examine the transmission effect of interest rate declines on housing prices during structural deflation cycles. The findings reveal that current and first-period mortgage rates show significant positive correlations with housing price indices, while second-period rates demonstrate no statistically significant impact. Empirical evidence confirms that in macroeconomic environments characterized by balance sheet recession combined with deflationary expectations, interest rate policy transmission to housing prices exhibits short-term localized effectiveness but long-term systemic ineffectiveness .Although current and first-period rate fluctuations can still influence housing prices through credit cost channels, three factors collectively undermine the efficiency of traditional monetary policy transmission: demand-side bottlenecks caused by household debt saturation, supply-side disruptions stemming from developers 'liquidity traps, and the fundamental reversal of price formation mechanisms driven by deflationary expectations. These findings not only revise the applicability boundaries of mature market interest rate transmission theories but also provide critical empirical evidence for China's deflation governance strategies.

However, this study has certain limitations. First, the data's timeliness is constrained by observations before mid-2025, failing to capture marginal improvement effects following subsequent policy intensification. Second, the model excludes micro-level threshold variables such as household leverage ratios and real estate developers' default rates, making it challenging to precisely quantify debt constraint thresholds. Future research will extend the analytical framework to the entire economic cycle, comparing heterogeneity in transmission mechanisms under deflationary versus inflationary conditions. Additionally, we will employ DSGE simulations to quantify dynamic optimization paths of different policy combinations in structural deflation scenarios, providing more comprehensive decision support for cross-cycle policy design.

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