The Impact of the Scale of Shadow Banking on Real Estate Prices— under the Background of Interest Rate Liberalization Reform

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Abstract

The paper is to examine the impact of the scale of shadow banking on housing price under the background of Interest Rate Liberalization Reform in China by implementing the autoregressive distributed lag-error correction (ARDL-ECM) model, based on China's quarterly data from 2005 to 2015. The empirical results show that, in the short term, the scale of shadow banking has no effect on real estate prices, while in the long term the expansion of shadow banking can promote the rise of real estate prices, and the interest rate liberalization reform will strengthen this effect to a certain extent. The reason may be that the interest rate liberalization reform has promoted the development of financial innovation, leading to the rapid growth of the shadow banking system. Therefore, when actively promoting the interest rate liberalization reform, the financing environment of the real economy should be rationally optimized to reduce the financing cost of the real economy, and the risk management of shadow banking should be strengthened to guide the shadow banking to serve the real economy and protect the health of the real estate industry steady development.

Keywords

Shadow Banking; Housing Price; Interest Rate Liberalization Reform; ARDL-ECM Model.

1. Introduction

In recent years, affected by the global economic downturn, the Chinese government needs to use a variety of macro policy tools to promote economic development. Real estate is an important part of China's national economy. When the real estate industry falls into recession, it will bring greater pressure on the macro economy and curb economic growth. As one of the capital-intensive industries, real estate has a wide range of funding sources, so housing prices are affected by many factors. Although China is in the final stage of the reform of interest rate marketization, which will improve the efficiency of resource allocation, reduce the capital tension of real estate, and help alleviate the non-steady rise of housing prices. However, marketization of interest rates also means that the frequency of interest rate fluctuations will increase, which will not only increase the operating risk of real estate, affect its financing capacity, but also cause severe fluctuations in real estate prices.

In the process of interest rate marketization, loan interest rates will rise and the real estate industry will face a shortage of funds in the short term. At this time, shadow banking has become the main source of funds for the real estate economy, because it is less regulated and flexible. Although shadow banking can alleviate the financial dilemma of real estate to a certain extent, it is conducive to promoting the development of the real estate industry, but when the source of funds of the real estate industry is excessively dependent on shadow banking, the risks accumulated by the shadow banking system will pass through the credit mechanism affect the real estate industry, and then spread to the entire national economy. Therefore, to study the impact of shadow banking scale on real estate prices based on the background of interest rate market reform is not only conducive to the institutional standardization of shadow banking, but also conducive to the long-term development of the real estate industry. Especially when the national economy is facing downward pressure, a better understanding of the relevant influencing factors that affect housing prices will facilitate the implementation of monetary policy, ensure the stability of housing prices, and promote the healthy development of the national economy.

The major contribution is twofold. First, the study considers the time-varying nature of interest rate market-oriented reforms. The completion of interest rate marketization needs to be done step by step, rather than overnight. Therefore, to grasp the overall interest rate marketization reform process will better understand its pros and cons to the real economy; second, we use the ARDL-ECM model to analyze the effect of shadow banking on real estate prices.

This paper is structured as follows. Section 2 reviews the literature. Section 3 selects variables and builds the ARDL-ECM model. Section 4 analyzes the empirical results and tests the stability. Section 5 summarizes the article and makes relevant suggestions.

2.   Related literature

2.1 Shadow Banking and the Real Estate Market

Shadow banking is a new type of financial innovation tool that is born to meet investment and financing needs[1]. Although the development of shadow banking has expanded the financing channels of real estate[2], when a large amount of shadow bank borrowing funds enter the real estate industry, it will cause certain changes to the real estate financing structure[3]. At the same time, the high risk brought by the excessively long shadow banking chain will increase the system fragility of real estate, which in turn will push up the housing price bubble [4]. Therefore, studying the role of shadow banking on housing prices is not only conducive to the development of the real estate industry, but also promotes the stability of the financial system. C. Shan et al. found that the expansion of shadow banking will lead to an increase in housing prices, which will lead to a decline in housing prices after a period of time[5]. S. Jia et al. believe that the expansion of shadow banking is the reason for the rise in housing prices[6].J. Li et al. found that bridge loans will increase housing prices[7]. Z. Zhang et al. concluded that the expansion of the scale of shadow banking will increase housing prices, but when the scale of shadow banking reaches a certain level, as real estate has sufficient funds, its effect on housing prices will no longer be significant[8]. S. Zhao et al. used the TVP-VAR model to find that the expansion of shadow banking can cause housing prices to rise [9]. X. Fang also used TVP-VAR to believe that the reason for the rise in housing prices was the expansion of shadow banking [10]. Y. Ma et al. believe that the impact of shadow banking on housing prices is time-varying [11]. X. Ren et al. believe that the high interest rate of shadow banking increases the development cost of real estate, which in turn leads to an increase in housing prices [12]. S. Jiang concluded that the influence of shadow banking on housing prices has gradually increased, which also reflects the increasing dependence of real estate on shadow banking [13].

2.2 Interest rates and the real estate market

Most theories believe that market interest rates are often used as the main tool of monetary policy to transmit their effects to the real economy. Therefore, interest rates have become the entry point for many scholars to study housing price fluctuations. Y. He et al. found that a loose monetary policy would lead to an increase in housing prices [14]. H. Gu et al. found that interest rates are the Granger cause of house price changes, but the regulatory effect is not significant, and there is no long-term stable relationship between the two [15]. X. Xu et al. believe that monetary policy has controllability on housing prices [16]. Based on the DSGE model, Li Songhua found that the long-term interest rate promotes the increase in housing prices [17]. Y. Ma et al. believe that housing prices are the Granger cause of interest rates, and loose monetary policy will boost housing prices [18]. Y. Yan et al. concluded that the impact of interest rates on housing prices is time-varying, and since 2011, the impact of interest rate shocks on housing price bubbles has gradually weakened and its impact on housing prices mainly revolves around basic housing prices [19]. From the perspective of time-varying analysis, R. Wang et al. believed that the effect of real interest rates on housing prices differed in different time periods [20]. Lu Tao concluded that changes in interest rates will have a negative impact on China's housing prices, but in the short term its impact is manifested through time lag [21].

Scholars pay more attention to the scale of shadow banking or the impact of interest rates on real estate prices, and most of them believe that the expansion of shadow banking is one of the reasons

for the rise in real estate prices. However, they did not consider that China is in the process of interest rate market reform. In a critical period, interest rate liberalization will also have a certain impact on shadow banking and the real economy. Based on the background of interest rate marketization, this paper explores the influence and transmission effect of the scale of shadow banking on real estate prices.

3.   Research and Methodology

This article uses the ARDL-ECM model to study the impact of the scale of shadow banks on housing prices under the background of interest rate market reforms. The main reasons for using this model are as follows: long-term and short-term parameters can be estimated simultaneously; when the data is a small sample, the method has higher robustness; the model estimation is not interfered by endogenous problems and can guarantee the validity of the results .

3.1 Variable selection

3.1.1. Main variable

(1) The scale of shadow banking (lnsb). The article adopts the most representative method to measure the scale of shadow banking. The article uses the sum of entrusted loans, trust loans and undiscounted bank acceptance drafts as the proxy variable of the shadow bank scale, and performs logarithmic processing on the selected data. The data comes from the official website of the People's Bank of China.

(2) The degree of interest rate marketization (lir). This article selects 12 indicators from four aspects: money market interest rate, bond market interest rate, deposit and loan interest rate, and wealth management product yield to construct a measure of the level of interest rate marketization.

(3) Real estate prices (lnhp). Calculated by dividing the sales of commercial housing by the sales area of commercial housing. The relevant data comes from the China Economic Network statistical database (China Economic Network). Because the relevant data published by China Economic Network is a cumulative value, it needs to be converted into the current value before calculation. And take the logarithm.

3.1.2 Other variables

(1) Interest rate (ibor). The weighted average interest rate of inter-bank lending is used to represent the interest rate level of the same period to reflect the demand for funds in the real estate industry. The data comes from China Economic Network.

(2) Real estate investment growth rate (inv). Since the completed investment of real estate development enterprises is a cumulative value, after converting it into a present value, the year-on-year growth rate of real estate investment is calculated. The data comes from the China Economic Network.

3.2 Model construction

In order to test the dynamic impact of the scale of shadow banking on real estate prices in the context of interest rate market reforms, the long-term simplified model established in this paper is shown in equation (1).

$$ln\,h\,p_t = \delta_0 + \delta_1 \ln s\,b_t + \delta_2 \mathrm{lir}_t + \delta_3 ibor_t + \delta_4 inv_t + \varepsilon_t \qquad (1)$$

ε_t is the disturbance term of the regression equation, hp_t is the housing price, sb_t is the scale of shadow banking, lir_t is the degree of interest rate marketization, $ibor_t$ is the interest rate level, inv_t is the growth rate of real estate investment, δ_0 is the constant term, δ_1, δ_2, δ_3, δ_4 is the variable coefficient.

In order to compare and analyze how the reform of interest rate marketization affects the impact of shadow banking scale on real estate prices, the variable lirt is subtracted from equation (1), and equation (2) is used to test the regulation of interest rate marketization reform on the entire system effect.

$$ln\,h\,p_t = \delta_5 + \delta_6 \ln s\,b_t + \delta_7 ibor_t + \delta_8 inv_t + \varepsilon_t \qquad (2)$$

When applying the ARDL model, the following two steps are generally required.

Step 1: Test whether there is a long-term cointegration relationship between the selected variables, and establish an autoregressive distributed lag model, as shown in equation (3).

$$\Delta \ln hp_t = \alpha_0 + \rho \ln hp_{t-1} + \theta \ln sb_{t-1} + \xi lir_{t-1} + \gamma ibor_{t-1} + \lambda inv_{t-1} +$$
$$\sum_{i=1}^{P} \beta_i \Delta \ln hp_{t-i} + \sum_{j=1}^{Q} \tau_j \Delta lnsb_{t-j} + \sum_{r=1}^{R} \psi_r lir_{t-r} + \qquad (3)$$
$$\sum_{m=1}^{K} \pi_m \Delta ibor_{t-m} + \sum_{n=1}^{N} \omega_n \Delta inv_{t-n} + \varepsilon_t$$

Where: α_0 is a constant term, ρ, θ, ξ, γ, λ are long-term correlation coefficients, β_i, ψ_r, τ_j, π_m, ω_n are short-term correlation coefficients, ε_t is white noise, and P, R, Q, K, N represents the lag order of the variable. To test whether there is a long-term equilibrium relationship between variables, the following hypothesis test is set:

Original hypothesis: $H_0: \rho=\theta=\xi=\gamma=\lambda=0$

Alternative hypothesis: H_1: $\rho \neq 0$, or $\theta \neq 0$, or $\xi \neq 0$, or $\gamma \neq 0$, or $\lambda \neq 0$

H_0 is the null hypothesis and H_1 is the alternative hypothesis. If H_0 is rejected, it means that there is a long-term equilibrium relationship between the selected variables. The boundary test method proposed by Pesaran et al. shows that if the F statistic is higher than a larger critical value, there is a long-term cointegration relationship between variables. If the F statistic is lower than the smaller critical value, there is no long-term cointegration relationship between the variables.

Step 2: Estimate the long-term relationship coefficients of related variables based on the AIC criterion, and then construct a short-term error correction model (ECM) corresponding to the ARDL model as shown in equation (4):

$$\Delta lnhp_t = \alpha_0 + \sum_{i=1}^{P} \beta_i \Delta lnhp_{t-i} + \sum_{j=1}^{Q} \beta_j \Delta \ln sb_{t-j} + \sum_{m=1}^{K} \beta_m \Delta lir_{t-m} +$$
$$\sum_{r=1}^{R} \beta_r ibor_{t-r} + \sum_{n=1}^{N} \beta_n \Delta inv_{t-n} + \beta_1 ECM_{t-1} + \varepsilon_t \qquad (4)$$

In formula (4), α_0 is a constant term, ECM_{t-1} is an error correction term, and β_1 is a coefficient of the error correction term. If $-1<\beta_1<0$, the correction of the error term is reversed, indicating that even if the variables are between In an unbalanced state, it can also maintain a long-term equilibrium relationship through error correction.

4. Findings

4.1 Unit root test

This article is based on Eviews10 software, using ADF (Augmented Dickey-Fuller) unit root test to test the stationarity of the variables involved (see Table 1). The experimental results show that only lnsb in the original sequence can pass the stationarity test, and the remaining variables pass the stationarity test after the first-order difference. Therefore, the ARDL model can be further used for regression analysis.

Table 1. ADF unit root test

variable	ADF statistics	1% level	5% level	10% level	P	stationarity
$\Delta lnhp$	-8.137112	-3.596616	-2.933158	-2.604867	0.0000	stationary
$lnsb$	-3.304648	-3.615588	-2.941145	-2.609066	0.0216	stationary
$\Delta ibor$	-11.33693	-2.621185	-1.948886	-1.611932	0.0000	stationary
Δlir	-3.298356	-2.627238	-1.949856	-1.611469	0.0016	stationary
Δinv	-4.821598	-2.621185	-1.948886	-1.611932	0.0000	stationary

4.2 Cointegration test

After verifying the unit root test, it is necessary to determine whether there is a co-integration relationship between the variables. The results of the co-integration test are shown in Table 2.

Table 2. Cointegration test results

Significance level	1%		5%		10%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
Critical value	3.29	4.37	2.56	3.49	2.2	3.09
F	5.149					
conclusion	There is a cointegration relationship					

The F statistic in Table 2 is 5.149, which is greater than the upper limit of the critical value at the 1% significance level of 4.37. Therefore, there is a long-term relationship between variables, and the long-term and short-term coefficients of the model can be further estimated.

4.3 Model estimation

Based on the long-term co-integration relationship between variables, the long-term coefficients of the model are estimated. Because the data selected in the article is a 10-year quarterly small sample time series, the Akaike Information Criterion (AIC) is used to estimate the selected ARDL model. Model 1 in Table 3 is the estimated result of the long-term coefficient of formula (1) under the AIC criterion, and model 2 is the estimated result of formula (2). The results of the two models are compared in order to analyze the impact of the interest rate market reform on the whole The regulatory role of the housing price system.

Table 3. ARDL model long-term estimation results (AIC) criteria

variable	Model 1			Model 2		
	coefficient	t	P	coefficient	t	P
lnsb	0.235	16.237	0.000	0.198	17.025	0.000
lir	-0.403	-4.292	0.028	—	—	—
ibor	-2.043	-1.492	0.147	-0.513	-0.463	0.6459
inv	-0.101	-2.313	0.000	-0.057	-2.871	0.006
Constant	6.521	51.533	0.000	6.503	42.978	0.000

The results of Model 2 in Table 3 show that when the process of interest rate marketization is not considered, the coefficient of shadow banking scale is 0.198, that is, there is a positive correlation between shadow banking scale and real estate prices, and if the scale of shadow banking expands by 1%, real estate prices will be Increased by 0.198%. This is because shadow banking, as an important financing channel for the real estate industry, provides a large amount of financial support for real estate developers, and also makes the "high interest rate" of shadow banking reflected in the rising housing prices. Comparing with Model 1, it can be found that when the effect of interest rate marketization reform is taken into account in the entire system, the coefficient of shadow banking scale increases from 0.198 to 0.235, that is, the reform of interest rate marketization will increase the influence of shadow banking on the real estate market. The reason is that with the advancement of the reform of interest rate marketization, the continuous innovation of financial tools and the development of the shadow banking system will further increase the influence of shadow banking on the real estate market. In Model 1, the coefficient of interest rate marketization reform is -0.403, and the result is significant, verifying that there is a long-term impact between interest rate marketization reform and real estate prices, and as the degree of interest rate marketization continues to improve, real estate can be stabilized The sharp upward trend of prices.

However, in either Model 1 or Model 2, the increase in real estate investment leads to a decline in housing prices, and there is a negative correlation between them. In the long run, when real estate

investment grows too fast, the supply of real estate is saturated, or even oversaturated. At this time, the demand for real estate fails to meet the current supply situation, and there will be a downward trend in housing prices. At the same time, in the two models, the interest rate coefficients of house prices are both negative, but the results are not significant, indicating that interest rates do not have much influence on house prices in the long run. This is because the main role of interest rates is to maintain the stable development of the macro economy and promote the stability of the financial market, and the government will not make excessive use of monetary policy to regulate and control due to short-term fluctuations in housing prices. At the same time, the real estate industry also has its own inherent stability. Therefore, although interest rate fluctuations will affect the supply and demand levels of the real estate industry, they cannot have a significant impact on housing prices.

After obtaining the long-term coefficients of the cointegration equation, the estimated value of the error term can be obtained. The short-term estimation results of the ARDL model are shown in Table 4.

Table 4. ARDL-ECM short-term estimation results

variable	coefficient	t	P
Δibor	0.784919	1.549873	0.1328
Δibor$_{t-1}$	2.795271	3.385770	0.0022
Δibor$_{t-2}$	2.689019	3.342497	0.0024
Δibor$_{t-3}$	1.608466	2.726919	0.0111
Δinv	-0.023755	-1.627157	0.1153
Δlir	-0.885688	-1.034921	0.3099
Δlir$_{t-1}$	3.215132	3.316475	0.0026
Constant	5.240711	5.148676	0.0000
ECM$_{t-1}$	-0.803545	-5.124490	0.0000

It can be seen from Table 4 that the effect of interest rates on real estate prices is a short-term positive promotion, but the current effect of interest rates on real estate prices is not significant, and the effect of the subsequent lag 1 period is maximized, and then the impact gradually weakens, and the overall existence Approximately 4 periods of time lag effect. This is because the transmission of interest rates has a time lag, and people often take a "wait and see" attitude towards the impact of interest rate fluctuations. In the short term, buyers will not be subject to rising interest rates and excessively reduce their desire to buy a house, that is, increased demand will lead to an increase in house prices. For real estate developers, because external financing is the main way to obtain funds, the increase in interest rates will increase the cost of funds obtained by real estate developers and lead to an increase in housing prices. The reform of interest rate marketization will promote the rise of house prices in the short term, but there is a period of lag effect. The reason may be that the reform of interest rate marketization is a gradual process, which will increase the level of borrowing interest rates in the short term. When there is a large funding gap in the real estate market, shadow banking has become an important financing channel for real estate, thereby increasing the financing cost of real estate manufacturers and prompting Real estate prices are rising. In the short term, ECM$_{t-1}$ is significantly negative, which is in line with the reverse correction mechanism. This indicates that the model has strong convergence, reflecting that when housing prices are impacted and deviate from the long-term equilibrium trend, they will be corrected by 0.8035 in the next period.

4.4 Stability inspection

When using the ARDL-ECM model to estimate time series parameters, it is necessary to check the stability of the parameters to prevent parameter instability. The article uses Eviews10 software to test the stability of the selected ARDL-ECM model by adopting the cumulative sum of recursive residual

squares (CUSUMsq) and the cumulative sum of recursive residuals (CUSUM). Figures 1 and 2 show the test results.
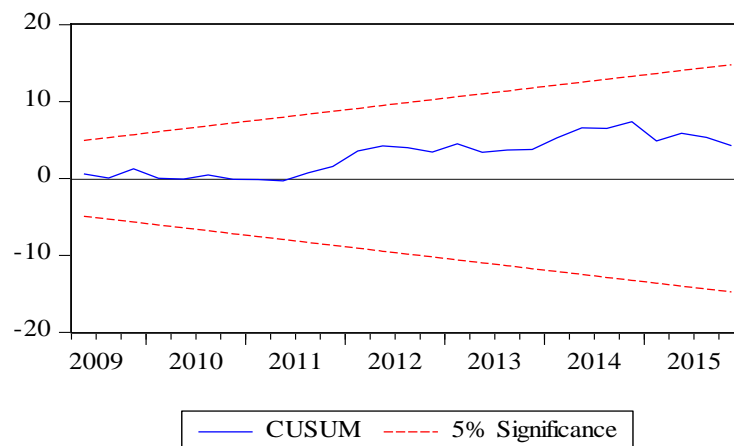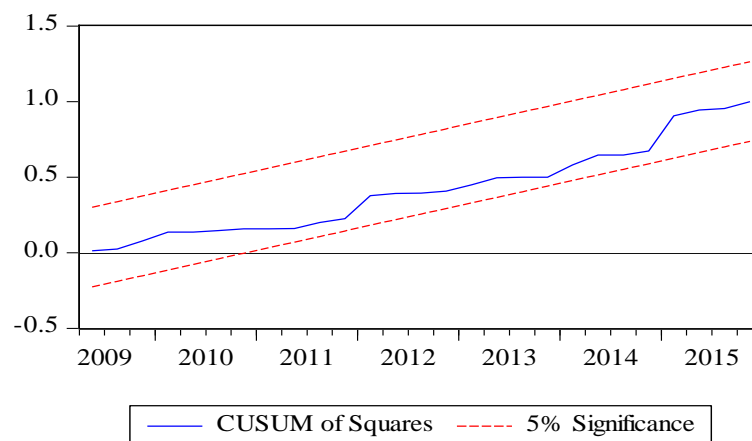

Figure 1. Recursive residual cumulative CUSUM

Figure 2. Recursive residual square cumulative CUSUMsq

It can be seen from the results in Figure 1 and Figure 2 that at the 5% significance level, the statistic values are all within the given boundary range, which shows that the results are trustworthy.

5. Discussion and Conclusion

On the basis of relevant research, this article uses autoregressive distribution lag-error correction model to empirically analyze the impact of shadow banking scale on real estate price fluctuations under the background of interest rate market reform. The following research conclusions are obtained: in the short term, shadow banking has no major impact on real estate prices, but in the long term, the expansion of shadow banking will lead to an increase in real estate prices, and the reform of interest rate marketization will make shadow banking affect the real estate market Enhanced. Combining with the empirical research on the effect of shadow banking scale on housing price fluctuations in the context of interest rate market reform, the following policy implications are drawn:

First, it is necessary to expand the source of funds for the real estate industry, change the financing structure of the real estate industry, and minimize the real estate industry's dependence on the shadow bank lending system. Although shadow banking injects a large amount of capital into the real economy, it will help alleviate the shortage of funds in the real estate market, promote the development of the real estate industry to a certain extent, and have the effect of promoting economic growth. However, the expansion of the scale of shadow banking will lead to an upward trend in real estate prices, and the risks caused by the excessively long shadow banking chain will gather in the real estate industry, increasing the risk coefficient of the real estate industry.

Second, reasonably guide the implementation of relevant policies in the process of interest rate marketization. The gradual improvement of interest rate marketization has increased the operating risks of the real estate market in the short term, leading to an upward trend in housing prices. Therefore, while advancing the reform of interest rate marketization, it is necessary to speed up the construction of interest rate formation and control mechanisms that meet market demand, improve the effectiveness of financial institutions in serving the real economy, and actively guide the flow of funds to the real economy to alleviate the difficulty and expensive financing of the real economy. problem. At the same time, the tightening monetary policy will promote the rise of real estate prices to a certain extent, which is not conducive to the stability of real estate prices. Therefore, while implementing monetary policy to guide housing prices, the monetary authority must also actively introduce other control measures to complement each other. For example, speed up the construction of affordable housing, implement "property tax", and reform the land auction system.

Third, strengthen the risk management of shadow banking. As a new type of financial innovation tool, shadow banking is not only an important supplement to the traditional banking system, but also a certain amount of financial support for the real economy. However, because shadow banking risks are concealed, complex, and contagious, they can easily cause systemic financial risks and lead to economic bubbles. Therefore, in order to ensure the efficient and stable operation of the financial system, the supervision of shadow banking and the standardized operation of the process should be strengthened to give full play to the positive effect of the shadow banking system on the real economy, reduce the negative risks caused by excessive scale expansion, and ensure the liquidity of financial markets to better implement the policy of "getting out of the virtual to the real".

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