

## **THE INFLUENCE OF SHADOW BANKING ON REAL ESTATE PRICES IN CHINA**

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### **ABSTRACT**

By building TVP-VAR model, adopting from January 2008 to April 2019 monthly data, this paper analyzes the shadow Banks' influence on real estate prices, and reaches a conclusion as follows: (1) The effect of shadow banking on housing prices is slightly different in different periods, but it has overall positive effect. (2) When the lag period of samples increases, this positive effect tends to weaken, which is also consistent with the current situation that the state gradually attaches importance to strengthening the supervision of shadow banking to maintain financial stability. (3) The expansion of shadow banking is not conducive to financial stability, so it is imperative to strengthen financial regulation.

**Keywords:** Shadow banking; Real estate price; Financial stability

### **1. INTRODUCTION**

Shadow banking emerges from the reform of financial development, and it develops rapidly in the gap of regulatory arbitrage, attracting wide attention from academia. In China, shadow banking mainly includes entrusted loans, private loans, guarantee companies and other institutions, with high liquidity, high leverage and other characteristics. According to moody's data, China's shadow banking business has reached about 60.4 trillion yuan at the end of 2018, accounting for about 67 percent of GDP. China is mainly a bank-based indirect financing system. The increase of shadow banking scale leads to the leakage of social financing scale from bank credit channels and the rise of off-balance sheet business of Banks, which is not conducive to financial stability under the circumstance of lagging regulation.

The real estate market is a major part of China's capital market and the real estate price fluctuates most frequently. Shadow banking funds with strong liquidity frequently move in and out of the real estate market, which is likely to affect the housing price. Abnormal price fluctuations will have a profound impact on the development of the macro economy. Therefore, it is of great

significance to analyze the influence of shadow banking changes on real estate prices to promote financial stability and regulate housing prices rationally.

## **2. LITERATURE REVIEW**

Domestic and foreign scholars have been disputing about the definition of shadow banking, but the definition of shadow banking by the financial stability board (FSB, 2011) is generally accepted by the academic community. It is actually a credit intermediary free from the regulatory system and has the characteristics of regulatory arbitrage, which may generate systemic financial risks. Banks tend to invest in innovative products of shadow banking to meet the demand for high profitability, high leverage and low capital pressure. However, the asset securitization business itself is potentially high risk, which may cause the risk overflow of shadow banking and tighten market liquidity, threatening the stability of the financial system (Meeks et al., 2013)<sup>[1]</sup>. In China, shadow banking replaces the credit function of traditional Banks in a sense, promotes social capital flow, improves resource utilization, promotes financial innovation and serves the real economy (Shusong Ba, 2013)<sup>[2]</sup>. Weiguo Xiao and xiaomei Lan (2019) affirm the credit creation ability of shadow banking business, and point out that bond investment and inter-bank business have crowding-out effect on the total bank credit of financial institutions<sup>[3]</sup>. In the stage of tighter credit policies, enterprises are unable to finance funds through formal channels, and the regulatory arbitrage of commercial banks dominates the development of shadow banking in China (Lin Lin et al. 2016)<sup>[4]</sup>. Shadow banking helps to solve the inefficiency of domestic credit supply, which is the result of financing demand of enterprises. However, it weakens the expected effect of monetary policy and aggravates the instability of macro economy (Lu Shengrong et al., 2019)<sup>[5]</sup>.

There is a certain symbiosis between the financial market and the real estate market. The shadow banking, as a financial innovation, is bound to have a natural economic relationship with the fluctuation of housing prices (Kangping Wu ,Guihua Lu , 2004)<sup>[6]</sup>. From the perspective of the financing structure of real estate in China, Xu Wang et al. (2017) demonstrates the relationship between non-bank loans, other funds and shadow banks, and finds that the three of them are in a co-integration relationship. The real estate market and shadow banks may have contagion, superposition and overflow of risks, which aggravates the vulnerability of the system<sup>[7]</sup>. Shichao Jiang (2019) referring to the information asymmetry of the defective market, explains the interactive relationship between shadow banking and housing price changes, and finds the existence of the interactive relationship between the two. After the financial crisis in 2008, shadow banking scale has a temporary negative impact on housing prices, while the impact of housing prices on shadow banking declines significantly<sup>[8]</sup>. Lin Lei (2018) also comes to the conclusion that shadow banking and housing prices will promote each other. By constructing the financial stability index, he finds that the expansion of shadow banking and housing price will

lead to the transmission, accumulation and spread of risks in the financial system, which have a negative impact on financial stability. The relevant regulatory system should be improved [9].

Predecessors mainly analyze the influence of shadow banking scale on real estate price from the macro level. This paper introduces the variable of bank credit for further analysis in order to analyze the effect of bank credit on shadow banking on housing price from the perspective of credit. This paper puts forward appropriate Suggestions for the sound and orderly development of shadow banking to promote financial stability and strengthen financial supervision.

### 3. MODEL SETUP AND DATA DESCRIPTION

After the crisis, shadow banking in China emerges and grows in scale, with increasingly complete and accurate statistical data. This paper uses sample data from January 2008 to April 2019 to construct a TVP-VAR model with four variables including shadow banking (S), real estate price (P), bank credit (L) and financial stability index (F).

#### (一) Model specification

In this paper, the time-varying parameter vector autoregression model (TVP-VAR) is mainly adopted, which optimizes the fitting effect of the traditional VAR model, facilitates the observation of the relationship between variables changing with time, and overcomes the prior error.

First, establish a VAR model with four variables:  $y_t = A_1 y_{t-1} + \dots + A_a y_{t-a} + u_t$ ,  $t = a+1, \dots, n$ .  $y_t$  is composed of the observation vector  $4 \times 1$ .  $B, A_1 \dots A_a$  are composed of  $4 \times 4$  matrix.  $u_t$  is a  $4 \times 1$  dimensional disturbance term representing structural impact.  $u_t \sim N(0, \Sigma)$ . Assume that  $B$  is the lower triangular matrix and subject to recursive recognition, where:

$$\Sigma = \begin{bmatrix} \sigma_1 & 0 & 0 & 0 \\ 0 & \sigma_2 & 0 & 0 \\ 0 & 0 & \sigma_3 & 0 \\ 0 & 0 & 0 & \sigma_4 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 \\ a_{41} & a_{42} & a_{43} & 1 \end{bmatrix}$$

Further transform the model into  $y_t = C_1 y_{t-1} + \dots + C_a y_{t-a} + B^{-1} \Sigma \varepsilon_t$ .  $\varepsilon_t \sim N(0, I_4)$ ,  $C_i = B^{-1} A_i$ ,  $i = 1, \dots, a$ .

The stack of all elements in  $C_i$  can form a new matrix  $\gamma$  of  $16s \times 1$  dimension.  $X_t = I_a \otimes (y_{t-1}^1, \dots, y_{t-a}^1)$ .  $\otimes$  is the kronecker product. At this point, the formula can be written as:  $y_t = X_t \gamma + B^{-1} \Sigma \varepsilon_t$ . Basic TVP-VAR model with time-varying parameters is  $y_t = X_t \gamma_t + B^{-1} \Sigma_t \varepsilon_t$ .  $t, B_t, \Sigma_t$  contain time-varying characteristics.  $h = (h_{1t}, h_{2t}, h_{3t}, h_{4t}, h_{st} = \log \sigma_{st}^2, s = 1, 2, 3, 4, t = a+1, \dots, n, \gamma_{t+1} = \gamma_t + u_{\gamma t}$

$$, \alpha_{t+1} = \alpha_t + u_{\alpha t}, h_{t+1} = h_t + u_{ht}.$$

$$\begin{bmatrix} \varepsilon_t \\ u_{\gamma t} \\ u_{\alpha t} \\ u_{ht} \end{bmatrix} \sim \begin{bmatrix} 0 \\ \begin{pmatrix} I & 0 & 0 & 0 \\ 0 & \Sigma_\gamma & 0 & 0 \\ 0 & 0 & \Sigma_\alpha & 0 \\ 0 & 0 & 0 & \Sigma_h \end{pmatrix} \end{bmatrix}$$

$\Sigma_\gamma, \Sigma_\alpha, \Sigma_h$  are diagonal matrices. This model is used to describe the structural impact between variables. In addition, this paper uses monte carlo method (MCMC) to estimate TVP-VAR model. The parameters meet the normal distribution:

$$\gamma_{a+1} \sim N(u_{\gamma 0}, \Sigma_{\gamma 0}), \alpha_{a+1} \sim N(u_{\alpha 0}, \Sigma_{\alpha 0}), h_{a+1} \sim N(u_{h 0}, \Sigma_{h 0})$$

**(二) data description**

Shadow banking scale is measured by the sum of monthly data of trust loans, entrusted loans and undiscounted bank acceptance bills in the stock of social financing scale, which is the most commonly used proxy variable by scholars at present. The housing price is represented by the ratio of sales volume of commercial housing to sales area of commercial housing. The missing January data are replaced by the linear trend method of points. Indicators of bank credit are represented by monthly data on the balance of loans made by financial institutions in RMB. Financial stability needs to be quantified by appropriate indicators. Combination of academic classification, the reference of the central bank to maintain financial stability framework, FSAP assessment framework, Ming Yin (2017)<sup>[10]</sup> and Xianming Fang(2017)<sup>[11]</sup> literature, considering the characteristics of the financial system in China and data availability indicators, this paper focuses on the selection of index of the banking system, and selects the nine basic index(as table1). The entropy value method is used to build the financial stability index. In this paper, the quarterly data are converted into monthly data, and the January data missing from the national housing sentiment index is replaced by the linear trend method of points. This paper observes whether the variables have seasonality according to the trend chart, and adopts Census-X12 to adjust the variables.

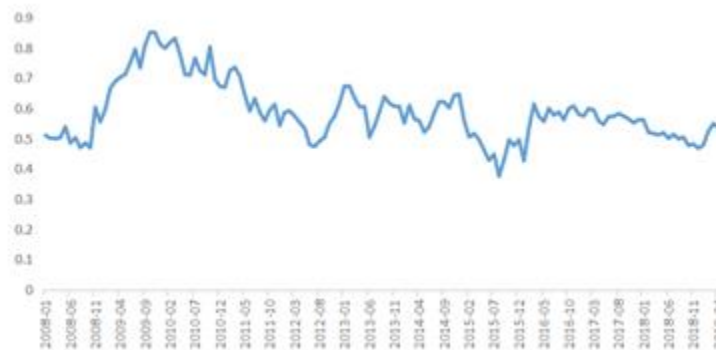
**Table 1: Table of financial stability indicators**

macroeconomic	National housing prosperity index	positive
	Inflation rate	negative
	Foreign debt balance/foreign exchange reserves	negative

financial markets	Shanghai composite index yield	positive
	PE	negative
	Investor confidence index: domestic economic fundamentals	positive
Bank of steady	Inter-bank lending rate	negative
	Non-performing loan ratio	negative
	Deposit and loan interest rates	negative

(note: positive and negative represent the correlation between indicators and financial stability. If positive, the larger the indicators are, the smaller the risk is and the more stable the finance will be. The opposite is financial instability.)

The changes of the financial stability index are shown in Fig. 1. During the sample period, the financial stability index shows a relatively large fluctuation, but the overall level fluctuates around 0.5. The mean value of the index is 0.59. The maximum stable level is up to 0.85, and the minimum value is 0.37, showing a high stable state overall. In 2008, due to the impact of the financial crisis, China's financial market was relatively fragile, with the stability index averaging about 0.45. Based on the support of national policies and strong economic capacity, during the crisis, China's stability index did not fall too much, and the overall stability of the market had a certain risk resistance. After getting through the crisis smoothly, China increased macroeconomic control, and the stability index rose significantly, and the index reached the peak of 0.85 in the sample period in October 2009, maintaining a stable domestic economic growth. In 2010, due to the debt crisis in Europe, the Chinese market was depressed due to the linkage between financial markets. Therefore, the financial stability index gradually declined after reaching the peak, and then the government's policies to stimulate the economy promoted the economic recovery and the volatility of the stability index rose. In 2015, China put forward the supply-side reform, deepened the financial reform, and achieved steady development. Although the financial stability index fluctuates, it generally shows a good trend.



**Fig. 1: The changes of the financial stability index**

**4. EMPIRICAL TEST**

In order to prevent the existence of a unit root, the existence of a unit root is first tested to determine the stability of the sequence. The original sequence of each variable is unstable, but after the first order decomposition, the sequence of each variable passes the significance level test and presents a stationary sequence (as table2).

**Table 2: Results of stationary test**

	1% critical value	5% critical value	10% critical value	T statistic	P values	stationarity
lnS	-2.582599	-1.943266	-1.615111	1.511119	0.9675	Not smooth
$\Delta$ lnS	-3.480425	-2.883408	-2.57851	-3.623972	0.0065	smooth
lnP	-2.583898	-1.943449	-1.614997	2.770504	0.9986	Not smooth
$\Delta$ lnP	-3.484198	-2.885051	-2.579386	-3.450784	0.011	smooth
lnF	-2.582204	-1.94321	-1.615145	-0.821336	0.3584	Not smooth
$\Delta$ lnF	-3.479656	-2.883073	-2.578331	-12.92958	0.00	smooth
lnL	-2.583444	-1.943385	-1.615037	3.163573	0.9996	Not smooth
$\Delta$ lnL	-3.482879	-2.884477	-2.57908	-3.765327	0.0042	smooth

In the case of the optimal lag order  $p=2$ , MCMC algorithm is preferred for 2000 times by Matlab, and then sampled for 20000 times by simulation. As shown in table 3, at the significance level of 5%, the maximum convergence diagnostic value is 0.975, far less than the critical value of 1.96. Therefore, the null hypothesis that the relevant statistics of the simulation converge to the standard normal distribution cannot be rejected, which also indicates that the sampling is stable and the simulation is valid. The maximum value of the invalid factor in this paper is 46.11. A total of 20,000 samples are sampled, and there are about 434 (20,000/46.11) irrelevant samples, which meets the requirements of posterior inference. The smaller the number of invalid factors is, the more effective the simulated sampling is and the more robust the results are.

**Table 3: Parameters results**

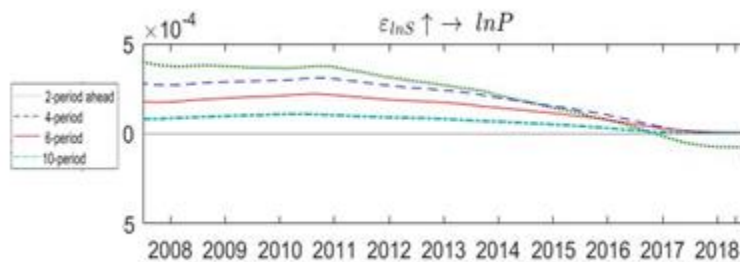
parameter	mean	standard deviation	95% confidence interval	Geweke	Invalid factor
sb1	0.0023	0.0003	[0.0018, 0.0029]	0.935	6.60
sb2	0.0023	0.0003	[0.0018, 0.0028]	0.266	7.59
sa1	0.0053	0.0015	[0.0033, 0.0088]	0.946	35.9
sa2	0.0055	0.0016	[0.0004, 0.0094]	0.566	46.11
sh1	0.2095	0.0567	[0.1168, 0.3372]	0.782	45.71
sh2	1.5925	0.2109	[1.2090, 2.0337]	0.975	11.08

As shown in Fig. 2, under a standard positive disturbance, shadow banking has a slightly different effect on housing prices, but generally produces a positive effect. When the lag period of the samples increases, the positive effect tends to weaken and gradually approaches zero, which is consistent with the current situation that the state attaches importance to strengthening the supervision of shadow banking to maintain financial stability.

Further observation of the trend chart with a lag of two months shows that there is a negative effect curve starting from 2017, which produces a weak negative impact. The reason may be that excessive reliance on shadow funds and increased investment in the real estate industry will increase the financial risk of enterprises, and if there is a vicious development, it is highly likely

to produce an industry bubble. In order to prevent financial risks and maintain financial stability, China starts to strictly control shadow banking business from 2017. The implementation of the macro-prudential assessment system (MPA) assessment and the introduction of the "334" document make regulatory arbitrage impossible. The gray transactions of shadow Banks have been cracked down and need to be gradually transparent and regularized. The profitability of financial enterprises has been impacted, which has further affected the real estate market, and the housing price is the most sensitive, with abnormal fluctuations.

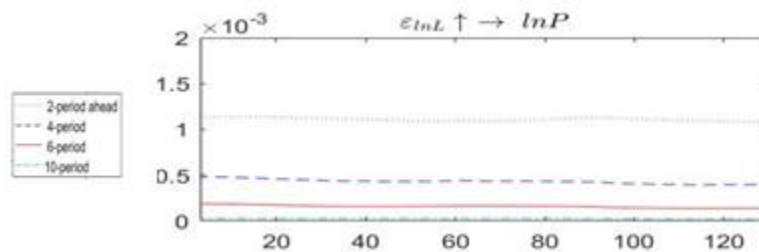
Before 2011, the influence of shadow banking on real estate prices was relatively stable. After that, the curve with a lag of 2, 4 and 6 months shows a significant downward trend. The boom is driven by the government's efforts to revive the economy quickly and stimulate domestic consumer demand after the financial crisis, and by the proliferation of shadow banks because of their regulatory arbitrage nature. However, the excessive growth of housing prices is not conducive to the stability of the industry, which may produce bubbles and a vicious circle. So after 2010, the government introduces restrictions on home purchases in order to prevent the adverse consequences of the housing boom announcement, and the curve begins to decline significantly from 2011.



**Fig. 2: Impulse response of shadow banking to real estate prices**

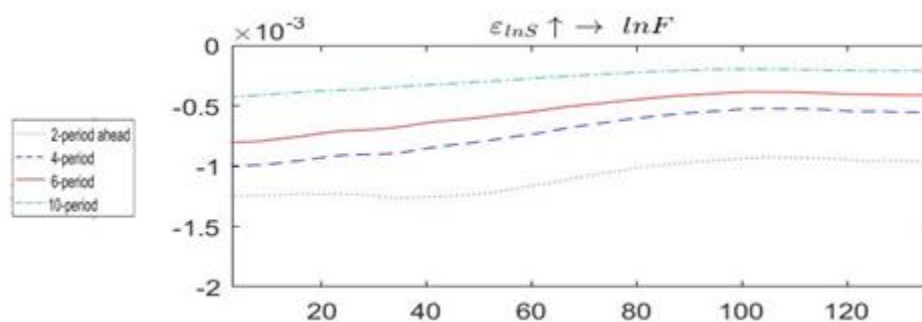
As can be seen from Fig. 3, under the impact of one unit, bank credit has no significant time variability in the fluctuation of real estate prices during the whole sample period, and the curve shows a flat trend with positive impact. Further comparing figure 1 and figure 2, the lag phase 2, 4, 6, 10, shadow banking and bank credit can be a positive impact on real estate prices, but the role of bank credit is less than the shadow banking on the impact of the real estate prices, particularly in a short period of the sample. With the change of time, the impact of shadow banking gradually slows down to zero, and bank credit remains stable. However, in general, shadow banking changes more strongly and has a higher time-varying effect, which further indicates that the growth of shadow banking has a driving effect on the real estate price, and the scale of shadow banking should be controlled to facilitate effective supervision.





**Fig. 3: Impulse response of bank credit to real estate prices**

As shown in Fig. 4, on the whole, the expansion of shadow banking scale will bring significant negative effects on financial stability, among which the impulse response value of the negative effect represented by the curve with a lag of 2 months is the largest, while the impulse response value of the curve with a lag of 10 months is the smallest, and the short-term negative impact is relatively large. However, with the change of the whole sample time, the negative effect of shadow banking on financial stability is alleviated and fluctuates in a small range. This is due to the fact that although shadow banking is a high-risk financial product, to some extent, it has solved the financing problem of enterprises, broadened the financing channels of enterprises, and made up for the unbalanced capital allocation in China, where banks are the main financing system. However, shadow banking is a double-edged sword. While it can bring certain benefits, the potential high leverage, high financing cost and high default risk of shadow banking will also spread to other fields. Once the capital chain is broken, it will lead to financial systemic risk, which is not conducive to the stable development of finance.



**Fig. 4: Impulse response of shadow banking to financial stability**

To sum up, this paper selects the sample data from January 2008 to April 2019, introduces shadow banking, bank credit, real estate price and financial stability index, constructs a four-variable TVP-VAR model, and investigates the time-variability of the two. The empirical results

show that : (1) shadow banking has a slightly different effect on housing prices in different periods, but it generally has a positive effect. The reason for the weak negative effect in a certain period may be that the intensified supervision of shadow banking in China has affected the housing price. Shadow banking may have both positive and negative effects on real estate prices, so it is necessary to judge and examine the real estate prices based on specific timing and dynamic policy factors. (2) the effect of bank credit on housing prices is far less than the impact of shadow banking on real estate prices. The change of shadow banking is more intense and the time-varying effect is higher. The growth of shadow banking has a positive effect on real estate price. (3) the expansion of shadow banking is not conducive to financial stability. Although it makes up for the imbalance of capital allocation in China to some extent, its potential high leverage, high cost and high default risk will also spread to other areas. Once the capital chain is broken, it will lead to the shock of the entire financial system, and effective supervision is imperative.

There are also shortcomings in this paper: (1) This paper selects 9 basic indicators and uses entropy value methods to weight the financial stability index, which may be insufficient in the selection of indicators, resulting in the deviation of the results. (2) there is still a grey area in shadow banking, which has not been included into the regulatory system, and there is some incompleteness in data. Therefore, this paper uses the data of core shadow banking for substitution, and has not yet determined the definite scale of a shadow banking. However, with the tightening of financial regulation and the deepening of market reform, shadow Banks will be able to collect more accurate information in the future.

## **5. POLICIES AND SUGGESTIONS**

Shadow banking is a kind of financial innovation product. Diversified product forms evade financial regulation and contain high risks. Therefore, relevant departments should establish a wider statistical scope for shadow banking. In the future, off-balance sheet assets, assets management products, financial companies and micro-credit companies can be considered to be subject to supervision. Relevant departments should improve relevant laws and regulations, minimize vacuum zones, regulate business operations, monitor the flow of shadow banking funds, strengthen law enforcement, and propose disciplinary measures.

The inflows of shadow capital will make the property market complicate, but prices are determined by supply and demand, and property prices are no exception. First of all, we should grasp the real estate market accurately, adjust the credit scale in a timely manner so as to control the housing price, and effectively use the means of policy control, instead of unilaterally pursuing profit maximization. The real estate market is closely related to various departments, which are closely related to each other. Therefore, we should strengthen the risk awareness of

real estate, improve the access standards of real estate loans, strictly control the approval and issuance of loans as well as strengthen supervision and reasonable guidance.

The important reason why real estate enterprises choose shadow banking funds is that financing is difficult. Therefore, the state should continue to deepen the reform of the financial system, recommend the diversification of financial products, create favorable conditions for enterprises to explore diversified financing channels, and conform to the trend of financial innovation.

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