A study on the Relationship between Housing Prices and Inflation from the perspective of Bank Credit

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Abstract

In this paper, an empirical study on the correlation between housing prices, bank credit and inflation is conducted through impulse response analysis and variance decomposition with 158 groups of monthly data from January 2000–July 2014 as the samples. The research findings show that: the expansion of inflation and bank credit can stimulate the rise of housing prices in the short term; the expansion of bank credit can curb inflation, and the rise of housing prices can curb inflation in the short term; inflation has positive stimulation on bank credit in the short term, and the rise of housing prices can stimulate the expansion of bank credit in the short term.

Keywords: HOUSING PRICES, BANK CREDIT, INFLATION.

1. Introduction

Since 2014, Chinese government would like to stabilize the real estate market through bank credit, while changes in bank credit will certainly have a certain impact on inflation and the people's consumption expenditure, and thus will influence their demands for housing. There is an inseparable correlation between housing prices, bank credit, and inflation. They also have a profound influence on China's economy, the financial system and the people's livelihood.

Regarding the correlation between bank credit and housing prices, there are three different views in academic circles. The first view believes that bank credit has an impact on housing prices. Liang and Cao (2007) [1] have found that there is a one-way causation between bank credit and housing prices from the correlation between housing prices and bank credit in China. Guangcan Cui (2008) [2], taking Shanghai as the example, has found that the expansion of real estate loans in Shanghai can facilitate the rise of

housing prices. According to the study conducted by Jing He et al. (2011) [3] on the change in bank credit and housing prices from 2000 to 2009, the change in bank credit is the Granger causality of the change in housing prices, and bank credit has a nonlinear impact on housing prices. The second view states that the change in housing prices has an influence on the change in real estate credit lines. Tong Jiang (2007) [4] has found that bank credit is not the Granger causality of housing prices, but that housing prices are the Granger causality of bank credit through conducting an empirical study on the correlation between bank credit and housing prices in China. The third view states that there is a two-way causation between housing prices and bank credit. Oikarinen (2009) [5] has conducted analysis on the housing prices and credit stock in Finland and found that the correlation between these two was very weak before financial liberalization, and that there was a strong two-way causation between them after the financial liberaliza-

tion process started at the end of the 1980s. Jinping Yu et al. (2014) [6] have studied the monthly data on the financial bank credit and housing prices in Shanghai from January 2008 - December 2012 and found that there is a negative feedback effect between financial bank credit and housing prices in the long term, and a positive promoting effect between them in the short term.

Regarding the correlation between inflation and housing prices, there are two different standpoints in the academic world. The first standpoint believes that there is a positive interaction between inflation and housing prices. Through studying the impacts of housing prices on young families' net assets, Louise (1995) [7] has found that when housing prices rise, young families will increase their saving and reduce consumption expenditures. Zhongdong Duan (2007) [8] has analyzed the mechanisms where housing prices affect inflation and output by using a mathematical model and the four quadrants model, and found that changes in housing prices have a weak impact on inflation in the short term, and a big impact on inflation in the long term, while there is also a positive feedback effect between them. Malihe Ashena, Ali A. Naji Meidani and Maryam Zabihi (2011) [9] have studied the correlation between housing prices, economic growth and inflation from January 1990 to March 2008 in Iran, and found that inflation is the Granger causality of housing price fluctuation, while housing prices are not the Granger causality of inflation. Min Deng and Kaiming Weng (2010) [10] have analyzed the action mechanism of housing prices and inflation from the perspective of aggregate supply and aggregate demand, believing that the rise of housing prices will increase the total social demand and stimulate inflation. Minfeng Lu and Yujie Zhang (2011) [11] have studied the correlation between the real estate market, stock market, and inflation in China with the VAR model. They found that the rise of housing prices will stimulate inflation, while the direction of the influence of inflation on housing prices is uncertain. The second standpoint states that there is a negative interaction between inflation and housing prices. Yongliang Deng (2010)[12] has studied the correlation between the appreciation of the RMB, the rise in housing prices, and inflation by using the VAR model, and found that the rise of housing prices will curb inflation and that inflation will not boost the rise of housing prices. Arestis and González(2014)[13] have proposed to endogenize the volume of bank credit by paying special attention to those variables that are related to the real estate market, which can be considered as key to the evolution of bank credit. Mallick and Mahalik(2015)[14] have made an initial attempt to explain the housing prices for 15 major cities of different regions in India. The overall result demonstrates that there is a dominance of fundamental factors over the non-fundamental factor (speculative factors) in explaining the regional housing prices. Muellbauer, John(2015)[15] have discussed the potential links between housing, credit, and the financial accelerator.Guangyou Zhou and Yao Zeng (2013) [16] have conducted a theoretical analysis on bank credit and inflation by introducing the CC-LM model, and carried out an empirical study on the correlation between them with the Granger causality test and the VAR model. The research findings show that the Granger causality exists between bank credit and inflation, and that bank credit has a fast, lasting, and obvious positive effect on inflation.

2. Methodology

As usual, the growth rate of the CPI is taken as the indicator to measure inflation. This paper takes the month-on-month growth rate of the CPI to represent the inflation rate, using the CPIGR (growth rate of the CPI); the ratio of the national real estate sales and the real estate transactions in the area are used to calculate the month-on-month growth rate of housing prices, using the HPGR (growth rate of the housing price); bank credit of saving-oriented financial institutions is used to calculate the month-on-month growth rate of bank credit, using BCGR (growth rate of bank credit). As the HPGR represents the rate of return of housing prices, i.e. housing prices rise when the HPGR rises, the rate of return of housing prices (HPGR) is used to represent housing prices in this paper. In the same way, the rate of return of bank credit (BCGR) is used to represent bank credit. The sample range is from January 2000 to July 2014 (excluding the months with blank data), and 158 groups of data are collected. All data comes from Wind Database, and EViews6 is used as the measurement software.

## 3. Results and Discussion
3.1. Variable Stationarity Test

Before a quantitative analysis of time series is conducted, a test for stationarity is needed. If the time series is not stable, the results of regression analysis on it are invalid. In this paper, an ADF test is adopted to examine the stationarity of the data samples, and the results (see Table 1) show that all initial series tend to be stable when below 1% and meet the requirements of regression analysis.

Table 1. Results of ADF Test

|		Critical Value	
Variable	ADF Statistics	1%	5%
CPIGR	-10.026	-3.472	-2.880
HPGR	-3.684	-3.475	-2.881
BCGR	-9.873	-3.472	-2.880

3.2. VAR Model Stationarity Test

Usually, the VAR model is used to forecast interacted time series systems and analyze the dynamic effects of random disturbances on variable systems. A stationarity test is conducted based on the estimated results of the VAR model of the three variables – housing prices, bank credit and inflation. As shown in Figure 1, all eigenvalues are inside the unit circle, i.e. they are all less than 1, indicating that this system is stable.
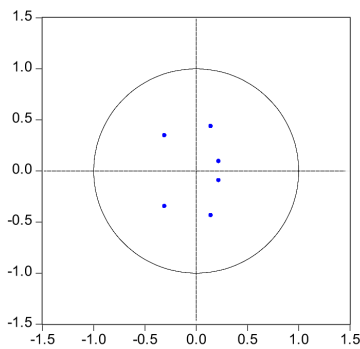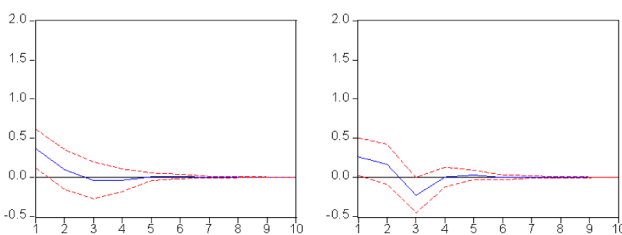

Figure 1. VAR Model Stationarity Test

3.3. Impulse Response Analysis

An impulse function is used to analyze the effects created by the mutual impact of inflation, housing prices and bank credit to each other. The analysis results are shown in Figure 2, Figure 3 and Figure 4.
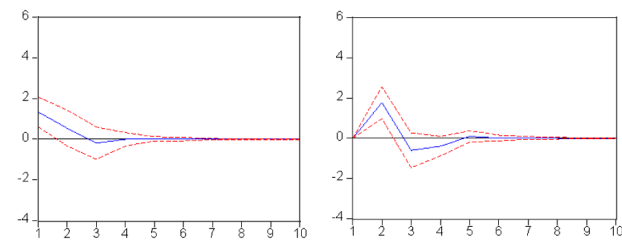
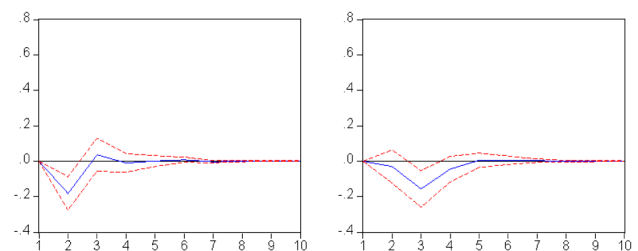**Figure 2**. Test Response of HP_{GR} to CPI_{GR} and BC_{GR}

Figure 3. Test Response of BC_{GR} to CPI_{GR} and HP_{GR}

Figure 2 is the response of housing prices to each impact. When a positive standard deviation information impact is exerted on inflation in the current period, the response of housing prices is strongest and positive in the first stage, and then gradually weakens; it reaches the strongest negative response in the third stage, and then goes towards 0 after the fourth stage. When a positive standard deviation information impact is exerted on bank credit in the current period, housing prices show no response in the first stage, and reach the strongest positive response in the second stage; it shows a negative response in the third stage, then declines gradually and goes towards 0 after the fifth stage. This indicates that both inflation and bank credit have a successive positive and negative impact on housing prices.

Figure 3 is the response of bank credit to each impact. When a positive standard deviation information impact is exerted on inflation in the current period, the response of bank credit is strongest and positive in the first stage, relatively weak but positive in the second stage, and negative in the third stage; then the response gradually weakens and goes towards 0 after the fifth stage. When a positive standard deviation information impact is exerted on housing prices, bank credit shows the strongest positive response in the first stage, a relatively weak positive response in the second stage, and a strong negative response in the third stage; then the response weakens and goes towards 0 after the sixth stage. This indicates that both inflation and housing prices have a successive positive and negative impact on bank credit.

Figure 4 is the response of inflation to each impact. When a positive standard deviation information impact is exerted on housing prices in the current period, inflation shows no response in the first stage, an obvious negative response in the second stage, and a positive response in the third stage; then the response gradually weakens and goes towards 0 after the seventh stage. When a positive standard deviation information impact is exerted on bank credit in the current period, inflation shows no response in the first stage, a relatively weak negative response in the second stage, and the strongest negative response in the

Figure 4. Test Response of CPI_{GR} to HP_{GR} and BC_{GR}

third stage; then the response gradually weakens and goes towards 0 after the seventh stage. This indicates that housing prices after being impacted by external conditions have a successive negative and positive impact on inflation, and bank credit has a negative impact on inflation.

3.4 Variance Decomposition

The variance decomposition method is adopted to study the contributions of housing prices, bank credit, and inflation to each other's changes. The results are shown in Figure 5, Figure 6 and Figure 7.
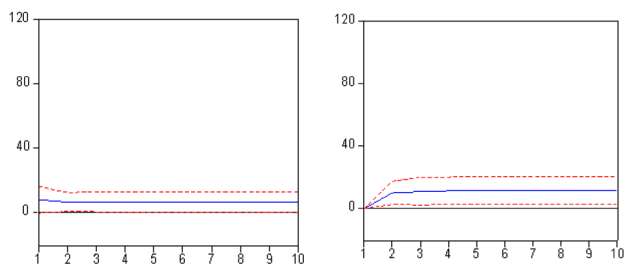

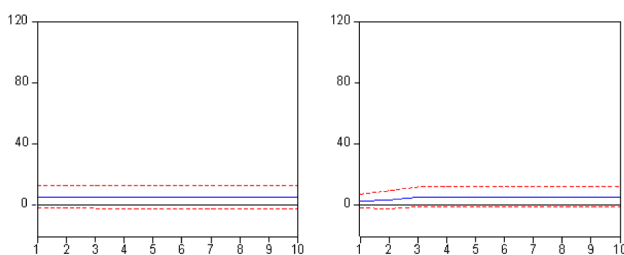**Figure 5**. Percent HP$_{GR}$ Variance due to CPI$_{GR}$ and BC$_{GR}$

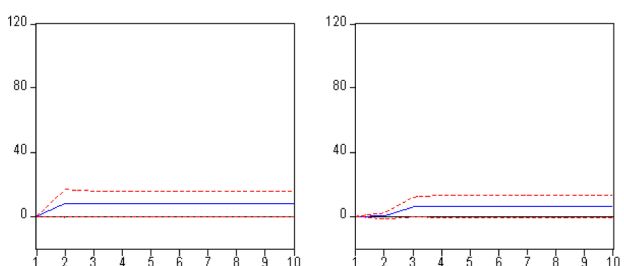**Figure 6**. Percent BC$_{GR}$ Variance due to CPI$_{GR}$ and HP$_{GR}$

Figure 7. Percent CPI$_{GR}$ Variance due to HP$_{GR}$ and BC$_{GR}$

According to the output results of EViews, the variance decomposition results of the information about every endogenous variable to each variable in the VAR model are basically stable after the eighth stage. Table 2 shows that when the whole sample range is included, the impact of bank credit information and housing price information in the fluctuation of inflation account for 6.35% and 7.85%, respectively; the impact of inflation information and housing price information in the fluctuation of bank credit account for 5.41% and 2.03%, respectively; and the impacts of inflation information and bank credit in-

formation in the fluctuation of housing prices account for 6.65% and 8.85%, respectively. It can be seen that changes in bank credit have a strong impact on inflation and housing prices, and the impact on housing prices are more obvious; changes in housing prices have a strong impact on inflation and a relatively weak impact on bank credit; and changes in inflation have a certain impact on both bank credit and housing prices, and the impact on housing prices is slightly stronger.

Table 2. Variance Decomposition of the VAR Model at the Eight Stage

Explained Variable	CPI$_{GR}$	BC$_{GR}$	HP$_{GR}$
CPI$_{GR}$	85.799	6.354	7.846
BC$_{GR}$	5.4113	92.558	2.030
HP$_{GR}$	6.646	8.847	84.507

Conclusions

The above influencing mechanism analysis shows that the expansion of inflation and bank credit can stimulate the rise of housing prices. The empirical findings show that the expansion of inflation and bank credit can facilitate the rise of housing prices in the short term, but that it changes afterwards and curbs the rise of housing prices. The main reason is that with the expansion of bank credit scale, real estate developers will increase the supply of real estate development projects and thus curb the rise of housing prices. Inflation affects the rise of housing prices through the interest rate effect, property hedging effect, and cost effect in the short term. However, when the prices rise to some extent, investors will shift their capital to other hedging products, thus curbing the rise of housing prices.

The expansion of bank credit will curb inflation, and the rise of housing prices will curb inflation in the short term and stimulate inflation in the long term. The above influencing mechanism analysis shows that bank credit affects inflation through different business structures, term structures and quality structures of bank credit; housing prices affect the total social demand and then inflation mainly through wealth effect, bank balance sheet effect, crowding-out effect, and Tobin's Q effect. The empirical result that bank credit curbs inflation may be caused by the differences in business structure of bank credit. Bank credit is put into the industries of excess production capacity, thus leading to supply that exceeds the aggregate demand so the price level falls, while the inhibiting effect of housing prices on inflation is mainly

due to the fact that the crowding-out effect plays a dominant role.

The rise of housing prices and inflation can stimulate the expansion of bank credit in the short term and will have an inhibiting effect afterwards. The above influencing mechanism analysis shows that the rise of housing prices can enhance the market value of collateral for a loan in the short term and stimulate bank credit, thus resulting in the expansion of bank credit scale; when inflation happens, regulatory authorities will launch policies to curb the risks that may be brought by the procyclicality of commercial bank credit. The empirical results of this paper are basically the same as the above influencing mechanism analysis.

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