

Empirical analysis of the effects of monetary policy on house prices ——Based on the VECM model

Wanyu Xiang

Dept of Financial Engineering, School of Economics and Management, Wuhan University of China,
430072, China

whuxwy@126.com

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Abstract. Over these years, China's real estate industry has achieved a rapid development. However, high house prices have become a hidden danger for the economy. Based on previous studies, this article selects three representative variables to build the vector error correction model (VECM) to test the impact of monetary policy on house price fluctuations Empirically. The result shows that there is a long-term stable relationship between monetary policy and house prices, and the monetary policy has a significant impact on house prices. To achieve the objectives of lowering house prices, central bank could combine administrative measures with the appropriate monetary policies.

Introduction

With the process of marketization, house prices in China have become too high for normal people to purchase. As we know, if the house prices are excessively high, not only the economic system will be affected, but also the society may be disrupted. As a result, taking measures to lower the house prices is an urgent task. In China, the main measures to regulate and control house prices is the combination of monetary policies, fiscal policies and administrative policies, among which the monetary policies is the most important. Based on the previous researches, this paper starts with the theoretical analysis of monetary policy's influence on house prices, and then selects some representative variables to build vector error correction model(VERM) to find out the effectiveness of monetary policy to regulate house prices.

The Theoretical Analysis of Monetary Policy's Influence on House Prices

The real estate industry is a typical capital intensive industry, as one of the major financial policies, monetary policy does have some influence on house prices. We can see the monetary policy's influence on the supply-demand relationship in the real estate market from three different aspects: interest rate, credit and supply of money.

Empirical Analysis Based on the VECM Model

A. Variable selection and preliminary Data Processing

As said in the theoretical analysis, this paper selects three typical variables: the inter-bank offered rate(R), broad money supply(M2) and total RMB loans(LOAN) as explanatory variables, chooses price index of real estate(HPI) as explained variable. And all variables are monthly data from January 2000 to December 2011.

To eliminate the effect of inflation, we divided HPI by CPI. Through the seasonal test, we can find that there are seasonal characteristic in HPI, M2 and LOAN under the significance level of 0.1%. To eliminate the effect, we adjusted those variables by means of Census X12. Meanwhile, to reduce heteroscedasticity, we take the logarithm of all variables, and recorded them as LR, LM2, LLOAN and LHPI. This paper uses Eviews 6.0 to do the empirical analysis.

B. Stationarity test

To test whether there is cointegration relationship in time series, we should test the non-station first. This paper applied ADF method to do unit root test. And we get lag intervals for endogenous

according to AIC. The following table shows the results of the unit root test.

Table 1 Results Of Series Unit Root Test

VARIABLE	Test For Unit Root In Lever			Test For Unit Root In First Difference		
	ADF	5% critical value	P	ADF	5% critical value	P
LR	-2.9969	-2.8817	0.0376	\	\	\
LM2	-1.8485	-3.4416	0.6758	-11.7934	-2.8818	0.0000
LLOAN	-1.7049	-3.4425	0.7441	-4.6830	-2.8823	0.0002
LHPI	-2.4463	-2.8818	0.1311	-8.5190	-2.8818	0.0000

It can be seen from the table above that under the significant level of 5%, each variable is non-stationary except LR. However, those non-stationary variables would be stationary after we take the log, which means that they are all first order integration, so we can build VECM for all the variables.

C. Cointegration test

There are two methods to do the co-integration test: E-G test and Johansen test, and this paper applied Johansen test to do co-integration test. The results of the co-integration test are shown as below.

Table 2 Results Of Cointegration Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.176194	48.45889	47.85613	0.0438
At most 1	0.077663	20.93647	29.79707	0.3616

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

From the table, we can know that there is a cointegration relationship between the four variables. And from the unit root test of the cointegration sequence we can know the sequence of the cointegration equation is stationary, that means there are co-integration relationship between the four variables. And the equation is as follows:

$$LHPI_SA=0.015939 LLOAN-0.013771 LM2-0.184200LR+\varepsilon_t \quad (1)$$

D. Granger Causality Test

To analysis the relationship between monetary policy and house prices, we should find out whether there is causal relationship between them. We can conclude from the granger causality test that:

(1)LR, LM2,LLOAN is the Granger cause of LHPI, which means that house prices would be influenced by interest rate, supply of money and credit.

(2)LM2 is the Grange cause of LHPI, which suggests that there may be connected effect between supply of money and total credit.

(3)LR is the Grange cause of the other three variables, which means that interest rate is the most powerful factor that have influence on house prices.

E. Impulse response and Variance decomposition

To examine that monetary policy's influence on house prices more intuitively, we applied impulse response and variance decomposition to do a further analysis. Fig. 1 shows the impulse

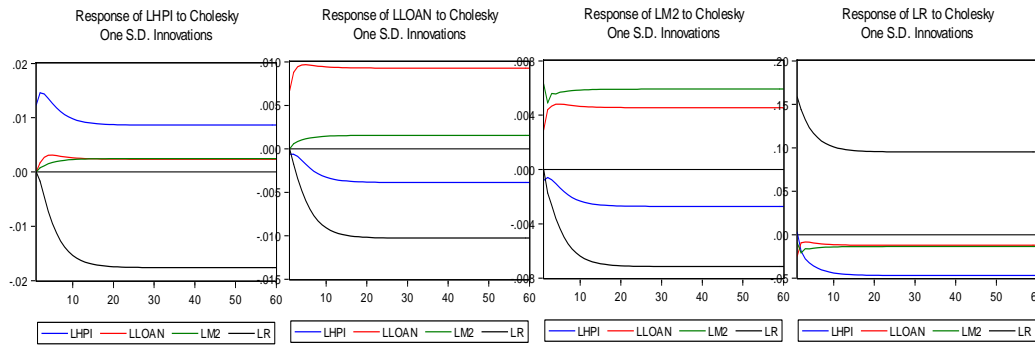


Fig. 1 Impulse response

From the figure, we can conclude that:

(1) House prices would fluctuate positively from scratch when we give a positive impact to LM2 or LLOAN. And the influence would last for a long time.

(2) House prices would fluctuate negatively from scratch when we give a positive impact to LR, and the fluctuation is more drastic. We can know that the increase of interest rate would decrease house prices.

Conclusions and policy proposals

A. Conclusions

This paper constructs the VECM model with the indexes of three important monetary policy tools and housing price, via conducting Granger Causality test and impulse response with the model, this paper studies monetary policy's impact to housing prices, and the conclusions are as follows:

(1) There exists a long-term and stable relationship between monetary policies and housing prices. There is a cointegration relationship existing among the broad money supply, the total amount of loans issued by financial institutions, the weighted average interest rate of LIBOR and the real estate price index. The relationship is the prerequisite for the effective transmission of monetary policies through real estate market

(2) The amount of money supply and the scale of credit will affect housing prices. The results of Granger Causality test show that both M2 and LOAN are the Granger causes of HPI, and they are the Granger cause of each other as well. This reveals that the amount of money supply and the scale of credit will affect housing prices, and the functions of M2 are similar to those of LOAN so that to some extent, they can replace each other. From the results of impulse response, it can be concluded that even though the increase of money supply and the enhancement of credit scale will lead to a higher housing price, the impact is not notable, which might be a result of the offset between the transmission effect of house suppliers and demanders.

(3) Interest rate has a significant influence over real estate price. The Granger Causality test shows that interest rate is the Granger cause of housing price and other monetary policy tools, the fluctuation of interest rate not only affects the housing prices directly, but also indirectly affects housing prices through its influence to other monetary policy tools. From the results of impulse response, housing prices fall immediately in response to a positive impulse of interest rate, interest rate also has a continuous negative effect. Thus it implies that the influence of home buyers plays a steering role in the interest rate transmission mechanism. Therefore, it is an important transmission channel for monetary policy options to affect housing price via interest rate. It is quite effective to control the investment activities of property developers and the purchasing decisions of individuals by adjusting interest rate.

B. Policy Proposals

As described above, monetary policies have significant influences over housing prices, it is necessary for the central bank to pay close attention to the fluctuation of housing price so that it can make correct monetary policies to stabilize commodity prices and promote economic growth.

References

- [1] Johansen, S. Statistical Analysis of Cointegration Vectors. Journal of Economic Dynamics and Control, 1988, (12): 231-254
- [2] Baffoe-Bonnie, John. The Dynamic Impact Of Macroeconomic Aggregates On Housing Prices And Stock Of Housing: A National and Regional Analysis. Journal of Real Estate Finance and Economics, 1998,17 (2): 179-197.
- [3] Kieran Mc Quinn, Gerard O'Reilly. Assessing The Role Of Income And Interest Rates In Determining House Prices [J]. Economic Modelling ,2008:377-390.
- [4] Hanbin Lv, Peng Li, Jibin Cao. Empirical Study On The Effectiveness Of Monetary Policies' Controlling On House Prices: Based On VAR Model [J]. Chinese real estate finance, 2010 (05) :15-18.
- [5] Sheng Chen. Empirical Analysis Of The Effects Of Monetary Policy Factors On House Prices. Friends of Accounting, 2010 (3) :25-27.