

Analysis of the Effect of Money Supply on Real Estate Price

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Abstract. Paper in real estate prices and monetary policy on the basis of the scope of literature review, after detailed analysis the way of the money supply affect real estate prices. On the basis of collecting the data, uses the Eviews6.0 co-integration analysis was carried out on the money supply and real estate prices, results showed that the three levels of the money supply in real estate prices both short-term and long-term equilibrium. This for our country to control money supply method provides a theoretical basis.

Keywords: The money supply, Real estate prices, Co-integration test

Introduction

With the rising domestic large and medium-sized city housing prices in recent years, the real estate industry has increasingly become the focus of the public and scholars. The academic circles have many scholars have made research on a rise in prices. In this paper, on the basis of these scholars research, analysis and discussion on the relationship between price and money supply. At present, the factors influencing the prices of research results, the author focuses on house prices and the connection between the monetary market research results were summarized as follows: (1) student input and the land investment; (2) the location of housing (density) and quality (or comfort). He took advantage of the data to estimate the Chicago city housing density on the elastic coefficient of house prices is 5.3, the quality of the elastic coefficient of house prices is 3.8, and calculate the land input and not into the elasticity of substitution between them is 1.2, but did not give the specific impact of house prices.

Wang Weian (2005)^[1] mainly from the theory, discusses the real estate price money market equilibrium. The author believes that because of fluctuations in the price of real estate assets and liabilities effect, under the condition of same the strength of the monetary policy, monetary policy will generate an additional policy effect, have the effect of monetary policy amplifier, the real estate market and real estate gains expected to affect money market equilibrium. Duan Zhongdong (2008)^[2] introduces the price of the commodity market and money market equilibrium, and proves that the dynamic system composed of commodity market and money market focus is a balanced steady state. The author thinks that house price fluctuations in the money supply both short and long term has a positive influence, that prices increase the endogenous money supply, reducing the monetary intermediary target control. Ding chen (2008)^[3] from the money supply endogenous to consider the effect of house price fluctuation of monetary supply and demand. The author believes that prices will lead to endogenous monetary expansion in China has two ways: (1) commercial bank real estate mortgage credit demand expansion caused the expansion of the endogenous money supply;(2) is rising house prices and the appreciation of the RMB is expected to attract inflows of foreign exchange, leading to the central bank of the passive on the monetary base. The author further suggested that, should the reference index detection data of the real estate market in the

current money supply regulation.

In addition, there are some reasons for the other studies the impact of price. For example Song Bo(2009)^[4], Wang Yuelong (2009)^[5] study on the relationship between housing price and land price and other scholars. Relative domestic research focused on the relationship between house price and land price, and currency markets or interest Angle research is less. The author thinks, the supply of land as a factor of the real estate market is appropriate. But with China's national conditions, the land price is not the result of the role of the market, and the real estate market has great market freedom. Therefore, the use of data for the research in China is likely to hide their true relationship. In addition, some scholars in the study of the relationship between money market and the housing price, the demand for money and interest rates factors are taken into account, which in theory is reasonable and is complete. But in the empirical analysis, monetary demand data is not equal. At the same time, our country is also a special interest rate formation system with similar to land prices. In recent years, central banks around the world more and more interest as one of the tools of monetary policy, and the volume of money supply control difficulty is greater, the money supply will tend to market. This article in view of the above consideration, researches the relations between the money supply and prices.

Data declaration

This article selects the money supply and real estate prices. In order to better study at all levels of the money supply influence on real estate prices, money supply indicators at the same time, we choose M0, M1, M2 three indicators of money supply. The real estate price index is the average sale price of commercial housing, and the average selling price is the monthly sales divided by the month sales area. This article selects from January 2003 to December 2013 data that from the China economic information network industry database as sample.

(1) Explain the index meaning

M0: M0= currency in circulation, in addition to bank each unit the sum of cash and cash on hand of residents.

M1: M1= narrow measure of money supply, Besides includes M0, M1 includes enterprises, organs, groups, troops, schools and other units of current deposit in the bank.

M2: M2= broad money supply, M2 includes M1 and companies, agencies, organizations, troops, schools and other units in the bank deposit and kinds of savings deposits of urban and rural residents in the individual bank and the securities customer deposit.

(2) Data processing

Before using data in this article we should adjusted seasonally change elements and irregular, because this data is monthly data in the article. This makes the data correctly reflects the trend of economic development and the current economic development situation, improve the correctness and reliability of the results of the study. The article adopts the method of X-ray II to seasonal adjustment of variables, the adjusted variables respectively M0SA, M1SA, M2SA, PSA. In order to eliminate the time series of the different variance, we take logarithm of various variables, after the transformation of variables respectively with the LOG (M0SA), LOG (M1SA), LOG (M2SA), LOG (PSA).

Unit root test

We must first examine whether the sequence was analyzed with the public (d) sequence, and thus to determine their co-integration, When in specific applications co-integration time series analysis. Here we use Eviews6.0 respectively complete the ADF test of LNM0SA, LNM1SA, LNM2SA, LNPSA , and then the natural logarithm of the variables for the first-order differential Postscript:DLNM0SA.DLNM1SA, DLNM2SA, DLNPSA. Test results are as follows table 1.

Tab. 1 ADF Test for variables

Variate	ADF Test value	1% critical value	5% critical value	10% critical value	Conclusion
LOG(M0SA)	2.259948	-2.584375	-1.943516	-1.614956	Non-stationary
LOG(M1SA)	10.92099	-2.584734	-1.943285	-1.615099	Non-stationary
LOG(M2SA)	11.65090	-2.582872	-1.943304	-1.615807	Non-stationary
LOG(PSA)	2.765574	-2.583444	-1.943385	-1.615037	Non-stationary
DLOG(M0SA)	-2.493536	-3.485586	-2.885654	-2.579708	Stationary
DLOG(M1SA)	-3.368013	-3.482453	-2.884291	-2.578981	Stationary
DLOG(M2SA)	-14.97809	-3.481217	-2.883753	-2.578694	Stationary
DLOG(PSA)	-9.016476	-3.482879	-2.884477	-2.579080	Stationary

From the test results can be seen in the table LOG (M0SA), LOG (M1SA), LOG (M2SA) and LOG (PSA) in a significant level of 5% of the cases, we accept the null hypothesis, which assumes the existence of a unit root, are non-stationary series. DLOG (M0SA), DLOG (M1SA), D (M2SA) and D (PSA) at a significance level of 5% of the cases, both reject the null hypothesis, indicating that there is no unit root, namely the existence of a first-order single whole sequence, indicating that between several non-stationary sequences may have co-integrated, it can be co-integration analysis.

Co-integration test

According to the above unit root test, the time series for each variable are integrated of order one process, in line with long-term co-integration analysis precondition, so we can test for EG co-integration among the variables analyzed here were three sets of variables: money supply M0 and real estate prices, money supply M1 and real estate prices, money supply M2 and real estate prices. First establishes the regression model between sequence, using the ordinary least squares estimate, and then to stationary test of regression residual error sequence, if the residual error sequence is smooth, then there is a long-term trend between them, namely, there is a co-integration relationship, rather than a spurious regression. Least squares specific results are as follows.

$$\text{LOG(PSA)}=0.051298+0.795175\text{LOG(M0SA)} \tag{1}$$

R-squared	0.870830	Adjusted-squared	0.869836
Akaike info criterion	-1.451129	Schwarz criterion	-1.451129
Durbin-Waston state	1.877300	t-Statistic	29.60443
F-statistic	876.4221		

$$\text{LOG(PSA)}=0.856016+0.621266\text{LOG(M1SA)} \tag{2}$$

R-squared	0.878835	Adjusted-squared	0.877903
Akaike info criterion	-1.515112	Schwarz criterion	-1.471433
Durbin-Waston state	1.811459	t-Statistic	30.70701
F-statistic	924.9207		

$$\text{LOG(PSA)}=0.943403+0.564138\text{LOG(M2SA)} \tag{3}$$

R-squared	0.888155	Adjusted-squared	0.887294
Akaike info criterion	-1.595147	Schwarz criterion	-1.551468
Durbin-Waston state	1.937228	t-Statistic	32.12976
F-statistic	1032.321		

According to the value of the above you can see that the R square value is above 0.8 and is close to 0.9, all the explanatory variables by T and F test, shows that equation of goodness of fit is good, then we are going to test the regression equation of residual error sequence is smooth, respectively for the ECM1, ECM2, and ECM3, residual stationary test is as follows table 2.

Table 2 ADF test for residual

Variable	Lag	D.W	ADF statistics	Critical value 1%	Critical value 5%	Critical value 10%	Prob	Conclusion
ECM1	0	2.051447	-12.54993	-3.480818	-2.883579	-2.578601	0.000	Stationary
ECM2	0	2.032416	-11.84301	-3.480818	-2.883579	-2.578601	0.000	Stationary
ECM3	0	2.054468	-12.78072	-3.480818	-2.883579	-2.578601	0.000	Stationary

From the above knowable we know ECM1, ECM2 and ECM3 residual error sequence is smooth, namely $E_t - i(0)$. This shows that there is a long-term stable equilibrium relationship between the money supply M0 and real estate prices, money supply M1 and real estate prices, money supply M2 and real estate prices. As can be seen from the above three regression equations, money supply (M0, M1, M2) of real estate price has a positive influence that is a long-term equilibrium relationship in the money supply and real estate prices. In the long term, M0 increased by one percentage point each, real estate prices will rise 0.7951751%, M1 increased by one percentage point each, real estate prices will rise 0.621266%, M2 increased by one percentage point each, and real estate prices will rise 0.564138%. Shows that in the long term, the central bank to control real estate price by using the method of regulating the money supply is significantly, and the central bank has larger control ability, the money supply to the conduction process of real estate is smooth.

Granger causality analysis

In order to avoid "false", we carried out on the money supply and real estate prices Granger causality analysis, how to determine the interaction between them, and test results are shown in table 3 below:

Table 3 Granger causality test for variables

Null Hypothesis:	lag	Obs	F-Statistic	Prob	result
Log(m0sa) does not Granger Cause log(psa)	1	131	24.783	1.E-20	Refuse
Log(psa) does not Granger Cause log(m0sa)			12.0491	0.0007	Refuse
Log(m1sa) does not Granger Cause log(psa)	1	131	115.872	1.E-19	Refuse
Log(psa) does not Granger Cause log(m1sa)			3.70477	0.0565	Accept
Log(m2sa) does not Granger Cause log(psa)	1	131	135.652	8.E-22	Refuse
Log(psa) does not Granger Cause log(m2sa)			1.87856	0.1729	Accept

By above knowable, we can get the mutual cause of money supply M0 and the change of the real estate prices. Money supply M1, M2 is the cause of the real estate price changes, but the real estate price is not the cause of the change of the money supply.

Error correction model

Because already there is a long-term equilibrium relationship between variables, there is also a causal relationship, so we can use error correction model to investigate the short-term dynamic relationship between the variables,, according to estimates by error correction model as shown below:

$$D(\text{LOG}(\text{PSA}))=-0.142908*D(\text{LOG}(\text{M0SA}))-0.933212\text{ECM1}(-1)+0.012272 \quad (4)$$

$$D(\text{LOG}(\text{PSA}))=-0.335438*D(\text{LOG}(\text{M1SA}))-0.939809\text{ECM2}(-2)+0.014937 \quad (5)$$

$$D(\text{LOG}(\text{PSA}))=0.722519*D(\text{LOG}(\text{M2SA}))-1.042084\text{ECM3}(-3)+0.001421 \quad (6)$$

From above, the error correction model, the equation of the fitting result is bad, the established model is not, is concentrated in the 0.5 R party, in addition to the ECM (1), the ECM (2), the ECM (3) the P value is 0, the P value is greater than 0.05, other didn't pass the test, but at the same time shows that the residual error sequence is very necessary, and has an impact on the real estate price. We can through the autocorrelation test, heteroscedasticity testing method to further study the effect of money supply on real estate prices.

Conclusion

In this paper by using co-integration analysis to study the influences of money supply to our country real estate prices, the principle of the money supply affect the price of real estate and the transmission mechanism has carried on the detailed theoretical analysis, and combined with empirical study on the three levels of monetary supply impact on real estate prices, the following conclusions:

(1) All aspects through empirical test, proving that the money supply to a certain extent can control the real estate price.M0 have bigger influence on the real estate prices in the long term , M1 and M2 have smaller influence; Also shows that China's real estate has become the important force in the national economy,. It is greatly influenced by national policy. The central bank to regulate the real estate price by using the method of regulating the money supply, and the central bank has larger control ability, the process of the money supply to the real estate is smoother, so central Banks should be focused on the real estate market .

(2) There are a series of problems such as: money supply control lack of relative independence, "one size fits all" policy when government use the money supply in regulating the real estate market in China. So we need to cooperate with other policies, establish good environment of the money supply and control, improve the effect of regulation.

Rapid growth in recent years our country house prices in China much higher than the growth rate of people's living standard. Housing prices is far more than the purchasing power of the people in some cities. The housing problem has become our government and the social from all walks of life concerns. The government has taken some measures to solve the housing problem of residents, but the effect is not obvious. This phenomenon caused the people to the regulation policies and methods are discussed and the research. So the research and literature emerge about it in endlessly. This article focuses on the influence of the money supply on real estate prices in China. There are many practical problems and not in-depth analysis of the theory, regional analysis of the effects of the money supply on real estate prices only stay at lower levels, and many insufficiencies remain to be further improved, it is due to my research level is limited.

(1) this article is mainly in terms of the money supply affect real estate price has carried on the

empirical analysis. Without analysis the impact on the real estate price of China's money supply, this should become an important direction of later research. This is because the development of China's real estate market gradually improving, and the real estate industry is a capital intensive industry. With the real estate market is becoming increasingly important in our country. It has become an important way of monetary policy in China and has a great influence on the national policy. And real estate related to the vital interests of the people, the national policy adjustment should be in reference to China's real estate market situation.

(2) The enforcement index of local government should be included when we study the regional differences in the impact of money supply on real estate prices. The real estate market occupies an important position in national economy, to the national economy contribution rate is as high as 20% above, in a certain extent, represents the level of local economic development, local government due to the pursuit of achievements and interests, do not want to decline in house prices, but want prices steady growth, so the policy of national regulation real estate prices greatly reduced in the process of implementation. It is a direction of the research in the future and more scientific that the government enforcement of index should be added .

(3) in this paper only investigates the money supply influence on real estate prices, in fact, the money supply not only have an impact on real estate prices, the majority of real estate has effects such as investment. In the later analysis should review more aspects, so for a comprehensive understanding of the money supply changes impact on the real estate market, as the country through using the method of control the money supply to influence the real estate market to provide more theoretical support and reference Suggestions. Of course, the above is just we study may lead to the question of the main in this paper, there are many other related issues is also worth our further study.

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