An Empirical Study on the Interconnections between Money Supply and Housing Price

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Abstract. In recent years, the COVID-19 epidemic has caused varying degrees of impact on the M2 money supply. Though the money supply side, a rise in the money supply will cause superfluous funds to access the real estate sector through various channels, which will have an impact on the real estate sector. In this paper, the VAR model is adopted to explore the mutual dynamic influence between M2 and real estate prices through variable stability test, lag selection of VAR model, convergence, impulse response and variance decomposition, etc. The analysis shows that the money supply of M2 positively influences the housing prices in China, however, the housing price has little effect on M2. In other word, the connection is unidirectional, from M2 to housing prices. Based on the consequences of concrete analysis, this paper provides some reference approaches for the progress of our real estate industry in the future.

Keywords: Money supply; real estate price; VAR model; M2.

1. Introduction

1.1. Background

The initial formation of the real estate market began in 1978. The housing system reform had a giant progress, the value of real estate as a consumer good and asset has gradually been clarified. Finally, under the condition that the government carefully builds a transaction price mechanism and removes layer-by-layer restrictions, the real estate market was gradually shaped and refined in the 1990s [1] . According to statistics from the National Bureau of Statistics, from 2000 to 2019, there were about 160 new real estate companies registered every day. The contribution rate of the real estate industry's added value to the social economy increased from 5.7% to 7.0%, and the proportion has gradually increased, playing a pillar role in the national economy. However, as the real estate market continues to heat up, high housing prices restrain housing demand from low and middle-income families, depressing non-residential consumption expenditures of residents, leading to a decrease in the quality of life of ordinary people, that is, it is easy to cause social discontent and affect harmony and social stability. Meanwhile, high housing prices will stimulate increased investment speculation, resulting in the real estate bubble phenomenon and economic recession [2]. In 2022, the real estate development of China's investment attained 13,289.5 billion yuan, down 10 percent from the previous year. According to data from the National Bureau of Statistics, in 2021, China's real estate development investment reached 14,760.2 billion yuan, a growth of 4.4% in the past year; This is an 11.7 percent increase from 2019 and a two-year average increase of 5.7 percent. Although China's economic growth has slowed down and there has been depreciating pressure on the RMB, the broad money supply is still growing at an average growth rate of 9%, the ratio of M2 to GDP has reached over 200%, and the phenomenon of economic monetization is serious. Meanwhile, China's price level is at a low level, and real estate prices are also increasing rapidly [3]. The current development situation of China's real estate market is fraught with enormous potential risks, which threaten China's sound and stable economic and financial development. In the context of economic transformation and improvement, economic development must strictly address the relationship between reform and opening up, domestic consumption and demand, but also to prevent the occurrence of real estate-related risks, the real estate market strictly controls risks [4].

The contribution of the real estate industry to China's GDP is enormous. By 2020, the added value of the real estate industry in China will reach 7,455.25-billion-yuan, accounting for 7.3% of GDP. In the first half of 2021, the added value of China's real estate industry was 39.7422-billion-yuan, accounting for 7.5% of GDP. Since 2020, due to the impact of the novel coronavirus outbreak in the initial period, the increase rate of development investment has slowed down. From January to September 2020, the total investment in real estate was up to 10.35 trillion yuan, an increase of 5.6%, and the growth rate was 4.90 percentage points lower than in 2019 (See Fig. 1).



Fig. 1 Variation of housing prices and housing growth rates

Therefore, in recent years, housing prices have become the focus of public attention. If house prices cannot be stabilized, it will be difficult for the economy to develop in a healthy manner. Historically, the real estate crisis in Japan and the financial crisis in the United States were caused by the collapse of the real estate market due to exorbitant house prices. This lesson also constantly reminds us that the healthy development of the real estate market is the main goal of today's real estate industry [5]. Facing rising housing prices every year and excessive investment in the housing market, the government has introduced appropriate measures to control the situation. In recent years, China has continuously introduced relevant regulations in the real estate market. On January 26, 2011, the executive meeting of the State Council put forward the "New Eight" and "Five" for 2013, which showed that the state attaches great importance to regulating housing prices and balancing the money supply. It is hoped that by regulating the money supply, house prices can be stabilized, real estate investment can be reduced, and the development of a sustainable and healthy real estate market can be encouraged. Therefore, timely and correct adjustment of the money supply in the market, on the one hand, requires precise macro control over exorbitant housing prices; on the other hand, the money supply can play a positive part in the overall macroeconomy via the real estate market platform [6]. The key to an effective money supply is understanding how the money supply affects house prices, to stabilize house prices and contain overheated investments.

1.2. Purpose

From the point of view of money supply, an increase in the amount of money increases the amount of capital in the market and too much capital enters the real estate sector through different channels [7]. However, a few experts believe that money is endogenous, determined together by several factors and subjects of the economic system. A rise in housing prices leads to an increase in the money supply [8]. At present, most domestic and foreign researchers adopt a single-factor monetary policy to study the factors affecting real estate prices, and the effects of other factors on real estate prices are not

taken into account [9]. Therefore, the study of the relationship between monetary policy and housing prices provides the financial community with a valuable reference for studying the healthy and steady development of monetary policy and the real estate market [10]. This paper introduces monetary policy data on money supply from two perspectives, with the aim of investigating the effect of money supply on national real estate prices, using national housing price data to create a var model, performing a stability test and cointegration test, and finally obtaining the actual impact of money supply M2 on real estate prices using an impulse response diagram.

2. Data, Methods and Results

2.1. Variable Selection

The data sample interval in this paper is 2000-2021, and the loan supply and real estate prices are selected to form the VAR model. Specific selection criteria: real estate price variable data HP adopts the average annual sales price of real estate development companies' commercial properties; Money supply uses M2 as agent information because M2 as floating capital is closer to real estate. The data for the two variables mentioned above are all from Statistics Finland.

In addition, in order to make the material more scientific and efficient, the average selling price of commercial housing and the money supply M2 is unstable and can cause heteroscedasticity in the time series. Therefore, the logarithms of the two variables M2 and HP are first taken to obtain lnM2 and lnHP. The variable analysis software uses Stata and Eviews programs.

2.2. Stationarity Test

Before gaining the analysis on the relationship between real estate prices and variables, a time series stationarity test of these two variables must first be performed. In this paper, the ADF test is used to obtain stationarity results for these two variables (See Table 1)

Table 1. ADF unit root test result

Variables	ADFvalue	5%CriticalValue	10%CriticalValue	P-value
D(LnHP)	-3.146	-3.000	-2.630	0.0233
D(LnM2)	-3.702	-3.000	-2.630	0.0041

The data shows that the P value is less than 5%, indicating the data is stable. As shown in the table, the P value of the two data is 0.0233 and 0.0041 after the first order difference, both of which are less than 5%, and the data are stable. Therefore, 1 time series variable is a first-order simple integer sequence.

2.3. Lag Order of VAR Model

The Table 2 below is the result of the selection of the lag order. There is no error in this result. The result shows that the lag order of the VAR model should be 1.

Table 2. Lag result

Lag	LogL	LR	FPE	AIC	SC	HQ
0	62.11330	NA	6.12e-06	-6.327716	-6.228302	-6.310891
1	70.09467	13.44231*	4.05e-06	-6.746808*	-6.448564*	-6.696333*
2	71.45491	2.004554	5.45e-06	-6.468938	-5.971864	-6.384813

2.4. Convergence of VAR Model

According to the AR unit root diagram (See Fig. 2), if the root of the characteristic equation lies in the unit circle, then the difference equation has a convergent solution, and the VAR model converges.

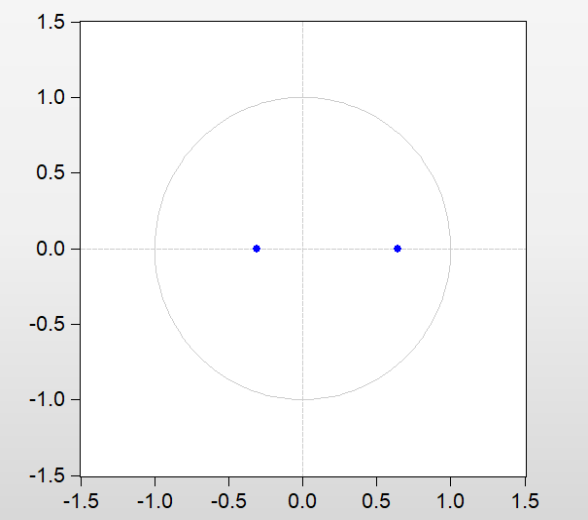


Fig. 2 Model convergence result

2.5. Impulse Response

Impulse response function of different time nodes refers to the degree of response of a variable to impact when it is positively impacted by one-unit standard deviation of other variables at a specific time node, namely, the impact on the variable. Then, VAR models are established for the two variables respectively, and these two variables are taken as endogenous variables of impulse response.

The Fig. 3 shows the impulse response of dlnm2 to dlnhp. The results show that the impact is insignificant. The Fig. 4 shows the impulse response of dlnhp to dlnm2. We can see that when there is a money supply shock, the house price rises rapidly in the short term, peaks in the second period, and then start to drop by degrees. From the results, we can see that the shock lasts about 10 periods, tends to a reasonably stable area in the 10th period, and reaches the best steady state in the 4th period. In the long term, the influence of the money supply M2 on real estate prices is positive. The analysis shows that the real estate industry is a capital-intensive that requires a lot of technology and money, and labor-intensive industry and the development of each project requires substantial capital and investment at the initial phase. On the one side, real estate companies' development and investment funds come from their own funds and most of them loan though banks. Therefore, as the money supply increases, banks will get more credit and real estate companies can obtain more plentiful funds to increase investment in real estate and increase the supply of commercial housing. In the short term, the property price will increase and if supply exceeds demand, this will dampen the property price. In the long run, more money means more money for consumers and investors, which drives home prices higher.

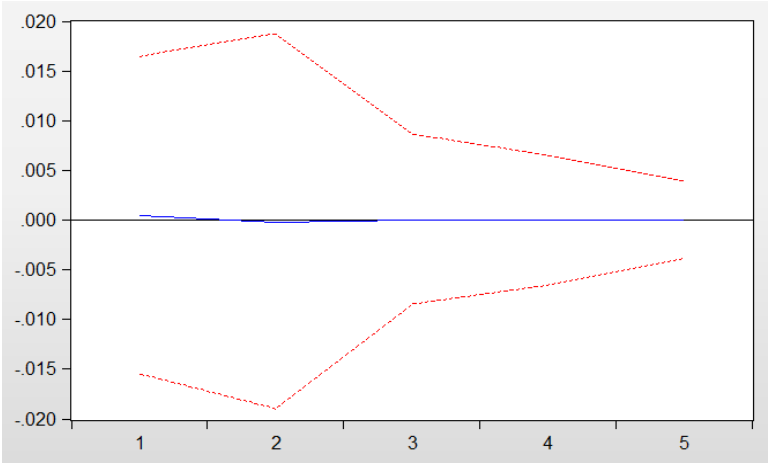


Fig. 3 Impulse response of dlnm2 to dlnhp

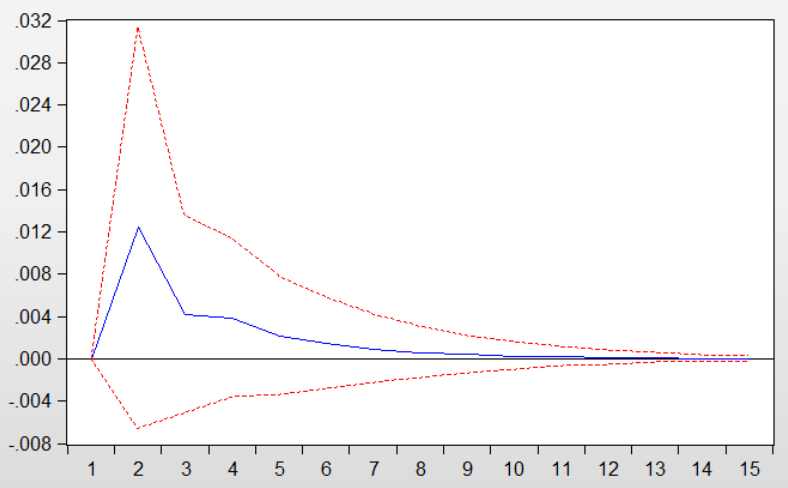


Fig. 4 Impulse response of dlnhp to lnm2

2.6. Variance Decomposition

The predictive variance of variables at different points in time can be decomposed into different shock interpretation parts. If N is large, it can be understood as the contribution of the shock to the variable fluctuation. Table 3 shows the variance decomposition of dlnm2. According to the results, it can only explain 0.011%, suggesting that M2 has little meaning for the house price. Table 4 shows the variance decomposition of dlnhp showing that the explanation is 6.51%, indicating that house price has a relatively significant impact on money supply.

Table 3. The variance decomposition of lnm2

Period	S.E.	DLNHP	DLNM2
1	0.050247	0.016532	99.98347
2	0.054020	0.013754	99.98625
3	0.054389	0.012288	99.98771
4	0.054546	0.011799	99.98820
5	0.054590	0.011592	99.98841
Cholesky Ordering: DLNHP DLNM2			

Table 4. The variance decomposition of dlnhp

Period	S.E.	DLNHP	DLNM2
1	0.050247	100.0000	0.000000
2	0.054020	94.73233	5.267673
3	0.054389	94.21469	5.785312
4	0.054546	93.74619	6.253813
5	0.054590	93.60411	6.395890
6	0.054610	93.53516	6.464844
7	0.054618	93.50855	6.491447
8	0.054621	93.49712	6.502885
9	0.054622	93.49245	6.507555
10	0.054623	93.49049	6.509509
11	0.054623	93.48968	6.510318
12	0.054623	93.48935	6.510654
13	0.054623	93.48921	6.510793
14	0.054623	93.48915	6.510851
15	0.054623	93.48912	6.510875

3. Conclusion

As housing price is a hot topic in China, thus, this paper focus on the issue. Specifically, this paper unfolds the investigation from the aspect of connections between housing prices and M2. The empirical process and results are generalized as follows. First, the unit root ADF is tested, and the money supply M2 and the real estate price HP are both first-order stables. Then the VAR model is used to calculate the delay order 1. Then the convergence of the VAR model is obtained by the root circle of the AR unit. Then, through the impulse response equation, it is found that the real estate price is positively impacted by the money supply of M2.

The results shed lights on policy makers. First, tighter controls on the money supply. This paper concludes that the money supply M2 has a long-term positive-going impact on the price of commercial real estate, which is an effective control measure. Increasing the money supply will stimulate housing price growth, but too much money supply will cause an overcapacity problem in the real estate industry, leading to inflated house prices and economic bubbles. So we need to tighten control over the money supply, using it rationally will bring better results for the economy.

We will strengthen oversight of the real estate market. Nowadays, China's real estate market has gone through several turns; but has not yet matured. Relying solely on the market mechanism is far from enough to achieve healthy and orderly development. It is more important to fully exploit the macro-control role of the government's visible hand. Although this paper states that monetary policy tools (especially the money supply) can effectively regulate house prices, the regulation and control of the real estate market cannot be based on monetary policy alone; but should be based on the coordination and cooperation of different regulatory policies.

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