Frontiers in Economics and Management Volume 4 Issue 3, 2023
ISSN: 2692-7608 DOI: 10.6981/FEM.202303_4(3).0001

Study of the Effect of Monetary Policy on the Regulation of House Prices in Different Provinces in China

-- Take Guangdong, Fujian, Jiangxi and Heilongjiang as Examples

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Abstract

Real estate has both consumer and investment attributes. In today's society, the stable and healthy development of the real estate industry is of great significance to the economic development of China. Monetary policy is one of the policies of the Chinese government to macro-control the real estate market. This paper selects Guangdong, Fujian, Jiangxi, and Heilongjiang as the samples, and chooses credit size, cash in circulation M0, defined money supply M1, broad money supply M2, and interest rate as the explanatory variables, and conducts Granger causality analysis and impulse response analysis by constructing VAR models to explore the effects of different monetary policies on the effect of different monetary policies on the average price of commercial housing in Guangdong, Fujian, Jiangxi, and Heilongjiang provinces is explored.

Keywords

Monetary Policy; House Prices; VAR Model; Impulse Response; Granger Causality.

1. Introduction

Real estate has two special attributes, namely, consumer attributes and investment attributes, and plays a role in China's economic development. Since 2000, the average house price in China has shown a continuous upward trend. the average house price of commercial houses nationwide in 2000 was 2112 Yuan/m^2, and in 2020 the average house price of commercial houses nationwide was 9859.56 Yuan/m^2 [1]. The rapid growth of house prices has attracted many investors and capital to enter the real estate industry. According to statistics, the amount of real estate investment in 2020 reached 132,194.64 billion yuan, while the number of developers reached 99,544 [2]. Such a huge increase has expanded the bubble of the real estate industry, making financial resources from real to virtual and eroding the development of the real economy.

The Chinese government has introduced monetary policies to regulate housing prices to guide the healthy development of the real estate industry. Monetary policies include price-based monetary policy and quantity-based monetary policy [3]. Among them, price-based monetary policy mainly refers to interest rates, and interest rate regulation refers to the demand-based approach, thus affecting the real estate industry. Raising the loan interest rate increases the cost of home purchases and reduces consumers' motivation to buy homes. The quantitative monetary policy includes the quantity of money supply and the scale of credit. The People's Bank of China regulates the money supply mainly through open market operations, rediscount rates, and deposit reserve ratio. Unlike price-based monetary policy, the regulation of credit volume refers to influencing the real estate industry from both the supply and demand sides. In the case of China, there are large disparities in economic development among cities, and it is

ISSN: 2692-7608 DOI: 10.6981/FEM.202303_4(3).0001

difficult to implement a uniform monetary policy to cope with regional differences, so it is necessary to study the impact of monetary policy on housing prices in different provinces and cities.[4]

This paper studies the effect of monetary policy on housing prices in Guangdong, Fujian, Jiangxi, and Heilongjiang provinces.

2. Literature Review

Many scholars have studied the effect of interest rates on house prices. Foreign researchers Kau and Keenan (1999) use the data from 1985 to 1993, by building an autoregressive model between interest rates and the average house price of commercial housing in the United States, elaborating that the two are inversely related [5]. Abraham and Hendershott (1996) found an inverse relationship between the increase in residential prices and interest rates [6]. Wang Laifu and Guo Feng (2008) took quarterly data from 1998 to 2007 in China to conduct an empirical study and found that interest rates have an effect on average house prices in China in the short run, but not in the long run [7].

Several scholars have used the money supply as an entry point to discuss the impact of monetary policy on house prices. Gouteron (2005), a foreign scholar, found that an increase in money supply in both Japan and the United States leads to an increase in house prices [8]. Qin Zhua (2006) also showed through data that an increase in money supply by the central bank can lead to an increase in house prices, but a decrease in money supply does not affect the regulation of house prices [9]. By constructing a VAR model and selecting quarterly data from 1999 to 2008 in China, Yuan Hui and Ma Zhefeng (2008) concluded that real estate selling prices and money supply, land prices, and gross domestic product are significantly and positively correlated in China [10]. Hongbo and Luo Xiaoling (2012) constructed a VAR model using data from 2001 to 2010 in China and found a two-way Granger causality between house prices and GDP and money supply through different analysis methods [11]. Qing Miao (2018) selected the money supply and house prices in China from February 2000 to December 2017 and found a significant positive relationship between money supply and house prices by building a VAR model [12].

In summary, scholars have mostly carried out the discussion of the effect of monetary policy on the regulation of house prices by taking the house prices of a certain country as the research object. This paper argues that few scholars have taken into account the differences in economic development among chinese provinces to explore the actual regulatory effects of monetary policy on different cities, and this study enriches the research system on the effects of monetary policy on real estate market prices.

3. Empirical Analysis

3.1. Data Sources and Model Selection

This paper uses monthly frequency time series data from December 2003 to December 2019 for Guangdong, Fujian, Jiangxi, and Heilongjiang.

This paper conducts a study of the regulatory effect of monetary policy on the average price of commodity housing in different provinces and cities using a VAR model, also known as a vector autoregressive model, which is a series of multiple equations and each of which represents a lagged value function generated by endogenous variables.

The concise expression of the multidimensional variable vector autoregressive model is

$Yt = A1\ Yt\text{-}1 + \ldots + AP\ yt\text{-}p + Bxt + Et \quad T=1,2,3\ldots T$

Yt denotes the longitudinal vector of endogenous variables in K dimensions

Xt denotes the longitudinal vector of exogenous variables in K dimensions

ISSN: 2692-7608 DOI: 10.6981/FEM.202303_4(3).0001

P denotes the lag order
T denotes the total number of test samples
A1, A2 ……Ap, B denotes the coefficient matrix to be tested for evaluation
It denotes the error vector
The above equation can also be shown in vector mode as follows.

$$\begin{bmatrix} y_{1t} \\ y_{2t} \\ \cdots \\ y_{kt} \end{bmatrix} = A_1 \begin{bmatrix} y_{1t-1} \\ y_{2t-1} \\ \cdots \\ y_{kt-1} \end{bmatrix} + \ldots + A_p \begin{bmatrix} y_{1t-p} \\ y_{2t-p} \\ \cdots \\ y_{kt-p} \end{bmatrix} + B \begin{bmatrix} x_{1t} \\ x_{2t} \\ \cdots \\ x_{kt} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \cdots \\ \varepsilon_{kt} \end{bmatrix} \quad (1)$$

3.2. Variable Selection

Table 1. Data processing and data sources

Data Name	Data source and processing
The average price of commercial housing (D_PRICE)	The ratio of the monthly total sales of commercial properties to the monthly total area of commercial properties provided by WI Harper is used to derive the monthly average price per square meter of commercial properties and do the difference processing.
Interest rate (D_R).	The benchmark 1–3year loan rates of financial institutions in Guangdong, Fujian, Jiangxi, and Heilongjiang provided by WIEGO are used for the difference process to make them stable.
Credit Size (D_CREDIT)	Medium - and long-term loans from financial institutions provided by China Economic Network have adopted Quantity replacement, make difference treatment, make it stable.
Broad Money Supply (D_M2)	The broad money supply M2 provided by China Economic Network is used, and different process is performed to make it stable.
Narrow money supply (D_M1)	Using the narrow money supply M1 provided China Economic Network and difference processing was performed to make it stable.
Cash in circulation (D_M0)	The cash supply M0 provided by China Economic Network was used, and different treatment was applied to make it stable.

In this paper, we will refer to the data and models selected by related scholars to conduct the study. The selected data are shown in Table I. The explanatory variable is the average price of commercial housing, which is calculated by dividing the monthly total sales of commercial housing by the total area of commercial housing. The explanatory variables are extracted from monetary policy. The money supply, interest rates, or exchange rates influence the economic behavior of each market participant. The exchange rate is not considered an indicator of the average price of commercial housing in this paper because foreign investment accounts for a relatively small percentage of investment in China's real estate market. According to the size of liquidity, China's money supply is divided into three main categories - cash in circulation M0, narrow money supply M1, and broad money supply M2 [13]. Gong (2012) selected broad money supply M2 as the explanatory variable to study the effect of monetary policy on the regulation of house prices [14], therefore, M2 is also selected as the explanatory variable in this

ISSN: 2692-7608 DOI: 10.6981/FEM.202303_4(3).0001

paper. Since M0 represents cash, which is closely related to the changes in consumption and is the most liquid currency, M1 represents M0 + demand deposits, which mainly respond to the changes in the liquidity of residents and enterprises and is a leading indicator of the economic cycle fluctuations [15]. Therefore, this paper adds M0, with M1 as the explanatory variable. In addition, the benchmark 1–3-year loan rate of financial institutions is selected as an explanatory variable in this paper. Credit is an important indicator of monetary policy, and through the study of Ye, Xin, and Wang Jie (2013), it is found that credit expansion drives house price rise, and house price rise likewise promotes credit expansion, and the two are mutually causal [16]. Therefore, this paper uses the stock of medium- and long-term loans of financial institutions in each province to represent the credit scale.

3.3. The Smoothness Test of the Series

Table 2. Guangdong variable stability testing

Variable	ADF test statistic	1% critical value	5% critical value	10% critical value	Result
D_PRICE	-17.630	-3.480	-2.884	-2.574	stable
D_M0	-16.957	-3.480	-2.884	-2.574	Stable
D_M1	-17.172	-3.480	-2.884	-2.574	Stable
D_M2	-17.204	-3.480	-2.884	-2.574	Stable
D_R	-8.436	-3.480	-2.884	-2.574	Stable
D_CREDIT	-9.514	-3.480	-2.884	-2.574	Stable

Table 3. Stability testing of variables in Fujian

Variable	ADF test statistic	1% critical value	5% critical value	10% critical value	Result
D_PRICE	-16.094	-3.480	-2.884	-2.574	stable
D_M0	-16.957	-3.480	-2.884	-2.574	stable
D_M1	-17.172	-3.480	-2.884	-2.574	stable
D_M2	-17.204	-3.480	-2.884	-2.574	stable
D_R	-8.436	-3.480	-2.884	-2.574	stable
D_CREDIT	-9.308	-3.480	-2.884	-2.574	stable

Table 4. Stability testing of variables in Jiangxi Province

Variable	ADF test statistic	1% critical value	5% critical value	10% critical value	Result
D_PRICE	-17.291	-3.480	-2.884	-2.574	stable
D_M0	-16.957	-3.480	-2.884	-2.574	stable
D_M1	-17.172	-3.480	-2.884	-2.574	stable
D_M2	-17.204	-3.480	-2.884	-2.574	stable
D_R	-8.436	-3.480	-2.884	-2.574	stable
D_CREDIT	-7.289	-3.480	-2.884	-2.574	stable

Table 5. Stability testing of variables in Heilongjiang

variable	ADF test statistic	1% critical value	5% critical value	10% critical value	Result
D_PRICE	-15.440	-3.480	-2.884	-2.574	stable
D_M0	-16.957	-3.480	-2.884	-2.574	stable
D_M1	-17.172	-3.480	-2.884	-2.574	stable
D_M2	-17.204	-3.480	-2.884	-2.574	stable
D_R	-8.436	-3.480	-2.884	-2.574	stable
D_CREDIT	-8.138	-3.480	-2.884	-2.574	stable

ISSN: 2692-7608 DOI: 10.6981/FEM.202303_4(3).0001

In this paper, the Dickyfuller test is used to conduct the stationarity test. As shown in Tables 2-6, real estate prices, interest rates, credit size, broad money supply, narrow money supply, and cash in circulation in Guangdong, Fujian, Jiangxi, and Heilongjiang are all stable data, so the vector autoregressive model can be constructed.

3.4. Constructing a VAR Model

3.4.1. Determination of the Lag Order of the VAR Model

To build a VAR model, determine the appropriate lag order. The selected metrics include FPE, AIC, HQIC, and SBIC.

Table 6. Selection of lagged orders of the VAR model for Guangdong Province

Lag	LL	LR	FPE	AIC	HQIC	SBIC
0	-8426.09		3.7e+31	89.7031	89.745	89.8064
1	-8266.62	318.94	9.8e+30	88.3896	88.6825	89.1126*
2	-8191.32	150.61	6.5e+30	87.9714	88.5155*	89.3142
3	-8150.6	81.436	6.2e+30*	87.9213*	88.7164	89.8838
4	-8117.36	66.468*	6.4e+30	87.9507	88.9969	90.533

As shown in Table 6, SBIC is selected with lag number 1, HQIC is selected with 2, and FPE and AIC are selected with the criterion of 3. The lag order 3 is selected as the final lag order for comprehensive consideration, and the VAR (3) model is established as the Guangdong Province model.

Table 7. Selection of lag order of VAR model for Fujian Province

Lag	LL	LR	FPE	AIC	HQIC	SBIC
0	-7954.59		1.8e+33	86.5282	86.5707	86.633
1	-7811.32	286.54	4.8e+29	85.3622	85.6596	86.096*
2	-7722.75	177.14	2.7e+29	84.7908	85.3432*	86.1536
3	-7677.68	90.142	2.4e+29	84.6922	85.4995	86.6841
4	-7626.69	101.98	2.1e+29	84.5293	85.5915	87.1501
5	-7584.94	83.505	2.0e+29	84.4667	85.784	87.7166
6	-7548.62	72.645	2.0e+29	84.4632	86.0354	88.3421
7	-7494.26	108.71	1.7e+29*	84.2637*	86.0908	88.7716

Table 8. Jiangxi Province VAR model lag order selection

Lag	LL	LR	FPE	AIC	HQIC	SBIC
0	-7862.68		3.5e+29	85.0668	85.1091	85.1713
1	-7691.24	342.88	8.2e+28	83.6026	83.8989	84.3337*
2	-7610.07	162.35	5.0e+28	83.1142	83.6645*	84.472
3	-7569.36	81.423	4.8e+28	83.0633	83.8676	85.0477
4	-7523.66	91.389	4.3e+28	82.9585	84.0167	85.5696
5	-7486.92	73.477	4.3e+28	82.9505	84.2627	86.1883
6	-7445.6	82.638	4.2e+28	82.893	84.4592	86.7574
7	-7380.66	129.88*	3.1e+28*	82.5802*	84.4003	87.0712

ISSN: 2692-7608 DOI: 10.6981/FEM.202303_4(3).0001

As shown in Table 7, SBIC chooses lag 1, HQIC chooses lag 2, and FPR and AIC choose Lag 7. Because FPE and AIC tend to choose more satiated models, they are not informative. On balance, VAR(2) is chosen as the model for Fujian Province.

As shown in Table 8, lag 1 is chosen for SBIC, lag 2 for HQIC, and lag 7 for FPR and AIC. similar to the case of Fujian Province above, FPR and AIC are not of reference significance here, and VAR (2) is chosen as the model for Jiangxi Province on comprehensive consideration.

Table 9. Selection of lag order of VAR model for Heilongjiang Province

Lag	LL	LR	FPE	AIC	HQIC	SBIC
0	-7965.76		1.7e+30	86.6496	86.6921	86.7544
1	-7806.39	318.74	4.5e+29	85.3086	85.6061*	86.0425*
2	-7754.02	104.75	3.8e+29	85.1306	85.683	86.4935
3	-7710.66	86.72	3.5e+29	85.0506	85.858	87.0425
4	-7673.69	73.929	3.5e+29	85.0402	86.1024	87.661
5	-7635.7	75.98	3.4e+29	85.0185	86.3357	88.2684
6	-7597.94	75.52	3.4e+29	84.9994	86.5716	88.8783
7	-7547.72	100.45*	3.0e+29*	84.8448*	86.6719	89.3527

As shown in Table 9, SBIC chooses a lag of 1, HQIC chooses a lag of 1, and FPR and AIC choose a lag of 7. Again, since AIC and FPE would regionally be more full of models and therefore are not of reference significance here, VAR (1) is chosen as the model for Heilongjiang Province.

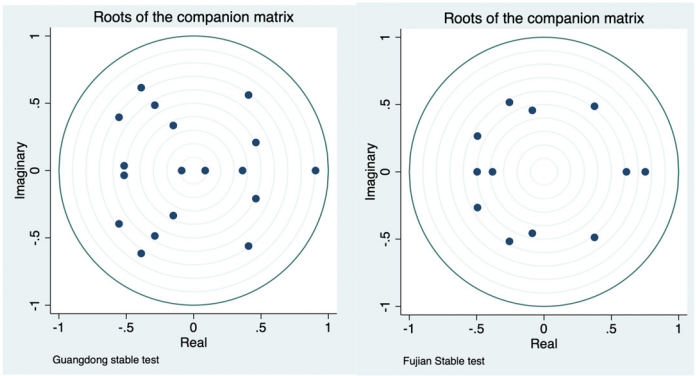
3.4.2. Constructing the VAR Model

As shown in Table 10, with the optimal hysteresis model chosen above, we built the following model and filtered the useful coefficients by the 5% significant level.

Table 10. Construction of the VAR model

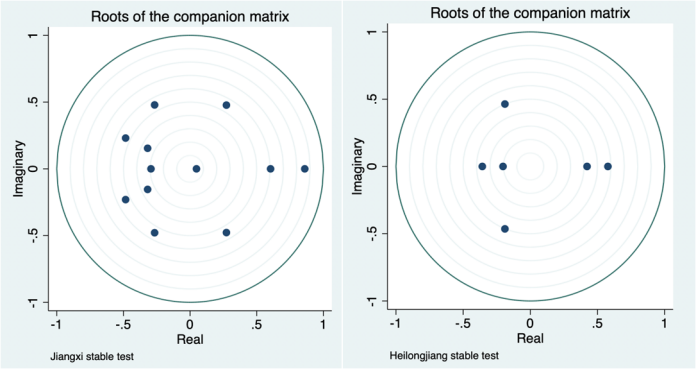
Area	Optimal lag order	Model
Guangdong	3	D_PRICE=-0.325312D_PRICE(1)+0.0028671D_M2(1)+ 0.0037938D_M2(2)
Fujian	2	D_PRICE=0.0101876D_M0(1) + 0.0170685D_M0(2)
Jiangxi	2	D_PRICE=-0.2198744D_PRICE(1)-0.0059595D_M0(1) -0.0052571D_M0(2)+0.0016279D_M2(1)+0.0012676D_M2(2)
Heilongjiang	1	D_PRICE=-0.1554658D_PRICE(1)+0.0237967D_M0(1)- 0.009773D_M1(1)+0.0038236D_M2(1)+0.4251432D_CREDIT(1)

3.4.3. VAR Model Stability Test



a. Guangdong Province stability test **b.** Fujian Province stability test

ISSN: 2692-7608 DOI: 10.6981/FEM.202303_4(3).0001



c. Jiangxi Province stability test d. Heilongjiang Province stability test

Fig 1. Guangdong, Fujian, Jiangxi, Heilongjiang AR root map

The stability of the VAR model is determined by the condition that the reciprocal of the roots of the AR characteristic polynomial all fall within the unit circle, and the results are shown in Figure 1: the characteristic roots of Guangdong, Fujian, Jiangxi, and Heilongjiang all fall within the unit circle, so the VAR(3) established for Guangdong Province, VAR(2) for Fujian Province, VAR(2) for Jiangxi Province, and VAR(1) for Heilongjiang all pass the stability test, so the model of the estimation results are reliable.

3.5. Granger Causality Wald Tests

3.5.1. Definition of Granger Causality Analysis

When regressing time series variables, there are often pseudo-regressions - high correlations between time series that are not linked in any way. For this reason, it is also necessary to use the granger causality test to determine whether there is an economically meaningful correlation between the variables. The Granger causality test is a test to see if there is a causal relationship between numbers and reasoning. In layman's terms, it is to see to what extent y at the present point in time can be explained by the prediction of x at the past point in time. If x plays a significant role in predicting y then a Granger causality relationship exists between x and y.

For the mathematical interpretation, it is necessary to first consider the mean squared error (MSE) of the s-period forecast.

$$MSE = \frac{1}{S}\sum_{i=1}^{s} (\hat{y}_{t+i}-y_{t+i})^2 \quad (2)$$

If all s> 0, the mean square error obtained from (yt ,yt-1 ,...) predicting yt+s is the same as the mean square error obtained based on (yt ,yt-1 ,...xt ,xt-1 ...), then y is not caused by x Granger. Therefore, it is possible to test whether there is a causal relationship between different monetary policies on the average price of commodity houses by this method.

3.5.2. Granger Causality Test Results

As shown in Table 11, in Guangdong Province, only the broad money supply M2 has Granger causality with the average price of commodity houses, and the broad money supply M2 is the Granger cause of the average price of commodity houses.

As shown in Table 12, in Fujian Province, only cash supply in circulation M0 has Granger causality with the average price of commodity housing.M0 is the Granger cause of the average price of commodity housing.

ISSN: 2692-7608 DOI: 10.6981/FEM.202303_4(3).0001

Table 11. Granger causality test results for Guangdong

Null hypothesis	Chi^2	Pro>chi^2	result
D_M0 does not granger cause D_PRICE	3.8005	0.284	Fail
D_M1 does not granger cause D_PRICE	0.18038	0.981	Fail
D_M2 does not granger cause D_PRICE	8.793	0.032	Reject
D_CREDIT does not granger cause D_PRICE	1.0051	0.800	Fail
D_RATE does not granger cause D_PRICE	1.9398	0.585	Fail

Table 12. Granger causality test results in Fujian Province

Null hypothesis	Chi^2	Pro>chi^2	result
D_M0 does not granger cause D_PRICE	14.155	0.000	Reject
D_M1 does not granger cause D_PRICE	0.11567	0.734	Fail
D_M2 does not granger cause D_PRICE	8.9e-05	0.992	Fail
D_CREDIT does not granger cause D_PRICE	1.3549	0.244	Fail
D_RATE does not granger cause D_PRICE	1.3452	0.246	Fail

As shown in Table 13, in Jiangxi Province, only the cash supply in circulation M0 and broad money supply M2 have Granger causality with the average price of commodity houses. The cash supply in circulation M0 and broad money supply M2 are Granger causes of the average price of commodity houses.

Table 13. Results of Granger causality test in Jiangxi

Null hypothesis	Chi^2	Pro>chi^2	result
D_M0 does not granger cause D_PRICE	11.69	0.003	Reject
D_M1 does not granger cause D_PRICE	3.6281	0.163	Fail
D_M2 does not granger cause D_PRICE	9.1013	0.011	Reject
D_CREDIT does not granger cause D_PRICE	4.1563	0.125	Fail
D_RATE does not granger cause D_PRICE	0.50819	0.776	Fail

As shown in Table 14, in Heilongjiang Province, cash in circulation M0, narrow money supply M1, broad money supply M2, and credit size have Granger causality with the average price of commodity houses. The cash supply in circulation M0, narrow money supply M1, broad money supply M2, and credit size are Granger causes of the average price of commodity houses.

Table 14. Results of Granger causality test in Heilongjiang

Null hypothesis	Chi^2	Pro>chi^2	result
D_M0 does not granger cause D_PRICE	22.086	0.000	reject
D_M1 does not granger cause D_PRICE	11.419	0.001	reject
D_M2 does not granger cause D_PRICE	6.6352	0.010	reject
D_CREDIT does not granger cause D_PRICE	9.2181	0.002	reject
D_RATE does not granger cause D_PRICE	0.00653	0.936	Fail

3.6. Impulse Response Analysis

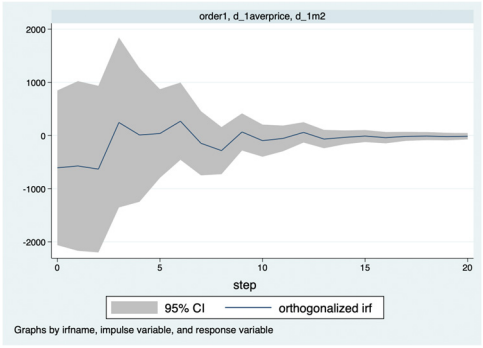
Impulse response function analysis refers to the analysis of the effect that an impulse of a single variable has on the entire system. By imposing a shock of a standard deviation size on a random error term, the future impact on the system variables is quantified. The following impulse response analysis is used to analyze the effect of monetary policy on the regulation of average

ISSN: 2692-7608 DOI: 10.6981/FEM.202303_4(3).0001

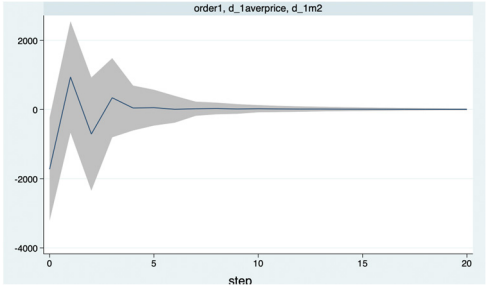
commodity housing prices in Guangdong Province, Fujian Province, Jiangxi Province, and Heilongjiang Province, respectively.

(1)The impact of M2 on the average price of commodity housing in Guangdong Province, Jiangxi Province, and Heilongjiang

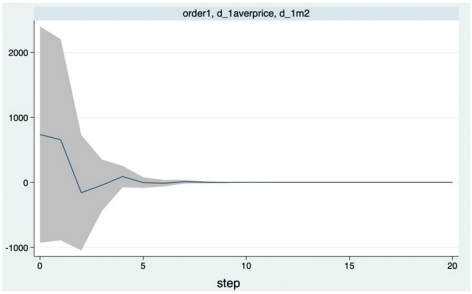
As shown in Figure 2, for Guangdong Province, given a shock from M2, the average price of commercial housing in Guangdong Province reacts negatively in the current period to the third period, then bounces back to a positive reaction in the fourth period, and then the shock to the average price of commercial housing begins to converge to 0. For Jiangxi Province, given a shock from M2, the average price of commercial housing reacts negatively in the current period, then bounces back to a positive reaction in the first period, then converges to 0 in the fourth period. For Heilongjiang Province, given an M2 shock, the average commodity house price reacts positively at the moment, continues to react negatively in the third period, and then gradually tends to 0. The effect is no longer obvious and tends to be 0.



The impact of M2 on the average price of commercial properties in Guangdong



The impact of M2 on the average price of commodity housing in Jiangxi



The impact of M2 on the average price of commercial housing in Heilongjiang

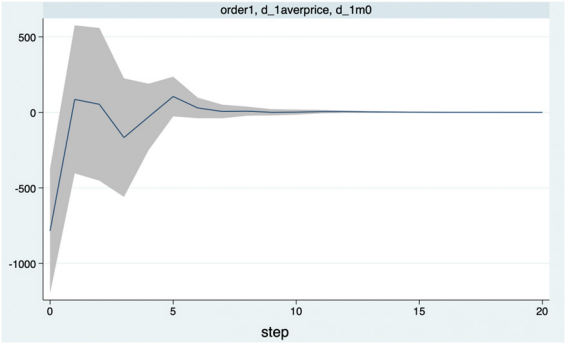
Fig 2. Impact of M2 on the average price of commodity housing in Guangdong, Jiangxi and Heilongjiang provinces

(2)The impact of M0 on the average price of commercial housing in Fujian Province, Jiangxi Province, and Heilongjiang Province

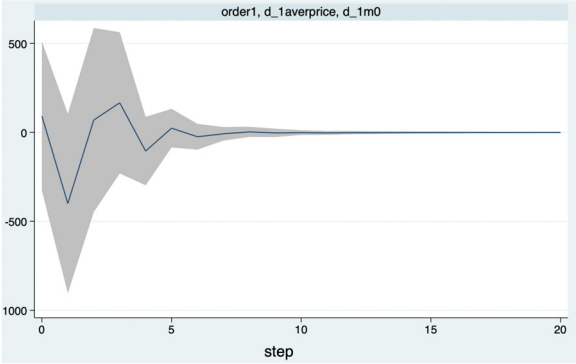
As shown in Figure 3, M0 has different effects on the average price of commodity houses in Fujian Province, Jiangxi Province, and Heilongjiang Province, respectively. There is no significant effect on the average price of commercial housing in Guangdong Province. The

ISSN: 2692-7608 DOI: 10.6981/FEM.202303_4(3).0001

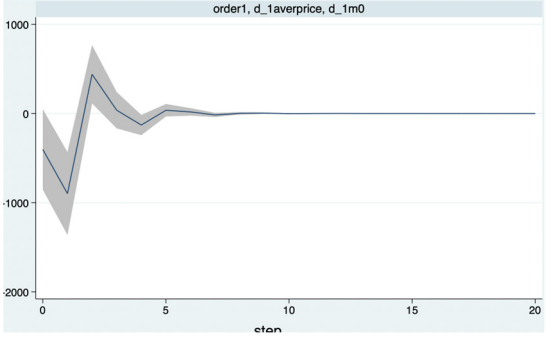
regulation effect on Heilongjiang province is the most significant. For the average price of commercial housing in Fujian Province, the response to a given M0 shock is negative in the current period and then bounces back to positive in the first period. For Jiangxi province, a shock of M0 produces a small positive response in the current period, followed by a negative response in the first period, then bounces back to positive in the second period, then peaks positive in the third period, reaches negative in the fourth period, and bounces back to positive in the fifth period, and gradually dissipates to 0. For Jiangxi province, a shock of M0 produces a small positive response in the current period, followed by a negative response in the first period, then bounces back to positive in the second period, then peaks positive in the third period, reaches negative in the fourth period, and bounces back to positive in the fifth period. Gradually the shock effect then dissipates. For Heilongjiang Province, given an M0 shock, the average commodity house price reacts negatively at the moment, then falls more in the first period, bounces back to positive in the second period, and then the effect slowly disappears.



The impact of M0 on the average price of commercial housing in Fujian Province



The impact of M0 on the average price of commodity houses in Jiangxi Province



The impact of M0 on the average price of commercial housing in Heilongjiang Province

Fig 3. Impact of M0 on the average price of commodity housing in Fujian, Jiangxi, and Heilongjiang

(3)M1's impact on the average price of commercial housing in Heilongjiang Province

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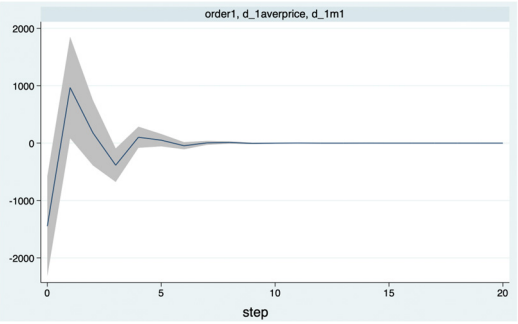
As shown in Figure 4, for the average commodity house price in Heilongjiang Province, when given a shock of M1, the response is negative in the current period, quickly bounces back to positive in the first period, then falls to negative in the third period, and then the effect of the shock gradually dissipates and tends to 0.



Heilongjiang

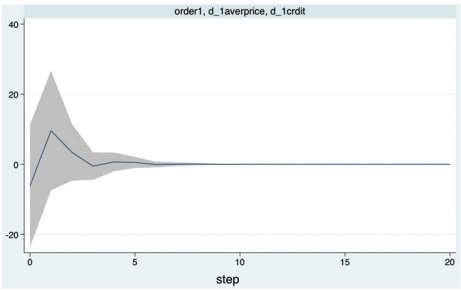
Fig 4. Impact of M1 on the average price of commercial housing in Heilongjiang Province

(4)The impact of interest rates on the average price of commercial housing in the four provinces

The effect of interest rates on regulating the average price of commercial housing in all four provinces was not significant.

(5)The impact of credit size on the average price of commercial housing in Heilongjiang Province

As shown in Figure 5, there is a moderating effect of credit size only on the average price of commercial housing in Heilongjiang Province. When given a shock of credit, the immediate response is negative and the stochastic first period reaches a peak and then gradually decreases tending to 0.



Heilongjiang Province

Fig 5. Impact of credit size on the average price of commercial housing in Heilongjiang Province

4. Cause Analysis

This paper argues that the reasons for the different effects of monetary policy on the regulation of house prices in different provinces are Differences in the level of economic development of each region. Houses have different percentages of attributes in different regions. First of all, in terms of the effect of M0 on the regulation of the average price of commodity houses, there is a significant effect in all regions except for the regions with higher GDP, the reason why the regulation effect of M0 is not significant in the regions with higher GDP is that the consumption attributes of properties are no longer prominent in these regions. the direct reason for the significant effect of M0 on the regulation of the average price of commodity houses in medium and high GDP provinces, and medium GDP provinces may be Due to the fact that monetary policy directly stimulates the acquisition of houses, which leads to a decrease in the number of houses and an increase in house prices. Indirectly, it is because monetary policy stimulates

ISSN: 2692-7608 DOI: 10.6981/FEM.202303_4(3).0001

business and economic development, which in turn attracts more people to such areas, thus leading to a spike in house prices. m0 is ineffective and negatively correlated in regulating the average price of commodity houses in low and medium GDP provinces, since once more cash is available in these areas, people will switch to spending, which eventually leads to a decrease in house prices. m1 is significant and negatively correlated in regulating the average price of commodity houses in lower GDP provinces. is significant and negatively correlated. This means that people in economically backward areas do not buy houses after saving more, which eventually leads to a decrease in house prices. m2 influences the average price regulation of commodity houses in high GDP, medium GDP and low GDP provinces, and all have a positive relationship. This is due to the fact that when a large number of investors (M2 holders) increase, they will first go to buy property, which leads to a decline in the total number of houses and an increase in house prices, and from the impulse function of which the most economically developed regions have the most significant regulation effect, precisely because the most economically developed regions have the strongest investment properties of houses. The size of credit only has a significant regulatory effect on the average price of commercial housing in lower GDP provinces and is positively related. This indicates that people in the less economically developed regions will increase their leverage through credit to purchase property and promote the rise of house prices.2. The poor interest rate transmission effect is because the interest rate standard set by the state is the minimum interest rate standard, and the interest rate is non-market-oriented, and the interest rate is too low for a long period, resulting in the insignificant regulation of the average price of commodity houses in the above four regions. In addition to this, the different levels of financial development, land supply, the number of real estate investors, and the strength of government policy support in each region also lead to the different effects of monetary policy on the regulation of average commodity housing prices in different provinces and cities.

5. Conclusion

This paper uses a vector autoregressive model and selects credit size, cash in circulation M0, narrow money supply M1, broad money supply M2, and interest rate as explanatory variables to investigate the effect of China's monetary policy on the regulation of average commodity housing prices in Guangdong, Fujian, Jiangxi, and Heilongjiang provinces. The conclusions are as follows: 1) This paper first conducts Granger causality analysis from a static perspective. In Guangdong Province, only the supply of broad money supply, M2, has Granger causality with the average price of commodity houses in Guangdong Province. In Fujian Province, only the supply of cash in circulation M0 has Granger causality with the average price of commodity houses in Fujian Province. For Jiangxi Province, both M0 and M2 have Granger causality with the average price of commodity houses in Jiangxi Province. In Heilongjiang province, there is a Granger causality relationship between cash in circulation M0, narrow money supply M1, broad money supply M2, and credit size and the average price of commodities in the region. 2) Based on the impulse function analysis and the optimal lag model, the effects of monetary policy on the average price of commodities in Guangdong, Fujian, Jiangxi, and Heilongjiang provinces are different. For the average price of commodity houses in Guangdong Province, M2 influences its regulation, but credit size, cash in circulation M0, and narrow money supply M1, have almost no effect on the regulation of the average price of commodity houses in Guangdong Province. For the average price of commodity houses in Jiangxi Province, the regulation of M2 and M0 had a significant effect, but the credit size, M1 and interest rate had no significant effect on the regulation of the average price of commodity houses in the region. For the average price of commodity houses in Heilongjiang Province, the regulation of M0, M1, M2, and credit size has a significant effect, but the interest rate has no effect on the regulation of the average price of commodity houses in the region. For the average price of commodity houses in Fujian Province,

ISSN: 2692-7608 DOI: 10.6981/FEM.202303_4(3).0001

M0 influences the regulation of the average price of commodity houses in the region, and the other explanatory variables have no significant effect on the regulation of the average price of commodity houses in the region. In other words, M0 influences the regulation of the average price of commodity houses in Heilongjiang, Fujian, and Jiangxi provinces, with the most significant effect on Heilongjiang. M1 has a significant effect on the regulation of the average price of commodity houses in Heilongjiang. M2 influences the regulation of the average price of commodity houses in Guangdong, Jiangxi, and Heilongjiang provinces, with the most conducive effect on Guangdong. Credit size only has a regulatory effect on the average price of commodity housing in Heilongjiang Province. The interest rate has no regulatory effect on the average price of commodity houses in all the above provinces.

References

[1] WI data https://db.cei.cn/.

[2] WI data https://db.cei.cn/.

[3] Mu Jianshe. Analysis of the characteristics and operational effects of quantitative easing monetary policy. Journal of Central University of Finance and Economics.

[4] WI data https://db.cei.cn/.

[5] Kau, Keenan. The theory of house and interest rates. Journal of Financial and Quantitative Analysis, 1999.

[6] Abraham, Jesse & Hendershott, Patric. (1994). Bubbles in Metropolitan Housing Market. Journal of Housing Research. 7.

[7] Wang, Laifu, Guo, Feng, A study on the dynamic image of monetary policy on real estate prices - an empirical evidence based on VAR model. Research on Finance and Economics, 2008, (11): 15-19.

[8] Gouteron S and sqiino D. exeat Monetary liquidity and Asset Price. bank of franctic Paper, 2005, (9):32-34.

[9] Qin, Z. H. A whole study on the relationship between China's real estate market and money supply. Journal of Gansu United University (Social Science Edition), 2006, (3): 33-36.

[10] Ma Zhefeng,Yuan Hui. Empirical analysis of factors affecting real estate prices in China and policy recommendations. Modern Economy: Modern Material Next Edition, 2008(9):7-12.

[11] Hsiao-Ling Luo, Bo Hong, Shi-Chang Ma. Research on real estate price influencing factors based on VAR model. Journal of Central South University (Social Science Edition),2012,18(4):1-7.

[12] Miao Qing. A theoretical and empirical study on the influence of money supply on real estate prices in China . Capital University of Economics and Trade,2018.

[13] Zhao, S.S.. Research on the effect of monetary policy on regulating house prices in different types of cities in China. Henan University, 2020.

[14] B.E. Gong. Study on the real estate price transmission effect of monetary policy in China. Fudan University, 2012.

[15] Wang, H.-T. Zeng Jingjing. A study on the time-varying response mechanism of monetary policy to asset prices in China. Statistics and decision making. 2021.01:139.

[16] Ye X. Dynamic impact relationship between bank loans and house prices in China under macroeconomic environment: An empirical analysis based on SVAR model. Management Review. 2013.09 (2013): 62-71.