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IMPACTS OF MONETARY POLICIES ON THE REAL ESTATE BUBBLE IN HANOI, VIETNAM

Abstract

The development of the real estate market always goes hand in hand with the fluctuation of the economy. In recent years, this market has experienced many recessions and «freezes» associated with the appearance of a real estate bubble. To approach this issue, this paper studies and gives an overview of the real estate bubble and the impact of monetary policies on the real estate bubble in Vietnam. This paper's purpose is to identify and measure the influence of monetary policies, including interest rates, credit and money supply, on the real estate bubble in Ha Noi. The vector autoregression model (VAR) is used to test the interaction of the variables in the model. Dickey-Fuller test (DF) is applied to determine the stationarity of the variables, while the Akaike information criterion (AIC), Likelihood Ratio (LR), Final prediction error (FPE), Hannan-Quinn information criterion (HQ) and Schwarz criterion (SC) are used to find optimal lag of the model; then Granger causality test is utilized to determine the two-way correlation between variables. The results showed that the real estate bubble reacted quickly to shocks from macroeconomic factors representing the monetary policy, consisting of interbank interest rates, credit growth, and money supply growth. Thus, it is concluded that monetary policy is not only the cause of formation, but also one of the effective solutions to deflate the real estate bubble.

Keywords

Hanoi real estate bubble, Vietnamese monetary policy,
interest rate, credit, money supply

JEL Classification

G1, G11, G12, G18

INTRODUCTION

A real estate bubble (housing bubble) is an economic phenomenon when real estate prices surge to an unreasonable level in a short period, accompanied by the optimism of investors about the future. History has shown that this phenomenon may last for a long time with the risk of a bubble bursting. A common explanation for this phenomenon is the occurrence of the supply-demand gap. The influence of monetary policy on the property bubble is explained by the fact that interest rates and credit, affecting the money supply, cause the housing supply-demand curve to change, from which the contractionary or expansionary monetary policy can either increase or decrease housing prices, thereby stimulating or bursting the bubble.

In fact, until now, Vietnam has not had any research exploiting deeply and comprehensively the impact of extremely important factors (monetary policies) on the real estate bubble, as well as, focusing only on analyzing the housing bubble in Ho Chi Minh City but ignoring this phenomenon in Ha Noi.

As a result, being aware of the fact that completing content for other scholars, learning and evaluating the existence of the real estate bubble in Ha Noi and explaining the impact of monetary policies on the

real estate bubble is undoubtedly necessary and urgent, theoretically and practically, this paper is done to research on the impacts of monetary policies on the real estate bubble in Ha Noi.

The research is aimed at (1) constructing a specific framework and theory of the real estate bubble and monetary policy; (2) pointing out and analyzing the existence of the real estate bubble in Ha Noi and Vietnam; (3) evaluating the influence of monetary policy tools on the real estate bubble through quantitative models; and (4) discussing the facts of the Hanoi real estate bubble and governmental solutions to ease the situation.

This study contributes to providing managers and policy makers with a more comprehensive view of the real estate bubble in Vietnam. Vietnam's real estate market in general and Ha Noi's real estate market in particular are currently in a period of instability: prices in many areas have skyrocketed, investment demand has been greatly influenced by the COVID-19 epidemic. Monetary policy is not only the cause of formation, but also one of the effective solutions for deflating the real estate bubble. For managers in the real estate business, it can also be utilized as a source of reference to be able to assess the advantages and disadvantages of the real estate market initiated by alterations of monetary policy.

1. LITERATURE REVIEW

The real estate industry is an important part of the national economy, so the development of this market is always closely tied to the changes in the economy. In recent years, beside growth, the real estate market also has experienced many recessions and “freezes” associated with the appearance of a real estate bubble. To make the issue more approachable, this study provides an overview of the real estate bubble and the impact of monetary policy on the real estate bubble in Vietnam and around the world.

Many studies have been done to confirm the existence of real estate bubbles in different countries. Kim et al. (1993), through analyzing the influence of speculation on the House Price/Rent Index, show the existence of real estate bubbles in Korea and Japan. Different studies in China demonstrate unsimilar findings about the time and the venue of bubble existence and explosion (Chen et al., 2013; Coleman et al., 2008; Tie-Ying Liu et al., 2016). Many regions in the USA were proved to have bubble formations, such as the Northeast, Midwest, South and West regions from 2005–2006 (Zhou et al., 2006), and the whole USA (Nneji et al., 2011). Itamar Caspi (2016) conducted research on the basis of concerns about the bursting of the real estate bubble in Israel based on specific data from 2008 to 2013 and found the emergence of a housing bubble in this period. Coskun et al. (2017) conducted the first study to find a housing bub-

ble in Turkey from Jan 2010 to Dec 2014 and from June 2007 to Dec 2014, but only concluded that the Turkish housing market has experienced some cases of overvalued, but not bubble formation.

In Vietnam, Le Thanh Ngoc (2014) used data series in Ho Chi Minh City from 2004–2013 and found the housing bubble in the study period. Research by Bui Ngoc Toan et al. (2018) and Phan Hoang Long (2020) were also based on the VAR model and confirmed the existence of a real estate bubble in Ho Chi Minh City in the research period (2009–2017) with the apartment segment. Using the same method, there is a study by Tran Le (2020), on the Ho Chi Minh real estate market, which gives similar conclusions.

Meanwhile, Dao Huu Hoa (2013) clarified the mechanism of setting real estate price, and from there confirmed the existence of a bubble in the real estate market in Vietnam. Truong Quang Hien et al. (2018) quantified factors such as location, shape of land, direction, purpose of use, etc. of the housing market in Bong Son, Hoai Nhon, Binh Dinh to establish a house pricing model for each region in the area. From there, actual housing price data on the market were compared as a basis to confirm the existence of a housing bubble. Using the same method, the studies by Pham Huu Ty et al. (2015) on urban land prices in Ha Tinh and Dao Ngoc Mai (2018) on the Thai Binh real estate market in the period 2015–2018 also concluded about the existence of bubbles.

Many other studies have been conducted to find the impact of monetary policies on the housing market in different countries. Xiaoqing Eleanor Xu and Tao Chen (2012) used a quantitative vector autoregression (VAR) model to measure the impact of monetary policy on the Chinese housing market from 1998 to 2010. The study showed that variables of the long-term benchmark bank loan rate, money supply growth, and mortgage credit policy indicator moved in parallel to the formation of a real estate bubble. Besides, expansionary monetary policy tended to accelerate house price growth, while contractionary monetary policy tended to slow down house price growth. Monetary policy tools that have a strong impact on the real estate market were given, including: (1) Required reserve ratio; (2) Interest rates, and (3) Open Market Operations (OMO).

Na Yan (2019), through the results of using the VAR regression model, showed that a country's monetary policy played a very important role in the real estate market, whether the impact was observable or not. It is shown that both money supply and interest rates had an impact on real estate prices. Therefore, the central bank could use interest rates as a tool to regulate the behavior of real estate market participants, thereby controlling supply – demand and real estate prices. Besides, the government should concentrate on regulating the money supply to the equilibrium point of the real estate market because ill-implemented policies will widen the gap between supply and demand of real estate.

Besides, Subramaniam S. Pillay also studied the Chinese real estate market (2010) and built a perfect model to verify the existence of the real estate bubble in Singapore, while Stefan Gerlach (2003) built a model to evaluate the influence of bank credit flows on the growth of real estate prices in Hong Kong.

Mark Thornton (2009), John F. McDonald and Houston H. Stokes (2011) all agreed that the FED's low interest rates (specifically, below 2% from the end of 2001–2002 to less than 1% in 2004) conditioned the formation of the 2008 US housing bubble, as well as the ineffective implementation of monetary policy. Tsatsaronis and Zhu (2014) found that lending rates explain 10.8% of the change in house prices. When interest rates are floating, short-term rates have a stronger impact on house prices than long-term rates.

In Vietnam, Le Thanh Ngoc (2014) used modeling and inductive methods to find out the causes of the real estate bubble and the reverse effect of the real estate bubble on the economy in Ho Chi Minh City. According to the research, the total bank loans for real estate increased the most drastically in 2007, which was also the year the housing fever occurred in Ho Chi Minh City. In the following years, this rate decreased along with the slump of the real estate market. The real estate bubble in Ho Chi Minh City is also affected by money supply and capital into the real estate market. M2 money supply growth peaked in 2007 and then recession, along with the depreciation of the real estate market. During the period from 2010 to 2012, the money supply was low and the real estate market fell into a frozen state.

In addition, Doan Thanh Ha (2013) also used a self-regressive vector quantitative model to intensively analyze the contemporary situation of housing prices in Ho Chi Minh City in particular and in Vietnam in general based on data gathered from different surveyors and reliable sources: Real Estate Market Division – Ministry of Construction, National Financial Supervision Commission, General Statistics Office. By the method of data analysis, two periods have been demonstrated clearly signaling the boom – slump of the real estate bubble in Vietnam. Do Duy Tan and Phuong Lan Le (2022) found evidence of contagion between stock bubbles and real estate bubbles in Vietnam by Granger causality test, however, contagion effect was found to move from the real estate market to the stock market, not the backward way.

Most studies have shown that the real estate market is associated with monetary policy and is directly affected by interest rates and money supply of the central bank. Studies also show that the cause of the housing crisis is largely attributed to the unreasonable monetary policy of that state. And to solve the problem of the real estate bubble, the most effective tool is still monetary policy.

Given that literature review, some hypotheses for this paper are constructed as follows:

H1: The Savills Real Estate Price Index in Ha Noi (SPPI) in the previous quarters has an influence on itself in the present.

- H2: *Overnight interbank interest rates in previous quarters affect the current Savills Ha Noi real estate price index (SPPI).*
- H3: *The 6-month interbank interest rate in the previous quarters affects the current Savills Ha Noi real estate price index (SPPI).*
- H4: *Credit growth in the previous quarters affects the current Savills Ha Noi real estate price index (SPPI).*
- H5: *Growth of M2 money supply in previous quarters affects the current Savills Ha Noi real estate price index (SPPI).*

2. METHOD

VAR model (Vector Auto Regression) is chosen in this study based on the theoretical model studied by Na Yan (2019) and Le Thanh Ngoc (2014) to test the interaction among the variables in the model, especially the influence of variables representing monetary policies on the SPPI price index, which represents the real estate bubble. Accordingly, besides estimating the VAR model, within the scope of this research paper, other various tests are also used with a view to:

- Determining the stationarity of the variables by Dickey-Fuller test (DF).
- Finding the optimal delay for the model based on the criteria Akaike (AIC), Likelihood Ratio (LR), Final prediction error (FPE), Hannan-Quinn information criterion (HQ) and Schwarz (SC).
- Determining the two-way correlation among variables by Granger causality test.
- Using the Impulse response function and the variance decomposition to present and analyze the VAR model results.

The secondary data collected was in the form of time – series data from the first quarter of 2009 to the first quarter of 2019 from different sources, such as Savills Corporation Vietnam, the website of the State Bank of Vietnam and the website vi-

etstock.vn. After collecting the data, the research team used Microsoft Excel to calculate the average quarterly data, and Stata 16.0 software to make descriptive statistics of the variables.

The five main variables used in the model are explained in detail as follows:

SPPI in Ha Noi (SPPI – Savills Property Price Index): represents the quarterly fluctuations of real estate prices across different segments of the market as calculated by Savills Vietnam. Accordingly, for the Ha Noi housing market, the index is built based on a fixed sample basket of more than 161 projects in the primary and secondary markets. The basket, nevertheless, is updated regularly with new projects to ensure timely response to market changes and applies a “liquidity ratio” to adjust the asking and trading prices to get the most accurate results. The increase or decrease of SPPI shows the corresponding fluctuations of real estate prices traded on the market and this is also one of the manifestations of a real estate bubble. (Unit: point)

Interbank interest rate (R1 – Interbank overnight interest rate, R6 – Interbank interest rate for 6-month term): is a part of the interest rate tool, an important transmission channel of monetary policy that affects subjects in the real estate market and real estate prices. The high interbank interest rate also reflects an increase in capital demand of commercial banks, which may stem from people’s demand for loans for real estate investment. Besides, in the research period mentioned above, the interbank interest rate is the only interest factor with clear fluctuations, suitable for testing. (Unit: %)

Credit growth (TM): is the rate of increase in the money supply for entities in the economy compared to the previous month. The higher the commercial value, the more credit is loosened, the greater the demand for real estate due to buyers’ psychology. Meanwhile, the supply of real estate cannot meet the demand, leading to the soaring prices of real estate, thus the formation of a bubble. (Unit: %)

Growth of money supply M2 (TM2): represents the growth rate of M2 money supply over the months, an important factor in forecasting eco-

The model is represented as a matrix:

$$\begin{bmatrix} SPPI_t \\ R1_t \\ R6_t \\ TM_t \\ TM2_t \end{bmatrix} = \begin{bmatrix} c_{1t} \\ c_{2t} \\ c_{3t} \\ c_{4t} \\ c_{5t} \end{bmatrix} + \sum \begin{bmatrix} \alpha_{1i} & \beta_{1i} & \delta_{1i} & \gamma_{1i} & \lambda_{1i} \\ \alpha_{2i} & \beta_{2i} & \delta_{2i} & \gamma_{2i} & \lambda_{2i} \\ \alpha_{3i} & \beta_{3i} & \delta_{3i} & \gamma_{3i} & \lambda_{3i} \\ \alpha_{4i} & \beta_{4i} & \delta_{4i} & \gamma_{4i} & \lambda_{4i} \\ \alpha_{5i} & \beta_{5i} & \delta_{5i} & \gamma_{5i} & \lambda_{5i} \end{bmatrix} \begin{bmatrix} SPPI_{t-i} \\ R1_{t-i} \\ R6_{t-i} \\ TM_{t-i} \\ TM2_{t-i} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \end{bmatrix}, \quad (1)$$

conomic problems and a tool of monetary policy. When the Central Bank acts to increase the money supply, real estate lending increases, leading to an increase in the supply and demand of real estate. However, the increase in supply is not equal to the increase in demand, which in turn caused real estate prices to increase. (Unit: %)

where $i = 1, p$ is a lag order; $SPPI_p, SPPI_{t-i}$: Savills Real Estate Price Index in Ha Noi in period t and period $t-i$; $R1_p, R1_{t-i}$: Interbank overnight interest rate in period t and period $t-i$; $R6_p, R6_{t-i}$: Interbank interest rate for 6-month term in period t and period $t-i$; TM_p, TM_{t-i} : Credit growth in period t and period $t-i$; $TM2_p, TM2_{t-i}$: Growth of money supply $M2$ in period t and period $t-i$; $c_{jt}, \alpha_{jt}, \beta_{jt}, \gamma_{jt}, \delta_{jt}, \lambda_{jt}$ – coefficients, with $j = 1, 2, 3, 4, 5$ respectively; ε_{jt} – white noise errors that can be contemporaneously correlated, with $j = 1, 2, 3, 4, 5$ respectively.

3. RESEARCH RESULTS

After doing the stationarity test, the results are shown as follows. It can be seen that the variables SPPI, R1, R6, TM, TM2 in the original series are non-stationary. However, when taking the first-order difference, all variables were stationary at the 5% confidence level.

Table 1. DF test results

Source: Compiled by authors from Stata 16.0.

Variable	Original results		Results after first-order difference		Variable after difference
	DF	P-value	DF	P-value	
SPPI	-1.254	0.6499	-3.754	0.0034	DSPPI
R1	-1.447	0.5594	-4.739	0.0001	DR1
R6	-0.866	0.7990	-4.634	0.0001	DR6
TM	-1.711	0.4256	-6.840	0.0000	DTM
TM2	-2.206	0.2040	-7.493	0.0000	DTM2

It is determined that the lag at $p = 4$ was selected according to three criteria: FPE, AIC and HQIC.

Granger causality test results are shown below. The results showed that there was a Granger cause-oriented relationship between the variable SPPI and R1, as well as between SPPI and R6. Besides, SPPI had an impact on the credit growth variable (TM) and the money supply growth variable M2 (TM2), while in the opposite direction, these variables did not affect the SPPI variable in the period 2009–2019.

Table 2. Granger causality test results

Source: Compiled by authors from Stata 16.0.

Hypothesis $H0$	chi2	Prob>chi2
DSPPI has no effect on DR1	14.608	0.006
DR1 has no effect on DSPPI	46.054	0.000
DSPPI has no effect on DR6	9.5692	0.048
DR6 has no effect on DSPPI	40.333	0.000
DSPPI has no effect on DTM	11.158	0.025
DTM has no effect on DSPPI	4.5661	0.335
DSPPI has no effect on DTM2	12.381	0.015
DTM2 has no effect on DSPPI	1.6959	0.791

Note: Reject hypothesis $H0$ if p -value $< 5\%$.

Parameter estimation results of the VAR model are presented here. By testing the stability, normal distribution, autocorrelation and stationarity of

the residuals, it can be concluded that the research model satisfied all the above conditions of econometrics at the 5% confidence level. Next, after estimating the VAR model, the impact of various factors on SPPI can be clearly seen as follows: the overnight interbank interest rate variable (R1) and 6-month term (R6) along with the real estate price index SPPI had a positive impact on the bubble variable with the lag of one to three period. The remaining variables, including credit growth (TM) and money supply growth M2 (TM2), were not statistically significant.

Table 3. VAR model estimation results

Source: Compiled by authors from Stata 16.0.

	Coef.	Std. Err.	z	P> z	
DSPPI					
DTM	L1.	0.2819894	0.2378264	1.19	0.236
	L2.	-0.0179957	0.2127517	-0.08	0.933
	L3.	0.1474412	0.2361063	0.62	0.532
	L4.	0.1079271	0.3270862	0.33	0.741
	_cons	-0.9061163	0.6014333	-1.51	0.132
DSPPI					
DTM2	L1.	0.2923714	0.2416807	1.21	0.226
	L2.	0.0237659	0.2161996	0.11	0.912
	L3.	-0.1456958	0.2399327	-0.61	0.544
	L4.	0.1165376	0.332387	0.35	0.726
	_cons	-0.8101118	0.6111803	-1.33	0.185
DSPPI					
DSPPI	L1.	-0.1442359	0.1634214	-0.88	0.377
	L2.	0.6346499	0.1461914	4.34	0.000
	L3.	0.1225896	0.1622394	0.76	0.450
	L4.	-0.7121575	0.2247558	-3.17	0.002
	DR1				
	L1.	1.380057	0.4786897	2.88	0.004
	L2.	-1.16306	0.554211	-2.10	0.036
	L3.	-0.5236249	0.4098387	-1.28	0.201
	L4.	-0.5767402	0.4324326	-1.33	0.182
	DR6				
	L1.	0.4349003	0.9524204	0.46	0.648
	L2.	0.8533322	0.7517964	1.14	0.256
L3.	2.061631	0.7161487	2.88	0.004	
L4.	0.0838902	0.6728404	0.12	0.901	
DTM					
L1.	-0.2357018	0.2296274	-1.03	0.305	
L2.	0.2123085	0.1710587	1.24	0.215	
L3.	0.2871723	0.1615677	1.78	0.076	
L4.	0.0996496	0.1664915	0.60	0.549	
DTM2					
L1.	0.3018763	0.2532729	1.19	0.233	
L2.	-0.3812005	0.2154733	-1.77	0.077	
L3.	-0.2384131	0.17378	-1.37	0.170	
L4.	-0.1307856	0.180557	-0.72	0.469	
_cons	-0.1881057	0.4132723	-0.46	0.649	
DSPPI					
DR1	L1.	-0.1813988	0.0621626	-2.92	0.004
	L2.	-0.0884577	0.0556086	-1.59	0.112
	L3.	0.388969	0.061713	6.30	0.000
	L4.	-0.0649714	0.0854932	-0.76	0.447
	_cons	0.1055137	0.1572015	0.67	0.502
DSPPI					
DR6	L1.	-0.022788	0.0290463	-0.78	0.433
	L2.	-0.008133	0.0259838	-0.31	0.754
	L3.	0.141326	0.0288362	4.90	0.000
	L4.	0.0580157	0.0399478	1.45	0.146
	_cons	0.0117864	0.0734544	0.16	0.873

	Coef.	Std. Err.	z	P> z	
DSPPI					
DTM	L1.	0.2819894	0.2378264	1.19	0.236
	L2.	-0.0179957	0.2127517	-0.08	0.933
	L3.	0.1474412	0.2361063	0.62	0.532
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	L4.	0.1165376	0.332387	0.35	0.726
	_cons	-0.8101118	0.6111803	-1.33	0.185

3.1. Impulse response function then is conducted

The analysis results showed that the SPPI variable responded to all the shocks from the selected variables in the model right from the first period in a positive direction and at different levels, as well as lasted for different time periods. However, compared to its response to itself, TM, and TM2, the SPPI variable had a stronger response to two variables R1 and R6.

3.2. Variance decomposition

The results of variance decomposition by SPPI showed that the endogenous shocks from the real estate market played a relatively large role in explaining the change in SPPI (67 – 79%). Then, the variable R1 explained about 15-17% of the variation, while the remaining variables R6, TM, and TM2 only explained a very small part with the values respectively: 0.3-5%, 0.4-4% and 2-7%.

4. DISCUSSION

Based on the results of the model, further details can be discussed.

Firstly, the results obtained from the VAR model and the tests of overnight interbank interest rate (R1) and 6-month term (R6) variables are consistent with the theory studied by the group. In the first period of 2008, when inflation showed signs of increasing, the State Bank of Vietnam promptly implemented a flexible monetary policy and lowered interbank and credit interest rates. This

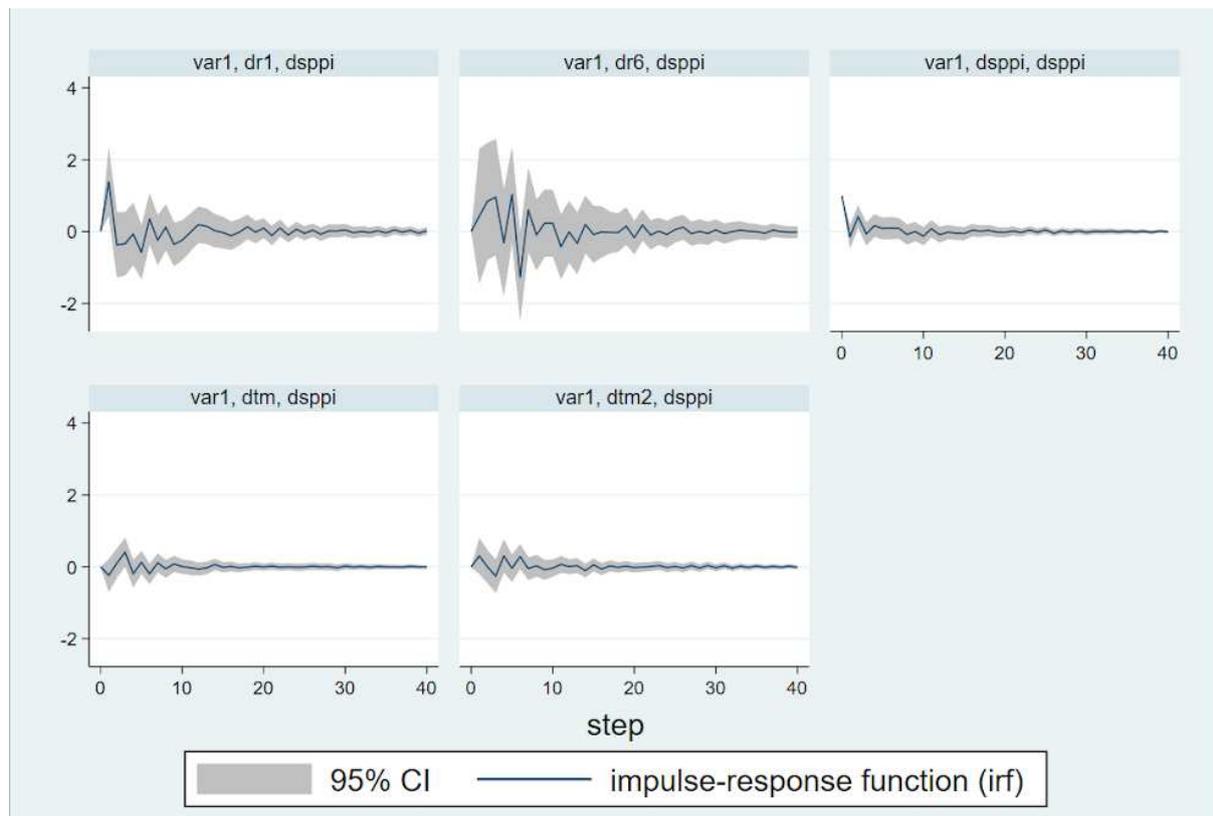


Figure 1. Impulse response results of SPPI to various variables

made it easier for businesses to access credit capital, leading to an excess of credit in the economy and a rise in real estate prices. From 2009 to the first half of 2011, with signs of a bubble flashing, the State Bank of Vietnam tightened the monetary policy by increasing interest rate followed by the need for loans between banks to offset the required reserve ratio, as well as a decline in lending, which made it more difficult for businesses and investors to access loans as banks became more cautious in their lending policies. Besides, in explaining for results of the variance decomposition test showing that R1 explains more of the volatility of the bubble than the variable R6, the group argues that long-term interest rates are often behind the short-term interest rates on managing the bubble (Doan Thanh Ha & Le Thanh Ngoc, 2013).

Secondly, clarifying the lack of statistical significance of the credit growth variable (TM) in the model and test results obtained, it is believed that the use of the general credit growth instead of real estate credit growth as a variable can result in inaccuracy in interpreting the impact of credit on

the real estate bubble because, from 2009 to 2011, the decline in real estate credit growth was slower compared to the decline in total credit in the previous year. However, theoretically, the variable TM has been found to have an impact on the real estate bubble because an increase in credit will, in turn, trigger an increase in the capital flowing into both the economy and the real estate market, raising the amount of money in circulation and escalating the housing prices. In this situation, the State Bank of Vietnam implemented a tightening monetary policy to control the supply of credit capital, as a result, from the second half of 2011, credit growth declined, which cooled down the housing market.

Thirdly, although the results of the VAR model did not provide statistical significance to the influence of money supply growth M2 on the SPPI variable, the tests found that SPPI responded to the shock from M2 and this variable partly explains the volatility of the real estate price index variable. In fact, in late 2010 and early 2011, due to the loosening monetary policy, stimulus packages, and interest

rate support policies applied since 2009, a large amount of money was pumped into the economy. This led to a large amount of capital pouring into the real estate market, causing real estate prices to surge. Facing that situation, the Central Bank implemented a tightening policy, with the goal of reducing the amount of money circulating in the economy, making it difficult for most businesses, including real estate businesses, to access capital. Therefore, many businesses fell into stagnation or bankruptcy and the supply of real estate was tightened.

Fourth, besides the variables representing monetary policy, the SPPI variable also contributed to the fluctuations of the real estate price index. This aligns with the fact that the bubble is formed from speculative sentiment in the real estate mar-

ket. When real estate price reaches its attractive price level, it will encourage more and more investors with speculative motives to join the market, making the liquidity and demand for real estate skyrocket. The increasing demand and shrinking supply drive real estate prices up to a record high figure (Doan Thanh Ha & Le Thanh Ngoc, 2013). With prices anchoring high and the fear of loss infused among investors, a spike in demand for real estate speculation was recorded. This explains the results of the variance decomposition function, which showed that the impact of SPPI on itself accounted for about 67%-79%. Moreover, the monetary policy variable modestly contributes to an increase in SPPI. This implies that monetary policy is a catalyst for the real estate market, while the main cause of the bubble in the psychology and behavior of real estate investors.

CONCLUSION

In summary, the study has completed all the goals set out initially, however, there are still some limitations that cannot be resolved within the framework. Firstly, the sample size and research time scope are limited because there are many difficulties in accessing real estate price data and macro variable data in Vietnam. Besides, due to the limitation in finding statistical data of Vietnam, only the impact of overnight and 6-month interbank interest rates, credit growth (TM) and growth money supply M2 (TM2) to the housing price index in Ha Noi can be assessed. These variables represent monetary policies in Vietnam but are not the most optimal. Moreover, the research team has proposed a number of solutions to deal with the real estate bubble, but those solutions are only relevant to general market participants such as commercial banks, business enterprises and real estate investors. There are no clear solutions for people who are in real need of accommodation.

This study has met the aims of constructing a theory of the real estate bubble and monetary policy correlation, and analyzing the existence of the real estate bubble in Ha Noi and Vietnam so that the influence of monetary policy tools on the real estate bubble can be analyzed using a quantitative model and further issues of governmental control can be discussed. The results from VAR model have demonstrated that (1) there was a Granger cause-oriented relationship between the variable SPPI and R1, as well as between SPPI and R6. (2) Besides, the overnight interbank interest rate variable (R1) and 6-month term (R6) along with the real estate price index SPPI had a positive impact on the bubble variable with the lag of one to three period. (3) Moreover, this study documented that the SPPI variable responded to all the shocks from the selected variables in the model right from the first period in a positive direction and at different levels, as well as lasted for different time periods. However, compared to its response to itself, TM and TM2, the SPPI variable had a stronger response to two variables R1 and R6. (4) The endogenous shocks from the real estate market played a relatively large role in explaining the change in SPPI (67-79%), while the variable R1 explained about 15-17% of the variation.

Upon learning those findings, the government should take into consideration the need to have judicious monetary policies to prevent the emergence of a real estate bubble during the country's developing period. Among the resolutions made by the government, controlling overnight interbank interest rate as well as 6-month interbank interest rate is the most important monetary policy that should be well considered.

AUTHOR CONTRIBUTIONS

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