

Analysis of Influencing Factors of Real Estate Price Fluctuation in Ho Chi Minh City Province Based on VAR Model

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Abstract

In recent years, the real estate industry occupies a crucial position that plays a pivotal role in the national economy. The real estate market contains huge economic capital and the total value of real estate usually accounts for about 40% of a nation's assets. Vietnam's economic development is very strong, and with this development, the real estate industry is still developing rapidly. The real estate industry has gradually grown into a mainstay of Vietnam's economic system and its contribution to Vietnam's GDP cannot be underestimated, which created significant effects on the economic situation and industrial structure of Vietnam. Based on the literature review and practical situation of using VAR model, the author conducted to analyze macroeconomic factors affecting housing prices in Ho Chi Minh City..

Keywords

Real estate; Vietnam; Land price; VAR model; Real estate price; Fluctuation, HCM City.

1. Research and analyze factors influencing on the real estate prices

Most countries and regions have analysis systems of real estate, land, real estate transactions, and real estate services. Real estate is such a complex concept, which is a legal term in many countries such as the United Kingdom, Canada, Australia, the United States and the Bahamas.

This thesis will focus on analyzing the situation of real estate including construction and land in Ho Chi Minh city based on the economic development situation of Vietnam.

1.1 Economic development

In fact, GDP is considered an indicator of economic conditions. If the economic situation is stable, companies will need more workers to increase production, which will help reduce unemployment and increase workers' wages, leading to increased procurement demand. For foreign investors, this will be a great opportunity. In addition, GDP per capita will also indicate the relative income of a country and the quality of life of its people to reflect the level and foundation of overall macroeconomic development. In real estate development, there must be a certain correlation between GDP and housing prices. The optimistic economic situation will attract more investment, especially real estate investment funds will increase significantly, this will push housing prices up. Theoretically, the better the economic growth, the greater the likelihood of house price increases and the two parties are positively involved.

1.2 Per capita income

The increase in per capita income (IN) is a socioeconomic indicator that helps to reflect a nation's standard of living and development. This index is based on the results of a survey of living standards of the population every two years. Per capita income determines their actual purchasing power and

so determines housing consumption. that is. The increase in disposable income of urban residents will increase the amount of money people use to buy houses, and make people want to improve their living standards. This stimulates demand for real estate, thereby pushing up housing prices to a certain extent. Therefore, home prices and income per capita also need a positive correlation.

1.3 Interest rate

The interest rate (R) is a part of the real estate developers' financial costs. If interest rates fall, then investors or borrowers who want to buy real estate can receive money at a lower cost and the profit of real estate development is relatively safe, so investors will receive relatively significant benefits. The characteristics of the real estate industry determine that interest rates are an important factor affecting real estate prices. Real estate itself is a high debt industry. Most real estate developers get through debt financing. Therefore, lending interest rates will certainly affect real estate prices.

1.4 Money Supply

Fact indicated that the money supply (MS) will affect the real estate investment credit scale from the supply side and the demand from the demand side. Vietnam's financial market has been developing at a slower pace, the market mechanism is still in its infancy and the proportion of indirect funding is high. Real estate investment requires bank-level credit information. main. , Affect the buying level from the demand side. One of the factors contributing to the development of the real estate market is the monetary policy of the government. If you put money into the market, it will help increase financial investment in the real estate market.

1.5 Land price

Land price is a significant component of real estate, and its trend directly affects housing prices. This is because: First, in housing prices, low prices often account for 50% to 60% of the old price. The second is the development of the national economy and urban construction, resulting in an increase in the price of land sold. Especially with the progress of Vietnam's urbanization process, urban land resources are increasingly scarce and the amount of land gold is increasing. The third is Vietnam's accession to the WTO (2006). Some large and medium-sized cities have developed international routes. The functions of the city and its policy factors have caused a significant increase in districts or cities.

1.6 Other prerequisites

When discussing supply and demand to determine prices, the market is based on the assumption that reasonable consumers are often out of control. Although house prices have risen, there are still people queuing up to buy because consumers want house prices to rise further. At the same time, the prosperity of the real estate industry will also affect consumer expectations. During difficult times in real estate, consumers will expect housing prices to rise further. At the same time, the prosperity of the real estate industry will also affect consumer expectations. During difficult times in real estate, consumers will expect housing prices to rise further. In order not to have to spend more money to buy the same commercial housing in the future, many consumers will choose to buy it, which makes the demand for real estate more open. During a downturn in the real estate industry, consumer expectations will conflict, which will reduce demand for real estate.

2. The basic concepts of the VAR model

Vector automatic regression model uses each endogenous variable in the system as a function of the lag value of all endogenous variables in the system to build the model, thus extending the spontaneous model. transform into a spontaneous "vector time series variable" Vector. In short, the VAR model is treating all variables as a vector and then executing its regression on its lag.

The mathematical formula of the VAR (p) model is:

$$Y_t = A_0 + A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + \varepsilon_t \quad t=1,2,\dots,T$$

Where: Y_t is the endogenous n-dimensional variable

A_0 is a constant term

A_1, A_2, \dots, A_p is the estimated coefficient matrix;

ϵ_t is a noise vector, they can be related to each other at the same time, but not to their own lag value

Not related to the variable on the left side of the equation. Suppose is covariance matrix of ϵ_t , is positive definite matrix ($n * n$).

3. Current situation of real estate prices in Ho Chi Minh City

In fact, in Ho Chi Minh City, Vietnam, especially in terms of psychology, most people still prefer to own land or build a house instead of buying an apartment.

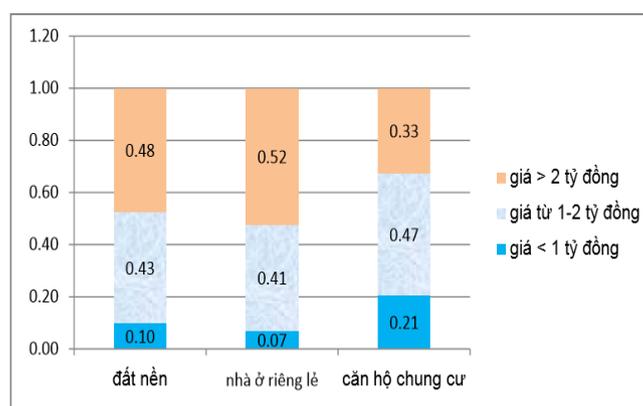


Figure 1: Structure of housing demand by price in Ho Chi Minh City

(Source: Banking Research Institute)

Based on the price, real estate is divided into three kinds: under 1 billion, from 100 to 2 billion, over 2 billion.

Survey results show that the price of the housing segment is from 1 billion to 2 billion, accounting for the highest rate of 47.19%, followed by the housing segment with prices exceeding 2 billion, accounting for 28, 15%; Houses under one billion rupiah make up 24.66%. Housing demand has a different distribution according to the prices of different market segments. As for demand for apartments, because the characteristics of buyers are mainly low and middle income people, cheap apartments are the first choice. Demand for apartments priced at less than VND 1 billion accounts for 41%, for apartments priced from VND 1 billion to VND 2 billion, accounting for 43%, and for apartments priced over VND 2 billion accounting for 16%. This result reflects a very serious imbalance between supply and demand of apartments in the market in terms of product factors and prices. When the real estate market is booming, speculation demand rises, causing many real estate manufacturers to mistakenly believe that high-end luxury products are easily absorbed by the market, which helps them earn huge profits.

3.1 Town houses

Townhouses are products targeted at families with middle or higher income. Therefore, the demand for medium to high price segments accounts for a relatively large proportion. Demand for houses ranges from VND 100 billion to VND 2 billion, accounting for 52.39%, houses priced at over 2 billion losses account for 31.75% and the rest are only 15 market segments with prices below 1 billion losses. 85%.

3.2 Land

For land, including project land and family-provided land, buyers range from affordable and lower-income families to families. The family has high income and high income.

As a result, the proportion of demand is proportional to each price level relative to that of other types of housing. Demand for price segments from VND 100 billion to VND 2 billion accounts for 44%, prices of less than VND 1 billion account for 33% and prices of over VND 2 billion account for 23%.

3.3 Wooden houses

Wooden houses/townhouses in the garden are just products for high-income families, so no market segment is priced below 1 billion. The price part is about VND 2 billion, accounting for about 20%, the rest is the high price with the price exceeding VND 2 billion, accounting for 80% of the demand.

4. Empirical analysis of factors affecting real estate prices in Ho Chi Minh.

In this thesis, the author used macroeconomic variables including: growth rate of national income (GDP), inflation (CPI), long-term lending interest rate (R), foreign investment capital into real estate. In addition, the real estate market (FDI) and per capita income (IN) in Ho Chi Minh City, Money Supply (M2) assess the correlation with the average selling price of commercial housing (HP). Variables are used in the form of natural logarithms. The data used is annual data from 2000 to 2019.

4.1 Augmented Dickey Fuller Test (ADF)

Econometric studies have shown that most macroeconomic time series variables are not fixed and that the use of non-fixed variables leads to false regression. The unit root test in this study is used to check whether time series variables: HP, GDP, R, RE, CPI, FDI, IN, M2 are fixed. Table 1 shows the unit root test results of variables based on the enhanced Dickey-Fuller (ADF) standard.

Table 1: Tests of variables in the model

Variables	ADF	Rejected Value			P value	Results
		1%	5%	10%		
LNHP	-0.494208	-3.886751	-3.052169	-2.666593	0.8699	No Stationary
D(LNHP)	-6.487326	-3.857386	-3.040391	-2.660551	0.0001	Stationary
CPI	-2.995934	-3.920350	-3.065585	-2.673459	0.0567	No Stationary
D(CPI)	-10.83247	-3.857386	-3.040391	-2.660551	0.0000	Stationary
LNGDP	-2.924907	-3.886751	-3.052169	-2.666593	0.0632	No Stationary
D(LNGDP)	-3.303863	-3.920350	-3.065585	-2.673459	0.0323	No Stationary
LNFDI	-4.009971	-3.959148	-3.081002	-2.681330	0.0091	Stationary
M2	8.219679	-3.831511	-3.029970	-2.655194	1.0000	No Stationary
D(M2)	-5.837929	-3.920350	-3.065585	-2.673459	0.0003	Stationary
IN	1.863568	-3.831511	-3.029970	-2.655194	0.9995	No Stationary
D(IN)	-3.640713	-3.857386	-3.040391	-2.660551	0.0155	Stationary
R	-4.019902	-3.831511	-3.029970	-2.655194	0.0048	Stationary
RE	-0.834034	-3.857386	-3.040391	-2.660551	0.7847	No Stationary
D(RE)	-5.955694	-3.857386	-3.040391	-2.660551	0.0001	Stationary

The table above shows that at the reliability degree of 0.05, the chains of LNHP, CPI, LNFPI, LNGDP, IN, R, M2 and REN all rejected the null hypothesis and all passed the fixed test without distinguish. In addition, the consolidation test is aimed at unstable variables with a stable equilibrium relationship, so this article does not need to perform a consolidation test, but just select a reasonable lag order and build VAR model to prepare for the next test.

4.2 Establishing concept model

There are many ways to choose the lag of a VAR model. This study proposes a standard method of selecting VAR lag to find the appropriate lag of a model.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-396.0731	NA	6.11e+10	47.53802	47.93012	47.57699
1	-293.0361	96.97600*	1.61e+09*	42.94543*	46.47433*	43.29621*

Note: * is the most chosen lag order in the approximate side

The result of the model's optimal lag test (see Table 2) shows that the optimal lag order according to AIC criteria is the 1st order and the optimal lag order using SC criteria is the 1st order. At this point, the optimal lag order in LR is also order 1, so it is possible to determine that the model's optimal lag order is order 1.

4.3 Granger causality test

The next step is to use the Granger causality test to determine if the selected macroeconomic variables are related to Ho Chi Minh City's HP index. This test is used to analyze the relationship between variables. It evaluates whether the lag variable of one variable can be affected by the lag variable of other variables. If a variable does not have a Granger causal relationship with the explained variable, then it is exogenous and the VAR model must be reset and should only be endogenous.

Table 3: Granger causality test results

Hypotheses	F-Statistic	Prob
LNGDP does not Granger Cause LNHP	0.12918	0.7240
LNHP does not Granger Cause LNGDP	0.9656	0.3404
LNFDI does not Granger Cause LNHP	2.61963	0.1251
LNHP does not Granger Cause LNFDI	0.93328	0.3484
IN does not Granger Cause LNHP	5.77807	0.0287
LNHP does not Granger Cause IN	3.30959	0.0876
CPI does not Granger Cause LNHP	2.11579	0.1651
LNHP does not Granger Cause CPI	0.03925	0.8455
M2 does not Granger Cause LNHP	7.58802	0.0141
LNHP does not Granger Cause M2	0.83551	0.3743
R does not Granger Cause LNHP	1.1951	0.2905
LNHP does not Granger Cause R	0.5975	0.4508
RE does not Granger Cause LNHP	4.1883	0.0575
LNHP does not Granger Cause RE	0.36565	0.5539

As can be seen from the table at the confidence level of 0.05, there is a significant Granger relationship between the average selling price of LNHP volatility of commercial housing L and IN volatility, and the initial assumption that RE is not GNH is the Granger of LNHP cannot be denied. At a confidence level of 0.1 and M2 affects HP in the Granger sense. Therefore, these three variables can become endogenous variables in the VAR model.

4.4 Testing the stability of the model

After building the VAR model (3), we should evaluate whether the model is stable or not. If the estimated model is not stable enough, the validity of the experimental results will be affected. This test can be evaluated with AR Roots Graph of EViews. The points in the unit circle represent the roots of the characteristic polynomial of the VAR system. If the unit roots are all smaller than 1, that means the model is stable and the VAR construction is completed. Handling the original sequence. It can be seen in Figure 2 that all the roots are in the unit circle, that is, the model is stable.

Inverse Roots of AR Characteristic Polynomial

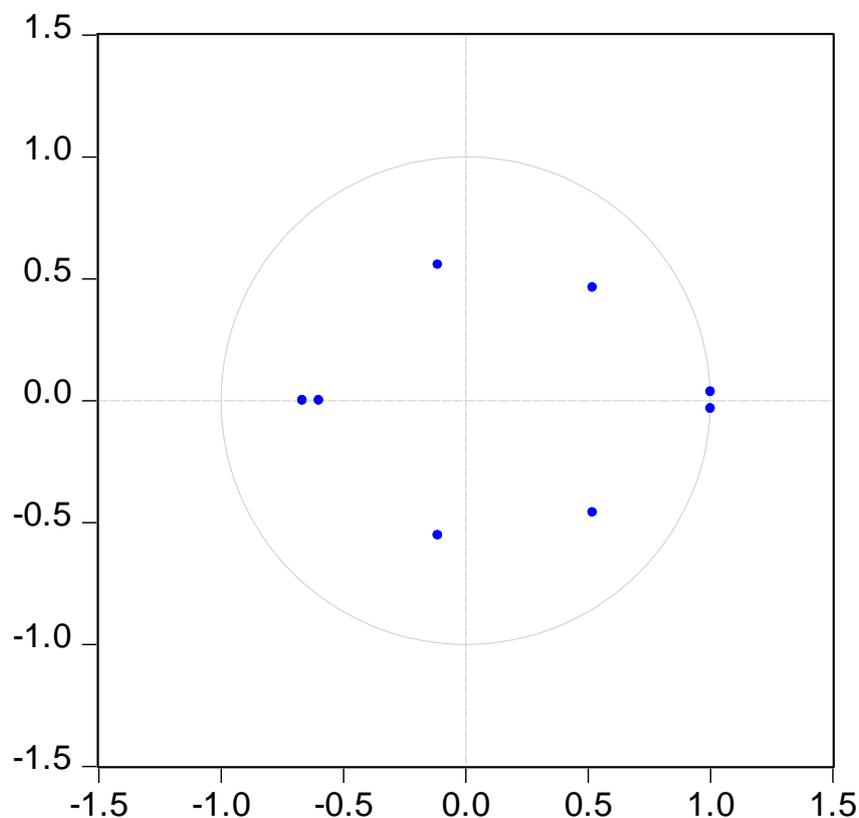


Figure 2: The stability of the model

4.5 Analysis of empirical results

a. Impulse Response Function

In the empirical analysis of the spontaneous vector model, there is not much analysis on the coefficients. This is because in the case of many variables and lag cycles, the number of VAR model coefficients is often large and the dynamic relationship is reflected by a single limiting factor. Therefore, after the VAR model is built, the impulse response function is used to reflect the impact of one variable on other variables. The advantage is that it can visually reflect the effects between variables. The direction and degree of influence accurately describe the dynamic correlation between variables in the model system.

Response of CPI to LNHP Innovation using Cholesky (d.f. adjusted) Factors

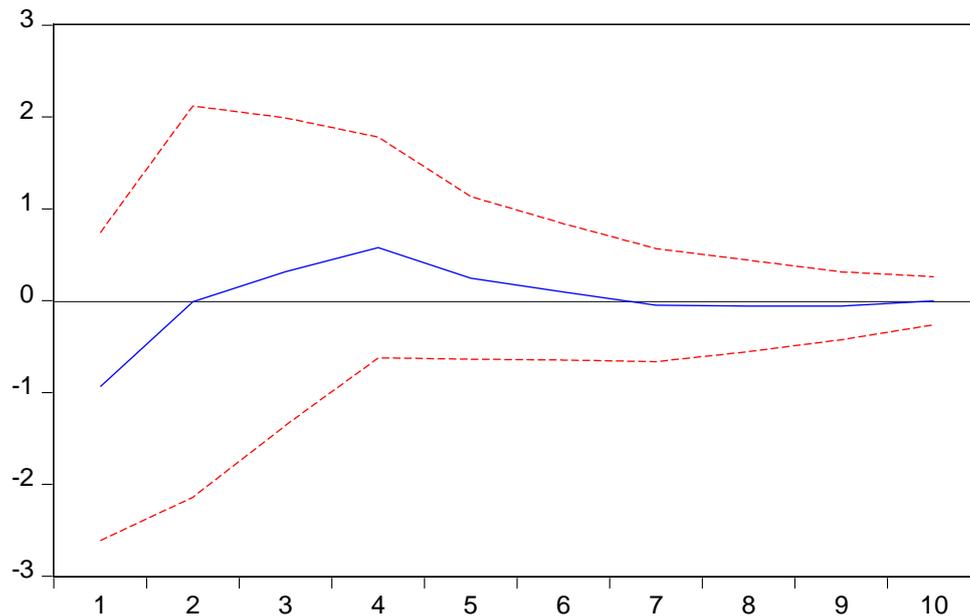


Figure 3: Response of CPI to LNHP Innovation

The impact of CPI has led to an increase in the average selling price of commercial housing, the HP index. The greatest impact is the delay time from the second to the fifth cycle, then reduced to zero. When a real estate bubble occurs, the rise in real estate prices escapes the real value of the property.

Response of IN to LNHP Innovation using Cholesky (d.f. adjusted) Factors

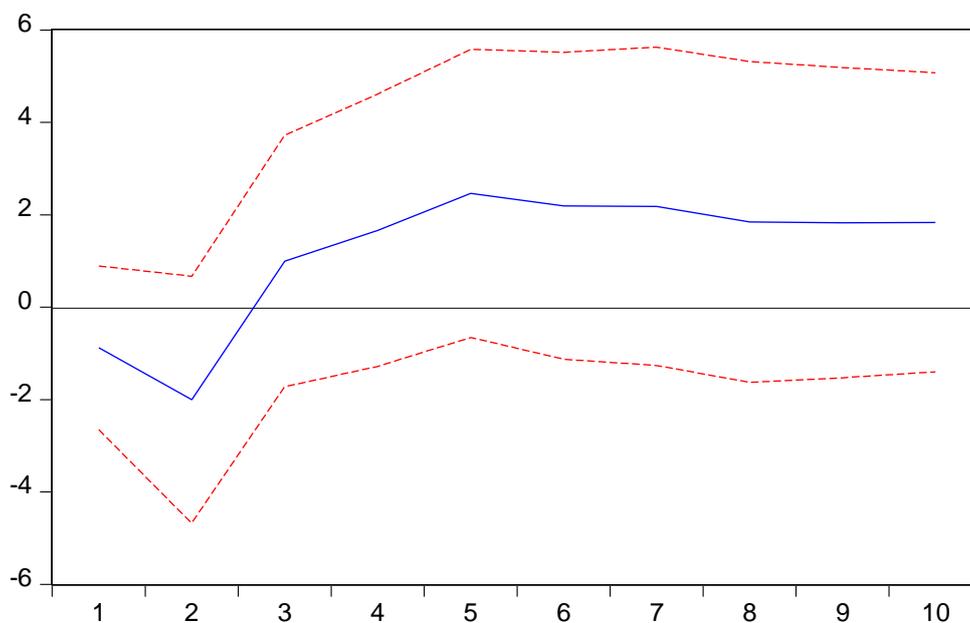


Figure 4: Response of IN to LNHP Innovation

From Figure 4, HP's response to the IN revenue shock is relatively strong. The IN shock does not immediately raise the average selling price of HP commercial housing immediately, but reduces prices in two phases and significantly increases house prices in subsequent periods, thereby reducing the impact of stages 9 and 10.

Response of LNGDP to LNHP Innovation using Cholesky (d.f. adjusted) Factors

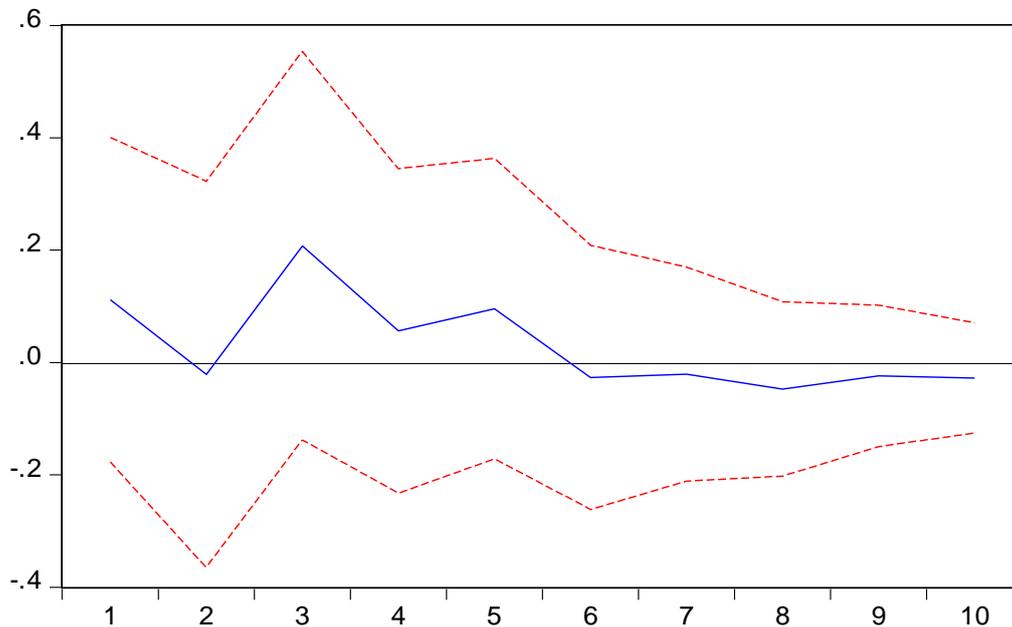


Figure 5: Economic development degree of Ho Chi Minh City

It is evident from Figure 5 that the impact of Ho Chi Minh City's level of economic development on house prices is a positive one and the impact of real estate prices has led to an increase in the consumer price index. The greatest impact is the delay time from the second to the fifth cycle, then reduced to zero.

Response of LNFDI to LNHP Innovation using Cholesky (d.f. adjusted) Factors

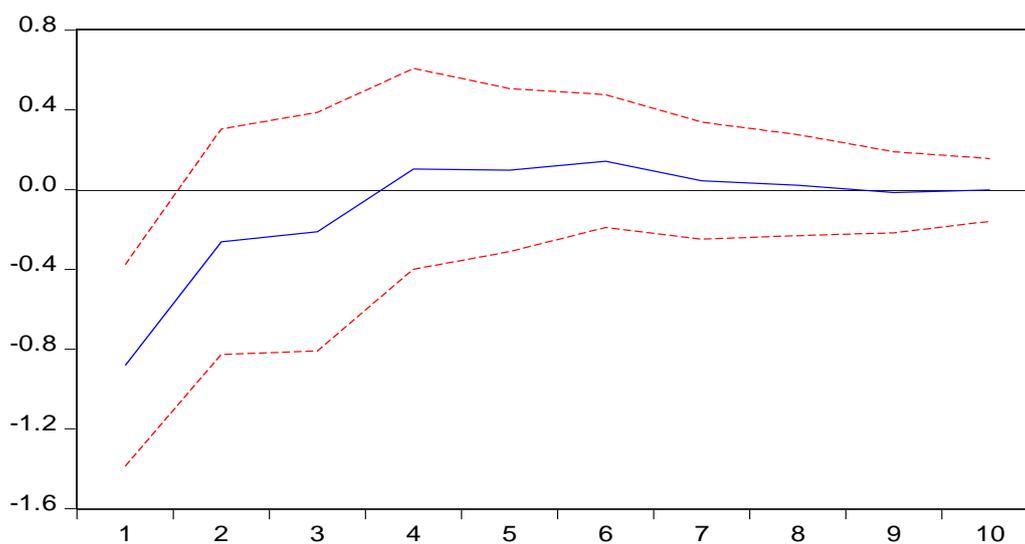


Figure 6: The level of economic development in Ho Chi Minh City

As can be seen in Figure 6, the impact of Ho Chi Minh City's level of economic development on house prices is a positive one and the impact of real estate prices has led to an increase in the consumer price index. The greatest impact is the delay time from the second to the fifth cycle, then reduced to zero. When a real estate bubble occurs, the rise in real estate prices escapes the real value of the property.

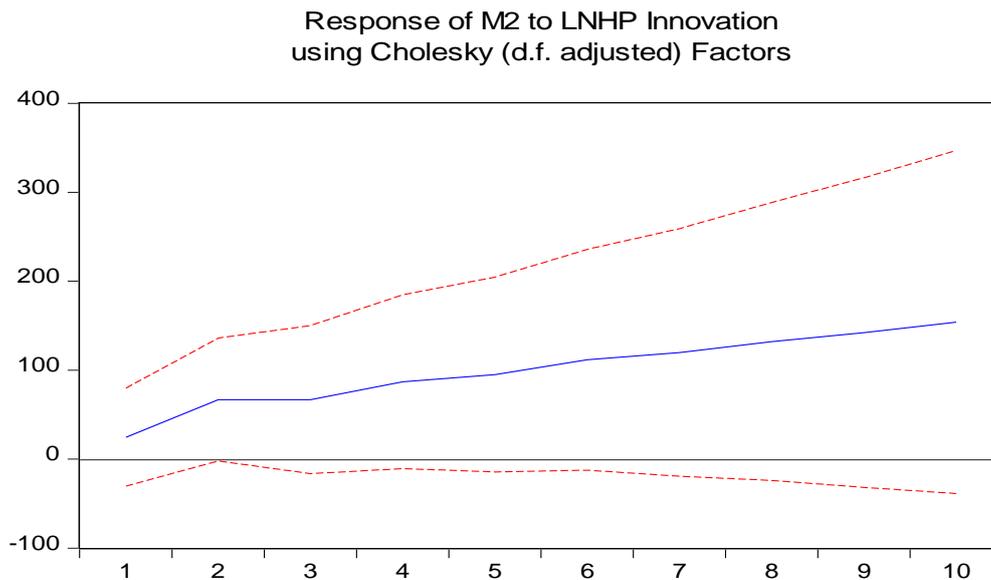


Figure 7: Response of M2 to LNHP Innovation

The impact of real estate prices has caused the consumer price index to rise. The greatest impact is the delay time from the second to the fifth cycle, then reduced to zero. When a real estate bubble occurs, the rise in real estate prices escapes the real value of the property. Therefore, the price is no longer sending an accurate signal in the market. Real estate speculation has become a popular trend, wasting a lot of social resources. This eventually affected the consumer price index in the economy soaring.

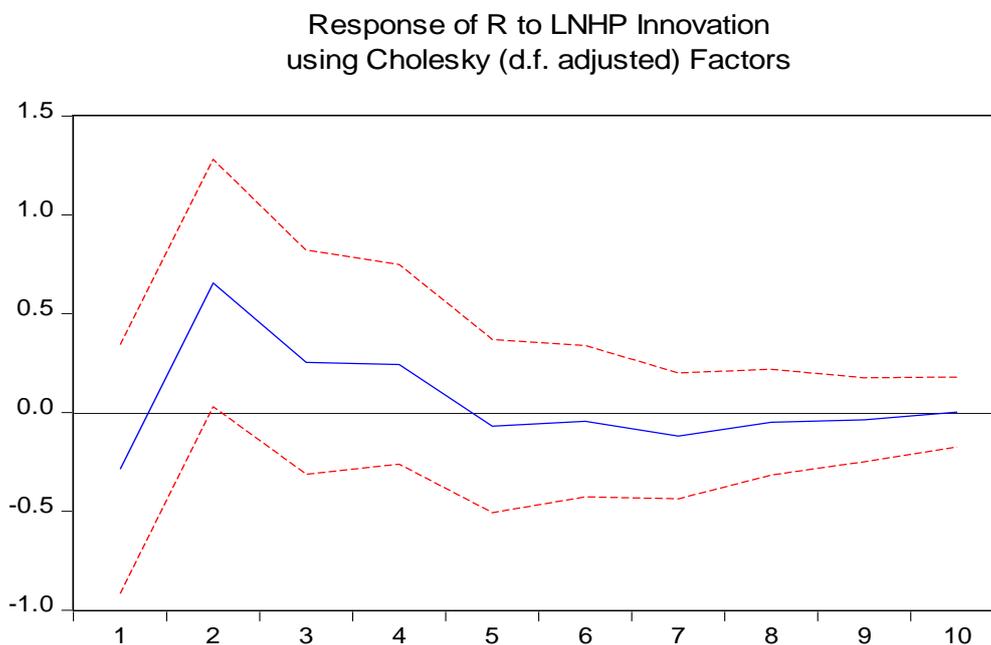


Figure 8: Response of R to LNHP Innovation

It is seen as one of the tools to reflect the lending policy of commercial banks, lending rates will not change immediately before the real estate bubble touches, but only after two cycles of delay. It is best to observe the impact level after the lag in the third phase, and then to zero. This result shows that the reaction of commercial banks in the implementation of market-oriented lending policy is relatively passive. This is also the result of the lack of a transparent information system on the real estate market, making banks slow to identify real estate loan risks, thereby increasing operational risks in banking system.

5. Research Results

After analysis the data, it is clear to see that the real estate market in Ho Chi Minh City is in a serious imbalance in product structure and price. The supply of real estate is heavily focused on the high-end market with high prices, while the affordable and low-end housing markets are mostly vacant. Affordable housing is also a part of most people's needs. As a result of the imbalance between supply and demand in real estate, supply and demand could not be met afterwards, the market froze and inventories of real estate companies increased because they did not sell products.

Based on the theoretical analysis of the previous chapters, this chapter selects the representative variables affecting housing prices in Ho Chi Minh City. Through the development of the VAR model, according to the results of the Granger causality test, the response to motivational and variance analysis, house prices, foreign direct investment in Ho Chi Minh City, income to meet the import per capita, population, money supply, economic development level, inflation, Ho Chi Minh Market fluctuates lending rates. According to empirical analysis, the reason for the rapid rise in housing prices in Ho Chi Minh City is that the demand in the real estate market is greater than the supply, and the excessive speculation demand affects satisfaction, which meets the common housing needs. This lead to a boosting effect to the price of real estate in Ho Chi Minh City, Vietnam.

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