

Analyzing Factors Influencing Inflation in Vietnam Using SVAR Model: A Case Study

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Abstract

Vietnam's economy has experienced complicated and unpredictable inflationary periods such as 1986. Therefore, the research to forecast inflation is significant in both macro and micro aspects. It not only contributes to improving the efficiency of policy administration, but it is also used towards the goal of macro stability, sustainability of economic growth, and improving the efficiency and competitiveness of enterprises and the economy. There are many quantitative studies on inflation forecasting in the world and Vietnam, notably using the SVAR multivariate models. This paper will use the SVAR model to analyze factors impacting inflation in Vietnam. Based on the data collected from 2016 to 2020, the results show that, in the short term, inflation is mainly affected by its fluctuations in the past, while the world oil price, exchange rate, and interest rate partly explain the volatility of inflation, but the contribution is tiny. On the other hand, in the long term, the influence of past inflation reduces over time, but it still explains the current fluctuation.

Keywords

Inflation, consumer price index, interest rate, monetary policy, SVARS, Vietnam

Introduction

Inflation is a primary concern of each country because it has significant impacts not only on people's lives but also on the economy's growth. In particular, inflation is the central and most sensitive issue of socio-economic life in Vietnam. High inflation widens the gap between the rich and the poor and creates potential risks of social instability. Along with the integration and opening up, the Vietnamese economy has suffered more impacts from the world economy's developments and increased the risk of instability.

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In 2016-2020, all countries, including Vietnam, have been heavily affected by the Covid-19 pandemic. From an economic point of view, the global supply chain is severely broken and fragmented. Economic activity is almost entirely paralyzed, especially in highly open economies. Countries' economies fall into a severe recession, possibly even many times larger than the 2008 crisis (Pham, 2020). The Governments have tried to apply several solutions to control the epidemic while reducing the negative consequences and substantial economic losses (Pham, 2020). In analyzing the market price situation in the first six months of 2020, the market price level increased in January due to the Tet holiday (the biggest holiday in Vietnam), decreased in the following months due to the epidemic's impact, and gradually recovered to normal when the Covid-19 epidemic was controlled in May and June (Van Truong, 2020). In addition, consumer price index (CPI) in June 2020 increased by 0.66% compared to May 2020 - the highest increase in the same period in 2016 – 2020 (General Statistics Office, 2021). At that time, the government had applied a combination of policies to stabilize supply - demand and recovery—economic policy, monetary policy, and disease control policy. The Vietnamese government starts with the causes of inflation to find the leading cause and find solutions to fix it.

The VAR model was applied to study and compare the effects of monetary policy shocks in 7 East Asian economies (Fung, 2002). The author has estimated the relative weights of interest rates and exchange rates; in particular, exchange rates have different effects on different economies, while interest rates strongly impact monetary policy. Besides, to assess the impacts of oil prices, inflation, and interest rates on G7 countries, Bastianin a et al. studied the direct influence of oil price shocks on output and prices and the response of monetary variables to external shocks using a VAR model (Bastianin, Conti, & Manera, 2016). Empirical analysis shows that, for most countries considered, unexpected oil price shocks appear to impact interest rates, suggesting a contractionary monetary policy in response to combat inflation. An increase in interest rates is transmitted to the real economy by reducing output growth and the inflation rate.

Through secondary data collected in the 2016-2020 period, we are interested in factors affecting inflation in Vietnam during this period: Consumer Price Index, Gross Domestic Product, Money Supply, 3-month Short-Term Interest Rate, World Oil Price, and US Federal Fund Rate. Specifically, the study focuses on specific items: First, we apply the SVAR model in analyzing the factors affecting inflation in Vietnam in the 2016-2020 period. Second, based on the results of the analysis, we propose some recommendations for inflation control in Vietnam.

Methodology

Data

This research uses secondary data from Vietnam and online publications. The collected data includes Consumer Price Index CPI; money supply M2; gross domestic product GDP; short-term interest rates; world oil prices; and federal funds rate (US). The data is taken from the following sources: Vietnam GSO, World Bank, State Bank of Vietnam, International Monetary Fund (IMF), Oil Price, and Vietstock in the period 2016 – 2020. Furthermore, in our empirical analysis, all

variables are in logarithmic form except for interest rates. Table 1 summarizes the observed variables, symbols, collection period, and sources.

Table 1. Observed variables in the Vietnam SVAR model

Variables	Abbreviation	Period	Source
Foreign Block			
World Oil Price in logarithm	OP	2016:1/2016 – 2020:12/2020	IFS – IMF
Federal Funds Rate (US) in percentage	R_US	2016:1/2016 – 2020:12/2020	FED
Domestic Block			
Real GDP in logarithm	Y	2016:1/2016 – 2020:12/2020	MPI
CPI in logarithm	P	2016:1/2016 – 2020:12/2020	IFS – IMF
M2 in logarithm	M2	2016:1/2016 – 2020:12/2020	IFS – IMF
Interest rate (short term) in percentage	R	2016:1/2016 – 2020:12/2020	IFS – IMF

Source: Authors' calculation

Empirical model

This study uses empirical model which have been applied in several previous researches, see for example (Anwar & Nguyen, 2018; Nguyen & Tran, 2013; Phung, Nguyenn, & Pham, 2022). The interested model is

$$Y_t = f(Y_{1,t}, Y_{2,t}) \quad (3.4)$$

where $Y, Y_{1,t}$ and $Y_{2,t}$, represent the foreign block and the domestic block. Since Vietnam is a small open economy, the variables included in the foreign block are assumed to be exogenous. The elements in the two blocks are as follows:

$$Y_{1,t} = f(OP_t, R_US_t) \quad (3.5)$$

$$Y_{2,t} = g(R_t, M2_t, P_t, Y_t, XR_t) \quad (3.6)$$

Using the information provided above, the elements of equation (3.5) can be represented as:

$$Y_t = \begin{bmatrix} Y_{1,t} \\ Y_{2,t} \end{bmatrix}; A_0 = \begin{bmatrix} A_{0,11} & A_{0,12} \\ A_{0,21} & A_{0,22} \end{bmatrix} B(L) = \begin{bmatrix} B_{11}(L) & B_{12}(L) \\ B_{21}(L) & B_{22}(L) \end{bmatrix}; u_t = \begin{bmatrix} u_{1,t} \\ u_{2,t} \end{bmatrix}$$

Where, 2 blocks $B_{11}(L)$ and $B_{12}(L)$ contain coefficients corresponding to foreign variables, while $B_{21}(L)$ and $B_{22}(L)$ contains coefficients corresponding to the domestic economy.

Similar to (Anwar & Nguyen, 2018), we assume that domestic variables do not have a Granger causality causing foreign variables. Then, we impose exogenous biomass constraints by excluding all domestic variables from the foreign equation block, which imposes two constraints: $A_{0,12} = \mathbf{0}$ and $B_{12}(L) = \mathbf{0}$. Exogenous restrictions reduce the number of parameters to be estimated and allow a larger number of outliers to be included in the model (Raghavan, Silvapulle, & Athanasopoulos, 2012).

The analysis was performed on R software, version 4-1-3. For the SVAR model estimation, test, and response function, we use the SVARS command package (Pfaff, 2008). For other analyses, we use the tseries, tidyverse and zoo packages.

Results and Discussion

Results

Figure 1 shows the bar chart of the observed variables. In 2016, the inflation rate was relatively stable to January 2016. From 2017 to 2018, the inflation rate increased and fluctuated around 3-4%. Since January 2019, the inflation rate has increased and peaked in early 2020 (Figure 1.a). The money supply increased steadily from January 2016 to January 2020. Vietnam's gross domestic product (GDP) has also increased steadily over the years since we can only observe the total data for each year. World oil prices show extreme volatility during the study period. During the interest period, oil prices tended to increase. In the first months of 2017, oil prices tended to decrease slightly and then continued to increase until the end of 2018. At the end of 2019 and the first months of 2020, oil prices tended to decrease and increase slightly by the end of 2020.

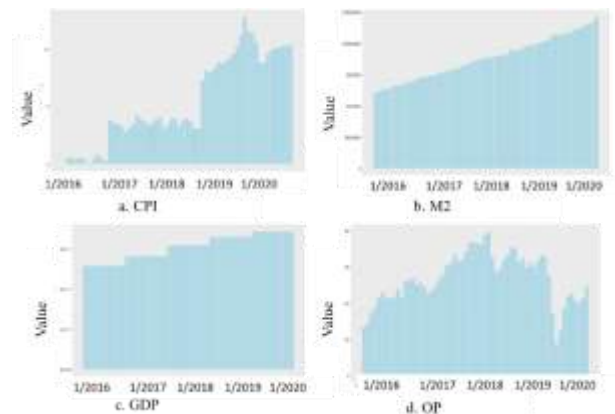


Figure 1. Barchart of a. Consumer price index CPI (%); b. Money supply M2; c. Gross domestic product GDP; d. World oil prices OP

Applying the empirical model, we first run the Augmented Dickey - Fuller (ADF) test to test the stationarity of all variables, and the results show that all variables are stationarity (p -value <0.01). Then, we run the impulse response function for the shock of each variable.

Figure 2 shows the response to an interest rate shock R to Gross Domestic Product (Y), the US Federal Funds Rate, and the Consumer Price Index. The results show that the response curve is flat, has a positive value, and is quite close to zero, which shows that the total output shock does not affect interest rates (Figure 2a). The reaction of the US interest rate increased due to the shock of Vietnamese interest rates. From the shape, we can see that the shock of Vietnamese interest

rates changes inflation. Specifically, inflation increased rapidly until the third quarter at 1.1%. After that, the inflation gradually decreased; in the 18th quarter, the inflation decreased the most at 1.18% and tended to increase from the 19th to the 45th quarter. The inflation decreased slightly from the 46th quarter onwards (Figure 2b). The shock of the consumer price index negatively impacts interest rates in all medium and long-term research periods corresponding to the COVID-19 pandemic. It had the most significant effect in the 15th quarter with 0.5%. After that, there was an upward trend from the 45th quarter, which decreased gradually (Figure 2c).

For the shock of the other variable, we also obtained significant results.

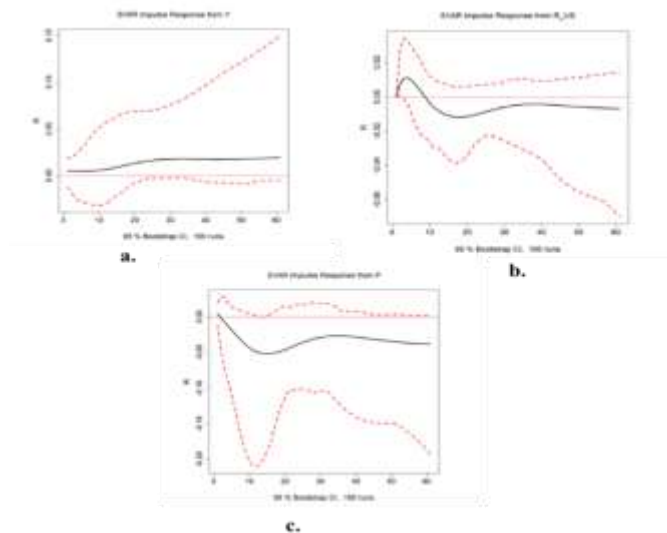


Figure 2. Interest rate shock response R of a. Gross GDP (Y); b. US federal funds rate; c. Consumer price index

Discussion

This research has applied the SVARS model to study factors affecting inflation, evaluate the results achieved in stabilizing the macro-economy and curbing inflation, and propose some solutions and recommendations to improve inflation control in Vietnam in the following periods. In the short term, inflation is mainly affected by its fluctuations in the past. At the same time, the world oil price, exchange rate, and interest rate partly explain the volatility of inflation, but the contribution is minimal. In the long run, the impact of past inflation gradually fades over time, but it still explains well the fluctuation of current inflation, and the remaining factors all affect inflation.

The results show that the CPI growth rate is significantly affected in the short term. Then, creating public confidence in the Government's efforts to control inflation through disseminating monetary and fiscal policy messages is extremely important in times of high inflation. In addition,

to keep inflation low and stable, the Government must continue to implement monetary policy towards tightening and flexibility for at least 6-7 months after the inflation rate starts to slow. In the future, it is necessary to study and improve the effectiveness of the central bank's interest rate tool in regulating the money market. Finally, government spending significantly impacts on the increase of CPI; therefore, in a period of high inflation, the government must permanently attach importance to the effective coordination between fiscal and monetary policies.

This study has some limitations. The study was carried out in 2016 -2020 and did not have a period to assess the impact of recovery after the Covid-19 pandemic. In addition, research on the SVAR model must continue to be expanded, such as adding other tests to examine the relationship between economic variables in more detail.

Conclusion

In order to better understand the factors influencing inflation, assess the progress made in stabilising the macroeconomy and reducing inflation, and make recommendations and suggestions for improving inflation management in Vietnam going forward, this research has employed the SVARS model. The short-term impact of inflation is primarily determined by historical variations. In addition, although they only make a small contribution, the price of crude oil globally, the exchange rate, and interest rates all influence inflation volatility. Although historical inflation has a diminishing effect over time, it continues to provide a good explanation for current inflation fluctuations, because inflation is influenced by all other causes.

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