

# The Impact of Global Uncertainty Shocks on Macroeconomics: The Case of Vietnam

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## Abstract

The global financial crisis of 2008–2009 and the COVID-19 pandemic that started in 2019 along with the slow and unstable recovery of the global economy have raised concerns about the impact of global uncertainty on the macroeconomics of the countries. The paper used the Structural Vector Autoregression (SVAR) model to examine the impact of global uncertainty shocks on Vietnam's economy from the period 2008–2022. We found that Vietnam's output dropped following the shock of global uncertainty, the peak was in the third month, and lasted for one year. Inflation in Vietnam had a rapid downturn in the first month, peaked in the seventh month, and took a long time to cease. When the economy experienced the shock of increased global uncertainty, Vietnam's policy interest rate was adjusted downward. Additionally, we included a long-term interest rate to consider the overall impact of monetary policy into account. A decreasing trend was also found with this rate. The global uncertainty shock effects acted as the aggregate demand shocks, reducing output and inflation as the uncertainty increases and vice versa, thus monetary policy can be used to regulate Vietnam's economy to deal with negative shocks without the trade-offs between output and inflation as aggregate supply shocks.

**Keywords:** Uncertainty, Macroeconomics, Monetary Policy, SVAR

**JEL Classification Code:** D80, E17, E20, E52

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## 1. Introduction

The global financial crisis of 2008–2009 and the COVID-19 pandemic that started in 2019 along with the slow and unstable recovery of the world economy have raised concerns about the impact of economic uncertainty on the macroeconomics of the countries. Consumer and firm beliefs about the future state of the economy or their personal finances are two important factors that shift the aggregate demand curve. These two factors affect the willingness to

spend on individuals and enterprises. John Maynard Keynes described trust fluctuations in the direction of optimism or pessimism as “animal spirits” and considered them as the main factors influencing the aggregate demand curve and an important source of variation in business cycle dynamics (Mishkin, 2009). When global uncertainty is low, consumer and business confidence about the future state of the economy or personal finances is positive, leading to an increase in willingness to spend on the consumption, investment, and hiring of workers to expand production, thereby increasing output, increasing employment, and reducing unemployment. Conversely, increased uncertainty causes consumers to increase savings to prepare for future financial situations, thus firms reduce investment and hire workers, resulting in higher unemployment, lower output, and inflation decreases.

There have been previous studies measuring the impact of uncertainty on economies in various aspects. Uncertainty measures included global uncertainty in general (Bloom, 2009; Carrière-Swallow & Céspedes, 2013; Bachmann et al., 2013; Leduc & Liu, 2020); economic uncertainty and policy uncertainty at the sectorial level (Jeon, 2018), or

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national level (Aziz et al., 2021; Leduc & Liu, 2014; Shin & Zhong, 2020; Fatima et al., 2022). Besides, Baker et al. (2020a) and Baker et al. (2020b) used more indicators to calculate the magnitude of uncertainty, such as stock market volatility (VIX), based on news indicators and consumer and business expectation surveys. In almost these studies, the VIX index was popular, even Bloom (2009) also indicated the high correlation between this index with other uncertainty measures. There were different models applied to test the response of economic variables to uncertainty shocks, of which the vector autoregression model (VAR) was the most priority. The results almost confirmed the negative influence of uncertainty on economic variables, including employment, inflation, output, and working hours (Bloom, 2009; Carrière-Swallow & Céspedes, 2013; Bachmann et al., 2013; Leduc & Liu, 2020; Jeon, 2018; Aziz et al., 2021; Leduc & Liu, 2014; Shin & Zhong, 2020; Fatima et al., 2022; Baker et al., 2020a, 2020b). To Vietnam's economy, there was Trung et al. (2022) found the impact of world policy uncertainty on Vietnam's output while the inflation response was not significant. They used reduced VAR to examine the influence, and the uncertainty measure was the world policy uncertainty. The VAR model of this form has the disadvantage that it is not controlled for the same-period effect between time series, so the assumption of non-correlation of errors may be violated. The world policy uncertainty index also didn't cover global uncertainty in general.

Following these studies, we estimate the SVAR model to examine the impact of global uncertainty shock on Vietnam's economy. VAR models have several advantages: (i) it is a very simple model which does not need to mind endogenous or exogenous variables; (ii) the estimator is very simple, performing the equations simultaneously while the conventional OLS method estimates each equation separately; and (iii) forecast results from VAR models are in most cases better than many other complex simultaneous equation models. Besides forecasting purposes, the VAR models also provide an analytical framework for testing causality among variables (Phung, 2010). The above VAR models are called reduced VAR. Based on the reduced VAR model and adding contemporary effects, the SVAR model is introduced in the paper. The global uncertainty shock measure is the VIX index, as Bloom (2009) showed that this stock market volatility index is a popular uncertainty measure and is highly correlated with other measures of uncertainty. The research period lasts from the beginning of 2008 to the nearest time the data source could be accessed, which is May 2022. With this period, the paper can cover two sub-periods with significant shocks of the global financial crisis of 2008–2009 and the COVID-19 pandemic outbreak in April 2020.

The rest of the paper is organized as follows, part 2 will present the literature review, part 3 is the methodology, part 4

reports the results of the empirical study in Vietnam and discusses the findings, and part 5 is the conclusions.

## 2. Literature Review

The particular study on this topic is Bloom (2009). A VAR model was applied in the period between 1962M7 and 2005M7 to test the effect of global uncertainty on countries' macroeconomics. The research showed that when the uncertainty increased, industrial production and employment declined rapidly, lasting six months. The uncertainty measure used in the study was the stock market volatility index (VIX) through the filtering method and identifying shocks beyond the threshold level to be included in the evaluation model. The role of this index was evaluated and found a high correlation with other uncertainty measures such as the standard error in the growth of corporate earnings after tax, the company's stock sales, or the forecast of GDP growth in the future. Also using the VIX index, Carrière-Swallow and Céspedes (2013) realized that different countries had different responses to uncertainty shocks. However, emerging economies experienced a sharper decline in investment and consumption than developed countries, and it took a longer period for these countries to recover. Bachmann et al. (2013) confirmed that production in the US and Germany had a rapid decline along with the uncertainty shock, and the decline of production in the US was more persistent than in Germany. Leduc and Liu (2020) assessed the impact of the uncertainty shock caused by the Coronavirus on macroeconomic variables in the US. The results showed that following the uncertainty shock, the unemployment rate increased over time, peaking after one year. The inflation rate fell continuously for six months after the shock, then rose again. The rapid decline in Treasury bill rates reflected the expansion of monetary policy in response to this shock.

At the sectorial level and the country level, the economic policy uncertainty of four Asian countries was applied by Jeon (2018) to examine its impact on Korea's economy. The research found the negative effects of those countries' uncertainty and the most important one was from Korea itself. Aziz et al. (2021) investigated the volatility spillover from the US's financial uncertainty to the stock markets of some countries. They realized the spillover effect of uncertainty is negative in most of these countries. Leduc and Liu (2014) used survey data from businesses and consumers in the US and UK and found that increased uncertainty resulted in the continuously increasing unemployment rate in the US, peaking after eighteen months and lasting three years. At the same time, the inflation rate also dropped and peaked after the same period. There were similar results in the UK, unemployment rose, and inflation rate and nominal interest rates decreased following the increased uncertainty.

Measuring uncertainty by estimating the model of economic variables in countries, Shin and Zhong (2020) also found the shock of financial uncertainty led to a downturn in real activity and an easing in federal interest rates compared to macroeconomic uncertainty. Fatima et al. (2022) used Ittner et al. (1997) business strategy score as a proxy of uncertainty, the result indicated that financial reports having the awareness of uncertainty should give optimal investment decisions for Pakistan.

Besides, Baker et al. (2020a) used three indicators to measure uncertainty shocks based on stock market volatility, newspaper, and business expectation surveys. They showed the contraction of the US real gross domestic from 11 percent to 20 percent and about half of the drop in forecast output reflects the negative impact of the uncertainty caused by COVID. With diverse uncertainty measures for 60 countries, Baker et al. (2020b) concluded that uncertainty shock resulted in a decreasing gross domestic product in the short term.

In Vietnam’s economy, there was Trung et al. (2022) used a measure of world economic policy uncertainty, data with quarterly frequency in the period between 2009 and 2020. Results from the vector autoregressive (VAR) model indicated that the world economic policy uncertainty had negative effects on industrial output, but an ambiguous and insignificant impact on inflation in Vietnam.

Generally, previous studies found the negative effects of uncertainty at a certain magnitude, but few of them showed an insignificant relationship. They also used diverse economic variables and different certainty measures. VAR models were applied popularly in different forms, such as reduced VAR (Bloom, 2009; Carrière-Swallow & Céspedes, 2013; Baker et al., 2020a; Baker et al., 2020b; Trung et al., 2022); BVAR (Leduc & Liu, 2014); VAR with random volatility (Shin & Zhong, 2020). In addition, the parametric model (Bloom, 2009), Ordinary Least Square - OLS (Fatima et al., 2022), Vector Error Correction Model–VECM (Jeon, 2018) or Exponential Generalized Autoregressive Conditional Heteroscedastic model - EGARCH (Aziz et al., 2021) were considered.

### 3. Methodology

#### 3.1. Data

Research data (Table 1) is taken from Asian Development Bank (ADB), Chicago Options Exchange (CBOE), Datastream - Thomson Reuters, and the International Financial Statistics (IFS) on the International Monetary Fund (IMF) page with the monthly frequency for the period 2008M1–2022M5. Global uncertainty is measured by the VIX index available from CBOE, consumer price index (CPI) data used for inflation, sourced from the IFS. Since data on Vietnam’s gross output are not available for monthly frequencies, we use data on industrial output growth as a proxy for Vietnam’s output variable. Vietnam policy interest rate is taken from the IFS. The 5-year government bond yield is used as a proxy for Vietnam’s long-term interest rate variable, from Datastream - Thomson Reuters. The data used for global uncertainty and inflation are in index form, so logarithms will be taken before being included in the research model, interest rates are used as a percentage.

#### 3.2. Models

To examine the impact of the global uncertainty shock on macroeconomic variables in Vietnam, the research model includes a group of external factors and a group of domestic factors as follows:

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

In which,  $Y_{1,t}$  and  $Y_{2,t}$  represent the group of external factors, and the group of domestic factors, respectively. The global uncertainty variable (VIX) acts as an external factor. Domestic factors include output (IP), inflation (IF), policy interest rate (I\_PC), and long-term interest rate (I\_5Y) in Vietnam. The factors are represented in two groups as follows:  $Y_{1,t} = f(\text{VIX})$ , and  $Y_{2,t} = f(\text{IP}, \text{IF}, \text{I\_PC}, \text{I\_5Y})$ .

Assumptions are set as follows: Vietnam is a small open economy, so domestic variables are assumed to have

**Table 1:** Variable Definition and Data Source

Variable Group	Variable Name	Sign	Unit	Data Source
External variables	Global uncertainty	VIX	log	CBOE
Internal variables	Output	IP	%	Datastream
	Inflation	IF	log	IFS
	Policy interest rate	I_PC	%	IFS
	Long-term interest rate	I_5Y	%	Datastream

no causal relationship with external variables. Vietnam’s output and inflation are slow to change and therefore do not respond immediately to other shocks. Inflation is assumed to be affected by output shocks but not by other shocks. Policy rates and long-term interest rates are affected by external shocks but do not respond immediately to domestic output and inflation shocks because the information is often not available for the current period.

The SVAR model structure:

$$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 \\ a_{41} & 0 & 0 & 1 & 0 \\ a_{51} & 0 & 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} u_t^{VIX} \\ u_t^{IP} \\ u_t^{IF} \\ u_t^{I-PC} \\ u_t^{I-5Y} \end{pmatrix} = \begin{pmatrix} \varepsilon_t^{VIX} \\ \varepsilon_t^{IP} \\ \varepsilon_t^{IF} \\ \varepsilon_t^{I-PC} \\ \varepsilon_t^{I-5Y} \end{pmatrix} \quad (2)$$

First, to ensure that the data series are eligible to apply the SVAR model, the paper tests the stationarity of each variable. If the stationarity condition is achieved, we continue to select the optimal lag, run the model and check for the necessary defects. Then, an analysis of the impulse response of output, inflation, policy interest rate, and long-term interest rate to the global uncertainty shock is performed to clarify the impact directions of the global uncertainty shock on macroeconomic variables in Vietnam. Finally, variance decompositions of output and inflation to explore the explanation magnitude of the global uncertainty in the volatility of Vietnam’s economic variables.

## 4. Results and Discussion

### 4.1. Results

#### 4.1.1. Stationary Tests

The unit root test results in Table 2 by the Augmented Dickey-Fuller test showed that the variables VIX, IP, and I\_5Y are stationary at the level with the significance level of 1%, while I\_PC and IF also get the standards at 5% and 10%, respectively. Stationary conditions are satisfied with all variables, so we are going to perform the next steps.

**Table 2: Stationarity Test Result**

Variables	t-statistic I(0)	Conclusion
VIX	-3.576539***	Stationary I(0)
IP	-11.77104***	Stationary I(0)
IF	-2.602323*	Stationary I(0)
I_PC	-3.800756**	Stationary I(0)
I_5Y	-5.362720***	Stationary I(0)

\*\*\*, \*\*, \* indicate the significance level at 1%, 5%, 10%.

#### 4.1.2. Optimal Lag Selection

The optimal lag for the research model is two periods according to the selection criteria with the same results of FPE, AIC, and HQ. Therefore, we choose two lags for the estimated model.

#### 4.1.3. Autocorrelation Tests

Testing the autocorrelation to the lag of 12 by residual serial correlation Lagrange Multiplier Tests, the results display that the model has almost no autocorrelation with a lag length of 12 periods.

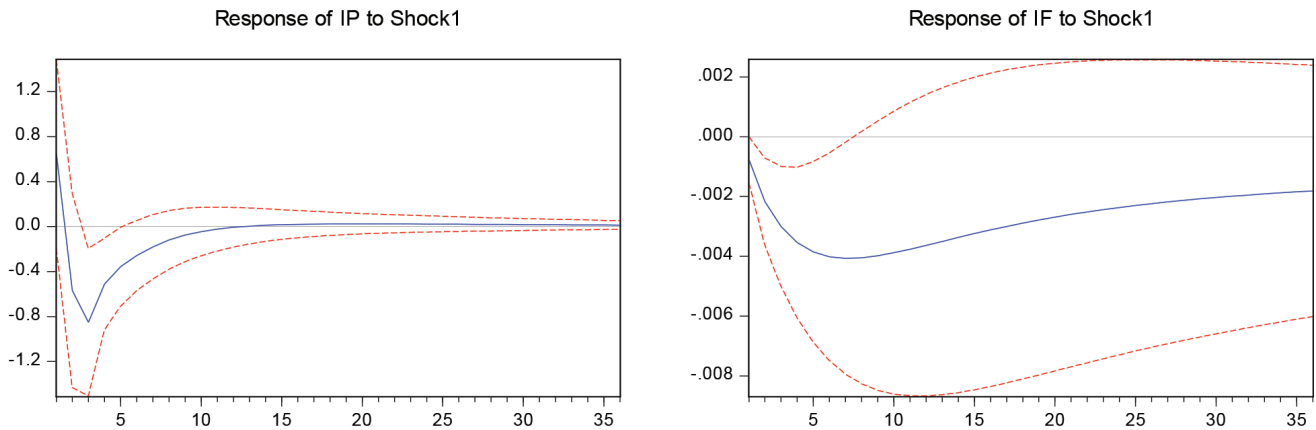
#### 4.1.4. Stability Test

Evaluating the model stability by the AR Roots Graph, the results show that all roots are within the unit circle. Thus, the research model has stability and reliability for further analyses.

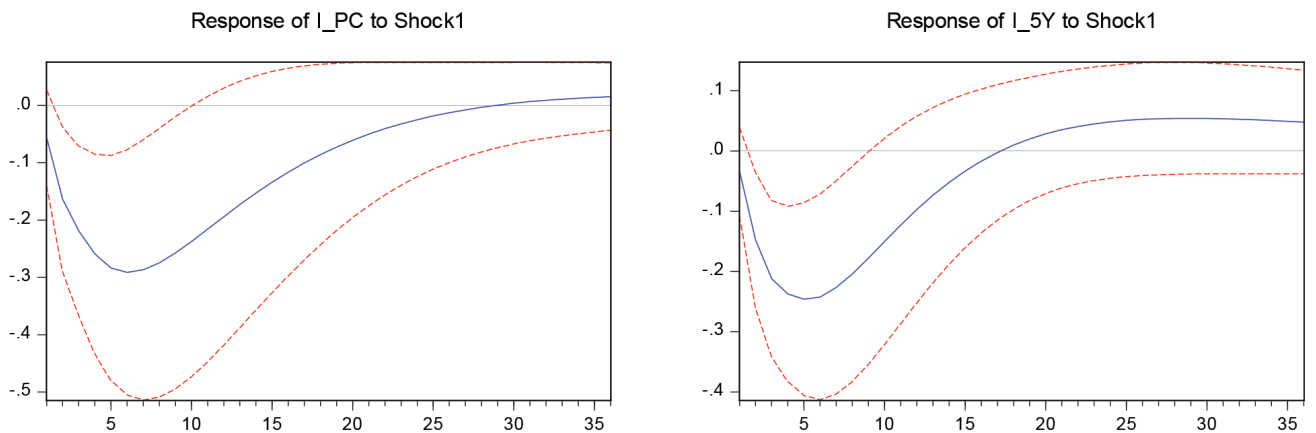
#### 4.1.5. Impulse Response Results

The shocks are respectively global uncertainty (Shock 1), Vietnam’s output (Shock 2), Vietnam’s inflation (Shock 3), Vietnam’s policy interest rate (Shock 4), and Vietnam’s long-term interest rate (Shock 5).

- The response of Vietnam’s output to the shock of global uncertainty  
The left graph of Figure 1 describes the response of Vietnam’s output to a shock of global uncertainty (Shock 1). When global uncertainty increased, the output didn’t fall immediately but dropped after one month, the sharpest was in the third month and lasted for one year.
- The response of Vietnam’s inflation to the shock of global uncertainty



**Figure 1:** Impulse Responses Functions of Vietnam's Output (Left) And Inflation (Right) to Global Uncertainty Shock



**Figure 2:** Impulse Responses Functions of Vietnam's Policy Interest Rate (Left) and Long-Term Interest Rate (Right) to Global Uncertainty Shock

The right graph of Figure 1 presents the response of Vietnam's inflation to the shock of global uncertainty (Shock 1). As global uncertainty increased, Vietnam's inflation dropped in the first month and reached a peak in the seventh month after the shock. The dropping magnitude of inflation gradually decreased after that, but the response still extended.

- The response of Vietnam's policy interest rate to the shock of global uncertainty  
 The left graph of Figure 2 shows the response of Vietnam's policy interest rate to the shock of global uncertainty (Shock 1). Vietnam's policy interest rate reacted negatively to the shock. The policy interest rate fell following the increase of global uncertainty in the first month, peaked in the sixth month, and lasted for more than two years before the response ceased.

- The response of Vietnam's long-term interest rate to the shock of global uncertainty  
 The right graph of Figure 2 indicates the response of Vietnam's long-term interest rate to the shock of global uncertainty (Shock 1). Vietnam's long-term interest rate had a negative response to the shock. The long-term interest rate fell when global uncertainty increased in the first month, with the sharpest decline in the fifth month. It lasted for eighteen months before turning into a positive relationship.

#### 4.1.6. Variance Decomposition Results

Table 3 shows Vietnam's output variance decomposition. Overall, the role of the global uncertainty shock (Shock 1) on Vietnam's output changes accelerated, from more than 1% in the first month to nearly 6% in the sixth month, and



**Table 3:** Vietnam's Output Variance Decomposition

Period	S.E.	Shock1	Shock2	Shock3	Shock4	Shock5
1	0.228677	1.370392	98.62961	0.000000	0.000000	0.000000
6	0.338041	5.928204	92.75035	0.166152	0.462188	0.693102
12	0.360027	6.049728	92.02712	0.534303	0.662148	0.726702
18	0.367672	6.046819	91.89467	0.644281	0.684022	0.730206
24	0.371357	6.053331	91.83697	0.690558	0.685891	0.733252
30	0.372925	6.058177	91.80251	0.719313	0.685705	0.734296
36	0.373503	6.060798	91.77893	0.739729	0.685964	0.734578

**Table 4:** Vietnam's Inflation Variance Decomposition

Period	S.E.	Shock1	Shock2	Shock3	Shock4	Shock5
1	0.228677	2.250163	0.050475	97.69936	0.000000	0.000000
6	0.338041	10.29719	1.093037	88.01561	0.099331	0.494824
12	0.360027	11.96802	1.144969	85.15207	1.034963	0.699971
18	0.367672	11.92637	1.077734	83.91131	2.367297	0.717295
24	0.371357	11.49259	1.004151	83.26315	3.546040	0.694065
30	0.372925	11.04450	0.944203	82.87446	4.466039	0.670799
36	0.373503	10.66897	0.898360	82.62279	5.155901	0.653985

maintained its influence for three years during the period. Although such a proportion is not high, this is the most influencing factor on Vietnam's output, excluding its impact in the past (Shock 2).

Table 4 shows Vietnam's inflation variance decomposition.

The role of the global uncertainty shock (Shock 1) on Vietnam's inflation has increased substantially, with more than 2% in the first month increasing to nearly 11% in the sixth month and continuing after two years. Although such a proportion is not high, this is the factor that has had the most influence on Vietnam's inflation regardless of its impact in the past (Shock 3).

## 4.2. Discussion

Vietnam's output response to global uncertainty shock is the same as Bloom (2009), Baker et al. (2020a), Baker et al. (2020b), and Trung et al. (2022); however, the negative response lengthened, as Carrière-Swallow and Céspedes (2016) indicated for emerging economies. The study mentioned monetary policy and fiscal policy should decrease credit frictions to support consumers and investment actions when facing uncertainty shocks. Along with Vietnam's output, we again realized the extent of inflation's response following the uncertainty shock. Our result is similar to

Leduc and Liu (2014, 2020), while Trung et al. (2022) didn't find a significant response of Vietnam's inflation to the uncertainty shock. Leduc and Liu (2014, 2020) also found the decrease in short-term interest rates reflected the eased monetary policy in response to the uncertainty shock. Monitoring the long-term interest rate path to cover the monetary policy stance more generally, we also found the response of Vietnam's long-term rate dropped following this exogenous shock, the findings are the same as Leduc and Liu (2014) with the two-year Treasury bond yields for long-term interest rate. The long-term rate and Vietnam's policy interest rate both reaffirmed that the country's monetary policy has eased in response to the shocks. In Vietnam, the global uncertainty shocks measured by the VIX index acted as aggregate demand shocks, necessitating softer monetary policy measures to promote economic activity without compromising on desired outcomes.

## 5. Conclusion

We have estimated the SVAR model to examine the impact of the global uncertainty shock on Vietnam's macroeconomic variables, including output, inflation, policy interest rates, and long-term interest rates. We identify that (i) Vietnam's output decreased following the increase

in global uncertainty, (ii) Vietnam's inflation also had a negative lengthen response to the uncertainty shock, and (iii) Vietnam's monetary policy is found to have responses by reducing interest rates to stimulate the economy facing the global uncertainty shock. The extent of the impact of the uncertainty shock on Vietnam's output and inflation is the most significant factor, even if the level of explanation is not high, the rapid and prolonged increasing role should be considered. The global uncertainty shock plays as an aggregate demand shock, reducing Vietnam's output and inflation, thus, the policymakers can use monetary policy to regulate the economy without facing a trade-off between output and inflation as in the case of aggregate supply shocks.

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