

# Research on the Impact of Economic Policy Uncertainty on Macro-economy from the Perspective of Sustainable Development

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**Abstract.** The reason of economic fluctuation has always been the most important topic in macro-economy research. In traditional economic theory, there are many reasons for economic fluctuation, both monetary factors and real economic factors will cause economic fluctuation. This paper takes the uncertainty of economic policy as the object of investigation, based on the perspective of sustainable development, and empirically tests the specific impact of economic policy uncertainty on macro-economy in a complete economic cycle through TVP-VAR model. Investment, consumption and R&D are included as endogenous variables. This paper empirically tests the impact of economic policy uncertainty on macro-economy variables such as investment, consumption, economic output and inflation rate in a complete economic cycle. The results show that the uncertainty of economic policy has a negative impact on investment and consumption. The negative impact of economic policy uncertainty in the fourth phase is the strongest, and the short-term negative impact will continue to deepen after 2019 until 2021, and the impact of the first phase will remain at around -0.15%. The variable that has the greatest influence on output fluctuation is economic uncertainty, which accounts for 84.15% of the fluctuation. Secondly, technological progress contributes 79.88% to output fluctuation, and economic uncertainty has a negative impact on output. The impact of economic uncertainty on output fluctuation is stronger than that on consumption, capital and employment.

**Keywords:** Macro-economy; Sustainable development; Economic policy; Uncertainty.

## 1. Introduction

With the slowdown of China's economic growth, the transformation of old and new kinetic energy, adjustment of industrial structure, insufficient internal demand, foreign trade friction and other factors are intertwined, resulting in downward pressure on China's economy. In this context, promoting the sustainable development of China's economy through economic policy regulation can not be ignored. Although there are structural adjustment factors in the economic downturn [1], in the process of economic fluctuation, economic uncertainty has always been regarded as an important reason for the economic downturn. At present, the foreign situation is complex, and external uncertainty will increase the pressure on China's economic development. China is in a critical period of economic restructuring. How to prevent and resolve major systemic financial risks and ensure the smooth operation of the economy is one of the key contents of current economic work.

The reason of economic fluctuation has always been the most important topic in macro-economy research. In traditional economic theory, there are many reasons for economic fluctuation, both monetary factors and real economic factors will cause economic fluctuation. The traditional view tends to think that the increase of uncertainty will cause damage to the economy [2]. For example, the increase of uncertainty will reduce the willingness of enterprises to invest, or make enterprises become extra cautious when investing, and the decrease of investment will damage economic growth. As far as China is concerned, China is currently in a period of high uncertainty in economic policy. Previous studies have shown that economic policy uncertainty may delay investment and consumption through real options, financial friction, prevention of savings and other channels, and then negatively affect economic growth [3]. However, most of the related studies are based on developed countries, and the conclusions have not yet reached an agreement. However, Chinese

scholars' research on the uncertainty of economic policy has just begun, which needs to be further deepened.

Because the policy uncertainty is difficult to observe directly, the academic circles study the influence of policy uncertainty by constructing various proxy indicators. At present, most of the literature focuses on the overall economic policy uncertainty, pointing out that economic policy uncertainty is not conducive to stable economic growth, but there is still little targeted analysis of economic policy uncertainty. And the research on the impact of economic policy uncertainty from the perspective of economic cycle needs to be further enriched. Based on the perspective of sustainable development, this paper takes economic policy uncertainty as the object of investigation, and empirically tests the specific impact of economic policy uncertainty on macro-economy in a complete economic cycle through TVP-VAR model.

## 2. Literature review

Reasonable measurement of economic policy uncertainty is the premise of relevant empirical research. Literature [4] estimates the time-varying volatility of government support, taxation and government debt by constructing equations, which represents the uncertainty of fiscal policy. Literature [5] examines the influence of regional policy uncertainty on the investment behavior of enterprises based on the change of provincial officials, and finds that regional policy uncertainty significantly reduces the investment of provincial state-owned enterprises and intensifies the volatility of stock returns of listed companies. Literature [6] shows that the uncertainty of economic policy mainly inhibits the investment behavior of enterprises through the channel of capital cost and the channel of marginal income of capital. Literature [7] improves the defects of previous studies and puts forward a more reasonable method to measure macro-economy uncertainty, which provides a new idea and framework for observing and understanding macro-economy uncertainty.

It is found that [8], medium uncertainty and high uncertainty have the same effect on investment; Literature [9] divides the uncertainty of fiscal expenditure into two types: deterministic endogenous shock, endogenous shock and random exogenous shock, and uses time-varying parameter model and regional transfer model to measure them. Literature [10] shows that in China, uncertain factors seriously restrict the credit supply of banks. Literature [11] on the basis of considering the characteristics of existing listed companies, securities market and other economic environment, this paper examines the relationship between economic uncertainty and financing constraints and the investment of manufacturing enterprises in China, and finds that internal cash flow and uncertainty have obvious effects on enterprise investment, and the two factors have mutually reinforcing effects on investment. Literature [12] found that the uncertainty of China's economic policy significantly inhibited the investment behavior of enterprises, and this effect was even more significant after the financial crisis.

## 3. Research method

### 3.1 Model design

Classical economics is mainly based on the assumption of complete information and certainty, and uncertainty is simply included in the risk category. Option gives the holder the right to trade the subject matter at the agreed price before a certain time in the future, and it is a contract with hedging uncertainty risk. The impact of uncertainty will lead to the decline of asset prices, which will lead to the depreciation of net assets and the increase of leverage ratio, which will lead to the improvement of loan standards and margin; In addition, uncertainty increases the probability of company default or bankruptcy, and the banking sector will respond by raising interest rates and shrinking loan scale. Because the adjustment cost of R&D investment is different from that of physical investment, the adjustment cost of physical investment is equal to the cost of directly changing the inventory, and the

knowledge stock is intangible and usually cannot be bought and sold, so the growth rate of knowledge stock can only be changed by changing the R&D level.

Many empirical studies show that the uncertainty of policy will have a negative impact on China's macro-economy development. From a macro point of view, uncertain factors will reduce both investment and output. Real options will also reduce the consumption of the household sector, especially the consumption of durable goods. The existing measurement of macro-economy uncertainty may have some limitations. Based on the perspective of sustainable development, when measuring uncertainty, only the predictable part can be removed to reflect the essential characteristics of uncertainty more reasonably, such as stock volatility and the inconsistency of survey data, which are not considered. Although a few studies involve macro-economy uncertainty, the measurement methods of macro-economy uncertainty in these studies are inconsistent and have certain limitations.

By introducing endogenous variables such as investment, consumption and R&D, and using TVP-VAR model, this paper investigates the time-varying effects of the uncertainty of China's economic policies on China's macro-economy. The classic VAR model is:

$$Ay_t = F_1y_{t-1} + F_2y_{t-2} + \dots + F_s y_{t-s} + u_t \quad (1)$$

Among them,  $y_t$  —  $k * 1$ -dimensional column vector observation;

$A, F_1, \dots, F_s$  —  $k * k$ -sustaining number matrix;

$u_t$  —  $k * 1$ -dimensional error vector.

TVP-VAR (Time varying Parameters VAR) model is an extension of the traditional VAR model, which assumes the time-varying characteristics of the coefficient matrix of the lagging term and the Covariance matrix of structural innovation on the basis of the VAR model.

$$y_t = B_1y_{t-1} + B_2y_{t-2} + \dots + B_s y_{t-s} + A_t^{-1} \sum_t \varepsilon_t, \quad \varepsilon_t \sim N(0, I_n) \quad (2)$$

Among them,  $A_t$  — The synchronous relationship between variables at time  $t$ ;

$\sum_t$  — Innovation time-varying characteristics of variable structure in  $t$ -time model;

$B_{it}$  — Observe the drift coefficient of vector lag period to capture the time-varying relationship of variable lag;

$\varepsilon_t$  — White noise term.

The above formula shows that the lag coefficient of model variables, the synchronous relationship and the innovation of disturbance term change at every moment.

### 3.2 Variable declaration

The influence of economic policy on China's macro-economy does not follow a single path, which may be through the structure of supply and demand, import and export trade, public psychological expectations and so on. For example, the supply and demand structure will link the micro-subject's economic behavior with the macro-economy, and the increase of economic policy regulation will enhance the public's confidence in the macro-economy, and consumers will reduce their savings and increase their consumption, thus driving economic development. The strengthening of economic policy regulation has also had a certain stabilizing effect on the operation of financial institutions in China. Non-performing loan ratio is one of the important regulatory indicators of commercial banks' operation. In recent years, due to the requirements of macro-prudential operation, the proportion of non-performing loans of various commercial banks in China has basically remained at a low level, with the exception of rural commercial banks, other banks have not exceeded 2%.

The empirical description of economic fluctuation by the theory of real business cycle is called characteristic fact. Lever can be divided into micro and macro types. Micro-leverage is mainly manifested in the asset-liability ratio of economic entities, that is, the ratio of borrowed funds to total assets. Micro-economic entities obtain funds through debts, which are used to expand investment and various production and business activities. Based on the perspective of sustainable development, macro leverage usually refers to the ratio of the total debt of the whole economy and society to its

income, which is usually analyzed in combination with a country's economic policy and economic operation. Obviously, on the one hand, the fluctuation of uncertainty in the economic policy environment will affect the implementation effect of China's economic policy, thus increasing the difficulty of economic policy regulation and macro-leverage, on the other hand, it will directly affect macro-leverage through other channels.

Based on the perspective of sustainable development, this project intends to build a model of the impact of China's economic policy uncertainty on the macro-economy from the perspective of sustainable development. In the aspect of variable selection, the variable selection and index description in this paper are shown in Figure 1.

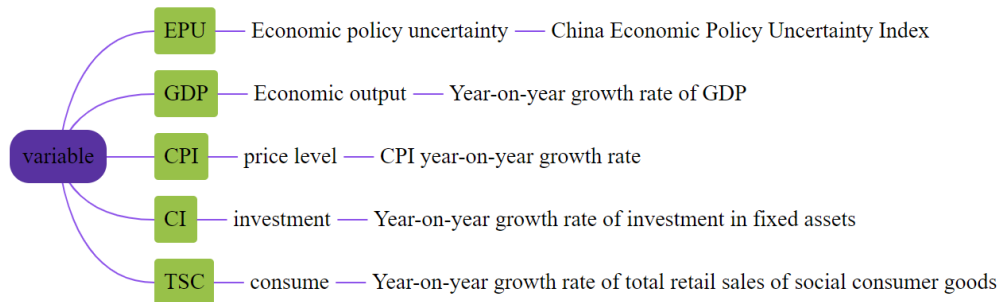


Figure 1 Variable Selection and Indicator Description

In terms of testing variables, this paper selects the investment amount of fixed assets  $CI$  as the investment variable, the total retail sales of social consumer goods  $TSC$  as the consumption variable, the gross domestic product  $GDP$  as the economic output variable, and the consumer price index  $CPI$  as the price variable.

The economic policy uncertainty index  $EPU$  is monthly data, and the arithmetic average is converted into quarterly data. Policy variables are not affected by seasonal factors, so no seasonal adjustment is made. Logarithmizing all variables to eliminate the possible heteroscedasticity problem.

### 3.3 Data processing and stationarity test

According to the research needs, this paper deals with the annual data from 2015 to 2022, which comes from the Statistical Yearbook of China over the years. The original data comes from the Wind database and the website of economic policy uncertainty. In order to test the stationarity of data, the stationarity of each variable is tested. Table 1 reports the results of stationarity test of each variable.

Table 1 Variable stationarity test

variable	T statistics	1% critical value	5% critical value	10% critical value	P value	conclusion
$EPU$	-2.266	-3.157	-2.343	-2.148	0.0674	5% level is stable
$GDP$	-0.973	-3.483	-4.498	-3.63	0.0778	1% level is stable
$CPI$	-3.119	-5.698	-3.698	-3.912	0.0775	5% level is stable
$CI$	-0.255	-4.546	-4.337	-4.331	0.0205	5% level is stable
$TSC$	-1.071	-3.599	-4.298	-4.181	0.0608	10% level is stable

After processing, all variables are stationary sequences without unit roots, which can be used to construct TVP-VAR model.

## 4. Results analysis and discussion

### 4.1 Analysis of simulation results of impulse response function

Impulse response function can capture the current and future changes of endogenous variables in the system impacted by disturbance terms, and is widely used to describe the influence relationship between macro variables. TVP-VAR model will update its parameter estimators in each period, and the estimated coefficients and covariance matrices have time-varying characteristics, which can better capture the interaction of variables at different stages and time points.

Because there are different time lags in the interaction between different macro variables, and the data used are quarterly data, the interval of equally spaced impulse response is set to 4, 8 and 12 quarters in this study to explore the effect of economic policy on macro leverage in the short term (one year), medium term (two years) and long term (three years) from the perspective of economic policy uncertainty. The results are shown in Figure 2.

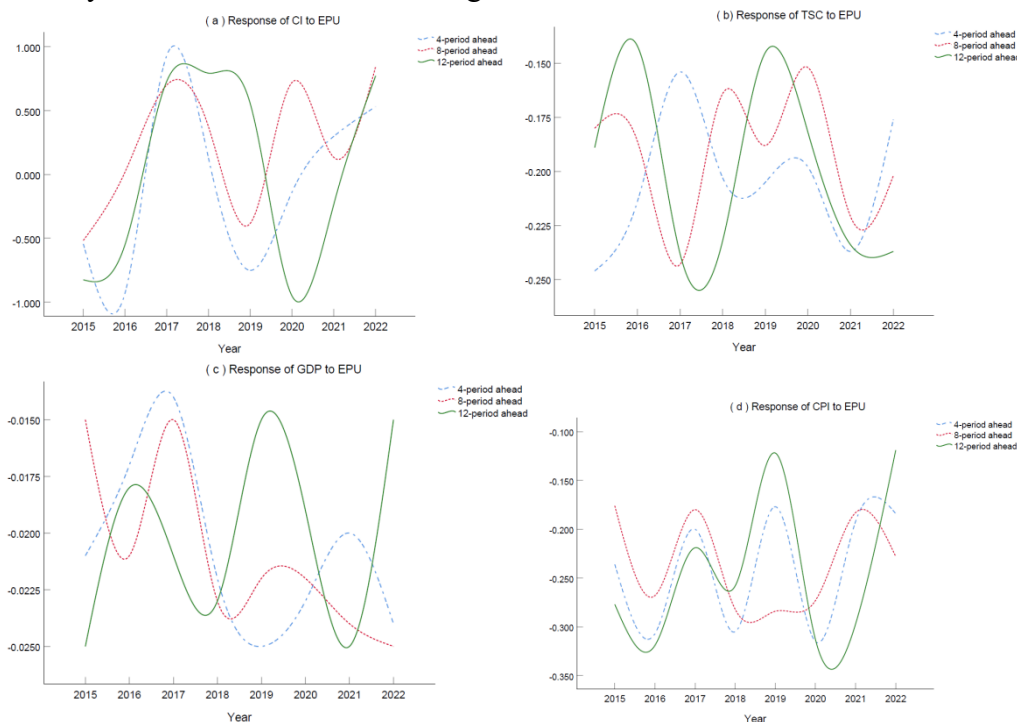


Figure 2 Time-varying influence of economic policy uncertainty

It can be seen that the four-phase lag of economic policy uncertainty has the strongest negative impact on output. After 2019, the short-term negative impact will continue to deepen until 2021, and the impact of the next phase lag will remain at around -0.15%. However, since the beginning of 2020, faced with the severe impact of the COVID-19 epidemic on the real economy, the capital chain of enterprises is fragile and easily broken, and they are forced to borrow money to live, thus making the response of macro-leverage to the uncertainty of economic policies show an upward trend.

Based on the perspective of sustainable development, overall, the short-term response function is above the medium-term and long-term, indicating that the uncertainty of economic policy has a more obvious short-term lifting effect on macro-leverage.

### 4.2 Variance decomposition of macro-economy variables fluctuation

In this paper, the variance decomposition of macro-economy variables is carried out to analyze the contribution rate of three kinds of shocks, such as economic uncertainty (see Table 2).

Table 2 Variance decomposition of main macro-economy variables

variable	<i>EPU</i> Ratio of shock (%)	<i>CI</i> Ratio of shock (%)	<i>TSC</i> Ratio of shock (%)
<i>EPU</i>	100	0	0

<i>GDP</i>	84.15	69.44	0.057
<i>CPI</i>	73.32	79.88	0.047
<i>CI</i>	0	100	0
<i>TSC</i>	69.66	0	0.013

It can be seen that the variable that has the greatest influence on output fluctuation is economic uncertainty, which contributes 84.15% of the fluctuation; Secondly, technological progress contributes 79.88% to output fluctuation, and economic uncertainty has a negative impact on output.

Comparatively speaking, the impact of economic uncertainty on output fluctuation is stronger than that on consumption, capital and employment. This is because the way of economic uncertainty affecting output is to change the intertemporal decision-making of families and enterprise investment, and to enlarge the macro-economy through the accumulation of micro-sectors. The variance decomposition result conforms to the model setting mechanism.

The above analysis shows that after years of high-speed growth, China's economy began to show a downward trend around 2019, which is the self-adjustment of micro-subjects to external shocks such as economic uncertainty. Although the formation of consumption habits can weaken the impact of external shocks, it is only a short-term effect. Then, by enhancing the predictability of macro-economy policies, reducing the generation of uncertainty, and improving the domestic social security system, weakening the impact of economic uncertainty on micro-subjects will be an important means to deal with the economic downturn.

## 5. Conclusion

Based on the perspective of sustainable development, this project focuses on the uncertainty of China's economic policy, and uses TVP-VAR model to empirically analyze the macro-economy effects brought about by the uncertainty of China's economic policy. The negative impact of economic policy uncertainty in the fourth phase is the strongest, and the short-term negative impact will continue to deepen after 2019 until 2021, and the impact of the first phase will remain at around -0.15%. Generally speaking, the short-term response function is above the medium-term and long-term, which shows that the uncertainty of economic policy has a more obvious short-term lifting effect on macro-leverage. The variable that has the greatest influence on output fluctuation is economic uncertainty, which accounts for 84.15% of the fluctuation. Secondly, technological progress contributes 79.88% to output fluctuation, and economic uncertainty has a negative impact on output. The impact of economic uncertainty on output fluctuation is stronger than that on consumption, capital and employment.

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