

# The Influence of Economic Uncertainty on the Effectiveness of Monetary Policy

Jiaxin Yu

School of Economics, Jinan University, Guangzhou 510632, Guangdong, China

## Abstract

Economic uncertainty is an important factor affecting the effectiveness of monetary policy. This paper begins with a theoretical perspective and analyses the impact of economic uncertainty on the effectiveness of monetary policy in light of public expectations, credit rationing and investment behavior, and policy lags. At the empirical level, the monthly data of macroeconomic climate index from January 1996 to December 2017 was selected in this paper. Seasonally adjusted and combined with the GARCH model to analyze the impact of economic uncertainty on the effectiveness of monetary policy. The empirical analysis found that the impact of economic uncertainty will weaken the effectiveness of monetary policy by suppressing the growth of the national economy. This conclusion manifests that in order to enhance the effectiveness of monetary policy in regulating the economy, economic uncertainties need to be taken into account. Monetary authorities need to pay close attention to the guiding role of information disclosure in the reasonable expectations of the public. At the same time, we must focus on perfecting the two-pillar regulatory framework for monetary policy and macro-prudential policies, and use the synergies between the two to cope with the impact of economic uncertainty, further deepen the reform of interest rate liberalization, and improve supporting mechanisms. In the use of traditional monetary policy tools to regulate the economy, we must gradually introduce innovative policy tools with shorter time lags to cope with the adverse effects of economic uncertainty.

## Keywords

Uncertainty; Monetary Policy; Expected Management; Investment Efficiency; External Time Lag.

## 1. INTRODUCTION

As one of the most important macroeconomic policies that affect the national economy, the effectiveness of monetary policy is also a topic of great concern in the academic and management circles. In the process of China's economic development, the effect of relying on the "flood of money and credit" to promote economic growth is no longer obvious, which actually means that in the transition stage of China's economy from high-speed growth to high-quality development, the effectiveness of monetary policy has declined. Some scholars have found that economic uncertainty has become the focus of well-designed monetary policy strategies, and even an important factor hindering the success of policy. In fact, economic uncertainty affects all aspects of our lives. As early as 1921, Keynes emphasized the importance of uncertainty in the whole social system including economic system in his paper probability. Domestic scholars mainly study the effectiveness of China's monetary policy from the micro level, especially from the perspective of the transmission mechanism of monetary policy. Huang (2002) believes that the main reason for the decline of the effectiveness of monetary policy is that the credit transmission mechanism is not smooth, especially in the transmission process

from commercial banks to enterprises and consumers [1]. Based on the VAR model of China's interest rate transmission channel, Gao et al. (2009) concluded that the effectiveness of China's monetary policy interest rate transmission channel is low [2]. Liu et al. (2016) studied the impact of Internet Finance on the effectiveness of monetary policy from the perspective of optimization of micro bank operation decision-making, and believed that Internet Finance enhanced the effectiveness of price based monetary policy through credit channels and interest rate channels [3]. Zhang (2017) studied the effectiveness of China's monetary policy under different exchange rate systems, and believed that the contradiction between the purpose of China's exchange rate management system and specific monetary policy measures reduced the effectiveness of China's monetary policy [4]. In recent years, some scholars try to study the effectiveness of monetary policy from the macro level. Xu (2007) found that the effectiveness of monetary policy largely depends on the macroeconomic situation [5]. Ma and Chen (2014) used the DSGE model of open economy to analyze and empirically test the relationship between economic openness and the effectiveness of monetary policy, which provides strong support for the view that the improvement of economic openness will reduce the effectiveness of monetary policy [6]. Su et al. (2019) pointed out that economic uncertainty will weaken the effectiveness of monetary policy by establishing a partial equilibrium model of enterprise investment under the control of monetary policy, but this impact mainly stays in the aspect of quantity, and does not affect its direction of action [7].

As one of the important sources of economic uncertainty, economic policy uncertainty has attracted more and more attention from scholars at home and abroad in recent years. Huang and Guo (2015) studied the impact of economic policy uncertainty on China's macro-economy in detail with the help of PVAR model, and found that in the short term, the impact of policy uncertainty on economic growth, investment, consumption and CPI is mostly negative, and there are regional differences [8]. Pär Stockhammar (2017) found that the uncertainty of economic policy in large economies has obvious spillover effect, which will have a negative impact on the economic growth of other economies except itself [9]. Duan (2017) found that increasing the uncertainty of economic policy itself will reduce the effectiveness of monetary policy [10]. Rangan Gupta (2017) found that expansionary monetary policy does not always bring high output, especially when the degree of uncertainty is high. The changes of output and price caused by monetary policy depend on the degree of economic uncertainty [11]. As one of the sources of economic uncertainty, the uncertainty of economic policy can partly reflect economic uncertainty, but not all. Few domestic scholars study the impact of economic uncertainty on the effectiveness of monetary policy. It is of great reference value for promoting the transformation of national economic development to study the factors restricting the improvement of the effectiveness of China's monetary policy and seek reasonable suggestions.

From the perspective of economic uncertainty, this paper discusses the relationship between uncertainty and the effectiveness of monetary policy. The paper proceeds as follows. Section 2 focuses on the theoretical analysis of the impact of macroeconomic uncertainty on the effectiveness of monetary policy, and puts forward research hypotheses. Section 3 makes an empirical analysis of the impact of macroeconomic uncertainty on the effectiveness of monetary policy by establishing an economic model and combining with the corresponding data. Section 4 makes a summary on the basis of empirical analysis, and provides relevant policy recommendations to improve the effectiveness of monetary policy.

## **2. CONCEPTUAL FRAMEWORK**

### **2.1. Public Expectation and Monetary Policy Effectiveness under Uncertainty**

According to the theory of rational expectation, whether the public can form an expectation consistent with the regulatory objectives is the key to the effectiveness of monetary policy. If

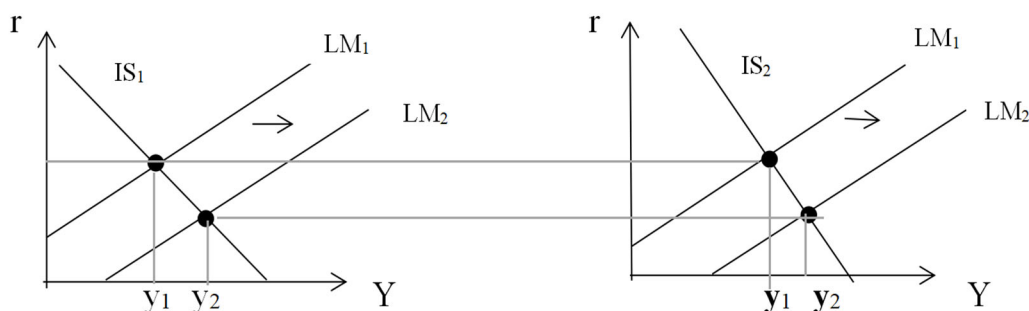
the public can rationally analyze and use the collected information to make economic decisions and form stable expectations consistent with the regulatory objectives, then the regulatory effectiveness of monetary policy can be improved. Because of the asymmetry of information and the difference of public's understanding and response ability in the market, the monetary authority's role in guiding the public's expectation is often unsatisfactory when the relevant system requirements of information disclosure in China are not standardized. In addition, public decision-making is often affected by economic uncertainty. In order to prevent the risk loss caused by the impact of economic uncertainty, the public's preventive motivation is enhanced, which often increases cash holdings and reduces current consumption, which makes it difficult for the monetary authorities to achieve the regulatory objectives. When the degree of economic uncertainty increases, the changes in the market are more difficult to predict, and the degree of information asymmetry also increases, which makes it difficult for the public to form expectations consistent with the objectives of monetary policy. "Herd effect" is obvious, which reduces the effectiveness of monetary policy.

## 2.2. Credit Rationing and Investment Behavior under Uncertainty

Economic uncertainty will reduce the sensitivity of investment to interest rate response, thus reducing the effectiveness of monetary policy. Keynesian school thinks that interest rate is the core factor in the whole monetary transmission mechanism. Monetary policy affects investment through interest rate, and then acts on output, so as to achieve the purpose of macroeconomic regulation and control. There is an implicit assumption in the effectiveness of monetary policy, that is, interest rate, as the most important factor, can affect the investment decisions of enterprises. In fact, the change of interest rate does not always effectively guide the investment behavior of Chinese enterprises, because Chinese enterprises are more or less faced with the problem of financing constraints, and under the condition of economic uncertainty, the negative impact of this constraint is more obvious. According to the hypothesis of neoclassical economics, investment is a decreasing function of the real interest rate. In the period of economic downturn, the monetary authority can promote the increase of enterprise investment by lowering the interest rate, so as to promote the growth of output. The fact is that lowering interest rates will lead to liquidity traps and other problems. At present, the construction of China's multi-level capital market still needs to be improved, and there is obvious financial repression. In fact, not all enterprises can obtain the funds needed for production and operation through direct financing. Under credit rationing, commercial banks, considering their own operating conditions, do not decide the object of loan according to the reserve price of interest rate that enterprises are willing to accept. Under the given interest rate level, there are always some enterprises can not get the loans needed for investment activities. In the case of high degree of economic uncertainty, even if commercial banks get some autonomy to change the interest rate, in order to reduce the risk they face, they tend to be more cautious in lending to enterprises, which makes it more difficult for enterprises to obtain investment funds, thus reducing the sensitivity of investment to the interest rate response.

It can be analyzed with IS-LM model. IS curve:  $r = (a + e) / d - (1 - b)y / d$ .

Where  $D$  is the sensitivity of investment to interest rate response. The slope of the curve is affected by both marginal propensity to consume  $b$  and marginal propensity to consume  $d$ . The larger  $D$  is, the more sensitive the investment is to the change of interest rate, and the smoother is curve is, otherwise it is steep. From the above analysis, we find that economic uncertainty will reduce the sensitivity of investment to interest rate response, and the is curve will become steeper (Figure 1).



**Figure 1.** Impact of economic uncertainty on IS-LM model

Through the comparison, we can find that the same expansionary monetary policy (LM<sub>1</sub> moving right to LM<sub>2</sub>) will lead to the decrease of interest rate and the increase of output level. Under the impact of economic uncertainty, compared with the situation without considering the impact of economic uncertainty, the decline of interest rate has a significant reduction in the stimulation of output, which indicates that economic uncertainty will reduce the effectiveness of monetary policy.

### 2.3.2.3 Economic Uncertainty and Time Lag of Monetary Policy

Monetary policy tools usually can not directly affect the ultimate goal of macroeconomic regulation and control, but need to act on the operational target and intermediary target of monetary policy in turn to affect the ultimate goal, there is a long external time lag. The effectiveness of monetary policy will be affected by the time lag of monetary policy. It is found that it takes four or five months for monetary policy to influence the real economy through monetary and credit channels [12]. This also means that the impact of policy will gradually increase over time, there is a amplification effect. Under the condition of economic uncertainty, it is more realistic to explore the impact of monetary policy delay on the effectiveness of monetary policy. Under the impact of economic uncertainty, monetary authorities often adjust monetary policy more frequently, and sometimes even need to reverse adjustment according to the change of economic situation. The effect of monetary policy with opposite adjustment direction offsets each other, which not only prolongs the external time lag of monetary policy, but also reduces the effectiveness of monetary policy.

From the above analysis, we can find that economic uncertainty can reduce the sensitivity of investment to interest rate response, prolong the external time lag of monetary policy and reduce the effectiveness of monetary policy by influencing public expectations. Therefore, we propose the following hypothesis: the impact of economic uncertainty will lead to the decline of the effectiveness of monetary policy.

## 3. RESULTS AND DISCUSSION

### 3.1. An introduction to the Measurement Index of Economic Uncertainty

Economic uncertainty is different from risk, it is often not observed and expected, lack of objective probability distribution. Scholars at home and abroad have made a lot of efforts to realize the quantitative analysis and measurement of economic uncertainty. Some scholars try to use the volatility of major macroeconomic variables (such as GDP, DPI, CPI, etc.) to reflect the macroeconomic uncertainty. In fact, although economic fluctuation can be regarded as the external manifestation of the impact of economic uncertainty, there are differences between the two. Macroeconomic variables often focus on one aspect of economic growth, price level, employment status or balance of payments. If only the standard deviation of a macroeconomic variable is used as the proxy variable of economic uncertainty, there is one sidedness. In

addition, macroeconomic variables will change with time, and also contain the expectations of economic entities. The standard deviation of variables is not enough to overcome these two obvious defects. Different from the macroeconomic variables we often choose, Leng (2017) discovered economic prosperity is a comprehensive description of economic development and activity [13]. Macro-economic climate index is a comprehensive index that can reflect production, employment, income distribution and demand. It is more comprehensive than macroeconomic variables that can only reflect one aspect. Among them, the peak and valley of the consensus index appear at the same time as the peak and valley of the overall economic operation, which can comprehensively describe the state of the overall economy. Taking 1996 as the base period (1996 = 100), the consistency index greater than 100 indicates that the economy is hot, and less than 100 indicates that the economy is cold. The difference between the actual index value and the benchmark value can reflect the degree of deviation of the economy. Therefore, this paper chooses to use the macro-economic climate index consistency index from January 1996 to December 2017, a total of 264 data. Referring to Xin (2015) and combining with GARCH (1,1) model which can eliminate variable expectation and overcome time-varying, the conditional heteroscedasticity obtained is regarded as the proxy variable of economic uncertainty to reflect economic uncertainty [14]. The data were collected from the website of National Bureau of statistics and CSMAR database, and were processed by stata15.0.

### 3.2. Measurement of Economic Uncertainty

The consistent index of macro-economic climate index is time series data. Before establishing the model, we need to test its stationarity. Using stata15.0 software for ADF unit root test of consistency index, we found that the original hypothesis can not be rejected within the 5% confidence interval (Table 1), which means that the original data is non-stationary and needs to be differential processed.

**Table 1.** Macro-economic Climate Index Consistency Index ADF Test

Null Hypothesis: P has a unit root

Exogenous: Constant

Lag Length: 4 (Automatic - based on SIC, maxlag=15)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.383015	0.1476
Test critical values:		
1% level	-3.455486	
5% level	-2.872499	
10% level	-2.572684	

\*MacKinnon (1996) one-sided p-values.

**Table 2.** Macro-economic Climate Index Consistency Index ADF Test after difference

Null Hypothesis: R has a unit root

Exogenous: Constant

Lag Length: 3 (Automatic - based on SIC, maxlag=15)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.843009	0.0000
Test critical values:		
1% level	-3.455486	
5% level	-2.872499	
10% level	-2.572684	

\*MacKinnon (1996) one-sided p-values.

After the first-order difference,  $P = 0.0000 < 0.05$ , indicating that the consistency index of the macroeconomic prosperity index after the difference is a stationary series (Table 2). Therefore, we can use the consistency index of macroeconomic prosperity index after the first-order difference, combined with GARCH model to get the conditional heteroscedasticity, so as to reflect the economic uncertainty.

The conditional heteroscedasticity of the measure is shown in Table 3.

**Table 3.** Conditional heteroscedasticity of consistent index measurement of macroeconomic prosperity index

Dependent Variable: R  
Method: ML - ARCH (Marquardt) - Normal distribution  
Date: 04/14/18 Time: 10:36  
Sample (adjusted): 2 264  
Included observations: 263 after adjustments  
Convergence achieved after 10 iterations  
Presample variance: backcast (parameter = 0.7)  
GARCH = C(1) + C(2)\*RESID(-1)^2 + C(3)\*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
Variance Equation				
C	6.82E-06	2.16E-06	3.153901	0.0016
RESID(-1)^2	0.544143	0.134057	4.059045	0.0000
GARCH(-1)	0.286740	0.108284	2.648027	0.0081
R-squared	-0.003254	Mean dependent var		-0.000315
Adjusted R-squared	0.000561	S.D. dependent var		0.005537
S.E. of regression	0.005536	Akaike info criterion		-7.776625
Sum squared resid	0.008059	Schwarz criterion		-7.735878
Log likelihood	1025.626	Hannan-Quinn criter.		-7.760250
Durbin-Watson stat	1.019767			

### 3.3. Model Setting and Variable Interpretation

According to the theoretical part of the analysis hypothesis, economic uncertainty will reduce the effectiveness of monetary policy and affect the achievement of macroeconomic control objectives. As the realization of economic growth is the primary goal of macroeconomic regulation and control, it is also an important indicator to measure the effectiveness of monetary policy. The models can be set as follows:

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 IEU_t + \alpha_3 MS_t + \alpha_4 \text{Export} + u_t \quad (1)$$

The statistics of variable explanation and data description are as follows:

$Y$  is the year-on-year growth rate of quarterly gross domestic product (GDP), and  $Y_{t-1}$  is the variable that the year-on-year growth rate of quarterly GDP lags one period to control the endogeneity of the model.

$IEU$  (index of economic uncertainty) is the main explanatory variable, which is the proxy variable of economic uncertainty obtained from the consistent index of macroeconomic prosperity index through GARCH process.

$MS$  (the speed of monetary supply) is the quarterly broad money supply (M2) growth rate after frequency adjustment, which is the main monetary policy variable.

Export is the year-on-year growth rate of quarterly export volume after adjustment.

$U$  is a random disturbance term.

Table 4 presents the mean, median, standard deviation, maximum and minimum of the variables used in this study.

**Table 4.** Descriptive statistics

	Mean	Med.	Max.	Mini.	Dev.
Y	0.09301	0.09050	0.14400	0.06400	0.01993
IEU	0.00003	0.00002	0.00018	0.00001	0.00003
MS	0.16430	0.15542	0.28977	0.08713	0.04445
Export	0.14540	0.15733	0.42700	-0.21833	0.16141

The results show that MS is a time stationary series (Table 5).

**Table 5.** ADF test of quarterly M2

Null Hypothesis: MS has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=11)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.896585	0.0031
Test critical values: 1% level	-3.508326	
5% level	-2.895512	
10% level	-2.584952	

\*MacKinnon (1996) one-sided p-values.

Using stata15.0 analysis, the absolute value of correlation coefficient between explanatory variables is not more than 0.65, indicating that the correlation between explanatory variables is low and there is no serious multicollinearity (Table 6).

**Table 6.** Multicollinearity test among variables

	GDP	IEU	MS	Export
GDP	1.0000	-0.0775	0.4179	0.6412
IEU	-0.0775	1.0000	0.2282	-0.0992
MS	0.4179	0.2282	1.0000	-0.0952
Export	0.6412	-0.0992	-0.0952	1.0000

**Table 7.** Model estimation results

	Y
Y(-1)	0.7151*** (0.004)
IEU	-45.5440* (0.057)
MS	0.0842*** (24.88)
Export	0.0278*** (0.006)
Observations	87
Adj. R2	0.87

Table 7 presents the results of our empirical tests for a relationship between economic uncertainty and the effectiveness of monetary policy. The decision coefficient  $R^2$  of the model is 0.88, and the adjusted decision coefficient  $R^2$  is 0.87, which shows that the fitting degree of the model is good. Based on the construction of economic uncertainty proxy variables, this paper uses the least square method (OLS) to estimate the impact of uncertainty proxy indicators on the important indicators of the effectiveness of monetary policy. The empirical analysis shows that there is a significant negative correlation between the macroeconomic uncertainty index IEU and the quarterly adjusted economic growth rate. This shows that the impact of economic uncertainty will hinder the growth of national economy, which is an important indicator of the effectiveness of monetary policy.

#### 4. CONCLUSION

This paper selects the economic prosperity index from January 1996 to December 2017, the consensus index and GARCH model to measure the proxy variables of economic uncertainty, and studies the impact of economic uncertainty on the effectiveness of monetary policy. This paper analyzes the impact of economic uncertainty on the effectiveness of monetary policy from the perspectives of rational expectation, credit rationing and investment behavior, and policy lag, and puts forward the hypothesis to be verified. Through the empirical analysis and test, it preliminarily confirms the hypothesis that the increase of economic uncertainty will lead to the decrease of the effectiveness of monetary policy. In order to improve the effectiveness of monetary policy and reduce the adverse impact of uncertain shocks on economic development, we can make efforts from the following aspects:

Strengthen the expectation management. It is found that accurate and timely information disclosure of monetary authorities can help the public form reasonable expectations consistent with policy regulation and reduce the adverse impact of uncertainty. When the effectiveness of monetary policy is insufficient, the introduction of expectation management can greatly reduce the loss of social welfare. Monetary authorities need to establish trust with the public through full information disclosure, and play the role of reputation mechanism. Specifically, the monetary authority can reduce the degree of information asymmetry by timely and accurately announcing information to the public, so as to reduce the adverse selection and moral hazard. On the other hand, we should also guide the public to enhance rational understanding and not blindly follow suit.

We will deepen the market-oriented reform of interest rates. As a key link in the transmission mechanism of monetary policy, the degree of interest rate marketization is closely related to the effectiveness of monetary policy. The sensitivity of investment to the cost of capital of Companies in regions with higher degree of marketization is greater than that in regions with lower degree of marketization. The imperfection of China's interest rate mechanism and the existence of credit rationing limit the role of monetary authorities in regulating interest rates to affect the economy. The reform of interest rate marketization affects the whole body. While relaxing the interest rate restriction, it needs the cooperation of industrial structure, system and other measures to overcome the negative impact of economic uncertainty.

Change the single mode of economic development controlled by monetary policy, and improve the dual pillar regulatory framework of monetary policy and macro Prudential policy. From the above analysis, we find that the effectiveness of monetary policy, as a tool of demand management, declines when it is impacted by economic uncertainty, which hinders the realization of macroeconomic control objectives. Compared with the economic stable period, the economic uncertainty in the crisis period is higher, and the impact on the real economy is greater. When the sensitivity of investment interest rate drops, it is not ideal to rely solely on monetary policy to regulate economic operation. Part of the impact of economic uncertainty



comes from the financial system's weak ability to resist risks. In response to the impact of economic uncertainty, macro Prudential policy can be adjusted in a counter cyclical way, which has incomparable advantages over monetary policy. Proper use of macro Prudential policy will help to improve the effectiveness of monetary policy.

Financial innovation. The traditional monetary policy tools have the problems of long external time lag, and the regulation is not timely. With the continuous development and improvement of the financial market, monetary policy control tools are also constantly improved, and new policy tools that are more in line with the requirements of the times have emerged. Therefore, while using conventional policy tools, monetary authorities should also pay attention to using innovative policy tools with short time lag, such as permanent lending facilities, to improve their regulatory capacity. Financial innovation is the inevitable requirement of financial deepening. In order to cope with the impact of economic uncertainty and enhance the effectiveness of monetary policy, financial strategy, financial instruments, financial business and financial institutions should be reformed.

## REFERENCES

- [1] F.M. Huang (2002). On the effectiveness of China's monetary policy from the credit transmission channel. *Journal of Finance and Economics*, vol.28, no.9, p.24-30.
- [2] S. Gao and Y. Huang (2011). An empirical study on the effectiveness of monetary policy transmission mechanism. *Research on Financial and Economics Issues*, vol.332, no.7, p.50-58.
- [3] L.B. Liu, Y.L. Qi and J.J. Zhang (2016). The influence of internet finance on the effectiveness of monetary policy. *Finance & Trade Economics*, no.1, p.61-72.
- [4] S.F. Zhang (2017). Research on the effectiveness of my country's monetary policy under different exchange rate systems. Shanxi University of Finance and Economics Master Thesis.
- [5] Y.P. Xu (2007). The macroeconomic operation situation and the effectiveness of monetary policy regulation. *Journal of Harbin Senior Finance College*, vol.89, no.1, p.1-4.
- [6] Y. Ma and Y.L. Chen (2014). Economic openness and monetary policy effectiveness: micro foundation and empirical analysis. *Economic Research Journal*, no.3, p.35-46.
- [7] Z. Su, C.C. Liu and X.L. Wei (2019). Will economic uncertainty weaken the effectiveness of China's monetary policy?. *The Journal of World Economy*, no.10, p.49-71.
- [8] N. Huang and P. Guo (2015). The impact of economic policy uncertainty on macroeconomics and its regional differences. *Finance & Economics*, no.6, p.61-69.
- [9] Pär Stockhammar (2017). The impact of US uncertainty Shocks on Small Open Economies. *Open Economies Review*, vol.28, no.2, p.347-360.
- [10] M. Duan (2017). Will economic policy uncertainty affect the effectiveness of monetary policy?. *Contemporary Finance & Economics*, vol.391, no.6, p.18-26.
- [11] G. Rangan (2017). Unconventional monetary policy shocks in OECD countries: how important is the extent of policy uncertainty?. *International Economics and Economic Policy*, no.6, p.1-21.
- [12] Y. Hao (2004). An empirical analysis of the time lag of China's monetary policy. *Nankai Economic Studies*, no.1, p.109-112.
- [13] Y. Leng (2017). Comparison and reflection on the research of economic prosperity index. *Statistics & Decision*, vol.470, no.2, p.5-8.
- [14] H.B. Xin (2015). Economic uncertainty and bank credit supply. *Industrial Economics Review*, vol.9, no.5, p.101-113.