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The Impact of Federal Reserve Monetary Policy on China's Industrial Economy

Jiacheng Gu[1,a,*]

[1]*Ontario Academy of International Education, Markham, Toronto, L3R 0B8, Canada*
a. 3041086505@qq.com
**corresponding author*

***Abstract*:** As the two largest economies in the world, China and the United States have a far-reaching impact on China's economic growth and global economic development. However, generally speaking, the impact of the Federal Reserve's monetary policy on the economic growth of various provinces in mainland China is quite heterogeneous. For example, the impact of the Federal Reserve's monetary policy on the economic growth of eastern coastal and border provinces is less than that of inland provinces. Therefore, China should not only comprehensively use monetary policy and fiscal policy tools to effectively deal with short-term external shocks but also make full use of the favorable factors brought by the Federal Reserve, solidly promote economic restructuring, transformation, and upgrading, accelerate the structural transformation of economic growth momentum, and actively cultivate new kinetic energy for economic development.

Keywords: monetary policy, spillover effect, inter-provincial affect policy, coordination

1. Introduction

As the world's two largest economies, China and the United States account for about one-third of the world's total economy. The spillover effect of the Federal Reserve's monetary policy on China's economic growth surpasses that of bilateral growth and broadly impacts global economic development. As an essential part of macroeconomic policy, the changes in monetary policy between China and the United States have a far-reaching impact on the development of both sides and even the global economy [1]. China's economy is in a critical period of structural adjustment and transformation mode. There is tremendous downward pressure on the economy—an in-depth study of the spillover effect of the Federal Reserve's monetary policy on China's economic growth. In order to coordinate the relationship between opening up to the outside world and domestic development, scientifically formulate and implement domestic monetary policy and further improve domestic economic development. The level has significant theoretical guiding value.

2. Literature Review

The impact of the cross-border spillover effect of monetary policy has always been a critical research issue in open macroeconomics. Fleming and Mundell combined with Keynesian theory. Based on the assumption of static exchange rate expectations, Fleming established a Mondale-Fleming model, believing that under a floating exchange rate system, active monetary policy will lead to the emer-

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gence of the beggar-thy-neighbor effect [2]. Later, with the emergence of the theory of rational expectation, Dornbush used the theory of full expectation to expand Keynesian static analysis methods and established the Mondale-Fleming-Dornbus model, which better explained how unintended tightening monetary policy led to the economy. Changes provide an effective forecasting method for studying the impact of monetary policy adjustment on economic shocks [3].

After the international financial crisis, with the introduction of the Federal Reserve's quantitative easing monetary policy and the normalization of monetary policy, many researchers paid more attention to the study of the spillover effects of the Federal Reserve's monetary policy on China's economic growth. For example, He Jun, Hu Jialian, and Zhang Yujuan found that the quantitative easing monetary policy of the United States inhibits China's economic growth; Mali and Yu Huijuan believe that the quantitative easing monetary policy of the United States will promote the economic growth of BRICS countries such as China in the short term [4,5]. Li Meng et al. Research pointed out that the spillover effect of quantitative easing monetary policy in the United States significantly impacts the economic growth of emerging economies such as China more than that of developed countries [6]. It can be seen that the Federal Reserve's monetary policies have a significant spillover effect on China's economic growth, which many research results have confirmed.

To sum up, the existing literature on the impact of the spillover effect of the Federal Reserve's monetary policy on China's economic growth has the following three shortcomings: First, most of the literature lacks an in-depth discussion on the heterogeneity of the spillover effect of the Federal Reserve's monetary policy on China's economic growth from an inter-provincial perspective and does not accurately describe the Federal Reserve [5]. The impact direction and impact degree of the spillover effect of monetary policy on China's economic growth are divided among provinces; second, when analyzing the impact of the Federal Reserve's monetary policy adjustment on China's economic growth, most literature does not accurately describe the time-degeneration characteristics brought about by the structural changes in China's economy; third, in reality At the time of the construction of the certificate model, the existing literature only considered the measurement model of the relevant economic indicators of China and the United States, ignoring the disturbance caused by the monetary policy adjustment of other vital economies on the estimated results of the model. Therefore, using the TVP-VAR-SV model, this paper empirically studies the inter-provincial effect of the Federal Reserve's monetary policy spillover on China's economic growth based on fully considering the time-varying characteristics of the international network of significant monetary policy spillovers [7,8].

3. Analysis of Empirical

3.1. Demonstration

An empirical study on the heterogeneity of the impact of the Federal Reserve's monetary policy spillover on China's economic growth from the inter-provincial perspective. This study is divided into the following three steps:

Firstly, the TVP-VAR-SV model empirically studies the spillover effect of the Federal Reserve's monetary policy on China's economic growth. According to historical data, the existence and time-varying characteristics of the spillover effect of the Federal Reserve's monetary policy on China's economic growth are confirmed.

Secondly, the TVP-VAR-SV model is used to empirically study the impact direction of the spillover effect of the Federal Reserve's monetary policy on the economic growth of 31 provinces (municipalities and autonomous regions) in mainland China. The empirical results are divided into four categories: first negative and then positive, first positive and then negative, and continuously positive and continuously negative [7]. The administrative maps of 31 provinces (municipalities and autono-

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mous regions) in mainland China are generated by R software. The provinces belonging to the above four categories are marked as red, green, blue, and orange in the maps, thus accurately depicting the regional distribution of the impact direction of the Federal Reserve's monetary policy spillover effect on the economic growth of different provinces in mainland China.

Thirdly, the TVP-VAR-SV model is used to empirically study the impact of the spillover effect of the Federal Reserve's monetary policy on the economic growth of 31 provinces (municipalities and autonomous regions) in mainland China. The final impulse response impact values of the recent economic growth of provinces (municipalities directly under the Central Government and autonomous regions) affected by the interest rate increase policy of the Federal Reserve are classified according to five intervals (-0.2, -0.1], (-0.1,0], (0,0.2], (0.2,0.4] and (0.4,0.9]). The R software is used to generate China. In the figure, the provinces whose final impulse response impact values belong to the above five ranges are marked as red, green, blue, orange, and black, thus accurately depicting the regional distribution of the impact degree of the Federal Reserve's monetary policy spillover effect on the economic growth of different provinces in mainland China.

3.2. Parameter Estimation Method

In order to more accurately depict the characteristics of abrupt structural changes among economic variables caused by time changes and reduce the estimation errors caused by the estimation results of model parameters, this paper adopts the TVP-VAR-SV model for empirical research. According to the research of Nakajima (2011), it is assumed that the parameters to be estimated in this empirical test equation obey the first-order random walk process with time-varying volatility [9]. Therefore, the TVP-VAR-SV model can more accurately describe the abrupt structural change of the relationship between variables in the model equation with time, reduce the lasting influence of abrupt structural change on the parameter estimation results in the model equation, and avoid the deviation of the parameter estimation results caused by the assumption that the volatility of the parameter to be estimated is not constant. Given the TVP-VAR-SV model equation:

$$Y = X\beta + A\text{-}1\sum\varepsilon\ t=p+1,\ \ldots,\ T \tag{1}$$

In order to estimate the matrix At in the above empirical test equation more conveniently, assume that the matrix is a lower triangular matrix with diagonal elements of 1 [10]. That is:

$$A1 = \begin{pmatrix} 1 & 0 & \cdots & 0 \\ a21 & 1 & 0 & 0 \\ \vdots & a32 & \ddots & \vdots \\ & & & \end{pmatrix} \tag{2}$$

4. Results of Empirical

4.1. The Existence Analysis of the Spillover Effect

From the test results of model reliability, the parameter estimates of the TVP-VAR-SV model were within a 95% confidence interval, and the CD value and invalidity factor value were relatively small. This indicates that the convergence effect of model parameter estimation is good, the effectiveness of state variable and parameter sampling is better, and the model estimation results meet the requirements (see Table 1).

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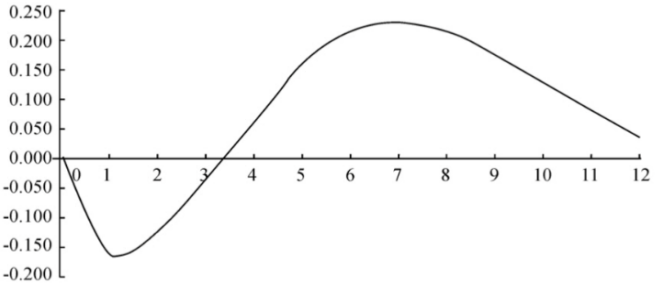

Figure 1: Short-run impulse response of the spillover effect of the Fed's monetary policy on the Chinese economy.

From the perspective of the short-term impulse response, the spillover effect of the expansionary monetary policy of the Federal Reserve has a positive impact on China's economic growth, while the impact direction of the contractionary monetary policy is the opposite, that is, negative first and positive backward. The degree of the impact of the expansionary monetary policy first increases and then decreases, then changes to the negative impact increase and decrease, generally showing the characteristics of a sinusoidal function image. The degree of impact of tightening monetary policy is first negative shock increases and then decreases, then converted to positive shock increases and decreases, generally showing the characteristics of negative sine function image (see Figure 1)[11]. This indicates that the impact of the spillover effect of the Federal Reserve's monetary policy on China's economic growth was initially more substantial than the effect of expenditure conversion. After some time, expenditure conversion became more potent than income absorption, showing the characteristics of a "strong and weak exchange of the two". Second, from the perspective of the long-term change trend of the impulse response, the final impact degree of the spillover effect of the Federal Reserve's monetary policy on the Chinese economy has a nonlinear time-varying characteristic. On the whole, the impact degree is decreasing (see Figure 2). This shows that in recent years, as the Chinese government continues to strengthen internal reform and opening up, the economic restructuring is progressing steadily, the pace of transformation and upgrading is significantly accelerated, the diversification strategy of the export market is effectively implemented, the dependence on the US export market is gradually reduced, and the driving force of economic growth continues to change.

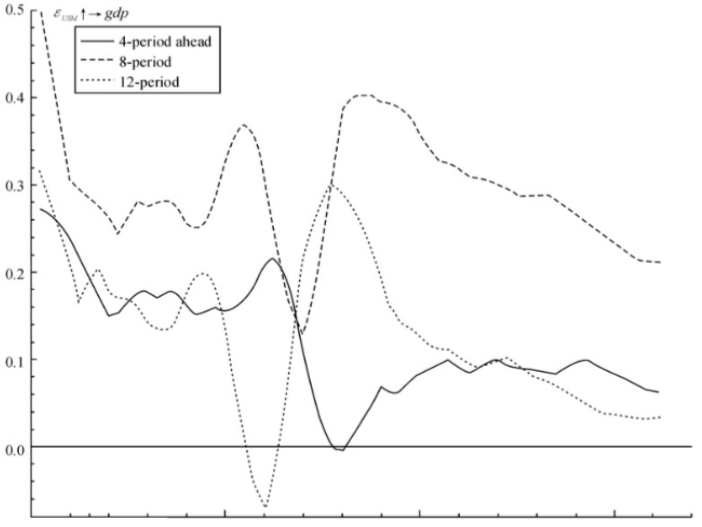

Figure 2: The long-term trend of the spillover effect of the Federal Reserve monetary policy on the impulse response of the Chinese economy.

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Considering the large number of empirical test objects involved, the test results of the reliability of the TVP-VAR-SV model cannot be presented in the main text. From the estimation results, the estimated parameter values of the TVP-VAR-SV model are within a 95% confidence interval, and the CD value and invalid factor value are more minor than each other. This shows that the convergence effect of model parameter estimation is better, the effectiveness of state variable and parameter sampling is better, and the model estimation results meet the requirements.

5. Conclusion

Under the background that "Trumpism" brings more uncertainty to American economic policy, the contradiction between the mutual spillover of monetary policies between China and the United States has a far-reaching impact on the global economic recovery. China and the United States are both economically interdependent and unbalanced, which determines that the spillover effect of US monetary policy on China's economic growth is the central aspect of contradiction. However, the economic development imbalance in mainland China complicates the spillover effect of US monetary policy on China's economic growth. Therefore, studying the impact of the spillover effect of the Federal Reserve's monetary policy adjustment on China's economic growth from the perspective of inter-provincial heterogeneity at the meso-level has significant theoretical reference value for revealing the regularity of changes in the economic and financial relations between China and the United States, and also has solid practical significance for improving China's macroeconomic regulation and control methods, effectively coping with external shocks and promoting economic transformation and upgrading.

From the above conclusions, we can get the following enlightenment: First, in the face of the normalization of the Federal Reserve's monetary policy and the "policy uncertainty" brought about by Trump's assumption of the presidency of the United States, on the one hand, all provinces (municipalities and autonomous regions directly under the Central Government) in mainland China should comprehensively use various monetary policy tools to smooth out the liquidity short-term wave caused by external shocks, Deepen the financial and tax reform such as "revenue reform and increase" into tax reduction and fee reduction for enterprises and enterprises, strengthen and change the pre-management to enhance investors' confidence in China's economy and effectively cope with external short-term shocks. On the other hand, we should make full use of the positive impact of the Fed's interest rate hike policy on the economy, seek advantages and avoid disadvantages, solidly promote economic restructuring, transformation and upgrading, and actively cultivate new kinetic energy for economic development. Second, when formulating policies to deal with the impact of the Fed's interest rate hike policy on China's economy, we should distinguish the particularity and heterogeneity of the impact of the Fed's interest rate hike policy on the economic growth of different provinces (municipalities and autonomous regions) in mainland China and adopt targeted strategies according to local conditions.

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