

The Unbalanced Spillover Effects of the Federal Reserve's Quantitative Easing Policy on Countries or Regions with Different Economic Development Qualities--Based on GVAR Model

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Abstract. This article uses GVAR (Global Vector Autoregressive Model) to analyze the impact of the Federal Reserve's quantitative easing policy on the real economy and financial markets of other countries and regions with different quality of economic development in the world. It is believed that there are spillover effects in US monetary policy, while there is heterogeneity in the response of countries or regions with different characteristics of economic development to external shocks. It is proposed that in the future, countries around the world can improve the driving force of domestic economic development by optimizing their economic structure, etc., while enhancing their ability to withstand external shocks. While improving innovation capabilities, accelerating opening up, optimizing the allocation of market resources, and strengthening the construction of ecological civilization, it is necessary to pay attention to the enhancement of the spillover degree of external environmental shocks. At the same time, the degree of debt leverage in different sectors will also change the impact of external shocks.

Keywords: GVAR model; Quantitative easing policy; Quality of economic development.

1 Introduction

Since the beginning of the 21st century, the degree of economic exchange among countries around the world has significantly improved, and the idea of economic globalization has taken root in the hearts of the people. The policy actions of major economic countries not only have an impact on domestic macro and micro economies, but also cause fluctuations in various economic variables in other countries in the world. Monetary policy, as an important regulatory policy for a country, has always received academic attention. As one of the major economies in the world, changes in the monetary policy of the United States will inevitably affect other countries and regions in the world. Due to their different levels of economic development, the response to the impact of US monetary policy spillovers will also be different. Therefore, exploring the factors that affect changes and their mechanisms is crucial for countries around the world to make future foreign relations and policy choices. This paper uses the Generalized Vector Autoregressive Model (GVAR) to analyze the spillover effects of the Federal Reserve's monetary policy by constructing a multinational dynamic model.

2 Literature review

From the perspective of research direction, there are many studies on monetary policy spillover effects in developed countries represented by the United States. Zhang Jingjing (2013) theoretically explores the impact and transmission channels of US monetary policy on China's economy^[1]; Li Zilei and Zhang Yun (2013) believed through the SVAR model that the quantitative easing policy of the United States affects China's inflation level through commodity prices and exchange rates^[2]; Xu Yijia (2015) constructed an SVAR model to show that the effects of quantitative easing policies in the United States on exchange rates, output, and price levels in the "Greater China Economic Circle" are different^[3]; Jiang Meihua (2014) explored the impact of economic growth and money supply on inflation levels in various countries through GVAR models based on economic data from the United States, China, Japan, and South Korea^[4]; Liang Bing and Xu Wenli (2022), from the perspective of quantitative easing policy of the European Central Bank, use GVAR analysis to believe that the monetary policy of the European Central Bank has a significant impact on domestic price levels and financial markets^{[5][6]}.

In summary, the world academic community has made certain achievements in the study of monetary policy spillovers, especially in exploring the monetary policies of developed countries, especially the United States, from the discussion of a single country to the overall discussion of the entire world; Regression from panel to VAR, SVAR, PVAR, GVAR^{[7][8][9]}, and other models; From the impact effect to the transmission mechanism. Most of the current literature focuses on the impact with specific countries, ignoring the dynamic links with other countries in the world; Even if countries with different economic sizes are considered, the research approach is relatively limited, and there is a lack of mechanism discussion, which does not fully analyze the causes of spillover effects. This article will start from the perspective of the Federal Reserve's quantitative easing policy, analyze the different responses of countries and regions with different economic development qualities to the Federal Reserve's quantitative easing policy, and explore the spillover impact from the macro dynamic perspective of the entire world using the GVAR model.

The contribution of this article lies in the following three points: First, taking into account various factors of economic development quality from a different perspective, systematically presenting the impact of US monetary policy on the world economy. The second is to adopt the GVAR model, which compensates for the shortcomings caused by the limitations of the previous academic research on the Federal Reserve's monetary policy spillovers. It also includes most of the world's major economies or countries, and constructs a worldwide dynamic model. The third is to provide a new perspective for future foreign economic cooperation among countries around the world and when facing the uncertain impact of the post crisis era.

3 Model building

The general form of the GVAR model is the same as that of traditional vector autoregressive models, with the form:

$$y(t) = \alpha(i) + \sum_{s=1}^n \beta(s)y(t-s) + v(t) \quad (1)$$

$y(t)$ is a matrix of endogenous economic variables for each country or region during the t period, $y(t-s)$ is a matrix of endogenous economic variables that lag for a certain period in the country or region, $\beta(s)$ is the coefficient matrix corresponding to the hysteresis term, $v(t)$ is a random impact matrix. Then, foreign economic variables are introduced to construct a country VAR model in the form of:

$$X(i, t) = Ai + \sum_{s=1}^n B(i, s)X(i, t-s) + \sum_{r=0}^m C(i, r)X^*(i, t-r) + \varepsilon(i, t) \quad (2)$$

$X(i, t)$ represents the endogenous economic variable matrix of the i th country or region in the t period, $X(i, t-s)$ represents the endogenous economic variables of the country or region in the $t-s$ period, $B(i, s)$ is the corresponding coefficient, $X^*(i, t-r)$ represents the endogenous economic variables of the country or region in the $t-r$ period, $C(i, r)$ is the corresponding coefficient, $X^*(i, t) = W(i)X(i, t)$, The weight matrix shows the proportion of the import and export trade volume between different countries or regions and the economy to all their import and export trade volumes. If the sum of each column is 1, it can be expressed as:

$$W(i, j) = \begin{cases} 0, & i = j \\ w_{ij}, & i \neq j \end{cases} \quad (3)$$

Then stack the country country country VAR models of different countries or regions through the weight matrix to obtain the formula:

$$X(i, t) = Ai + \sum_{s=1}^n B(i, s)X(i, t-s) + \sum_{r=0}^m C(i, r)W(i)X(i, t) + \varepsilon(i, t) \quad (4)$$

Then simplify:

$$X(t) = E + \sum_{o=1}^{o=\max(m,n)} F(o)X(t-o) + \alpha(t) \quad (5)$$

$$E = A/(I - C(0)W), \alpha(t) = \varepsilon(t)/(I - C(0)W), F(o) = (B(o) - C(o)W)/(I - C(0)W).$$

4 Model setting

This model uses 24 countries or regions (Australia, Austria, Canada, Brazil, Denmark, Chinese Mainland, Germany, France, India, Hong Kong, Ireland, Indonesia, South Korea, Japan, Mexico, Malaysia, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, the United Kingdom, the United States), which are distributed in different regions and have differences in economic systems. It selects variables from these countries or regions to construct a GVAR model to analyze the spillover effects of US monetary policy on economic variables in other countries.

In order to measure the quality of economic development, this article divides the quality of economic development into economic structure (total capital formation/GDP, final consumption expenditure/GDP, service and trade imports/GDP, service and trade exports/GDP), innovative development (number of scientific research and technical personnel per million people, number of patent authorizations/total population, research and development expenditure/GDP), resource allocation (total factor productivity, non-performing loan ratio of commercial banks) Market mechanism (financial market development index, financial institution development index, government non-financial investment/GDP), economic growth (consumer price index index, registered unemployment rate, year-on-year GDP growth rate), infrastructure (logistics performance index, railway passenger flow/total population, air passenger flow/total population, broadband network users per 100 people) Ecological environment (forest coverage, proportion

of natural reserve area, nitric oxide emissions/GDP, greenhouse gas emissions/GDP, number of deaths due to air pollution per 100000 people), economic benefits to people (per capita GDP, population mortality rate, proportion of people aged 25 and above completing junior high school education, proportion of international tourism in total imports) Debt structure (leverage ratio ratio of resident debt, leverage ratio ratio of government debt, leverage ratio ratio of non-financial enterprise sector, bank capital/assets), and indicator data are from the World Bank, Bank for International Settlements, International Monetary Fund and other organizations.

Select the countries or regions to be studied and construct VARX models respectively. The model includes 24 countries or regions, and the variables include eight variables: stock index $eq = \ln(E/CPI)$ (E is the actual stock index), long-term interest rate $rl = 0.25 \ln(1 + RL/100)$ (long-term treasury bond yield), inflation rate $dp = \ln(CPI)$ (including seasonally adjusted CPI index, 2010=100) Short-term interest rate $rs = 0.25 \ln(1 + RS/100)$ (interbank offered rate, short-term money market interest rate, etc., in which the U.S. short-term interest rate variable refers to the effective federal fund shadow interest rate of Wu&Xia (2015)), exchange rate $ep = \ln(E)$ (E=nominal exchange rate, direct pricing method), output $y = \ln(GDP)$ (quarterly adjusted real GDP), international crude oil price oil (Brent crude oil futures settlement price), gold closing price $pgold$ (COMEX gold futures closing price), And perform a first order difference for all variables. Due to the availability of data, the time span is selected from the second quarter of 2004 to the fourth quarter of 2019 (quarterly data). The original data comes from databases or websites such as China Economic Network, CEIC, IMF, WTO, WIND, BIS, and the World Bank.

In these VARX models, not only domestic variables need to be included, but also corresponding foreign variables should be added, including stock market index eq , long-term interest rate rl , inflation rate dp , short-term interest rate rs , exchange rate ep , and output y . Foreign variables include stock market index eqs , long-term interest rate rls , short-term interest rate rss , and exchange rate eps , The global variables are crude oil price, oil price, and gold closing price, $pgold$ (in which the U.S. exchange rate variable is not included in the domestic variable, while considering the spillover effect of the United States on other countries or regions, its foreign variables do not include short-term interest rates and stock indexes, while the global variables are endogenous variables in the United States (domestic variables: y , dp , rs , rl , eq , oil , $pgold$; foreign variables: eps); Foreign variables in other countries or regions do not include exchange rates, while global variables are exogenous variables in other economies (domestic variables: y , dp , rs , rl , eq , ep ; foreign variables: rss , rls , eqs). Then construct a VARX model.

Third, construct a trade weight matrix. Based on the weight coefficient calculated from the import and export trade volume from 2016 to 2018, the weight is calculated again among the 24 economies, so that the sum is 1. The VARX models of different economies are connected through the trade weight matrix.

5 Empirical testing

5.1 unit root test

This article uses the ADF unit root test to test the original sequences of Chinese internal variables, foreign variables, and global variables in various countries or regions. 89.86% of

domestic variables pass the test, 90% of foreign variables pass the test, and 100% of global variables pass the test.

5.2 cointegration inspection

This article calculates the cointegration relationship based on the AIC information criterion, and the results indicate that there is a long-term equilibrium relationship between the variables in the GVAR model in this article.

5.3 weak exogeneity test

The GVAR model requires that foreign variables and global variables in models with cointegration relationships should meet the weak exogeneity test hypothesis, and the results show that 90.52% of the variables are not significant at the 5% significance level.

5.4 structural stability test

Due to the large time span and major events occurring in the middle, structural stability test is required to judge whether the parameter stability hypothesis is tenable. The results show that the number of unstable variables after robust adjustment of Nyblom, QLR, MW, APW indicators accounts for 6.43%, 2.86%, 3.57%, 2.86% at the significant level of 5%, indicating that the structure is relatively stable.

5.5 impulse response analysis (US short-term interest rate change of one negative unit)

From the perspective of economic structure(**Fig. 1.economic structure(eth and etl)** and innovation-driven development(**tah and tal**)), short-term interest rates in countries or regions with good economic structure decreased by about 0.0004 units in the first period, while short-term interest rates in economies with poor economic structure decreased by 0.0005 units in the first period, indicating that economies with poor economic structure are more vulnerable to external shocks due to their unbalanced economic structure. In terms of exchange rates, economies with better economic structures experienced a relatively low impact after implementing quantitative easing in the United States, resulting in a rapid recovery in production and exports. At the same time, international capital flowed into more stable economies to avoid risks, resulting in a long-term appreciation of their exchange rates of 0.001 units; Economies with poorer economic structures are more vulnerable to external shocks, with slower economic recovery and international capital outflows, resulting in a devaluation of their exchange rate of about 0.0007 units in the 0th period.

From the perspective of innovation and development(**Fig. 1.economic structure(eth and etl)** and innovation-driven development(**tah and tal**)), short-term interest rates in countries or regions with strong innovation and development capabilities decreased by about 0.0005 units in the first period, an increase of about 0.0003 units compared to the other group. This may be due to the fact that domestic science and technology enterprises are one of the main drivers of economic development, while science and technology enterprises are more vulnerable to external shocks and global economic downturn, so the government has significantly lowered interest rates to ensure the survival and development of enterprises, Reduce the pressure of enterprise financing and daily operations. In terms of output and stock indexes, due to a significant reduction in interest rates, the output and stock indexes of economies with strong innovation capabilities have decreased significantly compared to the other group, indicating that low interest rate

policies are conducive to economic recovery and improving market expectations, thereby promoting international trade, capital inflows, and currency appreciation, with a long-term decline in their exchange rate of about 0.0018 units^{[10][11][12]}.

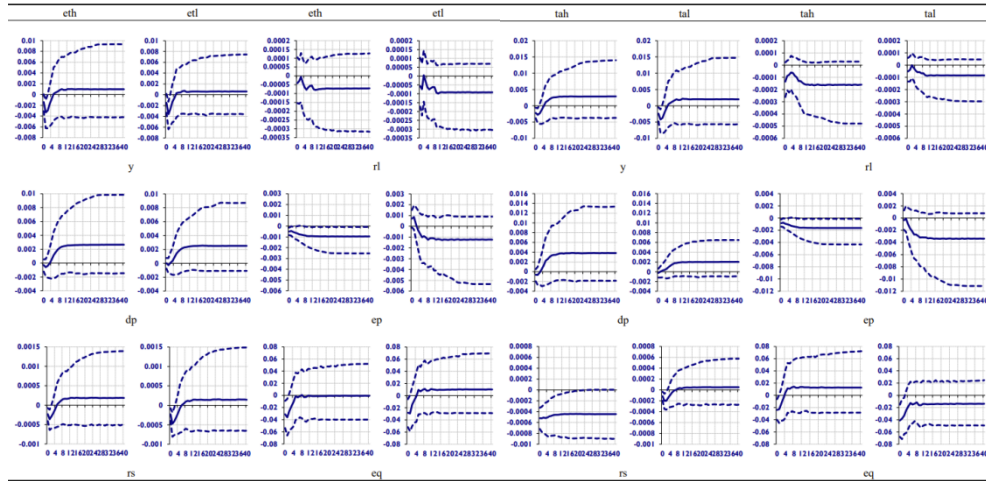


Fig. 1. economic structure(eth and etl) and innovation-driven development(tah and tal)

From the perspective of resource allocation(Fig. 2. resource allocation(rdlh and rdhl) and market mechanism(mfh and mfl)), the output of countries or regions with good resource allocation decreased by 0.003 units in the first period, while the output of another group decreased by 0.002 units in the first period. At the same time, the decline in the price index and stock index is also higher than that of economies with low resource allocation. This may be due to the fact that economies with high resource allocation generally have close external connections and high resource utilization rates. When the external environment and economy are sluggish, raw material supply is in short supply The obstruction of trade has a significant impact on output, which is reflected in prices and the stock market. In terms of interest rates, the short-term and long-term interest rates of countries or regions with efficient resource allocation decreased by 0.0006 and 0.0005 units respectively in the first period, while the short-term interest rates of countries or regions with inefficient resource allocation decreased by 0.0005 units in the long-term, indicating that in the short-term, countries or regions with efficient resource allocation were greatly impacted, and their interest rates fell more widely. In terms of exchange rate, due to the high degree of economic setbacks in economies with efficient resource allocation, their weak trade and investment, and capital outflows, the exchange rate increased by about 0.001 units in the 0 th period.

Similar to resource allocation, economies with well-developed market mechanisms are more vulnerable to external shocks, with short-term and long-term interest rates falling by 0.0007 and 0.0006 units respectively in the first period; In the short term, the sluggish economic recovery has led to an increase in output by 0.0028 units compared to the other group in the first period, an increase in the price index by 0.0007 units in the second period, and an increase in the stock index by 0.013 units in the second period. Multiple factors have driven the exchange rate to depreciate by 0.001 units in the second period(Fig. 2. resource allocation(rdlh and rdhl) and market mechanism(mfh and mfl)).

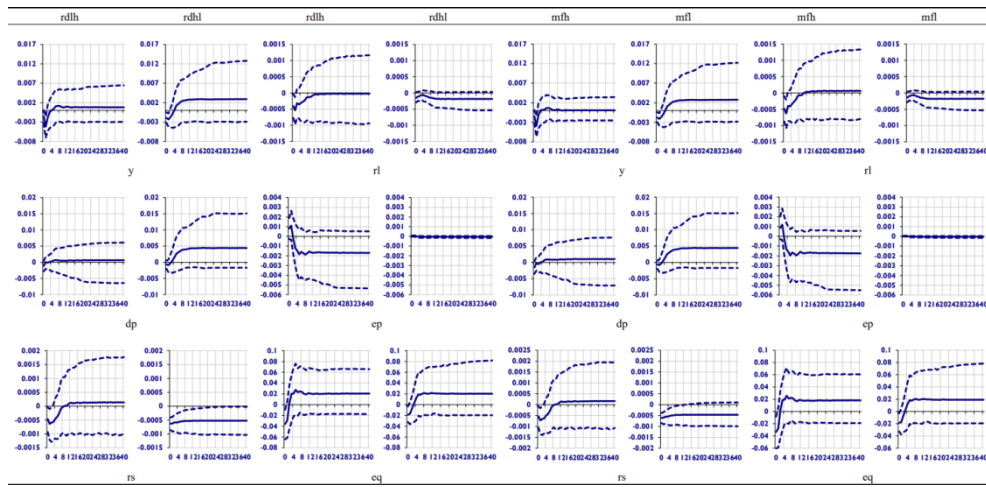


Fig. 2. resource allocation(rdlh and rdhl) and market mechanism(mfh and mfl)

From the perspective of economic growth(Fig. 3.economic growth(egh and egl) and infrastructure(bch and bcl)), the stock index of economies with high economic growth decreased by 0.04 units in the first period, an increase of 0.014 units compared to the other group. At the same time, short-term and long-term interest rates decreased by 0.0006 and 0.0005 units respectively in the first period, both of which decreased by a greater extent than the other group, indicating that economies with high economic growth are closely related to the external environment in terms of trade and investment, When exposed to external shocks, economic variables and market expectations react more acutely. For example, when the overall external economy of a country that relies on exports for economic growth is depressed, its trade volume will decline. However, due to the good fundamentals of its economic development, despite short-term pressure, the economic recovery is strong, reducing the scope of currency depreciation.

From the perspective of infrastructure(Fig. 3.economic growth(egh and egl) and infrastructure(bch and bcl)), the output of countries or regions with good infrastructure construction decreased by about 0.002 units in the first period, which is 0.0014 units less than that of the other group. This indicates that strengthening infrastructure construction can help reduce the negative impact on output when affected by the external environment. From the perspective of the stock index, countries or regions with well-developed infrastructure fell by about 0.02 units in the 0 th period, while economies with poor infrastructure fell by about 0.036 units in the 0 th period, which can also indicate that strengthening infrastructure construction is conducive to reducing economic volatility.

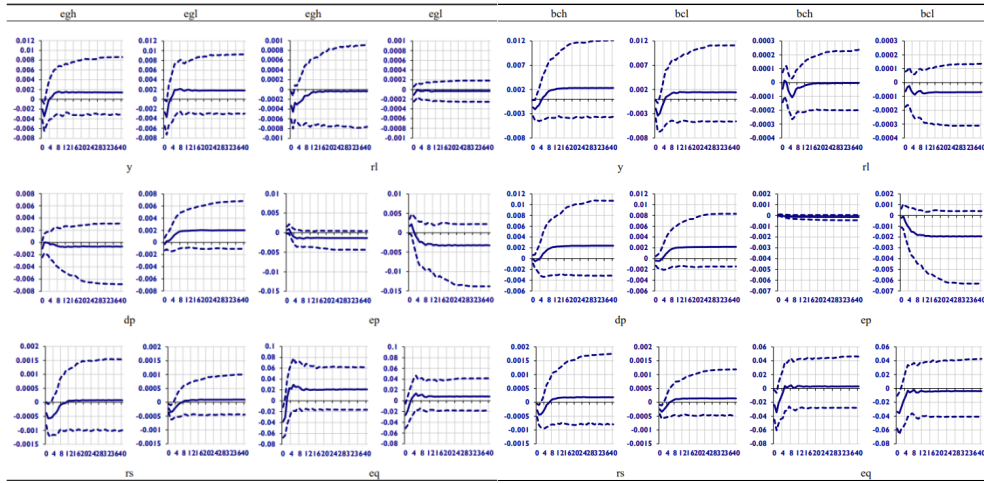


Fig. 3. economic growth(egh and egl) and infrastructure(bch and bcl)

From the perspective of ecological environment(**Fig. 4.** ecological environment(eph and epl) and economic benefits to the people(prh and prl)), short-term and long-term interest rates in countries or regions with good ecological environment protection decreased by 0.0005 and 0.0004 units respectively in the first period, while short-term interest rates in countries or regions with poor ecological environment protection decreased by about 0.0004 units in the first period, and long-term interest rates were not significant. The reason may be that industries with severe pollution in countries or regions with good ecological environment protection accounted for less economic development, The service industry and other tertiary industries are the leading industries, and when subjected to external economic shocks, their own impact is greater, so both short-term and long-term interest rates will decline in the short term; Countries or regions with poor ecological environment protection have more industries with high pollution and damage to the ecological environment, typically manufacturing and agriculture. However, when the external environment changes, the degree of change is not significant, so the corresponding economic variables are not significantly changed. In terms of exchange rates, countries or regions with poor ecological environments have appreciated by about 0.0015 units in the long term. It is precisely due to their industrial structure that the economy has been less affected and has recovered quickly from external pressure in the short term, driving exchange rate appreciation^{[13][14]}.

From the perspective of economic benefits to the people(**Fig. 4.** ecological environment(eph and epl) and economic benefits to the people(prh and prl)), countries with a high degree of economic benefits to the people generally have strong environmental protection, resource allocation, market mechanisms, and technological innovation, and are closely linked to the external environment. Therefore, when the United States implements quantitative easing policies, they will be greatly affected. In terms of output, economies with a high degree of economic benefit to the people decreased by 0.0036 units in the first period, an increase of about 0.0008 units compared to the other group. The price index decreased by about 0.0015 units in the first period, and the stock index decreased by about 0.04 units in the second period; In terms of interest rates, the short-term and long-term interest rates of economies with high economic benefits for the people

decreased by 0.0008 and 0.00078 units respectively in the first period, while the short-term interest rates of economies with low economic benefits for the people decreased by 0.0005 units in the first period, with no significant change in long-term interest rates. Due to the significant external impact on economies with high economic benefits to the people, foreign trade is hindered, and capital outflows lead to a devaluation of the exchange rate, with a devaluation of 0.001 units in period 0.

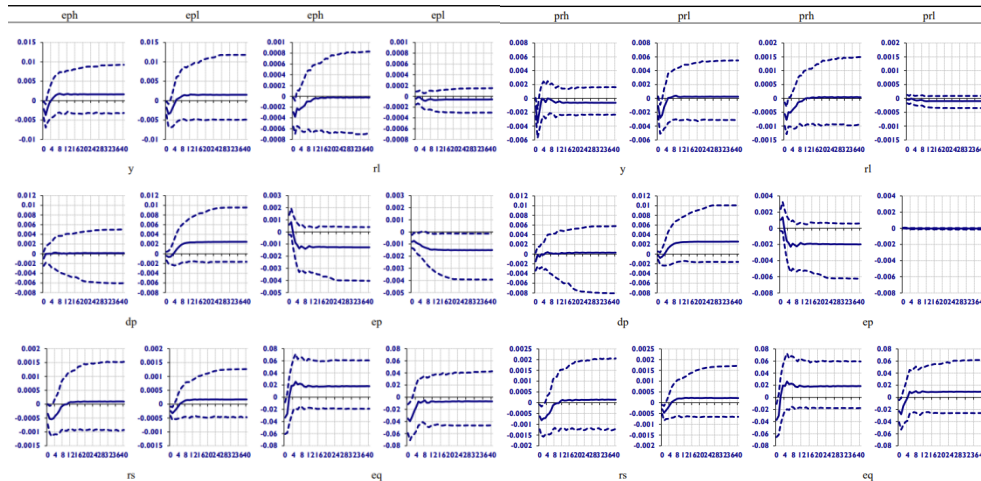


Fig. 4. ecological environment(eph and epl) and economic benefits to the people(prh and prl)

From the perspective of the debt structure of the residential sector(Fig. 5.debt structure-residents(lrll and lril)) and debt structure-government(lrpl and lrph)), the output of countries or regions with low leverage decreased by 0.004 units in the first period, while that of economies with high leverage decreased by 0.003 units in the first period. At the same time, the price index of countries or regions with low leverage also decreased more. It is said that due to low leverage and poor consumption ability of residents, such as low willingness to borrow and repay loans, the real estate industry developed slowly, which affected economic development, Therefore, when subjected to external shocks, its output decreases significantly; In order to stimulate consumption and investment, countries or regions with low leverage have significantly lowered interest rates, with short-term and long-term interest rates falling by 0.0007 and 0.0006 units respectively in the first period, while economies with high leverage have short-term interest rates falling by 0.0003 units in the second period, with no significant change in long-term interest rates. The weak economic recovery in low leverage economies pushed the exchange rate down, rising by about 0.001 units in the 0 th period.

From the perspective of the debt structure of government departments(Fig. 5.debt structure-residents(lrll and lril)) and debt structure-government(lrpl and lrph)), countries or regions with high leverage usually mean that the government has a higher degree of participation in economic development, which is consistent with Keynesian government interventionism, leading to a lower degree of marketization. When subjected to external shocks, it has a greater impact on the economy and the government, which in turn affects economic output and other aspects. The output of highly leveraged economies decreased by about 0.0027 units in the first period, while the stock index decreased by 0.03 units in the second period. At the same time, the uncertainty

caused by large economic fluctuations led to a devaluation of the exchange rate by 0.0015 units in the second period. Economies with low leverage from government departments have relatively complete market mechanisms, and their interest rates are closely linked to the external environment. Their short-term interest rates have fallen by 0.0005 units over the long term.

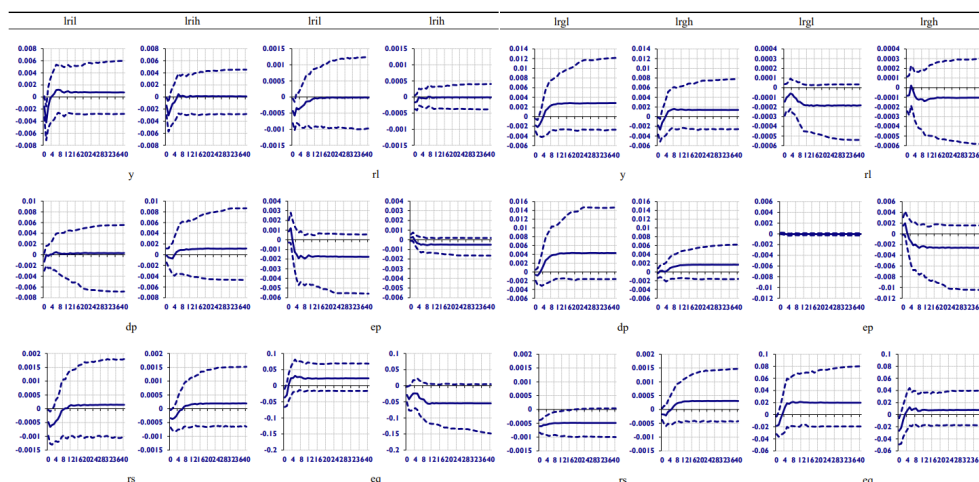


Fig. 5.debt structure-redidents(lrll and lrhh) and debt structure-government(lrgl and lrgh)

From the perspective of the debt structure of the non-financial corporate sector(Fig. 6.debt structure-non-financial corporate(lrll and lrhh) and debt structure-banks(lrbl and lrhh)), a high leverage ratio of a company usually means that its operational risk is high, and the impact is high when there are changes in interest rates and external economic environment shocks. Therefore, the short-term and long-term interest rate changes in highly leveraged economies are not significant, while in low leveraged economies, the flexibility is high, and their short-term interest rate decreases by 0.0005 units over the long term; In terms of exchange rates, economies with low leverage have been less affected by external shocks. The rapid economic recovery and relatively stable investment environment have prompted their exchange rates to appreciate, resulting in a long-term decline of 0.002 units. However, economies with high leverage have experienced a short-term depreciation of 0.001 units due to their greater risks and weak economic recovery.

From the perspective of the debt structure of the banking sector(Fig. 6.debt structure-non-financial corporate(lrll and lrhh) and debt structure-banks(lrbl and lrhh)), short-term interest rates in highly leveraged countries or regions have decreased by 0.0005 units in the long run, and long-term interest rates have decreased by 0.0002 units in the 0th period, while short-term interest rates in low leveraged economies have decreased by 0.0003 units in the 0th period. The impact of long-term interest rates is not significant. The capital adequacy ratio of the banking sector with high leverage is relatively low, and when the world economy is in a downturn and the United States implements quantitative easing, it will be greatly impacted, At the same time, in order to reduce the possibility of bank crises, their economies have made significant adjustments in interest rates; In terms of exchange rate, due to the high leverage of the banking sector, there is more uncertainty and risk, and the demand for its currency in the international market has decreased, resulting in a devaluation of 0.00076 units in the 0 th period; In terms of stock index, due to the significant interest rate reduction in economies with high leverage in the banking sector, the

price of securities assets is supported to some extent, and the decline in stock index is smaller than in economies with low leverage^[15].

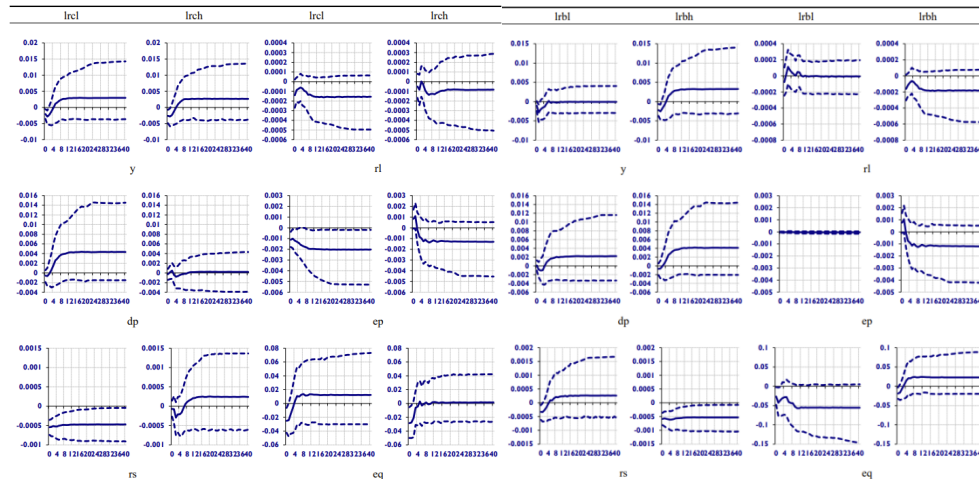


Fig. 6.debt structure-non-financial corporate(lrcf and lrch) and debt structure-banks(lrbl and lrbh)

6 Conclusion

This article uses a generalized vector autoregressive model to explore the changes in economic variables in countries or regions with different economic development characteristics after receiving the quantitative easing policies of the United States, in order to explore the points for attention when countries around the world respond to external shocks in economic development in the future.

In terms of economic structure, actively optimizing the economic structure is conducive to resisting external shocks, while the momentum of economic recovery is strong, promoting foreign trade and investment, leading to currency appreciation; In terms of innovative development, promoting the transformation and upgrading of high-tech industries is conducive to accelerating the recovery of the domestic economy and promoting currency appreciation. However, due to the vulnerability of high-tech companies to external risks, in order to ensure the smooth operation of the domestic high-tech industry, the economy has significantly lowered interest rates, the rapid economic recovery, and low interest rate policies have offset some of the decline in the stock market; In terms of resource allocation and market mechanism, accelerating the improvement of resources and markets usually means closer trade with other countries or regions and closer external ties. Therefore, under the dual impact of the global economic downturn and quantitative easing in the United States, the economy's actual output, price index, interest rate, and stock index fluctuate significantly, resulting in short-term devaluation pressure on the currency; In terms of economic growth, due to the weakness of the global economy as a whole, net exports, investment, and consumption will be affected to a certain extent. Therefore, output and stock indexes have significantly decreased, while external ties are relatively close, and interest rates have also significantly decreased. However, due to strong economic growth momentum, the depreciation of exchange rates is relatively low; In

terms of infrastructure construction, when affected by the external environment, strengthening infrastructure construction is conducive to reducing the negative impact on output and economic volatility; In terms of the ecological environment, strengthening the construction of the ecological environment is beneficial to the improvement of the environment, but it may increase the proportion of human resource intensive industries in economic development, and these industries are greatly affected by external environmental shocks, resulting in a significant decline in the exchange rate, which promotes the depreciation of the exchange rate; In terms of economic benefits to the people, improving the happiness of the people generally requires strengthening environmental protection, improving technological innovation, and improving the market resource allocation mechanism, while the impact is more vulnerable to the impact of the external environment, while there is pressure on the currency to depreciate; In terms of residents' leverage ratio, low residents' leverage ratio means that their willingness to consume is weak. When the economy is in a downturn, their consumption driving ability is poor, and the economy needs a relatively low interest rate to stimulate the economy; In terms of the leverage ratio of government departments, highly leveraged governments generally spend more on social finance and intervene more in the market economy. When exposed to external shocks, they have a poor response, resulting in a significant decline in output and stock indexes. However, economies with low government participation are more closely connected to the outside world, and their interest rates have a greater decline; In terms of the leverage ratio of the non-financial enterprise sector, a high leverage ratio of an enterprise usually means that its business risks are high, and when interest rates change and the external economic environment shocks, the impact is high, which drives the depreciation of the exchange rate. At the same time, the economy is more cautious in adjusting interest rates; In terms of the leverage ratio of the banking sector, the capital adequacy ratio of the banking sector with high leverage ratio is relatively low. When the world economy is in a downturn and the United States implements quantitative easing, it will be greatly impacted. At the same time, in order to reduce the possibility of a banking crisis, its economies have made significant adjustments in interest rates. More uncertainty and risks have led to a decline in the demand for their currencies in the international market, leading to a devaluation of the exchange rate.

First, optimize the economic structure. Governments should actively develop other industries based on the development of existing industries, enrich their respective industrial structures, and support the development of weak and small industries with monetary or fiscal policies.

The second is to treat opening up prudently. Countries should also pay attention to the systemic risks that may be caused by the uncertainty of the external environment, establish sound risk response measures, and prevent the domestic economy from exploding into a recession crisis. Third, optimize the debt structure of various departments. Countries need to treat the debt structure of various sectors with caution, and conduct leveraged operations on the basis of ensuring stability, liquidity, and safety.

References

- [1] Zhang Jingjing. Analysis of the Impact of US Monetary Policy on China's Economy [J]. New Finance, 2013 (12): 33-37.

- [2] Li Zilei, Zhang Yun. Has the US quantitative easing policy affected China's inflation—— Empirical Research Based on SVAR Model [J]. *International Finance Research*, 2013 (08): 13-21 .
- [3] Xu Yijia. Research on the Spillover Effect of US Quantitative Easing Policy on the "Greater China Economic Circle" [J]. *Economic Forum*, 2015 (01): 141-144.
- [4] Jiang Meihua. Research on the Impact of Economic Growth and Money Supply on Inflation: A GVAR Empirical Analysis Based on the United States, China, Japan, and South Korea [J]. *Modern Japanese Economy*, 2014 (05): 13-22.
- [5] Liang Bing, Ding Chun. Research on the impact of quantitative easing policies of the European Central Bank on the investment and financing of non-financial listed companies in China [J]. *Investment Research*, 2022,41 (10): 118-141
- [6] Liang Bing, Xu Wenli. The spillover effect of the European Central Bank's quantitative easing policy on China's macroeconomic fluctuations: a "double cycle" transmission mechanism test based on the GVAR model [J]. *Insurance Research*, 2022 (06): 3-24.
- [7] Ding Yi An Analysis of the Spillover Effect of US Monetary Policy on China's Economy [D]. Jilin University, 2016.
- [8] Ma Huaichun Research on the Impact of US Dollar Interest Rate Increase on Financial Markets in Emerging Economies [D]. Shanghai Normal University, 2018.
- [9] Yang Cheng Spillover Effects of Quantitative Easing Monetary Policy in Europe and the United States [D]. Shandong University, 2021.
- [10] Sang Qianqian, Li Yuxiang. Education investment, technological innovation, and high-quality economic development: empirical evidence from 237 prefecture-level cities [J]. *Qiushi Academic Journal*, 2021,48 (03): 86-99.
- [11] Tong Menghua, Chu Cuicui, Li Yang. Research on the Distribution Dynamics, Regional Differences, and Convergence of High Quality Development of China's Economy [J]. *Quantitative Economic, Technical, and Economic Research*, 2022,39 (06): 3-22.
- [12] Zhao Tao, Zhang Zhi, Liang Shangkun. Digital Economy, Entrepreneurship Activity, and High Quality Development: Empirical Evidence from Chinese Cities [J]. *Management World*, 2020,36 (10): 65-76.
- [13] Wei Min, Li Shuhao. Research on the Measurement of the High Quality Development Level of China's Economy in the New Era [J]. *Quantitative Economic, Technical and Economic Research*, 2018,35 (11): 3-20.
- [14] Wei Dongming, Gu Naihua, Liu Yujie. Haze Control, Local Government Behavior, and High Quality Development of Green Economy: Evidence from Chinese Counties [J]. *Economic Science*, 2022, (04): 64-77.
- [15] Tan Xiaofen, Wang Yaqi, Li Songnan. Differentiation of corporate leverage, resource mismatch, and high-quality development: an analysis from the perspective of economic policy uncertainty [J]. *Economic Science*, 2022, (01): 66-80.