

Transmission Machine of International Financial Crisis Based on VAR Model

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Abstract: The financial crisis has always been accompanied by human economic activities, and its outbreak has a serious impact on people's normal life, and it has no warning, which is a problem of great concern to all countries in the current economic development. Based on the monthly data of long-term bond yields of eight countries (six European countries, the United States and Japan) from December 2009 to February 2012, through correlation test and Granger causality analysis, the results show that there is no Granger causality between the bond yields of various countries and the bond yields of Greece before the European debt crisis, but Granger causality exists between the bond yields of Germany, France and Italy and Greece after the crisis. Finally, it puts forward the process of China's complete opening of capital account and the problems that should be paid attention to after that. The latest development direction of vector autoregressive model is the identification of exogenous policy shocks and the estimation of panel vector autoregressive model. This paper studies and analyzes the transmission mechanism of international financial crisis. Vector autoregressive model is used to describe the transmission mechanism of international financial crisis. The enhancement of the ability to resist the contagion of financial crisis is an important factor to promote the sound development of China's economy. Starting with the related concepts of the transmission mechanism of international financial crisis, this paper probes into the specific transmission modes of international financial crisis and the suppression measures of the transmission mechanism of international financial crisis.

Keywords: Financial crisis, Transmission mechanism, Economy.

1. Introduction

Financial crisis mainly refers to an economic phenomenon that causes economic losses to multiple countries through a series of chain reactions after the financial crisis in one country is transmitted to other countries under the environment where the economies of various countries interact with each other. With the development of history and the rise of the capitalist economy in modern times, the contradiction between the socialization of production and the privatization of the means of production has become an important factor that triggers the economic crisis [1]. Although China is currently not affected by the international financial crisis, it does not ignore its destructive power. It is necessary to strengthen the research on the transmission mechanism of the international financial crisis, and always prevent the outbreak of the crisis, so as to ensure the stable development of China's economy and society. The exchange rate channel and trade channel are the main channels for the international financial crisis to affect China, and the quantitative easing monetary policy of the United States has obvious negative effects on the Chinese economy [2]. The monetary and fiscal policy actions taken by the Chinese government in response to the international financial crisis were timely and effective, although the side effects were also great; without these stimulus policies, China's real output would have dropped by 5 percent in 2009, and exports would have dropped significantly decline. Consumption preference shocks, investment shocks, import price index shocks, interest rate shocks and shocks from foreign economic fluctuations are the main causes of macroeconomic fluctuations in China [3]. Therefore, it is necessary for us to explore the transmission mechanism of the international financial crisis.

2. Overview of the Transmission Mechanism of the International Financial Crisis

Before exploring the transmission mechanism of the international financial crisis, we must first understand the relevant concepts of the transmission mechanism of the international financial crisis. Although the Asian financial crisis only manifested as a currency exchange rate crisis in the initial stage of the crisis, it has successively led to a stock market crisis, a debt crisis and a banking crisis through continuous evolution, spread and deepening. Almost all financially open Asian countries failed to avoiding this crisis, even countries with strict financial supervision such as China have been hit to a certain extent [4]. Moreover, it has also spread to all countries and regions in the world, and has had a great destructive effect on the development of the world economy and the global financial market, triggering global deflation, and the impact of the financial crisis in 2001 was basically eliminated. It can be said that the Asian financial crisis is a comprehensive financial crisis.

By exploring the spread of the international financial crisis, we can find that the transmission mechanism of the international financial crisis mainly includes four forms. The first is the transmission of the monsoon effect, which means that some countries with similar factors are successively subjected to speculative shocks when the financial crisis occurs, thus triggering the transmission of the financial crisis. The typical representative of this transmission mechanism is the international financial crisis triggered by the US subprime mortgage crisis in 2007. The second is the transmission of the net contagion effect, which is mainly caused by the fact that the financial crisis cannot be explained by macro fundamental

data. It mainly involves the theory of self-realization and multiple equilibrium. Once a financial crisis occurs in one country, it will cause currency depreciation and capital outflow in the economy of another country, forming a "circular equilibrium" [5]. The third is the herd effect transmission, which is mainly due to the lack of relevant information of small investors, who are more willing to follow large investors to make decisions, resulting in the transmission of the international financial crisis. The fourth is the transmission of spillover effects. Since the economic links between countries often rely on finance and trade, financial and trade spillovers have also become the way of transmission of the international financial crisis.

2.1. Reasons for the Transmission of The Financial Crisis

First, the similarity of regional economic development. The most common model for the similarity of regional development is the center-periphery model, that is, the investors in different countries are divided into corresponding sectors according to the characteristics that are relatively vague but have some common attributes (such as culture, religion, economic development stage, etc.). It is found that a certain country in this sector may have a financial crisis due to the impact of speculative capital and other reasons. According to the "sector linkage effect", investors will lower their expectations for other countries in the same sector, resulting in the contagion of the crisis [6]. Of course, the similarity of regional development also has positive effects. For example, in the early 1990s, in the early stage of economic reform in Mexico and Argentina, investors' optimistic expectations for the economies of the two countries made the entire Latin American region benefit to varying degrees. And in the 1990s, international investors' vocal chorus of Asian economies helped Southeast Asian governments turn a blind eye to their potential financial crisis.

Second, monetary integration arrangements. If there is a certain monetary integration arrangement between countries in a certain region, this kind of integration arrangement objectively requires countries to maintain a certain level of monetary policy and interest rate. But an attack on any of these weak currencies could trigger market turmoil across the region, as happened in Europe's foreign exchange market in 1992.

Third, excessive reliance on international capital. Relying on international capital to borrow abroad is a shortcut for backward countries to develop their economies. However, if there is too much reliance on international capital and too much debt, the debtor country will fall into a debt crisis, and it will be transmitted to the corresponding creditor country through the debt chain. For example, in 1994 Mexico relied on international capital (debt) accounting for 43.5% of its GDP, in 1997 Thailand relied on international capital (debt) 55% of its GDP, and Malaysia 50%. Generally speaking, the proportion of a country's external debt to GDP should not exceed 10%, otherwise it will bring about a debt repayment crisis.

2.2. The Specific Transmission Mode of The International Financial Crisis

From the perspective of the specific transmission mode of the international financial crisis, the financial transmission in trade transactions and financial channels is the manifestation of the specific transmission mode of the international

financial crisis. The financial transmission in trade transactions is mainly after the outbreak of a financial crisis in a certain country, the devaluation of the currency, the reduction of consumers' consumption desire and consumption capacity, and the reduction of economic trade with other countries, so that other countries are also affected by it. The conduction form of [7]. In this situation, the financial crisis is very easy to spread, the currency of one country is constantly depreciating, while the currency of other countries is constantly appreciating. The volume is also reduced, and both sides will experience economic damage. For example, after the financial crisis in the United States, the number of foreign products imported by the United States continued to decrease, the export volume of countries with economic ties decreased, and the economic benefits obtained continued to decrease. The value of many assets in the United States shrank, and financial institutions began to tighten credit. For the American people who are conscious of consumption, this measure has had a great impact on their normal life. While the economy has been damaged, it has also caused panic among the people, and has transmitted the financial crisis to the world through trade transactions.

The transmission through financial channels mainly uses exchange rate and interest rate as the transmission method, and the foreign exchange market and capital market as the transmission channel. Compared with the transmission of trade transactions, this transmission method has the characteristics of greater destructive power and faster transmission speed. Especially in the current situation of economic globalization, countries are closely linked. Once a country has a financial crisis and its currency depreciates, it will also cause the bonds of other countries holding its national debts to shrink, resulting in economic losses. When the country recovers overseas funds from other countries, it will also cause fluctuations in the stock market and housing prices of the corresponding countries, resulting in economic damage to the enterprises of other countries [8]. For example, the decrease in imports after the US subprime mortgage crisis broke out in 2007 brought some adverse effects to some countries exporting goods to the US. In the process of exploring the transmission mode of financial channels, we can find that this mode mainly uses the foreign exchange market and capital market as the transmission channel of economic crisis transmission.

2.3. Restraining Measures of The Transmission Mechanism of The International Financial Crisis

2.3.1. Adjust the Export Structure and Expand Domestic Demand

Among the specific transmission methods of the international financial crisis, the financial crisis transmission method using financial channels as the transmission channel is a manifestation of the spillover effect transmission mechanism in the transmission mechanism of the international financial crisis. And we can only effectively reduce the impact of the international financial crisis by realizing the diversification of the export market. That is to say, in export trade transactions, we cannot completely rely on a certain country to carry out export trade, but we must weaken the crisis risk by opening up multiple export markets.

In order to restrain the transmission mechanism of the international financial crisis and enhance the national defense capability, the export market should be adjusted first to

achieve diversified development. The closer the economic ties between countries, especially in terms of trade, the more obvious the trade spillover effect will be [9]. Therefore, in terms of trade transactions, we should not completely rely on one country, but should properly adjust the export market, diversify risks and effectively reduce the negative impact of the financial crisis. Second, the state can increase education spending, medical spending and social security spending. Increase domestic consumption demand in a way that weakens households' incentive to save precautionary. The state should improve the residents' consumption demand for service products through the improvement of measures such as medical reform and education reform. Third, a corresponding early warning mechanism should be established. Although the outbreak of financial crises often has no signs, some deficiencies in economic operation will also appear before the outbreak. Through the establishment of an early warning mechanism, the existing problems can be found out in time, and the occurrence time and probability of financial crises can be identified. And so on to make predictions, and take corresponding measures to reduce the harm caused by it.

2.3.2. Stable Financial Market

Stabilizing the financial market and enhancing the flexibility of the RMB exchange rate are also effective measures to restrain the transmission mechanism of the international financial crisis. In the process of stabilizing the financial market, strengthening the cooperation between multinational financial institutions is an important issue that we need to pay attention to. Cooperation among multinational financial institutions should be strengthened. Judging from the impact of the international financial crisis, the emergence of the financial crisis will often bring serious losses to some transnational financial institutions. Therefore, the state should pay attention to the supervision of these institutions and require various institutions to form a good cooperative relationship. When a financial crisis occurs in an institution, its transmission effect to other institutions is weakened and the large-scale outbreak of the financial crisis is avoided. For this, we can only supervise these multinational institutions while forming a relatively good cooperation among them. Only in this way can we effectively weaken the transmission effect of the financial crisis to other institutions after a certain institution is affected by the financial crisis, thereby reducing the spread of the financial crisis [10].

3. Empirical Analysis of The Transmission of The International Financial Crisis

3.1. Analysis Based on VAR model

With regard to the problems of small sample size and unstable regression results of vector autoregressive model, existing research has been devoted to expanding vector autoregressive model into panel vector autoregressive model, so as to make full use of the advantages of large sample size of panel data and stable estimation results. The latest development direction of vector autoregressive model is the

identification of exogenous policy shocks and the estimation of panel vector autoregressive model. Theoretically, we should bring the four variables for measuring monetary policy into the same panel vector autoregressive model, but the variables are national time series data, and there is a strong correlation between them. If these four variables are brought into the same panel vector autoregressive model, the model cannot be estimated. The vector regression model obtained is shown in formula (1):

$$Y_{a,it} = [\ln BD_{it}, MOG_{it}, R_{it}, WAGG_{it}, GDPG_{it}, EMPG_{a,it}] = X'_{a,it} B + \eta_{a,it} + \mu_{a,it} \quad (1)$$

Using the vector autoregressive model with sign restriction, this paper estimates the promotion effect of expansionary fiscal policy and expansionary monetary policy on employment. It is suggested that in the economic recession, in order to give full play to the role of expansionary fiscal policy and monetary policy in promoting employment, expansionary fiscal policy should be given priority, and at the same time, it should be matched with expansionary monetary policy of increasing money supply and lowering interest rate, but it is not appropriate to match with expansionary monetary policy of increasing money supply and lowering interest rate, and it is even more inappropriate to adopt expansionary monetary policy of increasing money supply and lowering interest rate alone. This is because expansionary monetary policy of increasing money supply and lowering interest rate will accelerate the process of capital replacing labor and inhibit the employment effect of expansionary fiscal policy and monetary policy.

3.2. Data Analysis

Table 1 shows the correlation coefficients between the rate of change of national bond yields in Germany, France, the United States, Greece, Spain, Italy, Japan, Portugal and other countries. According to the calculated data, before and after the crisis, the correlation coefficient between the rate of change of national bond yields of each country showed a downward trend [11]. For example, the correlation coefficients of government bond yields between Greece and other countries are positive, while the correlation coefficients between Greece and France, the United States, Spain, Italy and other countries after the crisis have become negative, and the correlation coefficients with other countries are also very high. greatly reduced. According to the asset portfolio theory of the transmission of the international financial crisis, the correlation coefficient between the corresponding asset prices of countries affected by the same risk should show an upward trend, but the calculated correlation change trend is inconsistent with the theory. There are two reasons for this situation. One is the problem of heteroscedasticity. There is heteroscedasticity between the rate of change of national bond yields, which makes the test results of parameter stability unreliable; The response strategies adopted are not synchronized, and the response measures adopted by the government will affect the changes in the treasury bond market, thus weakening the correlation.

Table 1. Correlation coefficients of national bond yield rates before and after the crisis

Post crisis								
	Germany	France	U.S.	Greece	Spain	Italy	Japan	Portugal
Germany	1.00	0.71	0.80	0.03	0.14	0.07	0.56	0.15
France	0.71	1.00	0.70	-0.11	0.41	0.55	0.53	0.19
U.S.	0.80	0.70	1.00	-0.10	0.25	0.06	0.50	-0.04
Greece	0.03	-0.11	-0.10	1.00	-0.29	-0.14	0.25	0.36
Spain	0.14	0.41	0.25	-0.29	1.00	0.40	0.01	0.02
Italy	0.07	0.55	0.06	-0.14	1.00	0.40	0.01	0.02
Japan	0.56	0.53	0.50	0.25	0.01	0.36	1.00	0.34
Portugal	0.15	0.19	-0.04	0.36	0.02	0.30	0.34	1.00
During a crisis								
	Germany	France	U.S.	Greece	Spain	Italy	Japan	Portugal
Germany	1.00	0.98	0.63	0.51	0.56	0.86	0.73	0.85
France	0.98	1.00	0.60	0.59	0.56	0.90	0.75	0.90
U.S.	0.63	0.60	1.00	0.38	0.79	0.51	0.37	0.67
Greece	0.51	0.59	0.38	1.00	0.44	0.75	0.51	0.74
Spain	0.56	0.56	0.79	0.44	1.00	0.61	0.29	0.63
Italy	0.86	0.90	0.51	0.75	0.61	1.00	0.71	0.85
Japan	0.73	0.75	0.37	0.51	0.29	0.71	1.00	0.60
Portugal	0.85	0.90	0.67	0.74	0.63	0.85	0.60	1.00

4. Conclusions

In the current context of economic globalization, countries are closely linked. Once a financial crisis occurs in one country, it will quickly spread to other countries and form a large-scale international financial crisis [12]. Therefore, it is necessary to conduct in-depth research on the transmission mechanism of the international financial crisis, and to avoid or reduce the impact of the financial crisis by adjusting the export market, establishing a corresponding early warning mechanism, and optimizing the cooperation relationship between multinational financial institutions in various countries, so as to promote the healthy development of the national economy. The transmission mechanism of the international financial crisis is an important factor leading to the spread of the impact of the financial crisis. Only by conducting in-depth research on the transmission mechanism of the international financial crisis can we better reduce the impact of the financial crisis through the adjustment of economic policies.

The simple analysis method of correlation analysis is very powerless in the face of complex factors. Heteroskedasticity, endogenous variables and other factors make the results of correlation coefficient analysis unreliable, so Granger causality analysis is used for further processing. Through Granger causality analysis, it is found that there is a statistical causal relationship between the volatility of European government bond yields. Statistically, the Greek and Italian national debt markets have shown a mutual transmission effect, while Germany, as a safe-haven market, has played a guiding role in the Greek market, the impact of the international financial environment on a country's domestic finance. In today's increasingly integrated economy and finance, especially for countries that are also fully open to capital, foreign investment and investment activities in the domestic financial market make the domestic financial market change with the changes in the international financial situation. During this period, the price of domestic financial assets may fluctuate violently. This poses a challenge to a

government's financial regulator. At present, China is preparing to start the gradual and complete opening of capital projects, and should fully consider the impact of international capital on the domestic financial market. In addition, according to the fluctuation trend of national bond yields of various countries, countries with better economic and financial conditions themselves are less affected, while countries with greater volatility are mostly because of their own financial markets have greater risks. The author believes that external effects are only Accelerating or delaying the exposure and outbreak of risks, the governance of a country's financial crisis requires the efforts of the country itself.

References

- [1] Liu Chao, Hao Danhui, Tang Xiaowen, et al. Research on the Cross-Market Transmission Mechanism of Financial Risks Based on Complex Networks—Taking the Financial Crisis Period (2007-2009) as an Example [J]. *Operations Research and Management*, 2018, 27 (8):8.
- [2] Shen Yufan. On the Conduction Effect of the International Financial Crisis on my country's Foreign Trade [J]. *Economic and Trade Practice*, 2017(23):1.
- [3] Liu Yao, Wang Wei. Re-examination of the international transmission channel of the financial crisis—Based on the data analysis of Korean manufacturing enterprises [J]. *International Trade Issues*, 2017(11):12.
- [4] Gao Shanwen. Three Important Issues in Preventing Financial Crisis - Early Warning Feasibility, Transmission Mechanism and Policy Intervention [J]. *Tsinghua Financial Review*, 2019(3):2.
- [5] Liu Wenqiang. The transmission mechanism and impact of the global financial crisis on my country's stock price index [J]. *Vitality*, 2017(17):1.
- [6] Sun Hongmei, Zhu Weiqi, Cui Baisheng, et al. The Transmission Effect of Financial Crisis: Taking the European Financial Crisis as an Example [J]. *Financial Forum*, 2018, 23(1):11.
- [7] Liu Chao, Hao Danhui, Tang Xiaowen, et al. Research on the Cross-Market Transmission Mechanism of Financial Risks

- Based on Complex Networks—Taking the Financial Crisis Period (2007-2009) as an Example [J]. *Operations Research and Management*, 2018, 027(008):155-161,181.
- [8] Shen Hongfang, Liu Yuerong. Research on the Banking Industry of the Four ASEAN Countries under the International Financial Crisis [J]. 2021(2013-2):32-40.
- [9] Wu Liyun. Research on Financial Crisis Transmission Channels, Government Subsidies and Corporate Performance: Empirical Evidence from Chinese Listed Companies [J]. *Economic Issues Exploration*, 2019(3):11.
- [10] Yin Shulu. The Transmission Mechanism and Influence of Negative Interest Rate Policy [J]. *China Finance*, 2019(22):3.
- [11] Lang Ping. An Empirical Analysis of the Transmission Mechanism of my country's Monetary Policy after the Subprime Mortgage Crisis [J]. *Fortune Today*, 2020(12):46-48.
- [12] Peng Siwei. Analysis and Reflection on the Effect of my country's Monetary Policy from the Perspective of Financial Crisis [J]. *China Collective Economy*, 2021(19):2.
- [13] Huang Xin. Analysis of the Bank of England's Policy in Dealing with the Economic Crisis and Its Effect [J]. *Modern Marketing: Information Edition*, 2019(4):1.
- [14] Sun Fei, Wu Chongyu, Chen Fuzhong. The price pass-through effect of China's imported commodities and its changing trend: A brief perspective from the perspective of Armington's elasticity of substitution for imported commodities [J]. *China Industrial Economy*, 2017(7):18.