

Research on the Impact of Systemic Risk on the Economic Development of a Country

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Abstract: There were several financial crises during the last decade and each of them posed great threat to the global economy. This article studies the financial contagion and the systemic risks from the perspective of network analysis. The case analysis is adopted in this article with the case study of subprime mortgage crisis in 2008 in the US at first and then the network analysis and the solution are provided at last. The author found the financial crisis is largely related with the big nodes in the global financial network. Meanwhile, the network density is moderately ascending which shows the rising risks of the financial crisis in the future. Last but not least, the centralization keeps at a similar level during these years and the degree of centralization is positively related with the potential of financial contagion. The study is significant for understanding the mechanism of the network and the future policy decision.

Keywords: finance, network, case study, financial crisis

1. Introduction

1.1. Research Background and Significance

During the last 100 years, there were several major financial crises such as the Great Depression from 1929 to 1933 and the subprime mortgage crisis in 2008. The financial crisis has always been the hot topic because it not only has severe impacts on the country where the crisis originally occurs, but also has the potential to cause the financial contagions, spreading to other countries. With the rising massive awareness of the systemic crisis, the study of the financial network becomes more and more significant. Studying the financial network will be helpful for understanding the mechanism of the spread of financial contagion and instructive for better preventing the systemic financial crisis.

1.2. Literature Review

Financial contagion is a kind of spillover effect for it is an extension and spread of one country's financial crisis to other countries and there are several potential elements that affect the level of financial contagion. Jean Helwege, Gaiyan Zhang found that the counterparty contagion and the information contagion are both two crucial channels for externality [1]. From the aspect of network, Luisa Cutillo, Giuseppe De Marco, Chiara Donnini analysed the financial networks through

simulation and proved the argument that the financial network system becomes less resilient if the amount of linkages is fewer [2]. Besides, in different macro environments the financial network's density and the potential of outbreak of the financial crisis vary. Mike K. P. So, Lupe S. H. Chan and Amanda M. Y. Chu analysed how the financial network and the systemic risks are influenced by the pandemic network and found that the systemic risks are largely affected by the pandemic [3]. Jia-Li Ma, Shu-Shang Zhu and Xiao-Chuan Pang analysed the impacts of the financial networks on the systemic risks through three different networks, inter-liability, portfolio overlapping and share cross-holding and verified the impacts given by the financial network through numerical simulation [4].

On the relation between contagion and financial crisis, Jarosław Duda, Henryk Gurgul and Robert Syrek studied how stock markets interrelate with each other from different viewpoints and found out the contagion effects on financial markets can have significantly bad influences on the real economy and a contagion is usually related to financial crises [5]. As to the specific influences of the financial crisis on the banking system, Gian Paolo Clemente, Rosanna Grassi and Chiara Pederzoli analysed the state of European banking system after the financial crisis using the method of network analysis and the research captured many features of the European banking system when signing some banks that work as the big nodes in global financial system [6]. From the perspective of firms and social performance, Kais Bouslah, Lawrence Kryzanowski and Bouchra M'Zali examined the relation between the financial crisis in 2008 and the performance of firms and society. It was found that there was a difference between the social performance and the risks during the crisis and before the crisis [7].

1.3. Research Content and Framework

This article is focused on the financial contagion based on the network analysis. This research depicts the case of subprime mortgage crisis in 2008 and then analyses the global financial network using the core-peripheral network model and finds out how the network affects the global finance and causes financial crisis. In the end some advice is given for the prevention of systemic financial crises in the future.

2. Case Description

The 2008 subprime mortgage crisis began in the US due to the bankruptcy of the subprime mortgage financial institutions and the severe fluctuations of the stock market with the first bankruptcy of Lehman Brothers.

After the burst of Internet Bubble in 2000, the US had been adopting an expansionary monetary policy [8]. The data from the Federal Reserve shows that on January, 3rd, 2001, the federal funds rate was 6.00, while after that it was reduced sharply only within one year. On December, 12nd, 2002, the federal funds rate was 1.75. According to Galbraith, John Kenneth, all the financial innovations are for the new ways of issuing debts [9]. During the formation of the housing bubble, the subprime mortgages were promoted and easier to be accessed to all walks of life, and the new financial derivatives like Credit Default Swap (CDS), Collateralized Debt Obligation (CDO) were packaged to transfer the risks. All of these had led to a booming but hollow economy with the housing bubble becoming larger and larger. With the pressure of the inflation, Federal Reserve began to raise the Federal funds rate to 5%. This sharp increase led to the increasing stress for the subprime mortgage borrowers and a lot of subprime mortgages went into default. On July 19th, 2007, Bear Stearns filed for bankruptcy. Luckily, with the help of Federal Reserve and other financial institutions Bear Stearns went through the darkness and escaped the destiny of bankruptcy. However, on September 15th, 2008, Lehman Brothers went bankrupt while Federal Reserve did not help because it did not intend to convey the message to other financial institutions to be dependent on Federal Reserve. At the same

time, Merrill Lynch was acquired by the Bank of America. The breakdown of the major financial institutions made a severe financial contagion to other countries and regions like China and the Europe. The problem of the liquidity also affected the macro economy in the US. At Q4,2008, the GDP in the US declined by 6.1%.

3. Analysis on the Problems

Applying the Core-Peripheral Network Model to global trade reveals the dominance of core regions in international commerce. Core regions contribute significantly to the world's total exports and imports, boasting diverse economies, advanced infrastructure, and skilled labor. Figure 3 illustrates the distribution of global trade volume across core, semi-peripheral, and peripheral regions [10].

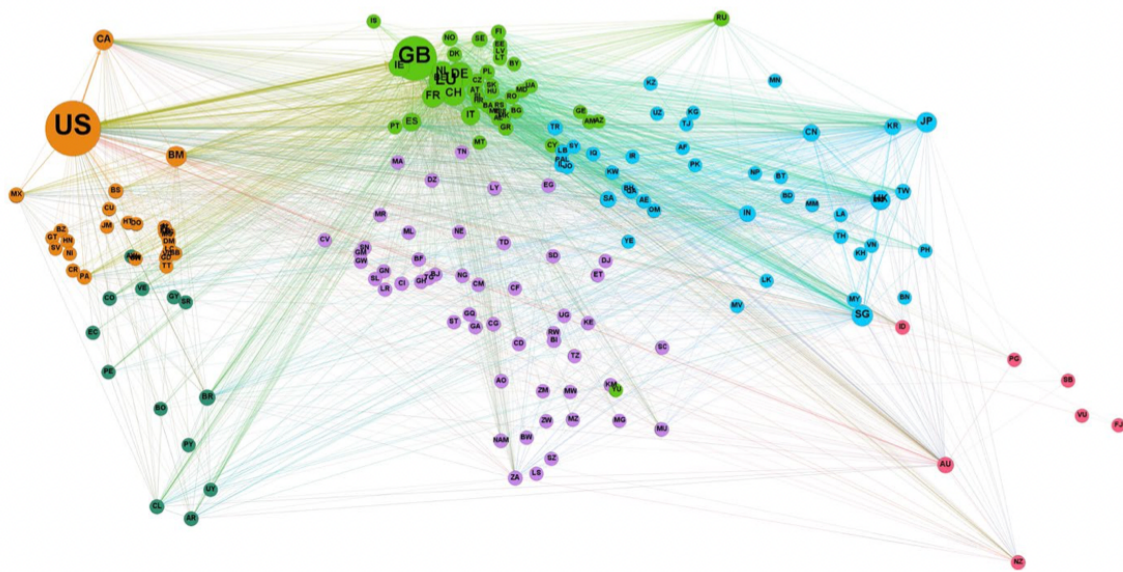


Figure 1: The networks of financial services in the year 2012 [10].

It can be seen from the Figure 1 that the node size represents the proportion to the total strength. For example, this is a core-peripheral network, with some nodes being the core, like the US, Great Britain and Japan, and the rest of them being the peripheral nodes. The node size represents the level of service flow. It can be seen that the US accounts for most of it. And the thickness of line represents the weight. It can also be observed that US is closely related to other two economies in the North America which are Canada and Mexico, because the lines are relatively thicker than others, and that's due to the geographical nearby and the existence of NAFTA. Besides, it can also be seen that the financial services' connection between the US and Europe is also strong, and that's due to that the Europe is also one of the central nodes, and the core nodes are more likely to have strong correlation with each other.

One of the largest nodes on the Figure 1 is Great Britain. In Britain, some leading banks are HSBC, Barclays and Lloyds Banking Group, etc. According to the data in Yahoo Finance, the stock price of HSBC went into a sharp 71.6% decline from 99.52 on September 30th, 2007 to 28.22 on February 28, 2009. What is more, Barclays' stock price was 53.97 on January 31st in 2007 but 4.737 on January 31st, about 91.2% decline for the entire two years. Lloyds Banking Group stock price was 45.72 on September 30th, 2007 while on January 31st, 2009 it was 3.250 with about 92.9% decline. As the leading and significant parts both in the global and British domestic financial system, the breakdown

of these stocks price will impose a large shock on the financial system and lead to systemic financial risks.

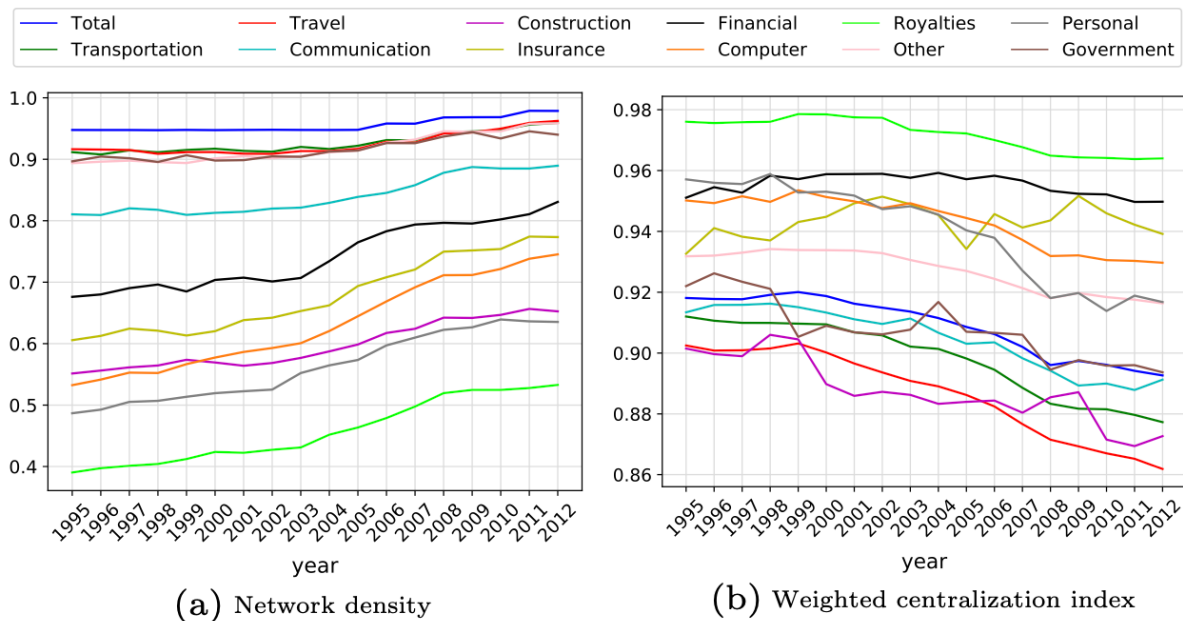


Figure 2: Network density and weighted centralization index per service category [10].

What is more, Figure 2 shows that the network density of financial services is growing gradually by years, from less than 0.7 to more than 0.8 [10]. This is an index that can indicate the degree of interaction of groups' member. A potentially growing network density will increase the risks of contagions because the possibility of each two nodes affecting each other will be higher.

At the meantime, it can be observed from the right graph that the weighted centralization index of financial service is stable in recent years. Therefore, the risks of contagions didn't decline.

An important factor is that the weight helps to increase the degree of centralization. If the impact of weight is ignored, due to the high density the degree of centralization will be very low because every nodes and linkages tend to be near homogeneous. But if the weight is taken into account, the degree of centralization will be much higher because there are only few nodes acting as the core and the higher weight between them and the rest of the world will help to centralize the whole financial network.

4. Solution

The strategies of preventing the systemic financial risks can be grouped into several sections.

First of all, it is vital to revise on the rule of control of credit and strengthen the level of transparency. The financial innovation is a kind of innovation for credit issuing. The problem lies on that the majority of subprime mortgage borrowers didn't get a thorough image of the risks of the mortgage and other financial derivatives. Improving the problem of lacking transparency will help the buyers of the financial products foster more objective and comprehensive view on them and make more rational decisions.

Secondly, with the development of the computer science, people have made the financial transactions more convenient and cost-saving. Therefore, working out how to prevent and control the safety of financial computer system is needed for the prevention of financial contagion. According to Lianxiong Du, it is advised to better the management, improve the safety control, and form a rigorous

prevention system [11]. Especially the large enterprises need to take on the responsibility to work out their compatible computer systems and implement rigorous supervisions.

Thirdly, raising the massive awareness of the financial safety will exert positive impacts on the process of preventing financial risks. The workers in the financial sector, especially accountants, have to reveal the data of financial reports transparently and the principal-agent problem needs to be alleviated or handled appropriately.

At the meantime, it is indispensable to further promote the integration and the development of the new wave of digital technology and the traditional financial services [12]. Along with the computer science, the digital technology has been stimulating more and more modern ways of transaction. For instance, the mobile payments enable people to get free of the traditional currencies and the cryptocurrency guarantees the safety of making financial transactions.

Furthermore, the big nodes like the US, has more responsibilities for preventing the global financial contagion at the very beginning and curb the spread of contagions from other countries. Being interdependent on each other, the global financial network is becoming more and more dense and centralized. So the large nodes on the global financial network will have greater influences on the spread of financial contagions. Addressing the problem of the potential spread of contagions in the large nodes and having a complete and mature financial framework in them are of great significance.

What is more, the improvement of the education on the financial safety is important. Every innovation will go through the process of gradual popularization with a few pioneers getting to know and grasp the key concepts in that field and then to the mass. However, only when the power of the mass is utilized effectively can the innovation become popularized. Therefore, it is useful to build up a more mature financial education system.

Last but not least, the laws of supervising the financial sector need to be refined. Nowadays in many countries the laws on the finance are not complete yet and there are many gaps in the monitoring waiting to be filled.

5. Conclusion

Nowadays, the globalization has made the financial transaction more convenient and cost-saving, so plenty of financial institutions are enabled to make transactions and extend their business globally. However, this also gives the risks of financial contagion and crisis, which poses a threat to the society and people's daily life such as unstable price level. So, the study of the global financial network and how the crisis is affected by the financial network is indispensable. This article adopts the method of case study. By studying the case of subprime mortgage crisis in 2008 and analysing from the perspective of network, the author found that the big nodes such as the US and Britain in the global financial network play the most significant role in spreading the financial contagion. At the meantime, the financial network density has become larger by year and the centralization of the financial network remains at a high level, meaning that the contagion is easy to be spread. This article may provide some insights and advice for the policy makers and professionals in the field of finance as this study is not only helpful for them to understand the financial network as the important element of influencing the global financial network, but it is also useful for making the future plan for the reshape of the financial network and better prevention of the financial crisis. However, the amount of data and the depth of the network analysis will have its space to be improved as the data are the crucial part for supporting the case study.

In the future, the study will be targeted at collecting more credible data and using more advanced model in the network analysis to find out the causes of the financial crisis and how the network helps to spread the financial contagion more deeply.

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