

Visualization Analysis of Systemic Financial Risk Literature based on CiteSpace

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Abstract: *By searching papers related to big data in Web of Science and Cnki, this paper adopts bibliometric analysis, visual analysis and content analysis to analyze the literature. We also analyze the research status and development trend in the field of systemic financial risk. In the end, we conclude that the current research hotspot of systemic financial risk tends to enter the direction of supervision and Internet finance.*

Keywords: visualization; systemic financial risk; summarize

1. Overview of Systemic Financial Risks

In recent years, due to the impact of the financial crisis in the United States, the study of systemic financial risk has gradually become a hot topic. Maintaining financial stability, preventing financial crises and preventing systemic financial risks are of great significance to economic security of a country. By analyzing and summarizing the literatures on systemic financial risks at home and abroad, we can have a comprehensive and accurate understanding of systemic financial risks, analyze the research status and development trend of this field, and conduct a continuous and in-depth study on it.

Foreign scholars on the definition of financial systemic risk mainly has the following views: Hart and Zingales (2009) argues that systemic risk refers to the end of the event occurs in the financial system, such as institutions fail or market collapse, spread from one market to market, leading to loss of spread over the whole financial system and the risk of causing serious impact on the real economy. Nicholas Chan (2006) believes that systemic risk is the internal feature of financial market, and the risk that the default of one market subject will bring negative effect to other market subjects.

Chinese scholars have also defined systemic financial risk: Gong Minghua and Song Tong (2010) believe that systemic risk is of great destructiveness, and its root cause is the external effect of micro-risk-taking behavior and the risk of rapid infection due to the interconnection of various subjects in the system. Zhang Xiaopu (2010) defined systemic risk as the probability of the collapse or loss of function of the entire financial system.

2. Research status of systemic financial risk in foreign countries

2.1 Data Sources

Based on CiteSpace, a visual analysis of Web Of Science literature on systemic financial risk was conducted. Systematic financial risk or financial systemic

vulnerability was the condition for subject retrieval. Literature type :ARTICLE or REVIEW or PROCEEDINGS PAPER; Time span: all years; Index: SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH, CCR-EXPANDED, IC. Recording content: references with full records and citations; File format: plain text. A total of 1290 results were obtained.

2.2 Research Methods

The research used CiteSpace 5.1.R8 software developed by professor Chen Chaomei's team as the main research tool. The retrieval time was June 20, 2018.

Through statistical analysis of various dimensions of the literature, we can obtain the research status and development history of specific fields in different countries, regions, research institutions or authors. By adopting the method of visual analysis, more direct results can be obtained, and then the internal relationship between different research subjects can be explained, so as to scientifically and effectively predict the development trend of scientific research.

2.3 Result Analysis

2.3.1 Publication statistics

A statistical analysis of the year of publication of the literature on systemic financial risk can reveal the development process of this research topic from the time distribution. The retrieval period was from 1997 to 2017. As can be seen from the annual distribution map of literature publication (figure 1), systematic financial risk has the lowest number of annual literature publications in 1998. While in 2016, the number of papers related to this topic reached 174, and the attention on this topic keeps rising. The research on information aggregation of systemic financial risks in 1997-2007 is not the focus of this field. Since 2008, there has been an increasing number of papers on the study of systemic risk. This is because the financial crisis in 2008 made the theoretical circle pay more attention to the study of systemic risk.

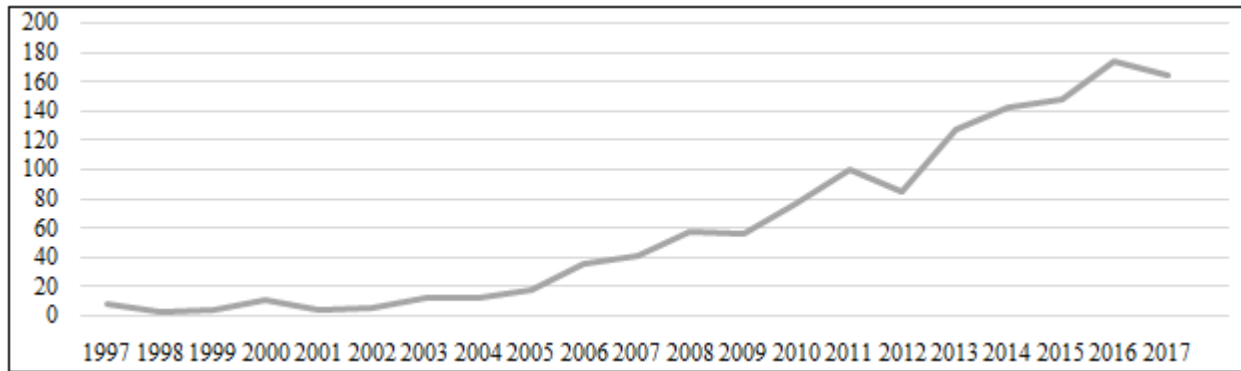


Figure 1: Age distribution of papers related to systemic financial risks in Web of Science

2.3.2 Geographical distribution study

The geographical distribution of research papers can help researchers to identify the countries and regions that are relatively advanced in a certain research field, so as to help researchers to understand their country's position in this field in the world and conduct more effective study and research.

In this paper, the retrieval result analysis tool in Web of Science was directly used to analyze the geographical distribution, and the results shown in table 1 and figure 2 were obtained after sorting and summarizing. As can be seen from table 1, the United States leads in the number of published papers on systemic financial risk, while the United Kingdom and Australia lead in the number of published papers. We can indicate that the United States and European countries are still in the lead in the international research on systemic risk. From figure 2, we can see that

research on systemic financial risk, the United States, Britain, Switzerland, Canada, Germany's research earlier, starting in the 90 s. China began to study the time of late, We can see not only the United States and European countries began to study earlier time of systemic financial risk, but also study more depth, more the number of articles published.

Table 1: Regional distribution of papers related to systemic financial risk in Web of Science

Country/Region	Number
America (1997)	401
England (2000)	212
Australia (2006)	139
China (2004)	126
Canada (2001)	107
Germany (2002)	100

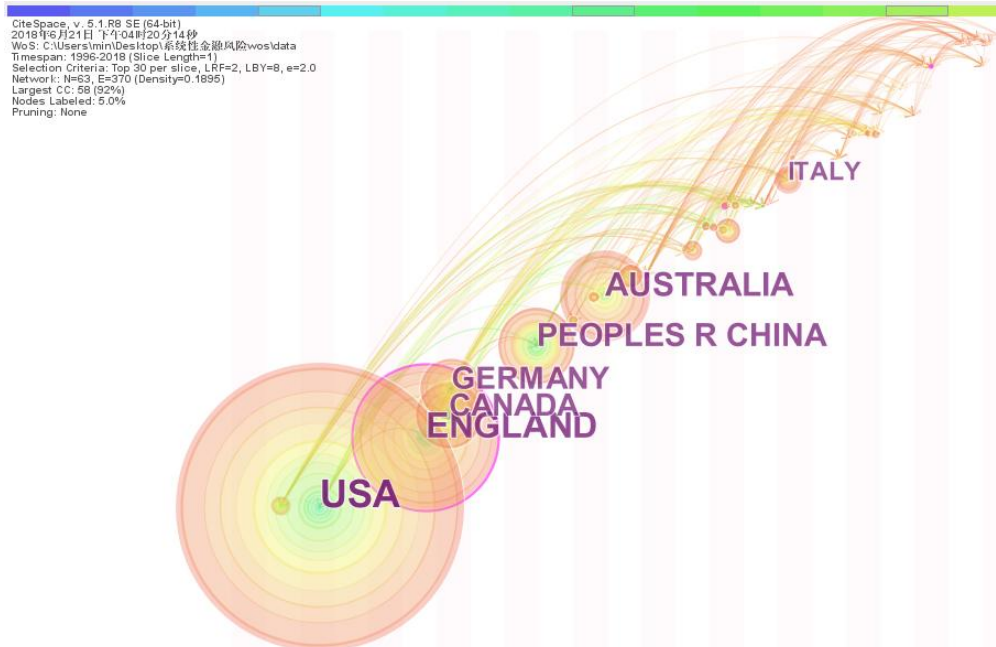


Figure 2: Geographical time distribution of papers related to systemic risk in Web of Science

2.3.3 Research hotspot analysis

Keywords are highly abstracted research content of the paper. Through the statistical analysis and co-occurrence analysis of the keyword frequency in this paper, the current research hotspots in this field can be effectively obtained. To grasp the research hotspot and development frontier of

systemic financial risk has important guiding significance for relevant research. In this paper, CiteSpace was selected to construct the keywords clustering knowledge map. The top 10 keywords and their centrality value and frequency are listed in table 2 and figure 3 according to their centrality. It can be seen that when systematic risk is excluded, the

word frequency with the highest occurrence rate is: model, return, market, impact, performance. And the highest centrality is: impact, price, management, market, health.

Table 2: Keywords frequency center statistics

Keywords	Centrality	Number
model, 2006	0.06	94
return, 2007	0.1	87
performance, 2007	0.05	61
risk factor, 2007	0.11	58
management, 2008	0.15	55
stock return, 2006	0.05	50
cross section, 2009,	0.05	48
financial crisis, 2011	0.13	47
equity, 2011	0.13	19
risk factor, 2007	0.11	58

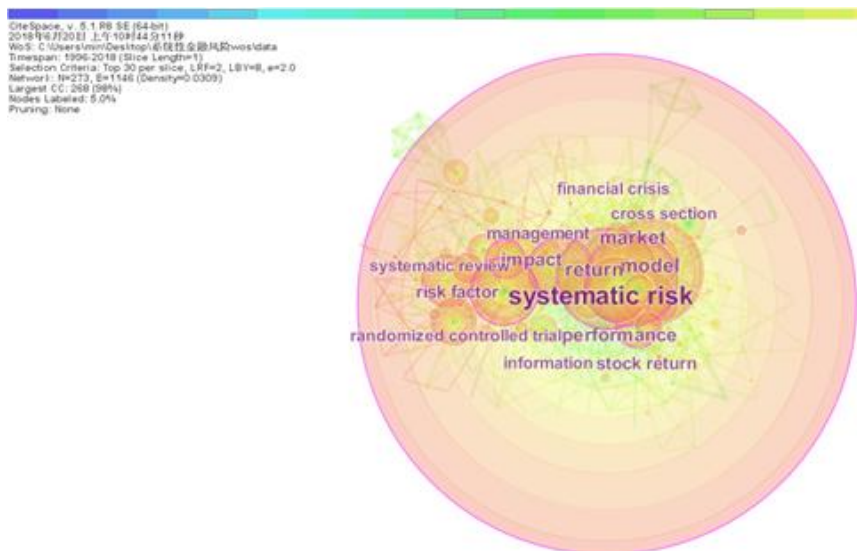


Figure 3: Keywords clustering knowledge map

Keywords into analysis of reference as you can see the change trend of burst in 1996-2007. As shown in figure 4, the current study emerging hot spot has a systemic risk of infection or prevention, namely cross section in the research

model of party building and the study of systemic risk for systematic review system, the contagion and portfolio, intervention research.

Top 18 Keywords with the Strongest Citation Bursts

Keywords	Year	Strength	Begin	End	1996 - 2017
risk management	1996	4.5078	2004	2011	-----
decision	1996	3.6506	2007	2010	-----
investment	1996	5.9744	2007	2012	-----
stock	1996	3.2492	2009	2011	-----
clinical trial	1996	3.2108	2011	2013	-----
financial performance	1996	4.715	2012	2014	-----
india	1996	3.5655	2012	2013	-----
trial	1996	3.708	2012	2013	-----
capm	1996	4.0771	2012	2013	-----
financial crisis	1996	4.6512	2014	2016	-----
liquidity	1996	5.3807	2014	2015	-----
population	1996	3.9069	2014	2015	-----
disease	1996	3.429	2015	2016	-----
cross section	1996	3.9391	2015	2017	-----
systematic review	1996	3.2272	2015	2017	-----
contagion	1996	4.4265	2015	2017	-----
portfolio	1996	4.828	2016	2017	-----
intervention	1996	4.286	2016	2017	-----

Figure 4: Keywords with the strongest citation bursts in Web of Science

Research status of systemic financial risk in China

3.1 Data Sources

The Cnki literature of systemic financial risk was visualized and analyzed based on CiteSpace. The detection topic was "financial systemic risk", and a total of 1120 literatures were searched, including 499 periodicals, 229 doctoral and master's theses, 19 conferences and 286 newspapers. Invalid literatures were removed, and 770 literatures were selected for visual analysis.

3.2 Research Methods

This study used the CiteSpace5.1 R8 software as the main research tool, retrieval time is on June 23, 2018, for the period 2000-2017 "financial systemic risk" theme, which can identify the literature analysis of relevant research results that are within the period keywords co-occurrence frequency, mediation centrality, dash forward show words, such as visual knowledge network map, so as to examine the attention of the researchers on the subject (hotspot), dash forward show word (frontier), as well as the mutual

cooperation between the author (institutions). In addition, Excel software was used to conduct statistical analysis on the literature sources, literature publication year and other indicators of the subject.

3.3 Result Analysis

3.3.1 Publication statistics

A statistical analysis is made on the publication year of the literature in a certain research topic field, and the development course and research heat of the research topic can be understood from the time distribution. The retrieval period was from 2000 to 2017. As can be seen from Figure 5, the annual publication number of literatures related to the topic of "systemic financial risk" is only 3 (2000) and 132 (2017). Although the annual publication volume has ups and downs, it shows an overall upward trend. Due to the financial crisis in 2008, the theoretical circle has paid attention to the study of systemic risk. Since 2008, the number of related papers on systemic risk has shown an increasing trend, which is roughly consistent with the change trend of the number of foreign papers.

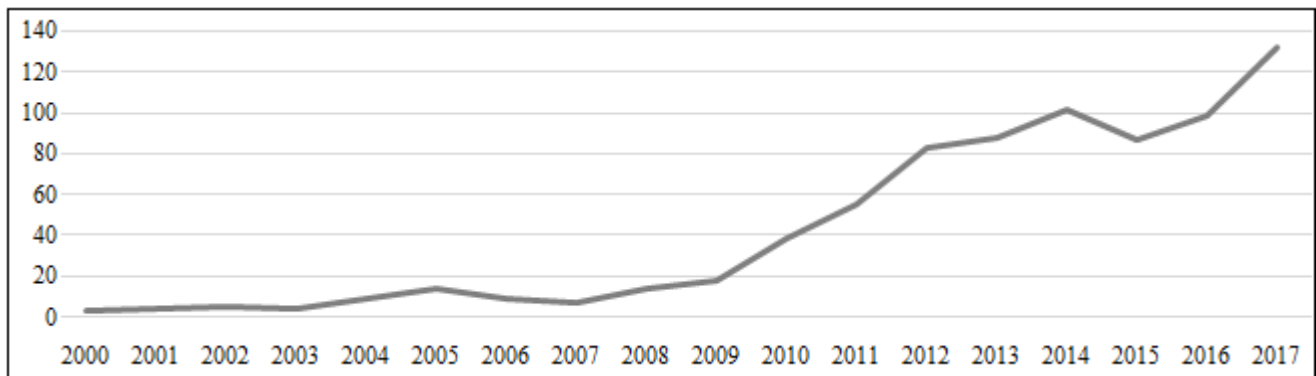


Figure 5: Trend chart of publication of papers related to systemic financial risks in Cnki

3.3.2 Analysis of mechanism

The analysis of the literature by research institutions and researchers can effectively grasp the key research institutions and academic leaders in this research field, and facilitate the researchers to carry out follow-up study. In the institutional and personnel analysis of papers related to systemic risk, this paper combines the analysis of researchers using the institutional analysis tool in Cnki. The

analysis found that 44 institutions and 75 researchers were involved in the research field, and selected the top 10 results of the two. As can be seen from figure 6, the co-occurrence density of the authors is extremely low, and most of them are isolated points. The cooperation between the authors is very low, and the cooperation between various research institutions is extremely poor.

Table 3: Keywords frequency statistics

Keyword	Frequency	Keyword	Centrality
Financial regulation, 2009	146	financial regulation, 2009	0.28
Financial crisis, 2004	70	macroprudential regulation, 2011	0.15
Finance, 2004	42	financial crisis, 2004	0.15
Macroprudential regulation, 2011	33	Finance, 2004	0.11
Shadow banking, 2013	22	systemically important financial institutions, 2011	0.07
Internet finance, 2014	22	financial security, 2013	0.05
Covar	17	real economy, 201	0.03

As can be seen from figure 7 and table 3, excluding systemic risk, the words with the highest frequency are: financial supervision, financial crisis, financial and macro-prudential supervision, while the words with the highest centrality are: financial supervision, macro-prudential supervision, financial crisis and financial.

Top 9 Keywords with the Strongest Citation Bursts

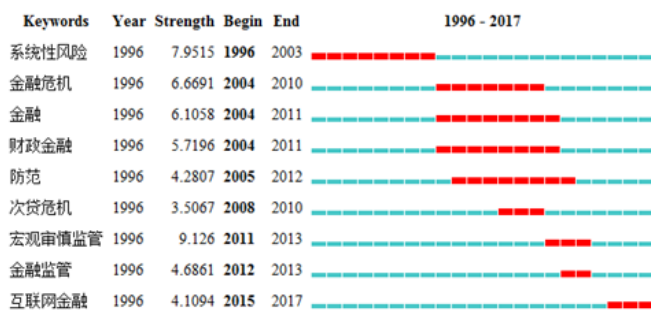


Figure 8: Keywords with the strongest citation bursts in Cnki

As shown in figure 8, emerging research hotspots include regulation of systemic risk and emerging financial institutions. In other words, researches on macro-prudential regulation, financial regulation and Internet finance in the study of systemic risk. CiteSpace finds the development and evolution track of keywords in the research field from figure 7 and figure 8 through the citation relationship between literatures. In recent years, the research on emerging financial industries such as "shadow banking" and "Internet finance", "systemically important financial institutions", "macro-prudential supervision" and "financial supervision" have been emphasized respectively.

3. Conclusion

Abroad study of systemic financial risk hot keywords is similar to the model, market, influence factors, research from the perspective of various systemic financial risk, and from real estate, insurance, banking and other financial market point of in-depth study abroad for the research of systemic financial risk earlier and deeper, paper is more, the research of systemic financial risk infectious, vulnerability of financial institutions. Through studying the foreign

literature on systemic financial risk, we can conclude that many models and methods are worth learning.

The main models and methods used abroad are: linear model based on cross sectional standard deviation (CSSD) test method; EVT approximation and moment method for evaluating tail attenuation parameters and tail dependence; The default marginal probability estimation of structural credit risk model is combined with consistent information multivariate density optimization (CIMDO) method and generalized dynamic factor model (GDFM). Using the quantile regression (QR hereafter) model, the distribution changes of stock returns in different periods and among different stocks were analyzed, and the results were compared with OLS and LAD estimation.

Of the current research for financial systemic risk, mainly by studying the western market, especially the countries, the financial crisis happened in the new generation of our local market research is relatively slow, the domestic literature research started late, most studies of theoretical research, especially the lack of a comprehensive system of quantitative analysis. Keywords related to systemic financial risks in China are similar to financial supervision, financial crisis, and macro-prudential supervision, etc. The domestic systemic financial risks are mainly from the perspective of macro-economy, and the research on macro-early-warning indicator mechanism and strengthening macro-prudential supervision needs to be deepened on risk measurement and infectivity.

The model methods used in China are: conditional value-at-risk CoVaR and marginal expected loss MES; The expected loss (SES) method, combined with the actual situation of China's commercial Banks, calculates the time dimension and cross-section dimension of the systemic risk of China's commercial Banks.

The real estate market bubble, the government debt, economic growth, liquidity risk, non-performing assets of financial institutions, inadequate capital, underdeveloped financial market, and macroeconomic fluctuation, the impact of capital flows of the financial system, and other forms of risk is the main form of systemic risk factors, macro-prudential regulation is a powerful tool to effectively prevent systemic financial risks.

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