Assessing Systemic Financial Risk in the Age of Digitalization: A Comparative Study Across Global Financial Markets

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Abstract: The wide application of digital technology has not only changed the way of providing financial services, but also profoundly affected the assessment and management of systemic financial risks. Financial markets in different regions have significant differences in risk sources, transmission mechanisms and coping strategies. The digital era should strengthen global financial regulatory cooperation and enhance the risk management capabilities of financial institutions. Based on this, this paper studies systemic financial risk assessment in the digital age: a comparison of global financial markets for reference.

***Keywords*:** digital age; systematic; financial risk assessment; global financial markets; comparative study

1. Introduction

With the rapid development of science and technology, the global financial market is undergoing unprecedented changes. In the digital age, the sources of risk in the financial market are more complex and changeable, and the risk transmission mechanism is more rapid and hidden. Therefore, how to accurately assess and manage systemic financial risks has become a key issue to maintain the stability of global financial markets. Based on this, this paper aims to provide useful reference for the risk management of global financial markets by comparing the systematic risk assessment of financial markets in different regions in the digital age.

2. Characteristics of systemic risk in global financial markets

2.1 The interconnectedness of financial markets

The interconnectedness of financial markets is reflected in how closely their components are linked to global economic activity. Various financial instruments, market participants and financial institutions are intertwined to form a complex web. Price fluctuations in financial instruments such as currencies, bonds, and stocks affect not only the single market, but also other markets. At the same time, business transactions and capital flows among financial institutions have also strengthened the interconnectedness of the market [1]. In addition, changes in the global economic environment are quickly reflected in financial markets, further highlighting the integrity and interdependence of financial markets.

2.2 Impact of macroeconomic environment on risk

The macroeconomic environment has a profound impact on financial risk. The fluctuations of the business cycle directly affect the stability of the financial market and asset values, and the boom period may mask the potential risks, while the recession period increases the risk exposure. Policy adjustments, such as changes in monetary and fiscal policies, indirectly regulate the level of risk in financial markets by affecting interest rates, exchange rates and credit conditions. In addition, external factors such as the international trade situation and geopolitical tensions also play a non-negligible role in financial risks by affecting market expectations and investor confidence.

3. Financial risk assessment methods in the digital age

3.1 Application of digital technology in financial risk assessment

3.1.1 Big data analysis

Digital technology in the financial risk assessment, big data analysis occupies a core position. By integrating massive data such as transaction records, credit information, and consumer behavior, financial institutions use specific analysis standards and models for in-depth mining. For example, in the credit evaluation process, big data analysis can set a series of evaluation criteria based on key indicators such as the customer's repayment history and consumer behavior pattern, and automatically calculate the customer's default probability through machine learning algorithms, so as to more accurately quantify credit risk.

3.1.2 Artificial Intelligence model

In the field of financial risk assessment, the application of artificial intelligence models is increasingly widespread. For example, an AI model utilizing deep learning algorithms can identify potential fraud or unusual trading patterns by analyzing historical transaction data. According to the practice of a financial institution, its artificial intelligence model has an accuracy rate of more than 95% in identifying fraudulent transactions [2]. In addition, the artificial intelligence model can also automatically calculate the customer's credit score based on the customer's credit history, income status and other factors, and provide decision support for financial institutions.

3.1.3 Blockchain technology

The application of blockchain technology in financial risk assessment increasingly highlights its unique value. With blockchain technology, financial institutions can build a more transparent and traceable risk assessment system. Supply chain finance projects using blockchain technology have improved financing efficiency by about 30%, while reducing risk by 20%. In addition, blockchain technology can effectively prevent data tampering and ensure the authenticity and integrity of risk assessment data. Therefore, blockchain technology has shown great potential in improving the accuracy and efficiency of financial risk assessment, and has become an important direction of fintech innovation.

3.2 Data source and preprocessing

3.2.1 Combination of internal and external data

Internal data usually comes from the enterprise's own operating system, such as transaction records, user behavior logs, etc., with a high degree of accuracy and pertinency. External data may come from third-party research institutions, social media, or publicly available databases, providing broader market information and consumer insights. By combining internal and external data, enterprises can build a more comprehensive and multi-dimensional risk assessment model [3]. For example, internal data can be used to identify the credit risk of a specific customer, while external data can provide background information such as macroeconomic trends, industry dynamics, etc., to help companies more accurately assess the overall level of risk.

3.2.2 Data cleaning, conversion and normalization

In the process of data source and preprocessing, data cleaning, conversion and normalization are the key steps. In the case of a financial institution, its risk management department pulled customer transaction records from internal systems while obtaining external credit score data from a third-party credit rating agency. During the data cleansing phase, the agency removes errors, duplicates, or incomplete data records to ensure data quality. Then, the data type is converted, for example, the date format is unified to YYYY-MM-DD. Normalization processing is carried out to convert data of different dimensions into the same scale, which is convenient for subsequent risk assessment model processing. As a result, data quality has improved significantly, creating a solid foundation for accurate risk assessment.

4. Comparative study on systemic risk assessment of global financial markets

4.1 European financial markets

In the comparative study of systemic risk assessment of global financial markets, European financial markets have significant characteristics. Take the European debt crisis as an example, which has exposed the high sovereign debt risks of some European countries. During the crisis, countries such as Greece got into trouble because of excessive fiscal deficits and heavy debt burdens, leading to a collapse in market confidence and a rapid spread of risks across European financial markets. It highlights the need for European financial markets to pay more attention to sovereign debt risk in risk assessment, as well as the importance of strengthening intra-regional policy coordination and regulatory cooperation [4]. Thus, the analysis allows for a deeper understanding of the complexity and challenges of systemic risk assessment in European financial markets.

4.2 Asian financial markets

The Asian financial crisis in 1997 is a typical case in the comparative study of systemic risk assessment of Asian financial markets. The crisis began in Thailand and quickly spread across Southeast Asia, hitting financial markets in South Korea, Japan and elsewhere. In the crisis, the currencies of Thailand and other countries fell sharply, the stock market plummeted, and financial institutions and companies went bankrupt. It reveals the problems that Asian financial markets need to pay attention to in risk assessment, such as excessive dependence on foreign capital, the risk of fixed exchange rate system and the lack of financial market supervision. In-depth analysis of such cases can provide valuable experience and lessons for Asian financial markets to improve their ability to assess systemic risk.

4.3 Emerging Markets

In the assessment of systemic risk in emerging markets, Turkey is a classic case. In recent years, the Turkish financial market has faced several risk challenges, such as the trade conflict caused by the United States' imposition of steel and aluminum tariffs on Turkey in 2018, which led to the collapse of the Turkish lira exchange rate and turmoil in the financial market. This case reflects the need for emerging markets to pay special attention to the international trade environment, geopolitical risks and their own economic structure in their risk assessment. At the same time, emerging markets also need to strengthen the management of foreign exchange reserves and improve the transparency and supervision of financial markets to better cope with systemic risks.

5. Suggestions for dealing with systemic financial risks in the digital age

In the digital age, dealing with systemic financial risks requires strengthening the integration of technology and supervision. Big data, artificial intelligence and other technologies should be used to improve risk monitoring and early warning capabilities, and timely detection of potential risk points. Strengthen cross-institutional and cross-border cooperation and information sharing, and build a global financial risk prevention and control network [5]. At the same time, improve the legal and regulatory system, clarify the regulatory standards for digital financial activities, and ensure the health and stability of the financial market. In addition, the risk management capacity of financial institutions should be improved, professional talents should be trained, and the ability to cope with complex risks and challenges should be enhanced.

6. Closing remarks

To sum up, the digital age brings new challenges and opportunities for systemic risk assessment in global financial markets. Through comparative study, it is found that the financial markets in different regions have their own characteristics in risk sources, transmission mechanisms and coping strategies. In the future, with the continuous development of digital technology and the continuous transformation of financial markets, the assessment and management of systemic financial risks will be more complex and arduous. Therefore, the global financial market needs to continuously strengthen regulatory cooperation, improve risk management capabilities, and jointly cope with the risk challenges brought by the digital age.

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