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The Interconnectedness of Systemic Financial Risks: An Analytical Framework for Predicting and Mitigating Crises

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Abstract: Systemic financial risk is one of the major challenges facing the modern financial system. In view of the interconnectedness of systemic financial risks, a comprehensive analytical framework is constructed to predict and mitigate financial crises. Through time series analysis, machine learning and integrated models, key indicators of financial markets and macroeconomics can be predicted more accurately. A number of policy recommendations and risk management measures were put forward, including strengthening regulatory policies, developing contingency plans and business continuity plans, to enhance the stability and resilience of the financial system. These measures will help reduce the impact of systemic financial risks and improve the overall health of financial markets. Based on this, this paper studies the correlation of systemic financial risks: an analytical framework for predicting and mitigating crises for reference.

Keywords: Systemic Financial Risk; Relevance; Anticipate Crises; Mitigating the Crisis; Frame Analysis

Introduction

As financial markets become more global and complex, the speed and scope of risk is increasing. Therefore, it is particularly important to understand and manage systemic financial risks. Based on this, this paper aims to propose policies and risk management measures through the correlation of systemic financial risks, so as to provide a solid theoretical basis and practical guidance for financial stability.

1. The concept of systemic financial risk

Systemic financial risk is a risk that spreads widely throughout the financial system and may trigger a chain reaction. It affects not only individual financial institutions, but also the entire market and economy. This risk usually stems from the high degree of interconnectedness among financial institutions, and once a problem occurs in one link, it can quickly spread to other institutions and markets. There are various forms of systemic financial risk, including credit risk, liquidity risk and market risk. Effective management and control of systemic financial risks is crucial to maintaining financial stability and promoting economic development [1]. Therefore, the impact of systemic financial risks can be effectively reduced by strengthening supervision, improving transparency, and enhancing the resilience of financial institutions.

2. Data sources for systemic finance

2.1 Financial market data

In terms of data sources, financial market data mainly include stock index, bond yield and foreign exchange rate. For example, the CSI 300 index can be used to reflect the overall performance of the stock market, the 10-year Treasury yield can be used to measure the stability of the bond market, and the movement of the dollar-yuan exchange rate can be used to analyze the volatility of the foreign exchange market. These specific data can help people to fully understand the dynamics of financial markets, so that more accurate analysis and predictions can be made. In addition, other key indicators such as interbank lending rates and commodity price indices can be combined to obtain more comprehensive market information.

2.2 Macroeconomic data

Macroeconomic data sources include key indicators such as gross domestic product (GDP), unemployment rate and inflation rate. For example, the GDP growth rate can indicate the overall health of the economy, such as the 5.2% GDP growth rate in the most recent quarter; The unemployment rate can reflect the state of the labor market, such as the current unemployment rate of 4.5%; The inflation rate measures changes in the price level, such as the Consumer Price Index (CPI), which has risen 2.8% over the past year. Therefore, these values are help-

ful for people to evaluate the current situation and trend of the macro economy and provide a solid foundation for the analysis of systemic financial risks. In addition, other important indicators such as industrial production index and retail sales can be consulted.

2.3 Data at the industry and institutional level

Industry-level and institutional-level data sources include financial statements, loan default rates, and asset quality indicators for major financial institutions. For example, the non-performing loan ratio of commercial banks is 1.5 percent and the capital adequacy ratio is 12.3 percent. A securities firm saw a 20% increase in trading volume in the past quarter; One insurance company has a 75% loss rate. These specific values reflect the operating conditions and risk levels of different organizations and industries. In addition, data such as industry average profit margins and asset-liability ratios can be referenced to comprehensively assess the health of various institutions and industries. Therefore, these detailed data provide insight into the internal structure and potential risks of the financial system[2].

3. Construction of prediction model for systemic financial risk

3.1 Prediction model based on time series

Forecasting models based on time series can use historical data to predict future market movements. For example, one can use the GDP growth rate data for the past five years to construct an ARIMA (autoregressive integral moving average) model, such as showing that the GDP growth rate for the next year is expected to be 4.8%. Similarly, using stock index data from the past ten years, build a moving average model and predict that the stock index will rise by 10% in the next year. These values can help people predict future market trends more accurately and provide strong support for decision-making. In addition, techniques such as seasonal decomposition and exponential smoothing can be combined to further improve the prediction accuracy.

3.2 Prediction model based on machine learning

Predictive models based on machine learning can capture complex non-linear relationships through large amounts of historical data. For example, one can use macroeconomic data and financial market data from the past five years to train a random forest model that predicts 20% stock market volatility for the next year. In addition, using deep learning algorithms, such as Long Short-term Memory (LSTM) networks, to analyze GDP growth and unemployment data over the past decade, the unemployment rate is projected to fall to 4.5% in the next year. These values provide a forecast of future market dynamics and help develop more effective risk management strategies [3]. In addition, support vector machine (SVM) and gradient lift tree (GBDT) can be combined to further optimize the prediction effect.

3.3 Integration Model

Integrated models improve prediction accuracy by combining the results of multiple prediction models. For example, you can build an integrated model that combines a time series-based ARIMA model with a machine learning-based random forest model. For example, the ARIMA model predicts GDP growth of 5.0% in the next year, while the Random Forest model predicts 4.9%. The integrated model takes a weighted average of these two predictions and finally predicts GDP growth of 4.95% for the next year. In addition, other models such as LSTM network can be introduced to further optimize the weight distribution and improve the prediction accuracy. Therefore, these values demonstrate the advantages of integrated models in predicting complex financial indicators.

4. Mitigation strategies for systemic financial risks

4.1 Policy Suggestions

Implement stricter risk management and capital adequacy requirements to ensure that financial institutions have sufficient buffers to cope with potential shocks. Strengthen the supervision of systemically important financial institutions and improve their transparency and information disclosure standards. Establish cross-agency coordination mechanisms to ensure rapid response and coordinated action in the event of a crisis. These measures will help strengthen the stability and resilience of the financial system and reduce the impact of systemic financial risks. At the same time, an early warning system will be established to identify and assess potential risks in a timely manner. Develop detailed

contingency plans, including liquidity management, debt restructuring and asset disposal options, to ensure prompt action in the event of a crisis. Strengthen business continuity planning for financial institutions to ensure that critical business functions continue to function in emergency situations [4]. Therefore, these measures help to improve the system's anti-risk ability and reduce the impact of the crisis.

4.2 Risk management measures

Risk management measures should focus on risk diversification, encouraging financial institutions to diversify their portfolios and avoid excessive concentration in one market or asset class. Promote the use of derivatives for hedging to reduce exposure to specific risks. Strengthen cross-institutional and cross-border risk management cooperation to jointly withstand external shocks. These measures help reduce the impact of a single source of risk and improve the stability of the financial system as a whole [5]. A business continuity plan should ensure the normal operation of critical operations in a crisis. First, establish backup system and disaster recovery mechanism to ensure the safety and reliability of information technology infrastructure. Develop detailed emergency operation procedures and train employees to respond to emergencies. Conduct regular drills and evaluations to ensure the effectiveness and implementability of the plan. Therefore, these measures help to maintain business continuity and stability and reduce losses caused by emergencies.

Closing remarks

To sum up, the correlation of systemic financial risks is a complex and multidimensional issue that requires multidisciplinary and multi-level comprehensive research. By constructing a forecasting framework based on time series analysis, machine learning and integrated models, and putting forward risk management measures such as strengthening regulatory policies, formulating emergency plans and business continuity plans, a feasible path is provided for predicting and mitigating financial crises. Future research can further explore new data sources and technical means to improve the accuracy and practicability of predictive models. Through sustained efforts, we are expected to significantly reduce the impact of systemic financial risks and provide strong support for the healthy development of financial markets.

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