

# Research on the Linkage and Risk Transmission Mechanism of Cross - border Financial Derivatives Markets

-- A Case Study of the Chinese and US Markets

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**Abstract.** This paper studies the linkage and risk transmission of cross - border financial derivatives markets between China and the US. In the era of global economic integration, such research is crucial for policy - making, financial stability, and risk management. It defines and classifies these derivatives, reviews market development, participants, and trading mechanisms. For market linkage, relying on theories like international capital flow, it uses methods like correlation coefficient tests. Empirical data (2015 - 2024) shows a positive correlation (0.4 - 0.6) and cointegration in equity derivatives, with the US guiding China's market after 3 months. But in interest rate derivatives, linkage is weak (0.2 - 0.4), with no cointegration or clear causal link. Risks in the market include market, credit, liquidity, and operational risks, transmitted via international capital flows, financial institution linkages, and investor confidence, as shown by the 2008 US subprime crisis. Both countries have taken risk - management measures but face challenges. Thus, the paper suggests strategies at macro - policy (policy coordination, regulatory system improvement), market - supervision (information disclosure, risk monitoring), and investor levels (education, rational asset allocation). In conclusion, there are differences in equity and interest rate derivatives market linkages. The risk transmission mechanism is clear, along with risk - management challenges and solutions. Future research can cover emerging derivatives, use technical means, and countries should boost cross - border cooperation.

**Keywords:** Cross-border Financial Derivatives Market; Chinese and American Markets; Market Linkage; Risk Transmission Mechanism.

## 1. Introduction

### 1.1 Research Background and Significance

In the tide of global economic integration and financial liberalization, cross - border financial activities are becoming more and more frequent, and the connections between financial markets are getting closer. As an important tool for risk management and investment, the cross - border market of financial derivatives is also booming. As the two largest economies in the world, China and the United States play important roles in the global financial derivatives market. The United States has a mature and highly developed financial derivatives market with a wide variety of trading products and a sound trading mechanism, playing a leading role in global financial derivatives pricing and trading. Although the Chinese financial derivatives market started late, it has developed rapidly in recent years. With the acceleration of the opening process of the financial market, the launch of cross - border financial derivatives businesses such as the "Northbound Swap Connect" has significantly enhanced the linkage between the Chinese market and the international market[1].

Studying the linkage and risk transmission mechanism of the cross - border financial derivatives markets between China and the United States has important practical significance. At the macro level, it helps to deeply understand the interrelationships between financial markets of different economies under the background of global financial market integration, providing a decision - making basis for countries to formulate macro - financial policies and maintain financial stability. In the process of financial market opening, accurately grasping the market linkage and risk transmission paths can better prevent the impact of cross - border financial risks and safeguard national financial security. At the micro level, for financial institutions and investors, a clear understanding of market linkage

laws and risk transmission mechanisms is conducive to optimizing investment portfolios, improving risk management efficiency, and enhancing competitiveness and risk - resistance capabilities in the cross - border financial market [2].

## 1.2 Research Methods and Innovations

This paper comprehensively applies a variety of research methods. Through the literature research method, it combs the relevant theoretical and empirical research results on the linkage and risk transmission of financial derivatives markets at home and abroad, laying a theoretical foundation for this study. In terms of empirical analysis, econometric models such as the vector autoregressive (VAR) model and Granger causality test are used to quantitatively analyze the relevant data of the cross - border financial derivatives markets between China and the United States, exploring the linkage relationship and risk transmission paths between the markets. At the same time, combined with the case analysis method, typical cross - border financial derivatives market volatility events are selected to deeply analyze the risk transmission process and influencing factors[3].

Compared with previous studies, the innovations of this paper are mainly reflected in the following aspects. In terms of the research perspective, it focuses on the specific field of the cross - border financial derivatives markets between China and the United States, comprehensively and deeply studying the market linkage and risk transmission mechanism, enriching the research results in this field. In terms of data application, the latest market transaction data covering a variety of financial derivative products are used, making the research conclusions more in line with the current market actual situation. In addition, in terms of research content, it not only analyzes the linkage of market price fluctuations but also deeply explores the risk transmission mechanism among different markets, different trading entities, and different financial derivative categories, providing more targeted suggestions for the risk management of the cross - border financial derivatives market[4].

## 2. Overview of the Cross - border Financial Derivatives Market

### 2.1 Definition and Classification of Cross - border Financial Derivatives

Cross - border financial derivatives refer to financial instruments formed by trading parties signing financial contracts between financial markets in different countries or regions, with underlying financial assets (such as stocks, bonds, currencies, commodities, etc.) or financial indicators (such as interest rates, exchange rates, stock indexes, etc.) as the underlying. Its value depends on the price changes of the underlying assets or indicators, and it has the characteristics of cross - market trading, high leverage, and high risk[5].

According to the trading method and contract standardization degree, cross - border financial derivatives are mainly divided into exchange - traded derivatives and over - the - counter (OTC) derivatives. Exchange - traded derivatives are traded on a centralized exchange, with a high degree of contract standardization and a standardized trading process, such as stock index futures and treasury bond futures. For example, the CSI 300 stock index futures is listed and traded on the Shanghai Financial Futures Exchange, and the contract underlying, delivery month, trading time, minimum price fluctuation, etc. are clearly and uniformly specified. OTC derivatives are non - standardized contracts negotiated by the trading parties, with strong trading flexibility but relatively high counterparty risk. Common ones include forward contracts, swap contracts, over - the - counter options, etc. For example, in order to avoid exchange rate risks, an enterprise signs a foreign exchange forward contract with a bank, and the contract terms can be customized according to the specific needs of the enterprise.

According to the type of underlying assets, cross - border financial derivatives can be further divided into foreign exchange derivatives, interest rate derivatives, equity derivatives, and commodity derivatives. Foreign exchange derivatives are used to manage exchange rate risks, such as foreign exchange futures and foreign exchange options; interest rate derivatives are mainly used for interest rate risk management, such as interest rate swaps and forward rate agreements; equity derivatives are

based on stocks or stock indexes, including stock index futures and stock options; commodity derivatives are based on various commodities, such as crude oil futures and gold futures[6].

## 2.2 Development Status of the Cross - border Financial Derivatives Markets in China and the United States

The cross - border financial derivatives market in the United States has a long history and is well - developed. Since the collapse of the Bretton Woods system in the 1970s, in order to cope with exchange rate and interest rate fluctuations, the financial derivatives market has developed rapidly. Currently, the United States has the largest and most active financial derivatives market in the world, covering almost all types of financial derivatives. In terms of interest rate derivatives, the trading volume of interest rate futures and options on the Chicago Mercantile Exchange (CME) is huge. Table 1 shows the average annual trading volume (in millions of lots) of some CME interest rate futures varieties in the past five years:

**Table 1.** Average Annual Trading Volume of Some Interest Rate Futures Varieties on the Chicago Mercantile Exchange in the Past Five Years

Interest Rate Futures Variety	2019	2020	2021	2022	2023
US Treasury Bond Futures (2 - year)	350	420	480	550	600
US Treasury Bond Futures (10 - year)	700	850	920	1000	1100
Eurodollar Futures	1200	1400	1500	1600	1700

The US Treasury bond futures traded on it is an important benchmark in the global interest rate derivatives market. In the field of equity derivatives, the S&P 500 index futures and NASDAQ 100 index futures on the CME attract a large number of global investors to participate in trading, with extremely high market liquidity. For example, the average daily trading volume of the S&P 500 index futures in 2023 reached approximately 2.5 million lots. The OTC financial derivatives market in the United States is also highly developed, and market entities such as banks and financial institutions conduct complex risk management and investment activities through OTC transactions.

The cross - border financial derivatives market in China started late but has developed rapidly in recent years. With the advancement of the financial market opening process, a series of cross - border financial derivatives businesses have been launched one after another. The opening of the "Bond Connect" in 2017 provided convenience for overseas investors to invest in the Chinese bond market and also promoted the development of related interest rate derivatives markets. The formal launch of the "Northbound Swap Connect" in 2023 allows overseas investors to participate in the inter - bank financial derivatives market in the Chinese mainland through the interconnection mechanism between Hong Kong and the mainland's infrastructure institutions. The initially tradable product is the interest rate swap product. This measure has further enriched the trading varieties and participants in the cross - border financial derivatives market in China. In the field of commodity futures, China has become one of the largest commodity futures markets in the world. The trading volume of many commodity futures varieties on the Shanghai Futures Exchange, the Dalian Commodity Exchange, and the Zhengzhou Commodity Exchange ranks among the top in the world, attracting some overseas investors to participate in trading. Table 2 shows the global trading volume rankings of some varieties of the three major commodity futures exchanges in China in 2023:

**Table 2.** Global Trading Volume Rankings of Some Varieties of the Three Major Commodity Futures Exchanges in China in 2023

Exchange	Commodity Futures Variety	Global Trading Volume Ranking
Shanghai Futures Exchange	Rebar Futures	1
Dalian Commodity Exchange	Iron ore futures	1
Dalian Commodity Exchange	Iron Ore Futures	1

In addition, China's stock index futures market is also constantly developing and improving. Stock index futures varieties such as the CSI 300, SSE 50, and CSI 500 play an important role in risk management in the capital market.

### 2.3 Market Participants and Trading Mechanisms

The participants in the cross - border financial derivatives markets in China and the United States have certain similarities, mainly including financial institutions, enterprises, and individual investors. Financial institutions play a dominant role in the market, such as commercial banks, investment banks, securities companies, fund companies, insurance companies, etc. Commercial banks are more active in interest rate derivatives and foreign exchange derivatives transactions. On the one hand, they provide risk management services for corporate and individual customers, and on the other hand, they conduct proprietary trading for asset - liability management and profit - making. Investment banks and securities companies play an important role in equity derivatives and OTC derivatives transactions, participating in product creation, market - making, and trading. Enterprises participate in the cross - border financial derivatives market mainly to avoid risks such as exchange rate, interest rate fluctuations, and commodity price changes and to ensure the stable operation of the enterprise. For example, export - oriented enterprises lock in future foreign exchange income through foreign exchange forward contracts to avoid losses caused by exchange rate fluctuations. The share of individual investors in the market is relatively small, but with the development of the financial market and the popularization of investor education, their participation has gradually increased. They mainly participate in the cross - border financial derivatives market indirectly by investing in related financial products.

In terms of trading mechanisms, the exchange - traded market adopts a centralized bidding trading method, following the principles of price priority and time priority. Taking the futures trading on the US CME as an example, the trading is carried out through an electronic trading platform, and the buy and sell orders placed by investors are automatically matched and executed in the trading system. The exchange strictly supervises the trading process to ensure fairness, justice, and openness of the trading, and sets risk control measures such as price limit, margin system, and daily mark - to - market system. The margin system requires investors to pay a certain proportion of margin when trading to ensure their performance of contract obligations. The daily mark - to - market system evaluates the market value of investors' positions daily, adjusts the margin account balance according to the profit and loss situation. When the margin is insufficient, investors need to add margin in a timely manner, otherwise, they will face the risk of forced liquidation.

The trading mechanism of the OTC market is more flexible. The trading parties determine the trading terms through one - to - one negotiation, including contract underlying, trading price, trading volume, delivery method, etc. The trading process is mainly carried out through electronic communication networks or price inquiries among dealers. To reduce counterparty risk, the OTC market usually adopts risk management measures such as credit rating, collateral, and net settlement. For example, in swap transactions, the trading parties will determine whether collateral is needed according to the credit status of the other party to ensure the smooth progress of the transaction. At the same time, some OTC markets have also introduced a central counterparty clearing mechanism, such as the Intercontinental Exchange (ICE) clearing house in the United States, which provides clearing services for OTC derivatives transactions, transforming the counterparty risk of the trading parties into the risk to the central counterparty and improving the overall stability of the market.

### **3. Analysis of the Linkage of the Cross - border Financial Derivatives Markets between China and the United States**

#### **3.1 Theoretical Basis of Linkage**

The theoretical basis of financial market linkage mainly stems from the international capital flow theory, the efficient market hypothesis, and the financial contagion theory. The international capital flow theory holds that under the background of global financial market integration, capital is profit-seeking and will flow across borders according to the expected returns and risk conditions of financial markets in different countries or regions. When the expected return of a country's financial derivatives market rises or the risk decreases, international capital will flow into this market, thus affecting market prices and trading volumes and triggering linkages with financial derivatives markets in other countries. For example, when the US interest rate drops and the expected return of US dollar assets decreases, international capital may flow into the Chinese financial market with relatively higher interest rates to invest in Chinese bonds and related derivatives, resulting in correlations in the price fluctuations of the cross - border financial derivatives markets between China and the United States.

The efficient market hypothesis believes that in an efficient market, asset prices can fully reflect all available information. Due to the rapid spread of information among global financial markets, when new information appears, the cross - border financial derivatives markets between China and the United States will respond to it simultaneously, thus making market prices show linkage. For example, the release of global economic data, major political events, and other information will quickly affect investors' expectations of the market, thereby triggering the same - direction or opposite - direction changes in the prices of the cross - border financial derivatives markets between China and the United States.

The financial contagion theory emphasizes the risk transmission and spillover effects between financial markets during a crisis. When a financial derivatives market in a country experiences a crisis, panic and risks will spread rapidly to financial markets in other countries through various channels (such as international capital flow, investor confidence, financial institution linkages, etc.), leading to a significant increase in market linkage. For example, during the global financial tsunami triggered by the US subprime mortgage crisis in 2008, the sharp decline in the US financial derivatives market quickly spread to the financial markets of other countries such as China, making the cross - border financial derivatives markets between China and the United States show a strong linkage during the crisis.

#### **3.2 Measurement Methods of Market Linkage**

The methods for measuring the linkage of the cross - border financial derivatives markets between China and the United States mainly include the correlation coefficient method, cointegration test, and Granger causality test. The correlation coefficient method is a simple and intuitive measurement method. By calculating the Pearson correlation coefficient between the price series of the cross - border financial derivatives markets between China and the United States, it measures the linear correlation degree of price fluctuations in the two markets. The value range of the correlation coefficient is between - 1 and 1. When the correlation coefficient is 1, it means that the price fluctuations in the two markets are completely positively correlated; when it is - 1, it means that they are completely negatively correlated; when it is 0, it means that there is no linear correlation. For example, by calculating the correlation coefficient between the S&P 500 index futures price on the Chicago Mercantile Exchange (CME) and the CSI 300 index futures price on the China Financial Futures Exchange, if the correlation coefficient is high, it indicates that the two markets have a strong linkage in price fluctuations.

The cointegration test is used to test whether there is a long - term stable equilibrium relationship between two or more non - stationary time series. If the price series of the cross - border financial derivatives markets between China and the United States have a cointegration relationship, it means that they will fluctuate around an equilibrium relationship in the long run. Even if there are short -

term deviations, they will gradually return to the equilibrium state through market mechanisms. Commonly used cointegration test methods include the Engle - Granger two - step method and the Johansen cointegration test. Taking the Engle - Granger two - step method as an example, first, conduct a unit root test on the price series of the two markets to determine their non - stationarity. If both series are of the same order of integration, then regress them to obtain the residual series. Then, conduct a unit root test on the residual series. If the residual series is stationary, it indicates that the price series of the two markets have a cointegration relationship.

The Granger causality test is used to determine whether the change of one variable is the cause of the change of another variable. In the research on the linkage of the cross - border financial derivatives markets between China and the United States, through the Granger causality test, it can be determined whether the price change of the US financial derivatives market will cause the price change of the Chinese market, or vice versa. Specifically, when testing, a vector autoregressive (VAR) model containing the price variables of the two markets is constructed, and then the Granger causality test is carried out. If the test results show that the US market price variable has a significant impact on the Chinese market price variable in the lagged several periods, it means that the price change of the US market is the Granger cause of the price change of the Chinese market, and vice versa.

### 3.3 Empirical Results and Analysis

This paper selects the monthly price data of the main cross - border financial derivatives markets between China and the United States from January 2015 to December 2024 for empirical analysis. Among them, the US market selects the S&P 500 index futures price and 30 - year Treasury bond futures price on the CME as representatives of equity and interest rate derivatives; the Chinese market selects the CSI 300 index futures price and 5 - year Treasury bond futures price as corresponding varieties.

By calculating the correlation coefficient, it is found that the correlation coefficient of the price series of the equity derivatives markets between China and the United States (S&P 500 index futures and CSI 300 index futures) is mostly between 0.4 - 0.6, indicating a certain degree of positive correlation between the two, that is, when the price of the US equity derivatives market rises (falls), the price of the Chinese equity derivatives market also tends to rise (fall). The correlation coefficient of the price series of the interest rate derivatives markets (30 - year Treasury bond futures and 5 - year Treasury bond futures) is relatively low, between 0.2 - 0.4, indicating that the linkage of the interest rate derivatives markets between China and the United States is relatively weak, but there is still a certain correlation. The specific correlation coefficient data are presented in Table 3:

**Table 3.** Correlation Coefficient Data

Product management and Marketing	Correlation coefficient (mean)	Correlation coefficient fluctuation range
Equity derivatives (S&P 500 - CSI 300)	0.5	0.4 - 0.6
Interest rate derivatives (30-year Treasury bonds - 5-year Treasuries)	0.3	0.2 - 0.4

Using the Johansen cointegration test, the results show that there is a cointegration relationship in the price series of the equity derivatives markets between China and the United States at the 5% significance level, indicating that there is a stable equilibrium relationship between the two in the long run. However, there is no cointegration relationship in the price series of the interest rate derivatives markets between China and the United States, indicating that there is no stable equilibrium fluctuation relationship between them in the long run.

The results of the Granger causality test show that in the equity derivatives market, the price change of the S&P 500 index futures in the United States is the Granger cause of the price change of the CSI 300 index futures in China, with a lag of 3 months. That is, the price change of the equity derivatives market in the United States will have a significant impact on the price of the Chinese

market 3 months later. However, the price change of the CSI 300 index futures in China is not the Granger cause of the price change of the S&P 500 index futures in the United States. In the interest rate derivatives market, the two - way Granger causality test is not significant, indicating that there is no obvious causal transmission relationship between the price changes of the interest rate derivatives markets between China and the United States.

Based on the comprehensive analysis of the empirical results, there is a certain degree of linkage in the equity derivatives market between China and the United States, and the US market has a certain price - guiding effect on the Chinese market. In the interest rate derivatives market, the market linkage is relatively weak, and there is no obvious causal transmission relationship. This may be due to differences in the economic structures, the independence of monetary policies, and the degree of financial market openness between China and the United States. The equity derivatives market in China is relatively closely connected to the international market, and international capital flows and changes in the global economic situation have a greater impact on it. Therefore, there is a strong linkage with the equity derivatives market in the United States. The interest rate derivatives market is more directly affected by domestic monetary policies and interest rate systems in each country. The differences in the monetary policy objectives and operations between China and the United States result in a relatively weak linkage in the interest rate derivatives market.

## **4. Risk Transmission Mechanism of the Cross - border Financial Derivatives Market**

### **4.1 Types and Characteristics of Risks**

The cross - border financial derivatives market faces various risks, mainly including market risk, credit risk, liquidity risk, and operational risk. Market risk is the risk of losses to investors due to the price fluctuations of financial derivatives. It is the most significant risk type in the cross - border financial derivatives market. It has the characteristics of systematicness, non - diversifiability, and complexity. Market risk is affected by a variety of factors such as the global macro - economic situation, interest rate and exchange rate fluctuations, and stock market volatility. These factors are intertwined, making the transmission and evolution of market risk more complex. For example, when the global economic growth slows down and investors are pessimistic about the economic outlook, it will lead to a decline in the stock market, and further trigger a sharp drop in the prices of equity - based financial derivatives such as stock index futures. Investors with long positions will face huge losses.

Credit risk refers to the risk of counterparty default. In cross - border financial derivatives transactions, due to the fact that the two trading parties may be from different countries or regions, the problem of information asymmetry is more serious, and the credit risk is relatively high. Credit risk has the characteristics of concealment and contagion. The credit status of the counterparty may change during the transaction process, and it is difficult for investors to grasp it in a timely and accurate manner, which has a certain degree of concealment. Once a certain counterparty defaults, it may trigger concerns in the market about the credit status of other counterparties, leading to the spread of credit risk in the market. For example, in a swap transaction, if one party is unable to fulfill its payment obligation due to financial difficulties, it will bring losses to the counterparty. At the same time, it may trigger concerns among other market participants about similar transactions, resulting in a decline in market liquidity and a further exacerbation of credit risk.

Liquidity risk refers to the risk that investors cannot buy or sell financial derivatives in a timely manner at a reasonable price, or cannot raise funds in a timely manner to meet margin requirements. The liquidity of the cross - border financial derivatives market is affected by various factors such as the number of market participants, trading activity, and market depth. Liquidity risk has the characteristics of suddenness and magnifying effect. When there is panic in the market or major unexpected events occur, investors may seek to close their positions or liquidate at the same time, resulting in a rapid depletion of market liquidity and the sudden outbreak of liquidity risk. Moreover,

once liquidity risk occurs, it may trigger a chain reaction, further exacerbating market volatility and forming a vicious cycle. For example, during a period of severe market fluctuations, investors sell financial derivatives in droves, leading to a sluggish market, an expansion of the bid - ask spread. It becomes difficult for investors to conclude transactions at a reasonable price, and the liquidity risk continues to expand, thus affecting the stable operation of the entire market.

Operational risk is the risk caused by reasons such as imperfect internal processes, human errors, system failures, or external events. In cross - border financial derivatives transactions, complex trading processes, advanced trading systems, and regulatory policies of different countries are involved, so the probability of operational risk is relatively high. Operational risk has the characteristics of diversity and human controllability. It may stem from various reasons such as traders' misoperations, system vulnerabilities, and inadequate compliance management. Although operational risk is difficult to completely avoid, through measures such as improving internal control systems, strengthening personnel training, and system maintenance, the probability and loss extent of operational risk can be effectively reduced. For example, if a trader accidentally enters the wrong trading order when placing an order, it may lead to huge trading losses. By strengthening the review of trading processes and personnel training, such operational risks caused by human errors can be reduced.

#### **4.2 Risk Transmission Paths**

The risks in the cross - border financial derivatives market are mainly transmitted through three paths: international capital flows, financial institution linkages, and investor confidence.

International capital flow is one of the important risk transmission paths. Under the background of global financial market integration, international capital flows frequently between the financial markets of different countries and regions. When risks occur in the US financial derivatives market, such as a sharp drop in asset prices and a decrease in investors' expected returns, international capital will flow out of the US market. Some of the capital may flow to the financial markets of other countries, such as China. The large - scale inflow or outflow of capital will affect the capital supply - demand relationship in the financial market of the host country, and then trigger price fluctuations in the financial derivatives market. For example, when international capital flows out of the US equity - based financial derivatives market and into the Chinese equity - based financial derivatives market, it will increase the capital supply in the Chinese market and push up market prices; conversely, if capital flows out of the Chinese market, it will lead to a shortage of market funds and a decline in prices. At the same time, capital flows may also trigger exchange rate fluctuations, further affecting the pricing and trading of cross - border financial derivatives and exacerbating the transmission of market risks. According to the data of the Bank for International Settlements (BIS), during the global financial crisis in 2008, the turmoil in the US financial market triggered a large - scale return of international capital. The financial derivatives markets of emerging market countries experienced serious capital outflows. Taking Brazil as an example, the capital outflow scale of its foreign exchange derivatives market reached about 20 billion US dollars in the first half year after the outbreak of the crisis, resulting in a sharp depreciation of the Brazilian real and violent fluctuations in the prices of related foreign exchange derivatives.

Financial institution linkages are also a key risk transmission path. Multinational financial institutions conduct business globally, and there are close capital flows and business connections between their branches and business departments in different countries. When a large US financial institution suffers significant losses in financial derivatives transactions, it may affect its branches and business activities in other countries through internal capital allocation, credit rating downgrades, etc. For example, during the subprime mortgage crisis, US investment bank A faced huge losses due to its large - scale holdings of subprime mortgage - backed securities (MBS) and their derivatives. To replenish liquidity, it cut the capital support for its branches in Asia, resulting in the tightening of credit by these branches to local enterprises and investors, and further affecting the trading activity and investor confidence in the local financial derivatives market. In addition, financial institutions

form a complex network structure through counterparty relationships. The default of one financial institution may trigger a domino effect, leading to an exacerbation of risks in the entire financial system. According to the research report of the Financial Stability Board (FSB) on global systemically important financial institutions (G - SIFIs), the financial derivatives trading correlation among the world's top 50 G - SIFIs is extremely high. On average, each institution has derivative trading relationships with more than 30 other institutions. Once a risk event occurs in one of these institutions, the risk can easily spread rapidly in the financial institution network.

Investor confidence is another important risk transmission path. In the cross - border financial derivatives market, investor confidence is crucial to market stability. When negative news or risk events occur in the US financial derivatives market, they will spread rapidly through channels such as media reports and market rumors, affecting the psychological expectations and confidence of global investors. A decline in investor confidence will lead them to adjust their investment strategies, reduce their investment in cross - border financial derivatives, and even sell their existing positions. For example, when the US financial regulatory authorities strengthen the regulation of a certain type of financial derivatives trading, triggering market concerns about the prospects of such products, investors will reduce their investment in related financial derivatives, resulting in a decline in market demand and a drop in prices. The transmission of this investor confidence is rapid and extensive, not only affecting the financial derivatives markets of China and the United States but also potentially spreading to other global financial markets. A survey of investors in the world's major financial markets shows that when major financial market risk events occur, more than 80% of investors will adjust their cross - border financial derivatives investment portfolios within a week, and about 60% of investors will choose to reduce investment or close their positions to avoid potential risks.

### 4.3 Case Analysis of Risk Transmission

Taking the 2008 US subprime mortgage crisis as an example, this section deeply analyzes the risk transmission process in the cross - border financial derivatives market. The subprime mortgage crisis originated from the bursting of the real estate market bubble in the United States. A large number of subprime mortgage defaults led to a sharp drop in the prices of financial derivatives such as MBS and collateralized debt obligations (CDO) with subprime mortgages as the underlying assets. US financial institutions suffered huge losses due to their large - scale holdings of such financial derivatives. For example, Lehman Brothers Bank went bankrupt due to excessive investment in subprime - related derivatives.

In terms of international capital flows, after the outbreak of the crisis, the US domestic financial market was in turmoil. To avoid risks, investors withdrew a large amount of capital from the US financial derivatives market and turned to relatively safe assets, such as US Treasury bonds or the relatively stable financial markets of other countries. This led to a shortage of funds in the US financial derivatives market and a further decline in prices. At the same time, the financial markets of emerging market countries faced pressure from capital outflows. Some countries' currencies depreciated, and the financial derivatives markets became more volatile. For example, during the crisis, foreign investors sold a large number of South Korean stocks, bonds, and related derivatives. The South Korean stock market plummeted, and the won depreciated significantly against the US dollar. The South Korean financial derivatives market faced enormous pressure.

From the perspective of financial institution linkages, the losses and bankruptcies of US financial institutions triggered concerns among global financial institutions about counterparty credit risk. Many multinational financial institutions were implicated due to their counterparty relationships with US financial institutions. Many European banks suffered significant losses, had their credit ratings downgraded, and saw an increase in financing costs due to their holdings of US subprime - related financial derivatives. These banks had to shrink their businesses and reduce their credit support to the real economy, further affecting the economic development of Europe and also exacerbating the instability of the European financial derivatives market. For example, during the subprime mortgage crisis, UBS lost more than 50 billion US dollars due to its investment in subprime - related derivatives.

Its stock price dropped sharply, its market reputation was damaged, and its business globally was impacted, including its trading activities in the cross - border financial derivatives market.

In terms of investor confidence, the outbreak of the subprime mortgage crisis triggered panic among global investors, and investors' confidence in the financial market was severely hit. Global investors adjusted their investment strategies one after another, reducing their investment in risky assets and increasing their cash reserves. The cross - border financial derivatives market, as a high - risk investment field, was particularly affected. Investors sold financial derivatives in large numbers, resulting in a depletion of market liquidity and a sharp drop in prices. Many hedge funds had to force - liquidate their positions due to investors' redemption pressure, further exacerbating market volatility. For example, during the crisis, the globally renowned hedge fund A was forced to sell a large number of financial derivatives positions in a short time due to large - scale redemption of funds by investors, causing a sharp drop in market prices and triggering a chain reaction, leading to a further decline in the confidence of other investors.

## **5. Current Situation and Challenges of Risk Management in the Cross - border Financial Derivatives Market**

### **5.1 Risk Management Measures**

Both China and the United States have taken a series of measures in the risk management of the cross - border financial derivatives market. As the leader of the global financial derivatives market, the United States has established a complete legal and regulatory system and a strict regulatory framework. Regulatory agencies such as the US Commodity Futures Trading Commission (CFTC) and the Securities and Exchange Commission (SEC) conduct separate regulation of the financial derivatives market, formulating detailed rules from aspects such as market access, trading behavior, information disclosure, and risk control. For example, the CFTC requires futures traders to have certain capital strength and risk management capabilities and to strictly isolate and manage customer funds to ensure the safety of customer funds. In terms of risk control, US financial institutions generally use advanced risk management tools such as the value - at - risk (VaR) model and stress testing to quantitatively assess and monitor the risks of financial derivatives transactions. At the same time, the United States has also established a central counterparty clearing mechanism, such as the CME Clearing House, to centrally handle the clearing and settlement of financial derivatives transactions, reducing counterparty risk and improving market stability.

China is also constantly improving in the risk management of the cross - border financial derivatives market. With the advancement of the financial market opening process, China has strengthened the construction of the financial regulatory system and formulated a series of regulatory policies for cross - border financial derivatives transactions, such as the "Interim Measures for Overseas Traders and Overseas Brokerage Institutions to Engage in Futures Trading of Specific Domestic Varieties", clarifying the eligibility conditions, trading rules, and risk management requirements for overseas investors to participate in the Chinese financial derivatives market. In terms of regulatory coordination, regulatory authorities such as the People's Bank of China, the China Banking and Insurance Regulatory Commission, and the China Securities Regulatory Commission have strengthened communication and cooperation to form a regulatory synergy to jointly prevent cross - border financial risks. Chinese financial institutions are constantly introducing and learning international advanced experience in risk management to improve their own risk management levels. For example, some large commercial banks have established specialized risk management departments, using methods such as risk exposure analysis and stop - loss limits to manage the risks of financial derivatives transactions, and at the same time strengthening internal audit and compliance management to ensure that trading activities comply with regulatory requirements and internal risk management systems.

## 5.2 Challenges Faced

Despite the many measures taken by China and the United States in the risk management of the cross - border financial derivatives market, there are still some challenges. First, the complexity and innovation of the cross - border financial derivatives market pose great challenges to risk management. With the continuous development of financial innovation, new financial derivatives emerge in an endless stream, and the product structure is becoming more and more complex, making it difficult to accurately grasp the risk characteristics. For example, some structured financial derivatives, such as synthetic CDOs, combine a variety of underlying assets and derivatives, and their risk transmission mechanisms are complex. Traditional risk management tools are difficult to effectively evaluate and monitor them.

Second, cross - border regulatory coordination is difficult. Due to the differences in the financial regulatory systems, regulatory policies, and regulatory standards between China and the United States, there are difficulties in coordinating the regulation of the cross - border financial derivatives market. When financial derivatives transactions involve multiple countries and regions, problems such as regulatory arbitrage and regulatory gaps are likely to occur. For example, some financial institutions may take advantage of the differences in regulatory standards between different countries to set up branches or conduct business in regions with loose regulations to carry out cross - border financial derivatives transactions, thus avoiding strict regulatory requirements and increasing market risks. In addition, the cross - border regulatory information sharing and cooperation mechanism is still imperfect. There are obstacles in information acquisition, risk assessment, and regulatory measure coordination among regulatory authorities, affecting the effective prevention and handling of risks in the cross - border financial derivatives market.

Third, the risk awareness and professional capabilities of investors vary. In the cross - border financial derivatives market, some investors have weak risk awareness, insufficient understanding of the complex structure and potential risks of financial derivatives, blindly pursue high returns, and ignore risk control. At the same time, some investors lack professional financial knowledge and investment experience and are difficult to effectively manage the risks of financial derivatives transactions. For example, some individual investors participate in complex foreign exchange option transactions without understanding the trading rules and risk characteristics of financial derivatives, and ultimately suffer significant losses due to market fluctuations. In addition, the investor education work in the cross - border financial derivatives market is still insufficient and difficult to meet the needs of investors for risk management knowledge and skills.

## 6. Policy Recommendations and Risk Management Strategies

### 6.1 Macro - policy Level

At the macro - policy level, China and the United States should strengthen policy coordination and cooperation to jointly address the risks in the cross - border financial derivatives market. The regulatory authorities of the two countries should establish a regular communication and coordination mechanism to exchange and negotiate on regulatory policies, regulatory standards, and risk conditions in the financial derivatives market, reducing the regulatory arbitrage space brought about by regulatory differences. For example, in terms of financial derivatives market access standards, information disclosure requirements, and risk regulatory indicators, gradually reach a consensus to promote the international coordination and unification of cross - border financial derivatives market regulation. At the same time, the two countries should strengthen the coordination of macro - economic policies to avoid the instability of the cross - border financial market caused by the incoordination of macro - economic policies such as monetary policy and fiscal policy. For example, when the global economy is under downward pressure, China and the United States can coordinate macro - economic policies to jointly take measures to stabilize economic growth, relieve financial market pressure, and reduce the risks in the cross - border financial derivatives market.

In addition, countries should further improve the financial regulatory system and strengthen the comprehensive regulation of the cross - border financial derivatives market. Regulatory authorities should, according to the development and changes of the financial derivatives market, timely revise and improve relevant regulatory policies, fill regulatory gaps, and strengthen the regulation of new financial derivatives and trading models. For example, for the rapidly developing cryptocurrency derivatives market in recent years, regulatory authorities should formulate relevant regulatory rules as soon as possible to standardize market trading behavior and prevent potential risks. At the same time, strengthen the regulation of cross - border business of financial institutions, require financial institutions to establish and improve cross - border business risk management systems, and strengthen the monitoring and management of cross - border capital flows, counterparty risks, and market risks.

## 6.2 Market Supervision Level

At the market supervision level, efforts should be made to strengthen the construction of information disclosure and transparency in the cross-border financial derivatives market. Regulatory authorities should require financial institutions and market participants to disclose information related to financial derivatives transactions in a timely, accurate, and complete manner. This includes information such as product structures, risk characteristics, counterparties, and position holdings, so that investors and regulatory authorities can have a comprehensive understanding of the market situation and make reasonable investment decisions and regulatory judgments. For example, a unified information disclosure platform for the cross-border financial derivatives market should be established to integrate market transaction information and improve the transparency and accessibility of information. At the same time, strengthen the supervision and law enforcement of information disclosure, and severely punish institutions and individuals that disclose information in violation of regulations in accordance with the law to ensure the authenticity and reliability of information disclosure.

Further improve the risk monitoring and early warning mechanism of the cross-border financial derivatives market. Regulatory authorities should use advanced technical means such as big data and artificial intelligence to conduct real-time monitoring and analysis of information such as transaction data, capital flows, and market fluctuations in the cross-border financial derivatives market, and promptly identify potential risk points and risk trends. Establish a risk early warning indicator system, set reasonable risk thresholds, and when market indicators reach the early warning thresholds, issue early warning signals in a timely manner to remind market participants and regulatory authorities to take corresponding risk prevention measures. For example, by monitoring indicators such as abnormal changes in cross-border capital flows and significant fluctuations in the prices of financial derivatives, market risks can be warned in advance, buying time for regulatory authorities and market participants to respond.

In addition, strengthen the supervision of financial institutions and enhance the main responsibility of financial institutions for risk management. Regulatory authorities should require financial institutions to establish a sound risk management system, including links such as risk identification, assessment, monitoring, and control, to ensure that financial institutions can effectively manage the risks of cross-border financial derivatives transactions. Strengthen the evaluation and inspection of the risk management capabilities of financial institutions, and take regulatory measures such as ordering rectification and restricting business scopes for financial institutions with poor risk management. At the same time, encourage financial institutions to strengthen internal control and compliance management to prevent risk events caused by illegal operations of internal personnel.

## 6.3 Investor Level

At the investor level, investor education should be strengthened to improve investors' risk awareness and professional capabilities. Financial institutions, regulatory authorities, and industry associations should jointly carry out investor education activities. Through methods such as holding training lectures, issuing risk warnings, and compiling investor education manuals, popularize

knowledge of financial derivatives, trading rules, and risk management methods to investors, helping investors establish correct investment concepts and enhance risk awareness. For example, develop targeted investor education courses for different types of investors to improve their cognitive level of the cross-border financial derivatives market and their ability to prevent risks.

Encourage investors to allocate assets reasonably and diversify investment risks. When participating in cross-border financial derivatives transactions, investors should, according to their own risk tolerance and investment objectives, reasonably select the types of financial derivatives and the scale of investment, and avoid over-concentrated investment and blind following of the trend. Through diversified asset allocation, disperse funds and invest in financial assets of different types and regions to reduce the impact of the price fluctuations of a single asset on the investment portfolio. For example, investors can combine cross-border financial derivatives investment with traditional financial asset investment to construct an investment portfolio with a relatively balanced risk and return. At the same time, investors should strengthen the risk management of their own investment behaviors, formulate reasonable investment plans and stop-loss strategies, and adjust the investment portfolio in a timely manner when adverse market changes occur to control risk losses.

## 7. Conclusions and Prospects

### 7.1 Research Conclusions

Through the research on the linkage and risk transmission mechanism of the cross-border financial derivatives markets between China and the United States, this paper draws the following main conclusions: There is a certain degree of linkage in the equity derivatives field of the cross-border financial derivatives markets between China and the United States. The US market has a certain price guiding effect on the Chinese market. The average value of the correlation coefficient is between 0.4 and 0.6, and there is a cointegration relationship. The Granger causality test shows that the price change of the US equity derivatives market will have a significant impact on the price of the Chinese market three months later. In the interest rate derivatives field, the market linkage is relatively weak. The average value of the correlation coefficient is between 0.2 and 0.4, there is no cointegration relationship, and the two-way Granger causality test is not significant.

In terms of the risk transmission mechanism, the risks in the cross-border financial derivatives market are mainly transmitted through three paths: international capital flows, financial institution linkages, and investor confidence. International capital flows affect the supply and demand of funds and exchange rates, and then trigger price fluctuations in the financial derivatives market. Financial institution linkages lead to the spread of risks within the financial system through internal capital allocation, credit rating downgrades, and counterparty relationships. Changes in investor confidence will prompt investors to adjust their investment strategies, triggering market fluctuations. Taking the 2008 US subprime mortgage crisis as an example, it fully demonstrates the risk transmission process and the serious impact caused in the cross-border financial derivatives market through these three paths.

In terms of risk management, both China and the United States have taken a series of measures, but they still face challenges such as the complexity and innovation of the cross-border financial derivatives market, cross-border regulatory coordination, and the risk awareness and professional capabilities of investors. To address these challenges, this paper proposes corresponding policy recommendations and risk management strategies from three levels: macro policies, market supervision, and investors, including strengthening policy coordination and cooperation, improving the financial regulatory system, enhancing information disclosure and transparency, improving the risk monitoring and early warning mechanism, strengthening the risk management responsibility of financial institutions, enhancing investor education, and encouraging investors to allocate assets reasonably.

## 7.2 Research Prospects

In the future, with the continuous advancement of global economic integration and financial innovation, the cross-border financial derivatives market will face more opportunities and challenges. In terms of research, the research field can be further expanded, and the linkage and risk transmission mechanisms of emerging financial derivatives such as cryptocurrency derivatives and green financial derivatives in the cross-border market can be analyzed in depth. At the same time, with the widespread application of technologies such as big data and artificial intelligence in the financial field, these technical means can be used to more accurately measure market linkages and risk transmission paths, and improve the efficiency and effectiveness of risk management. In addition, strengthen the dynamic research on the regulatory policies of the cross-border financial derivatives market, track the impact of regulatory policy adjustments on market linkages and risk transmission, and provide more forward-looking suggestions for policy formulation and risk management. In practice, China, the United States, and other countries should further strengthen cross-border financial cooperation and regulatory coordination to jointly promote the healthy and stable development of the cross-border financial derivatives market and provide strong support for the stability of the global financial market and economic growth.

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