MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
V.N. KARAZIN KHARKIV NATIONAL UNIVERSITY

Karazin Banking Institute

Department:	Banking Business and Financial Technologies
Specialty:	072 Finance, Banking, Insurance and Stock Market
Educational program:	Financial Technologies and Banking Management
Group:	AF-23M full-time mode of study

QUALIFYING MASTER'S THESIS

on the topic:

MARKET OF STOCK DERIVATIVES AND DIRECTIONS OF ITS FURTHER DEVELOPMENT

higher education student **Wang Jian**

The qualifying master's thesis was accepted for defense by the decision of the Department of Banking Business and Financial Technologies

Protocol No. 4 dated 25.11.2024.
Head of Department
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Kharkiv - 2024

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APPROVED
Head of the Department
of Banking Business and Financial Technologies
Doctor of Economics, Professor

_____ Galyna Azarenkova
« 25 **«** September 2024

TASK
FOR THE QUALIFYING MASTER'S THESIS

of Wang Jian

1.Topic of the work «MARKET OF STOCK DERIVATIVES AND DIRECTIONS OF ITS FURTHER DEVELOPMENT»
Scientific adviser PhD in Economics, Associate Professor Kateryna Oriekhova
(surname, first name, patronymic, academic degree, academic title)

Approved by order of the university dated September 17, 2024 No. 4601-5/1025

2. Deadline for the student to submit the work November 18th 2024

3. List of issues to be developed:
In Chapter 1: to study of definition and classification of stock derivatives, market status, and market functions; to analysis of the operation, trading mechanism, clearing mechanism, and market supervision of the stock derivatives market; to consider of risk types, risk management tools, importance of risk management, and risk management practices in the stock derivatives market.

In Chapter 2: to study of pricing model, to analysis of influencing factors, application of pricing model, limitations of pricing model; to analysis of international and domestic market cases in the stock derivatives market; to comparative analysis of successful experiences, lessons learned, and case.

In Chapter 3: to research development trends of stock derivatives market; prospects for the future development direction of the stock derivatives market, focusing on cutting-edge topics such as technological innovation, market market globalization and product diversification, regulatory changes.

4. Work plan

No.	Name of work stages
1	The choice of the topic of the qualifying master's thesis
2	Approval of the plan and tasks of the qualifying master's thesis
3	Completion of a qualifying master's thesis
4	Submission of the qualifying master's thesis to the scientific adviser
5	Signature of the qualified master's thesis by the scientific adviser
6	Submission of a qualifying master's thesis to the department to check for borrowings from other documents
7	Admission by the head of the department to the defense of a qualifying master's thesis
8	Defense of a qualifying master's thesis

5. Date of the task issue September 25th, 2024

Student

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ABSTRACT
ON THE QUALIFYING MASTER'S THESIS
“MARKET OF STOCK DERIVATIVES AND DIRECTIONS OF ITS FURTHER DEVELOPMENT” by Wang Jian

The qualifying master's thesis contains 65 pages, 9 tables, 8 figures, a list of 80 references.

The object of research is the market of stock derivatives on the example of international and domestic market cases in the stock derivatives market.

The subject of research is to explore in depth the operational mechanism, risk management, and future development trends of the stock derivatives market. Through a detailed analysis of these key areas, this article aims to provide valuable references and insights for investors, regulatory agencies, and policy makers. .

The purpose of the qualifying master’s thesis is studying the stock derivatives market is of great significance to investors, regulatory agencies, and policy makers. it not only helps investors optimize investment strategies and reduce investment risks, but also provides scientific decision-making basis for regulatory agencies and policy makers, jointly promoting the healthy development of the stock derivatives market.

The tasks of the qualifying master's thesis are:

to study of definition and classification of stock derivatives, market status, and market functions;

to analysis of the operation, trading mechanism, clearing mechanism, and market supervision of the stock derivatives market;

to consider of risk types, risk management tools, importance of risk management, and risk management practices in the stock derivatives market;

to study of pricing model, to analysis of influencing factors, application of pricing model, limitations of pricing model;

to analysis of international and domestic market cases in the stock derivatives market;

to comparative analysis of successful experiences, lessons learned, and case ;

to research development trends of stock derivatives market; prospects for the future development direction of the stock derivatives market, focusing on cutting-edge topics;

such as technological innovation, market market globalization and product diversification, regulatory changes.

Based on the results of the research is the stock derivatives market, as an important component of the financial market, continues to expand in size and influence. on a global scale, stock derivative trading has become an important means for investors to hedge risks and achieve asset appreciation. this study reveals the internal operating rules and external influencing factors of the stock derivatives market through in-depth analysis of market structure, trading mechanisms, and risk management.

The obtained results this study also identified some issues and shortcomings. Market supervision still needs to be strengthened, especially in preventing and cracking down on improper behaviors such as market manipulation and insider trading. The risk awareness and risk management ability of market participants need to be improved to avoid market risks caused by excessive speculation . in response to the above issues and shortcomings, this study proposes the following future development directions and improvement measures. We should further improve the regulatory system, enhance the pertinence and effectiveness of supervision, and ensure the fairness, impartiality, and transparency of the market. Strengthen risk education for market participants and enhance their risk management awareness and capabilities. Innovation should also be encouraged to promote the diversification of products and services in the stock derivatives market to meet the needs of different investors.

KEYWORDS: STOCK DERIVATIVES MARKET, RISK MANAGEMENT, PRICING MODELS, MARKET TRENDS, TECHNOLOGICAL INNOVATION.

CONTENT

INTRODUCTION

Since its inception, the stock derivatives market has become a significant force in the global financial sector. Its origins can be traced back hundreds of years when merchants began experimenting with various financial innovations and trading methods to mitigate risks and seek more investment opportunities. Over time, these early financial practices gradually evolved into the stock derivatives market that we are familiar with today.

Stock derivatives, as a type of financial derivative, are essentially financial contracts derived from underlying assets such as stocks and stock indices. These contracts allow traders to buy or sell the underlying assets at a predetermined price on a future agreed-upon date, thus providing traders with an effective tool for risk management and investment.

In the past few decades, with the continuous development of global financial markets and the advancement of technology, the stock derivatives market has experienced explosive growth. Today, the market size, variety of trading instruments, and the number of participants have reached unprecedented levels. In particular, in some mature financial markets, such as the United States, Europe, and some countries and regions in Asia, stock derivatives trading has become an important part of financial market activities.

It is worth mentioning that with the popularization of the Internet and big data technology, the trading mode and information transmission mechanism of the stock derivatives market have also undergone profound changes. The rise of electronic trading platforms has made transactions more convenient and efficient, while also reducing transaction costs. The application of big data technology enables market participants to more accurately analyze market dynamics and predict future trends, thereby making wiser investment decisions.

From a global perspective, the importance of the stock derivatives market is self-evident. It not only provides investors with diversified investment choices and risk management tools, but also promotes the liquidity and efficiency of financial

markets. The stock derivatives market is also an important place for price discovery and information transmission, which helps to enhance the transparency and fairness of the financial market.

The stock derivatives market plays a crucial role in the global financial market. Its development process is full of innovation and change, and in the future, with the continuous advancement of technology and changes in the market environment, the stock derivatives market will undoubtedly continue to maintain its vitality and importance, contributing to the prosperity and development of the global financial market.

The object of research is the market of stock derivatives on the example of international and domestic market cases in the stock derivatives market.

The subject of this study is to explore in depth the operational mechanism, risk management, and future development trends of the stock derivatives market. Through a detailed analysis of these key areas, this article aims to provide valuable references and insights for investors, regulatory agencies, and policy makers.

As for the future development trend, combined with the current market environment and technological innovation factors, this paper looks forward to the future development of the stock derivatives market. With the continuous advancement of technology, the application of new technologies such as blockchain may have a profound impact on the operation of the market. The acceleration of globalization trends and the continuous emergence of new products and services will also bring new development opportunities and challenges to the market. We will closely monitor these developments in order to accurately grasp the future development direction of the market.

This study aims to comprehensively and deeply explore the operational mechanism, risk management, and future development trends of the stock derivatives market, in order to provide useful references and guidance for relevant stakeholders.

The stock derivatives market, as an important component of the financial market, has profound research significance for investors, regulatory agencies, and policy makers.

By studying the stock derivatives market, policy makers can more scientifically formulate relevant financial policies and regulations to promote the healthy development of the market. The size and activity of the stock derivatives market often reflect the maturity and international competitiveness of a country's financial market. Therefore, policy makers need to closely monitor market dynamics, evaluate the market effects of existing policies, and adjust and improve relevant policies based on market development trends. For example, by optimizing tax policies in the derivatives market and lowering market entry barriers, more domestic and foreign investors can be attracted to participate in market transactions, thereby improving market liquidity and pricing efficiency.

The purpose of the thesis is studying the stock derivatives market is of great significance to investors, regulatory agencies, and policy makers. It not only helps investors optimize investment strategies and reduce investment risks, but also provides scientific decision-making basis for regulatory agencies and policy makers, jointly promoting the healthy development of the stock derivatives market.

To achieve the goal, the following tasks must be completed:

- to study of definition and classification of stock derivatives, market status, and market functions;
- to analysis of the operation, trading mechanism, clearing mechanism, and market supervision of the stock derivatives market;
- to consider of risk types, risk management tools, importance of risk management, and risk management practices in the stock derivatives market;
- to study of pricing model,to analysis of influencing factors, application of pricing model, limitations of pricing model;
- to analysis of international and domestic market cases in the stock derivatives market;
- to comparative analysis of successful experiences, lessons learned, and case ;

- to research development trends of stock derivatives market;prospects for the future development direction of the stock derivatives market, focusing on cutting-edge topics ;
- such as technological innovation, market market globalization and product diversification,regulatory changes.

The information basis of research consists of publications in scientific publications, reports at scientific conferences, statistical materials, data of quantitative and qualitative research, expert evaluation, data of Internet resources, legislative behavior, regulatory documents of China's financial market, etc.

When achieving the goal and solving the tasks, the following methods were used: employing a variety of research methods. In terms of data analysis, the study extensively collected historical trading data, price data, and macroeconomic data from the global stock derivatives market; in terms of model construction, the study utilized various financial economic models, such as option pricing models (e.g., the Black-Scholes model) and vector autoregression models (VAR), among others; case studies were also an important part of this research to ensure the comprehensiveness and accuracy of the analysis.

The stock derivatives market, as an important component of the financial market, has extensive and in-depth research content. This study focuses on core areas such as market structure, trading mechanisms, and risk management, with the aim of gaining a comprehensive and systematic understanding of the stock derivatives market.

In terms of market structure, in-depth exploration of the organizational structure, participating entities, and market levels of the stock derivatives market. This includes the functions and operational methods of key components such as exchanges, clearing institutions, and regulatory agencies, as well as the roles and behavioral characteristics of market participants such as investors, market makers, and brokers. This article also focuses on the diversity of market levels, such as the differences between the main board market and the ChiNext market, and the

complementary relationship between the on exchange market and the off exchange market.

The theoretical significance of the work's outcomes lies in the fact that the conclusions and regulations derived can be used for further research to understand the stock derivatives market, providing valuable guidance for practical operations. Through systematic analysis, the study reveals the unique functions of the stock derivatives market in risk management, price discovery, and asset allocation, among other aspects. These findings contribute to a deeper understanding of the complexity and diversity of financial market operations.

The practical value of the research is gaining a comprehensive and in-depth understanding of the stock derivatives market by delving into key areas such as market structure, trading mechanisms, and risk management. This will provide decision-making references for investors, policy basis for regulatory agencies, and also provide new research perspectives and methodological support for the academic community.

CHAPTER 1

THEORETICAL ASPECTS OF STOCK DERIVATIVES MARKET

1.1 Definition and classification of stock derivatives, market status, and market functions.

Stock derivatives are financial instruments derived from underlying assets such as stocks or stock indices, and their price fluctuations are closely dependent on the underlying assets. These derivatives mainly include futures, options, and swaps, each with its unique risk and return characteristics. For example, stock index futures allow investors to buy or sell stock indices at a predetermined price on a specific future date, while stock options give holders the right to buy or sell stocks at a specific price at a future time.

Table 1.1

Definition and classification of stock derivatives

Project	Detailed description
Concept of Stock Derivatives	Stock derivatives are financial instruments derived from underlying assets such as stocks or stock indices, and their value depends on the price changes of the underlying assets.
Main types	
-Futures	Stock index futures (such as S&P 500 index futures), individual stock futures, etc
-Options	Stock options (such as Apple stock options), index options, etc
-Swap	Equity swaps, stock index swaps, etc
Current market size	
-Global market size	According to data from the Bank for International Settlements (BIS), the total nominal principal of the global over-the-counter derivatives market exceeded $600 trillion in 2020, with stock derivatives accounting for a certain proportion.

Continuation of the table. 1.1

Project	Detailed description
-Main markets	The United States, Europe, Asia (especially Hong Kong, Singapore, etc.)
Participating entities	
-Investment institutions	Asset management companies such as BlackRock and Vanguard
-Hedge Fund	Bridgewater Associates, Quantum Fund, etc
-Financial institutions	Investment banks such as JPMorgan Chase and Goldman Sachs
-Individual investors	Participate through brokers or trading platforms
Trading volume	
-Futures trading volume	Taking the Chicago Mercantile Exchange (CME) as an example, the daily trading volume of its stock index futures exceeded 4 million lots in 2021.
-Option trading volume	Taking the US options market as an example, the average daily trading volume exceeded 15 million lots in 2021.
function	
-Risk management	Through derivatives such as futures and options, investors can hedge the risk of stock price fluctuations, achieve risk transfer and diversification. For example, airlines can use fuel futures to hedge against the risk of rising oil prices.
-Price Discovery	The derivatives market gathers the expectations and information of a large number of traders, which helps to form more accurate underlying asset prices. The S&P 500 index futures prices are often seen as the market's expectations for future stock market trends.
-Improve market efficiency	The derivatives market provides investors with more trading tools and strategic choices, which helps to improve market liquidity and trading efficiency.
-Promote financial innovation	Derivatives, as one of the tools of financial innovation, continuously drive the development and transformation of financial markets, providing more financing and investment channels for the real economy.

At present, the stock derivatives market has evolved into a crucial element within the global financial market structure. According to the latest statistics and data provided by the Bank for International Settlements, the aggregate nominal principal

amount within the global over-the-counter derivatives market was of an enormous magnitude in the year 2020. Within this vast market, stock derivatives have taken up a significant and noteworthy position. The United States, the continent of Europe, and certain key regions in Asia, including the financial hubs of Hong Kong and Singapore, stand out as the primary participants and key players in this particular market segment. Within these active markets, a diverse range of participants, such as investment institutions, hedge funds, financial institutions, and individual investors, are actively participating. They engage in derivative trading not only to manage and mitigate risks but also to seek out potential returns and profits. Additionally, these market participants employ various investment strategies through the use of derivative instruments to achieve their financial objectives[1].

When considering the trading volume in the financial markets, the Chicago Mercantile Exchange serves as a prime example, particularly with regard to its stock index futures. In the year 2021, these futures contracts experienced a significant amount of daily trading activity. To put this into perspective, the average daily trading volume for these instruments was quite substantial.

Furthermore, when examining the US options market, it becomes evident that it too has exhibited robust trading activity. On a daily basis, the average trading volume has surpassed the impressive figure of 10 million lots. These high trading volumes are indicative of the liquidity present within the stock derivatives market and underscore the widespread interest and engagement of investors in this sector. For a visual representation of the stock derivative market trading volume trend, please refer to figure 1.1.

The stock derivatives market plays a multifaceted and significant role in the financial ecosystem. It serves as an effective tool for risk management, offering investors a means to mitigate and control the inherent volatility risk associated with stock prices. By utilizing financial instruments such as futures contracts and options, investors can hedge against adverse price movements, effectively transferring risk and achieving diversification of their investment portfolios[2]. For instance, airlines, when confronted with the risk of fluctuating oil prices, might engage in hedging

strategies using fuel futures to protect themselves against the potential increase in fuel costs. Furthermore, the derivatives market is instrumental in the process of price discovery.

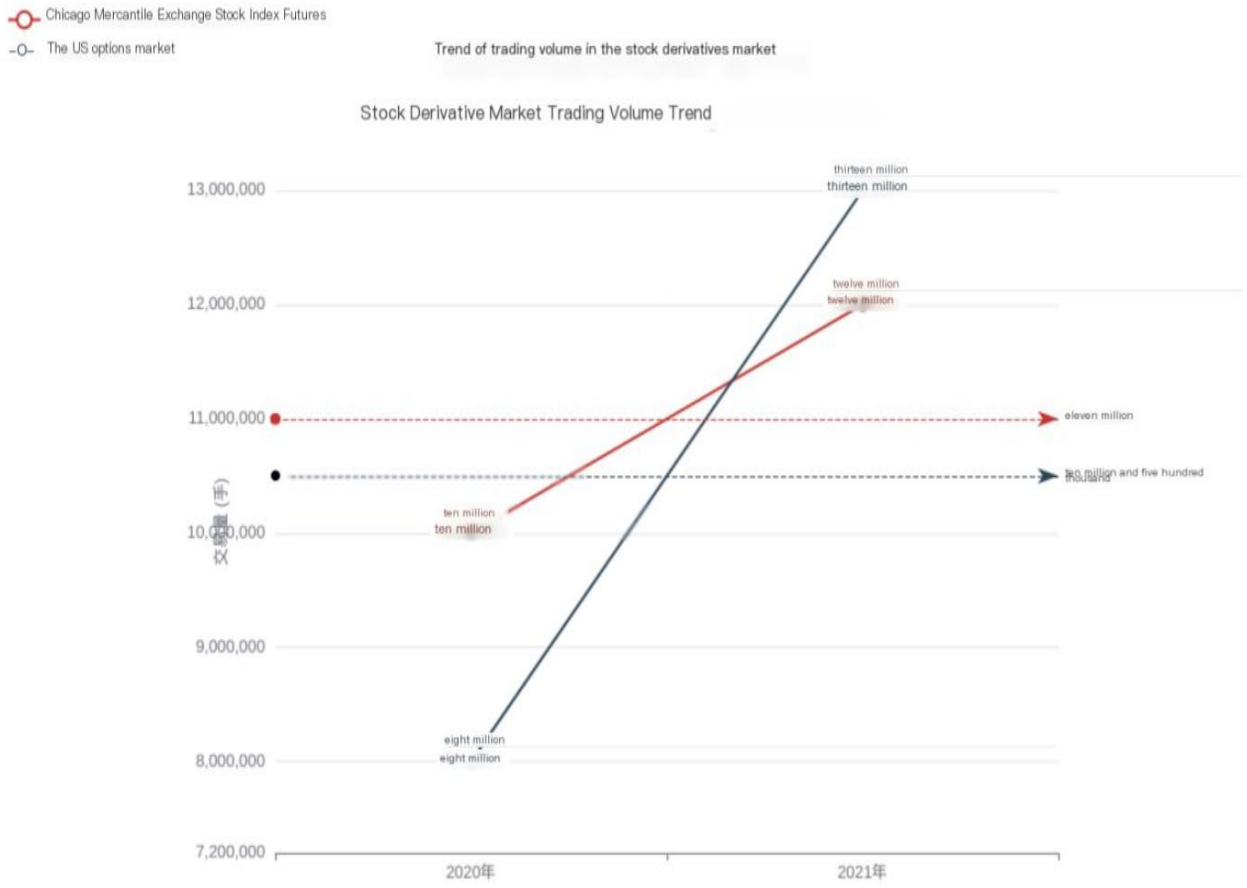

Fig. 1.1. Stock derivative market trading volume trend

The aggregation of a large number of traders with diverse expectations and information leads to a concentrated reflection of market sentiment, which in turn facilitates the formation of more precise and accurate prices for the underlying assets. Additionally, the derivatives market enhances market efficiency by introducing a broader array of trading instruments and strategic options, thus providing investors with more flexibility and choice. It stands as a key driver of financial innovation, continuously propelling the development and transformation of the financial markets, and fostering an environment where new financial products and strategies can emerge [3].

1.2 The operation, trading mechanism, clearing mechanism, and market supervision of the stock derivatives market.

The stock derivatives market operates through centralized trading and over-the-counter (OTC) trading. An introduction to the clearing process and settlement systems, regulatory frameworks, and relevant policies is provided in table 1.2.

Table 1.2

Introduction to the operation and trading mechanisms of the stock derivatives market

Category	Detailed content
transaction mode	
Centralized trading	-Exchange trading: Companies such as the Chicago Mercantile Exchange (CME) and the London International Financial Futures Exchange (LIFFE) offer derivatives trading such as stock index futures and stock options.
	-Electronic trading systems, such as Nasdaq OMX's NLX, offer European stock futures and options trading using high-speed electronic trading platforms.
Off exchange trading (OTC)	-Mainly conducted through financial institutions such as banks and securities firms, involving customized derivatives such as stock options and stock swaps.
	-For example, banks such as JPMorgan Chase and Goldman Sachs provide a wide range of stock derivative services in the OTC market.
Clearing process and settlement system	
Liquidation process	-After reaching an agreement between the trading parties, clearing is carried out through clearing houses such as LCH Clearnet, CME Clearing, etc.

Continuation of the table. 1.2

Category	Detailed content
	-As the central counterparty, the clearing house bears the credit risk of both parties in the transaction and ensures the fulfillment of the transaction.
Settlement system	-Real time settlement systems, such as CME's Globex system, support real-time trading and settlement.
	-T+1 or T+2 settlement: The settlement time may vary depending on market rules and the type of derivative.
	-For example, stock derivatives on the Hong Kong Stock Exchange (HKEX) typically use a T+2 settlement cycle.
Regulatory framework and related policies	
Regulatory agencies	-At the international level, the International Organization of Securities Commissions (IOSCO) develops regulatory standards for the global derivatives market.
	-At the national level, such as the Commodity Futures Trading Commission (CFTC) in the United States and the Financial Conduct Authority (FCA) in the United Kingdom.
Related policies	-Basel III: imposes higher capital adequacy requirements on banks' participation in derivative trading.
	-The EU Markets in Financial Instruments Directive (MiFID II): enhances transparency and investor protection in the derivatives market.
	-China Securities Regulatory Commission: Strictly regulate the stock derivatives market, such as restricting excessive speculation and market manipulation.

The operation and trading mechanism of the stock derivatives market primarily encompasses two distinct methods: centralized trading and over-the-counter trading. Centralized trading is conducted through exchanges where standardized derivatives, such as stock index futures and stock options, are traded in a centralized manner. Notable examples of such exchanges include the Chicago Mercantile Exchange and

the London International Financial Futures Exchange. These exchanges are typically equipped with sophisticated electronic trading systems, such as Nasdaq OMX's NLX, which facilitates rapid trading of European stock futures and options via high-speed electronic trading platforms. On the other hand, over-the-counter trading occurs directly between two parties without the use of a centralized exchange. This method allows for more customization of contracts but may involve higher counterparty risk. In figure 1.2, a detailed comparison of the trading mechanisms in the stock derivatives market is illustrated, highlighting the differences and similarities between centralized and over-the-counter trading.

Fig. 1.2 Comparison of trading mechanisms in stock derivatives market

Off exchange trading is also an important component of the stock derivatives market. Off exchange trading is mainly conducted through financial institutions such as banks and securities firms, involving more customized derivatives such as stock options and stock swaps. Morgan Stanley, Goldman Sachs and other globally

renowned banks play an important role in the OTC market, providing investors with a wide range of stock derivative services[4].

Upon the successful completion of a transaction, the subsequent clearing process and settlement system play a crucial role in guaranteeing the seamless and efficient execution of the trade. This clearing process is typically managed and facilitated by specialized clearing entities, such as LCH Clearnet and CME Clearing, which serve as central counterparties in the financial ecosystem. These clearinghouses assume the credit risk for both the buyer and the seller involved in the transaction, thereby providing a safety net that ensures each transaction can be cleared without any hitch. The settlement system, on the other hand, can be configured to operate in various modes, including real-time settlement, T+1 settlement, or T+2 settlement, depending on the prevailing market rules and the nature of the derivatives being traded. For instance, stock derivatives traded on the Hong Kong Stock Exchange are commonly settled using a T+2 settlement cycle, as indicated by reference [5].

In terms of regulation, the stock derivatives market has received joint attention from international and domestic regulatory agencies[6]. The International Organization of Securities Commissions, which is comprised of securities regulators from around the world, is responsible for developing regulatory standards for the global derivatives market. This international body works to ensure that there are uniform guidelines and practices that can be adopted by countries to regulate their respective markets effectively. Countries have also established corresponding regulatory agencies to oversee and manage their stock derivatives markets. For instance, in the United States, the Commodity Futures Trading Commission (CFTC) is the primary regulator, while in the United Kingdom, the Financial Conduct Authority (FCA) holds a similar role. These agencies are tasked with the crucial job of ensuring the integrity and fairness of the markets they supervise.

A series of related policies have also had a profound impact on the stock derivatives market. One such policy is Basel III, which has raised the capital adequacy requirements for banks to participate in derivative trading. This move is

aimed at enhancing market stability by ensuring that financial institutions have sufficient capital to cover potential losses from their derivative activities. The EU's MiFID II (Markets in Financial Instruments Directive II) is another significant regulatory framework that is committed to improving transparency and investor protection in the derivatives market. It introduces stricter reporting requirements and aims to make trading more transparent, thereby reducing the risks associated with the market.

In China, the China Securities Regulatory Commission (CSRC) implements strict regulatory measures to restrict excessive speculation and market manipulation. The CSRC's role is pivotal in ensuring the healthy development of the stock derivatives market[7]. By enforcing rules that prevent market abuse and ensuring that market participants act in a fair and transparent manner, the CSRC helps to maintain the stability and trustworthiness of the market. These measures are essential for fostering a robust and reliable stock derivatives market that can support the broader financial ecosystem.

1.3 Risk types, risk management tools, importance of risk management, and risk management practices in the stock derivatives market.

The primary categories of risk that are prevalent in the stock derivatives market encompass a variety of potential hazards, each with its own set of implications and challenges. These risks include market risk, credit risk, liquidity risk, operational risk, and legal risk, each of which can have a significant impact on the stability and profitability of investments in this sector. Market risk pertains to the inherent uncertainty associated with the fluctuation in the value of stock derivatives, which can be influenced by a multitude of market factors such as shifts in stock prices, interest rates, and exchange rates. This type of risk is a direct result of the volatility that characterizes financial markets and can lead to substantial gains or losses for

investors. Credit risk, on the other hand, is associated with the possibility that one of the parties involved in a derivative transaction may default on their contractual obligations. This risk is particularly relevant in the stock derivatives market, where the performance of the underlying assets can be unpredictable and may lead to financial distress for one of the parties involved. Liquidity risk is another critical concern, as it relates to the ease with which stock derivatives can be bought or sold in the market. In the event of a large volume of these instruments needing to be traded, liquidity risk becomes apparent if the transactions cannot be executed swiftly without causing a significant impact on the price levels. Operational risk is a broad category that encompasses the potential for losses due to failures in internal processes, human error, system malfunctions, or external events such as natural disasters or cyber-attacks. This type of risk underscores the importance of robust internal controls and contingency planning within organizations. Lastly, legal risk is a concern that stems from the possibility that changes in the legal or regulatory framework could affect the enforceability of derivative contracts or lead to disputes between parties. This risk highlights the need for a thorough understanding of the legal landscape and the ability to adapt to regulatory changes in a timely manner.

Table 1.3

Introduction to types of market risks in the stock derivatives markets

Risk type	describe	Management tools/strategies	Implementation methods in actual operation	importance
market risk	The risk of changes in the value of derivatives due to market price fluctuations (such as stock prices, interest rates, exchange rates)	Hedging (such as using options or futures for reverse operations)	Investors can hedge the risk of holding stocks or investment portfolios by buying or selling corresponding derivatives, such as using index futures to hedge the overall market downturn risk	Extremely high

Continuation of the table. 1.3

Risk type	describe	Management tools/strategies	Implementation methods in actual operation	importance
credit risks	The risk of counterparty's inability to fulfill contractual obligations	Credit insurance, credit rating, net settlement	Investors can choose to trade with high credit rated counterparties or purchase credit insurance to reduce credit risk. Exchanges usually adopt a net settlement method to reduce the possibility of counterparty default	high
Liquidity risk	The risk of not being able to quickly buy and sell derivatives at reasonable prices when needed	Diversified investment portfolio, advance planning of trading strategies	Investors should build diversified investment portfolios to avoid the depletion of liquidity from a single derivative. At the same time, plan trading strategies in advance to ensure that positions can be quickly adjusted when needed	in
Operational risk	Risks caused by human errors, system failures, or external events	Internal control, audit, automated trading system	Financial institutions should establish a sound internal control system and conduct regular audits. Adopting automated trading systems to reduce human errors and setting up risk warning mechanisms	high
Legal risk	Risks caused by changes in laws and regulations or unclear contracts	Legal consultation, compliance review, standardization agreement	Conduct sufficient legal consultation and compliance review before trading to ensure that contract terms are clear and explicit. Using standardized contracts to reduce risks caused by inconsistent contract interpretations	in

Continuation of the table. 1.3

Risk type	describe	Management tools/strategies	Implementation methods in actual operation	importance
Case study explanation	Morgan Stanley's' London Whale 'Incident	-	This incident emphasizes the importance of risk management in derivative trading, prompting financial institutions to strengthen internal controls and risk warning mechanisms	Extremely high (warning case)

Collectively, these risks necessitate careful consideration and management by market participants to ensure the sustainability and integrity of the stock derivatives market[8].

Risk management tools include strategies and instruments to reduce potential investment risks. Hedging strategies involve opposite market positions to offset losses and limit risk exposure. Stop-loss orders are preset instructions that execute trades at predetermined prices, helping to cap potential losses. Investment diversification spreads investments across various assets and sectors to minimize the impact of any single asset or market movement. Credit derivatives, like credit default swaps (CDS), transfer credit risk between parties. Insurance contracts offer investors protection against losses from uncontrollable events or circumstances.

In the stock derivatives market, investors face various types of risks. Market risk is one of the most significant types, originating from market price fluctuations such as changes in stock prices, interest rates, or exchange rates, which directly affect the value of derivatives[10]. To cope with market risks, investors often adopt hedging strategies, such as using options or futures for reverse operations, in order to offset potential losses on their held stocks or investment portfolios. For example, when the overall market is expected to decline, investors can use index futures to hedge risks.

Credit risk is also a risk that cannot be ignored, which involves the situation where the counterparty is unable to fulfill its contractual obligations. In order to reduce credit risk, investors tend to choose to trade with high credit rated

counterparties or purchase credit insurance to increase a layer of protection. The net settlement method commonly used by exchanges also helps reduce the likelihood of counterparty defaults[11].

Liquidity risk refers to the risk of not being able to quickly buy and sell derivatives at reasonable prices when needed. To manage this risk, investors should build diversified investment portfolios, avoid excessive reliance on a single derivative, and thus prevent falling into difficulties due to the liquidity depletion of a particular derivative. Pre planning trading strategies is also crucial, ensuring that positions can be quickly adjusted when necessary to cope with market changes[12]. In fig. 1.3 shows risk types and management in stock derivatives markets.

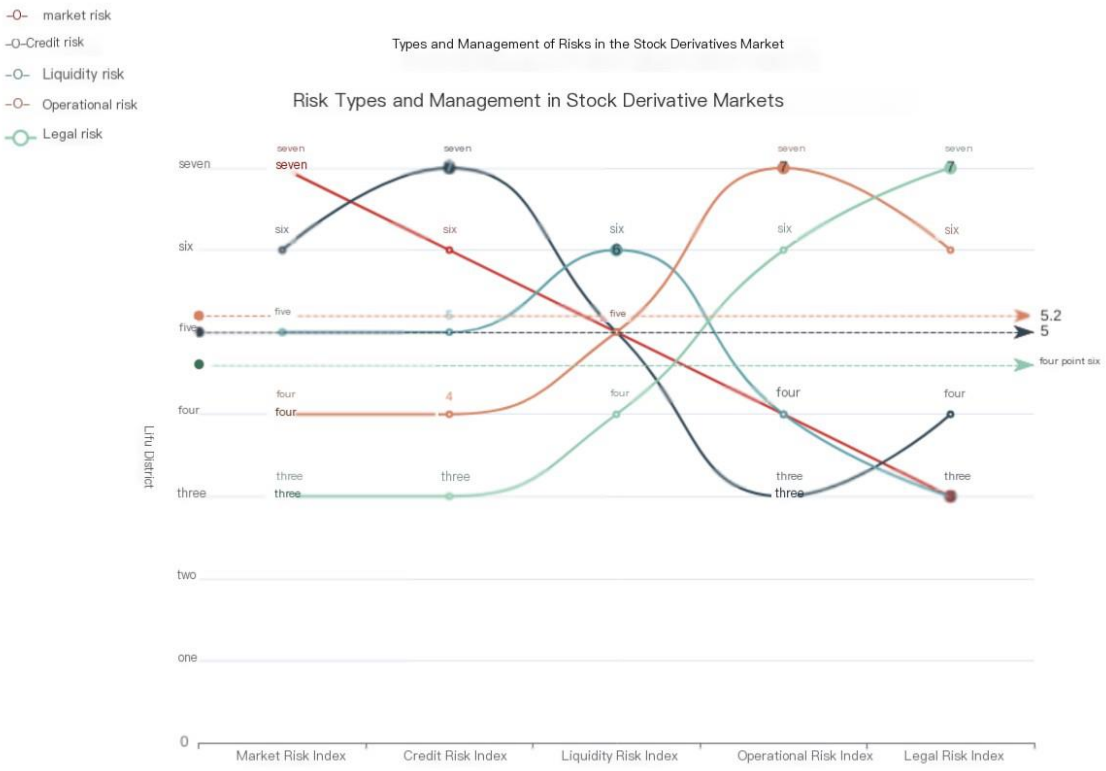

Fig. 1.3 Risk types and management in stock derivatives markets

Operational risks mainly stem from human errors, system failures, or external events. To prevent such risks, financial institutions need to establish a sound internal control system and conduct regular audits to ensure the compliance of various processes. The adoption of automated trading systems can significantly reduce the

occurrence of human errors, while setting up risk warning mechanisms can help timely detect and respond to potential risks[13].

Legal risks cannot be ignored, as they mainly involve changes in laws and regulations or ambiguity in contract terms. In order to reduce legal risks, investors should undergo sufficient legal consultation and compliance review before trading to ensure the clarity of contract terms. Using standardized contracts can also help reduce the risk of disputes caused by inconsistent contract interpretations.

It is worth mentioning that the Morgan Stanley "London Whale" incident is a typical case of risk management failure. In this incident, JPMorgan suffered huge losses in derivative trading due to poor risk management. This case not only emphasizes the importance of risk management in derivative trading, but also prompts financial institutions to pay more attention to the construction of internal controls and risk warning mechanisms[14].

CHAPTER 2
PRICING THEORY AND MARKET CASE ANALYSIS OF STOCK DERIVATIVES MARKET

2.1 Pricing Model, Analysis of Influencing Factors, Application of Pricing Model, Limitations of Pricing Model.

The stock derivatives market, which encompasses a wide array of financial instruments such as futures, options, and swaps, is characterized by a multitude of pricing models. Each model serves a unique purpose and is designed to cater to different trading strategies and risk management needs. For instance, the Black-Scholes model is widely recognized for its ability to price European options by taking into account the underlying stock price, strike price, time to expiration, volatility, and the risk-free interest rate. On the other hand, more complex models like the Binomial model are used to price options by creating a lattice of possible stock prices and calculating the probabilities of reaching each price point.

Table 2.1

Introduction to pricing model

Inex	detailed information
Introduction to Pricing Model	Black Scholes model, Binomial Tree model, Monte Carlo simulation, Heston model, SABR model
Factors affecting the prices of stock derivatives	-The price of the underlying asset (e.g. Apple Inc.'s stock closing price on January 1, 2023 is $150)

Volatility (e.g. Apple Inc.'s stock has an annualized volatility of 20% in 2023)

These models are essential tools for traders and investors as they provide a structured approach to valuing derivatives, which in turn helps in making informed decisions in the dynamic and often volatile stock market.

Risk free interest rate (for example, the yield of the 10-year treasury bond bond of the United States on January 1, 2023 is 2.5%)

Maturity time (e.g. derivative contracts have 6 months left to expire)

Dividend yield (e.g. Apple Inc. expects an annual dividend yield of 1.5%), pricing model application example takes the Black Scholes model as an example, assuming that an investor purchased a European call option on Apple Inc. on January 1, 2023, with an exercise price of $160 and a maturity of 6 months. Using the Black Scholes model, combined with the data of the influencing factors mentioned above, the theoretical price of the option is calculated to be $10. In actual trading, the trading price of the option in the market may fluctuate around this theoretical price. The problems and limitations of existing pricing models, such as the Black Scholes model's assumption that price fluctuations are continuous and follow a log normal distribution, often do not hold true in actual markets[15].

Parameter estimation: The parameters in the model, such as volatility and risk-free rate, need to be accurately estimated, but in reality, these parameters may vary over time and are difficult to predict accurately.

Market irrationality: Pricing models are typically based on rational market assumptions, but there are irrational behaviors in the actual market, such as panic selling or frenzy chasing, which can affect derivative prices.

Complexity and computational cost: Although some advanced models (such as Heston model and SABR model) are closer to reality, they are computationally complex and costly, making them unsuitable for all investors to use.

Failure to consider all risk factors, such as political risks, natural disasters, and other unforeseeable factors, which may also have a significant impact on stock derivative prices, but are often difficult to quantify in the model.

In fig. 2.1 shows comparison of stock derivative pricing models.

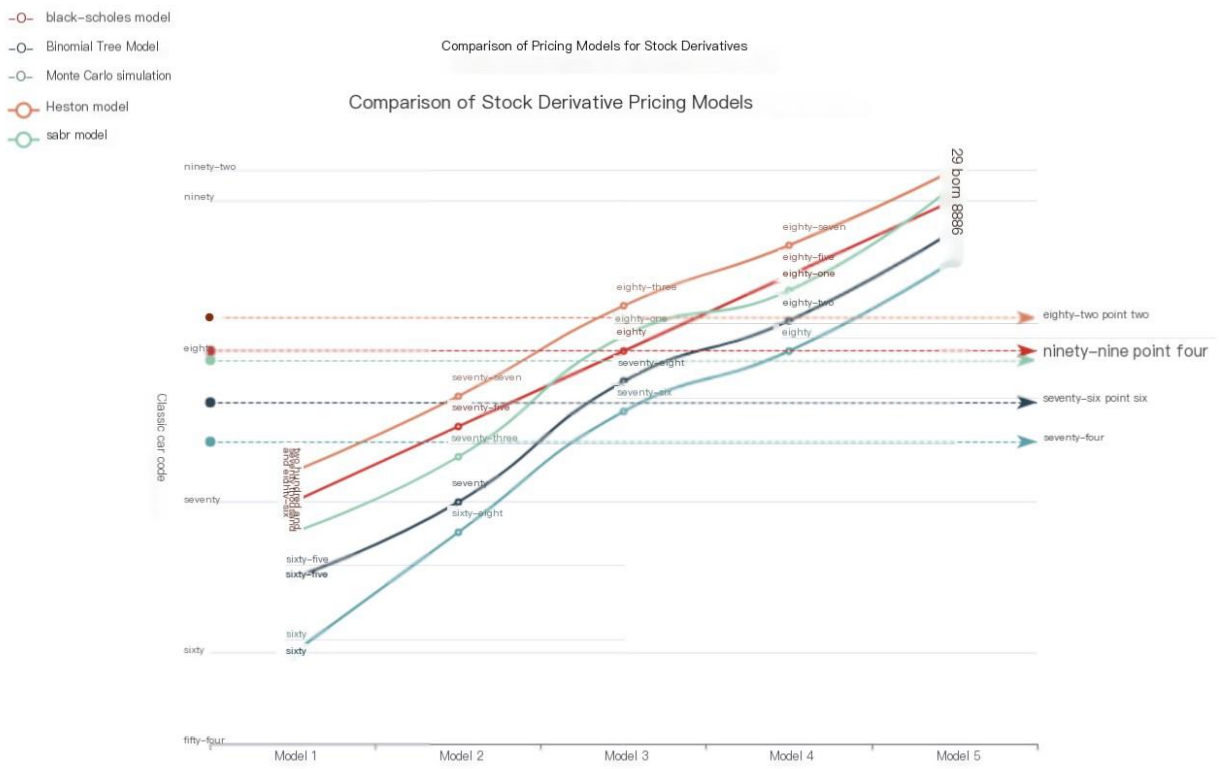

Fig. 2.1 Comparison of stock derivative pricing models

The pricing of stock derivatives is an important issue in the field of financial engineering, which directly affects the valuation and risk management of derivatives. Among them, the Black Scholes model is one of the classic models widely used in the pricing of stock derivatives. In addition, there are also models such as the Binomial Tree model, Monte Carlo simulation, Heston model, and SABR model. These models each have their own advantages and disadvantages, and are suitable for price estimation in different scenarios.

Taking the Black Scholes model as an example, its basic assumptions include that the underlying asset price follows geometric Brownian motion, there are no arbitrage opportunities in the market, the lending rate is fixed, and the option is a European option. Based on these assumptions, the Black Scholes model can derive a concise option pricing formula.

By using the above formula, this formula can calculate the theoretical value of options under specific conditions [16]. For example, suppose an investor purchased a European call option on Apple Inc. on January 1, 2023, with an exercise price of

$160 and a maturity of 6 months. Based on the given data (Apple Inc. stock closing price of $150, annualized volatility of 20%, risk-free rate of 2.5%, and expected annual dividend yield of 1.5%), this formula can calculate the theoretical price of the option to be approximately $10.

However, despite the theoretical significance of the Black Scholes model, which has been a cornerstone in financial mathematics and option pricing theory, it also has many limitations that are important to recognize. The model is based on a series of idealized assumptions, such as continuous and lognormal price fluctuations, which are assumed to follow a geometric Brownian motion. While these assumptions provide a neat mathematical framework, they often diverge from the reality of financial markets. In reality, price fluctuations are often abrupt and discontinuous, and there are a large number of irrational factors in the market that can influence prices in ways that are not easily predictable by the model. The model relies on accurate parameter estimation, but these parameters, especially volatility, may be difficult to accurately predict as market conditions change over time. Market volatility can be influenced by a myriad of factors, including economic indicators, investor sentiment, and global events, which are not always captured by historical data used in the model.

Moreover, the Black Scholes model, despite its foundational role in the field of finance, is not without its flaws and constraints. It operates on the premise of a perfectly efficient market, where prices adjust instantaneously to new information, and where trading is frictionless and arbitrage opportunities are nonexistent. However, these conditions are far from the complexities of actual financial markets. The model does not account for transaction costs, taxes, or the impact of liquidity on option pricing. Furthermore, it assumes that traders are risk-neutral, which is an unrealistic assumption as investors typically demand compensation for bearing risk. The Black Scholes model also does not consider the possibility of early exercise of American options, which can be exercised at any time before expiration, a feature that can significantly affect the valuation of such options. Lastly, the model's reliance on historical volatility as a proxy for future volatility can be problematic, as past

performance is not always indicative of future results, and the market's volatility can change abruptly due to unforeseen events or shifts in market dynamics.

The Black Scholes model, which is widely used in financial markets, is based on the premise that market participants act in a rational manner and make decisions that maximize their expected utility. This theoretical framework assumes that individuals weigh the potential outcomes of their actions against the probabilities of those outcomes occurring, and subsequently choose the option that offers the highest expected value. However, this assumption of rationality overlooks the emotional and irrational elements that often influence decision-making in the market. For instance, during periods of market downturns, investors may engage in panic selling, driven by fear and a desire to avoid further losses, even if it means selling assets at prices that are lower than their intrinsic value. Conversely, in bull markets, investors might exhibit overly optimistic behavior, making investment decisions that are not supported by the fundamental values of the assets, but rather by an unrealistic expectation of future gains. These emotional fluctuations and irrational behaviors can result in actual market prices that significantly diverge from the theoretical prices predicted by the Black Scholes model. Behavioral finance, an interdisciplinary field that combines psychology with economics, has demonstrated that such deviations are not at all rare. In fact, these deviations can have a profound impact on the pricing of financial instruments, as they reflect the true sentiments and behaviors of market participants. Understanding these behavioral patterns is crucial for investors and financial institutions, as it can help them make more informed decisions and better manage risks in an inherently unpredictable market environment.

As the complexity of models increases, with more advanced models such as the Heston model, which accounts for stochastic volatility, or the SABR model, which is used for interest rate derivatives, they can better reflect the actual market situation and the nuances of price movements. However, these more complex models come with a higher computational cost, which limits their application scope and makes them less accessible for real-time pricing and risk management. The computational complexity also means that these models may not be as easily implemented or

understood by all market participants, which can lead to a lack of standardization in pricing practices.

Most existing pricing models, including the Black Scholes model and its more complex counterparts, do not fully consider certain unforeseeable risk factors, such as political risks, natural disasters, or other exogenous shocks that can have a significant impact on the prices of stock derivatives. These events can introduce sudden and unpredictable changes in market conditions, which are not accounted for in the assumptions of these models. Therefore, while these models provide valuable insights and a starting point for pricing derivatives, they must be used with caution and supplemented with other forms of analysis and risk management strategies to fully account for the complexities of the financial markets.

Although pricing models such as the Black Scholes model play a crucial role in the stock derivatives market, they also have their own limitations. In order to improve pricing accuracy and better manage risks, it is necessary to constantly explore new models and technologies, and flexibly apply them in combination with practical situations.

2.2 Analysis of International and Domestic Market Cases in the Stock Derivatives Market

In the international stock derivatives market, the Chicago Board of Trade (CBOT) and the London Metal Exchange (LME) are two typical representatives. As a leading global derivatives trading platform, CBOT has provided an efficient and risk controlled trading environment for global investors since its establishment in 1848, thanks to its standardized contracts, margin system, and hedging mechanisms. In its development process, the constantly improving trading rules and settlement system have enabled CBOT to occupy a pivotal position in the global derivatives market.

LME is the world's largest non-ferrous metal exchange, offering a diverse range of metal futures and options contracts. Since its establishment in 1876, after more than a hundred years of development, LME has attracted numerous companies and investors from around the world, with trading volume and influence ranking among the top in the world. The success of LME is attributed to its comprehensive trading mechanism, extensive market participation, and good international reputation.

Turning to the domestic market, the Shanghai Futures Exchange and the China Financial Futures Exchange are the two core markets. The Shanghai Futures Exchange was established in 1990 and provides trading of various commodity futures contracts. Its margin system and daily market monitoring system effectively ensure the stable operation of the market. After years of market regulation and development, the Shanghai Futures Exchange has become one of the world's important commodity futures trading venues.

The China Financial Futures Exchange is the only financial futures exchange in China, established in 2006. The stock index futures, treasury bond futures and other financial futures launched by the Institute provide a wealth of risk management tools for financial institutions and investors at home and abroad. Its specialized trading platform and rigorous risk management system have won widespread recognition in the market.

However, the risks in the stock derivatives market cannot be ignored. Taking the "Lunni" incident in Qingshan as an example, in March 2022, Qingshan Group faced huge market losses due to the sharp rise in nickel prices, which shook the global derivatives market and highlighted the enormous risks in derivatives trading. Similarly, the bankruptcy of Bahrain Bank and the China Aviation Oil crisis were both caused by huge losses from derivative trading, ultimately leading to the bankruptcy or insolvency of the companies. These cases warn us that risk management is crucial in the stock derivatives market, and any neglect of risk can lead to catastrophic consequences [17]. Therefore, market participants should always remain vigilant and make reasonable use of risk management tools to ensure their own stable development.

Table 2.2

Case analysis of the stock derivatives market

Market name	Country /Region	Operational characteristics	development history
Chicago Board of Trade (CBOT)	U.S.A	1. Standardized compound about 2 Margin system 3. Hedging mechanism 4 Unified settlement	1. Established in 1848, it was the world's first relatively standardized futures exchange In 1865, standardized contracts were introduced and a margin system was implemented In 1882, it was allowed to exempt performance liability through hedging The Settlement Association was established in 1883. In 1925, the Settlement Company was established, and all transactions entered the settlement company for settlement
London Metal Exchange (LME)	britain	1. The world's largest non-ferrous metal exchange 2 Provide a variety of metal futures and options contracts Attracted numerous companies and investors from around the world to participate	Established in 1876, it is one of the oldest metal exchanges in the world and has undergone multiple mergers and reorganizations. Currently, it is an important platform for global metal futures and options trading
Shanghai Futures Exchange	China	1. Provide a variety of commodity futures contracts. 2 Implement margin system and daily market monitoring system Attracted numerous domestic and foreign enterprises and investors to participate	Established in 1990, it is one of the earliest futures exchanges in China and has undergone multiple rounds of clean-up and market regulation. Currently, it has become one of the world's important commodity futures exchanges
China Financial Futures Exchange	China	1. Provide a variety of financial futures contracts. 2 Implement margin system and daily market monitoring	Founded in 2006, it is the only financial futures exchange in China. It has launched stock index futures, treasury bond bond futures and other financial futures, providing

Continuation of the table. 2.2

Market name	Country /Region	Operational characteristics	development history
		system Attracted numerous financial institutions and investors to participate	important risk management tools for the market
The Qingshan "Lunni" incident	China	1. Derivatives trading poses significant risks. 2 Involving the international futures market 3. Causing significant losses to enterprises	In March 2022, Qingshan Group, as a short seller of LME nickel hedging, faced huge losses due to the sharp rise of nickel price caused by the Russia-Ukraine conflict, which shocked the global derivatives market
Bahrain Bank Bankruptcy Event	britain	1. Derivatives trading causes huge losses. 2 Risk Management Out of Control 3. Bank Bankruptcy	In 1995, Bahrain Bank suffered huge losses due to its Singapore branch trader Nixon's illegal engagement in derivative business, ultimately leading to its bankruptcy and significant impact on the international financial market
AVIC Oil Crisis Event	China	1. The trading of petroleum derivatives has caused huge losses. 2 Improper risk control 3. The company falls into insolvency	In 2004, China Aviation Oil Singapore suffered a loss of $550 million due to speculative trading of oil derivatives, which attracted widespread attention and had a profound impact on the company and the market

The above analysis provides case studies of the stock derivatives market through international and domestic markets, also introduces some risk incidents, offering a deeper understanding and recognition of the stock derivatives market. This analysis delves into the intricacies of the stock derivatives market, shedding light on its pivotal role in both international and domestic financial landscapes. In the international market, stock derivatives such as futures, options, and swaps are instrumental in providing investors with a multitude of opportunities for risk

management, price discovery, and diversification of investment strategies. These financial instruments enable investors to hedge against market risks, thus protecting their portfolios from unforeseen market fluctuations. For instance, exchanges like the Chicago Mercantile Exchange (CME) and Eurex in Europe offer a wide range of stock index futures and options products that help investors hedge against market risks while also providing liquidity to the market.

This liquidity is crucial for the smooth functioning of the market, as it ensures that there are always buyers and sellers available, facilitating the buying and selling of securities with ease and efficiency. The stock derivatives market, therefore, not only serves as a platform for risk mitigation but also as a catalyst for market efficiency and stability[18].

In domestic markets, such as China's stock index futures and options, investors are provided with tools to hedge against volatility in the stock market, which also promotes the maturity and stability of the capital market. Taking the CSI 300 stock index futures as an example, it offers investors a means to hedge against fluctuations in the broader market, while also providing market participants with opportunities for arbitrage and speculation.

By analyzing cases from both international and domestic markets, we can conclude that the development of the stock derivatives market contributes to enhancing the efficiency and depth of capital markets. It not only provides investors with more investment options but also promotes the improvement of the price discovery mechanism.

However, the high leverage and complexity of stock derivatives markets also bring risks, necessitating effective regulation and risk management measures to ensure the stable operation of the market. Therefore, regulatory bodies need to continuously update regulatory frameworks to adapt to market developments and the needs of investors. Additionally, the enhancement of investor education and risk management awareness is also a crucial factor in ensuring the healthy development of the stock derivatives market.

2.3 Comparative analysis of successful experiences, lessons learned, and case studies

In the development process of the stock derivatives market, both domestic and foreign markets have accumulated many successful experiences and lessons. By comparing and analyzing these cases, this article can gain a deeper understanding of the development path of derivative markets in different market environments.

Table 2.3

Stock derivatives market events or cases

Case / Event	Occurrence time	Location of occurrence	Company / Person	Types of derivatives	Success Experience/Lessons Learned
The Qingshan "Lunni" incident	March 2022	Global	Qingshan Group	Metal futures	Under extreme market conditions, forced positions in derivatives are prone to long tail risks, and participants should actively respond to risks
Bahrain Bank Bankruptcy Event	1995	Singapore	Barings Bank	Nikkei Stock Index and Interest Rate Futures	There are significant omissions in risk management during the operation of multinational banks, and an effective risk management system for financial derivatives business needs to be established
AVIC Oil Crisis Event	2004	Singapore	China Aviation Fuel (Singapore) Co., Ltd	Petroleum derivatives	Misjudging the expansion of oil price risks and continuously shifting and adding positions, it is necessary to strictly divide speculative and hedging positions

Continuation of the table. 2.3

Case / Event	Occurrence time	Location of occurrence	Company / Person	Types of derivatives	Success Experience/Lessons Learned
The National Copper Reserve suffered a huge loss event	2005	London	National Reserve Bureau	Metal futures	The sharp rise in copper prices has caused huge losses, and participating in the market must understand the market
Crude Oil Treasure Major Loss Event	2020	China	Bank of China	Crude oil futures	Negative oil prices under the impact of the epidemic require a deep understanding of the "black swan" in the financial market and conducting stress tests
Shanghai and Shenzhen 300 stock index futures listed	April 2010	China	China International Capital Exchange	Stock index futures	The rapid development of the stock index futures market provides risk isolation for long-term funds and promotes innovation in the derivatives market
Leo Melamed suggests China	Many years ago	China	Leo Melamed	Stock index futures	The stock index futures market helps maintain national economic and financial security, and promotes the development of derivative markets
CFTC regulatory experience in the United States	Over the past 30 years	U.S.A	CFTC	Commodity futures, financial derivatives	The regulatory structure needs to maintain flexibility, be customized according to market risks, and promote market innovation and competition

The Qingshan "Lunni" incident is a typical case in recent times, demonstrating the long tail risk brought by derivative forced positions under extreme market conditions. This event reminds market participants to actively respond to risks and avoid excessive risk exposure when facing severe market fluctuations. In contrast, the bankruptcy of Bahrain Bank exposed significant oversights in risk management by multinational banks during their operations. This incident emphasizes the importance of establishing an effective risk management system for financial derivatives business.

The crisis of China Aviation Oil Corporation and the huge loss of China National Copper Reserves Corporation both involved misjudgments of market price risks. These two cases demonstrate that participating in the derivatives market requires a thorough understanding of the market, strict delineation of speculative and hedging positions, and avoidance of significant losses caused by misjudgment of risks. The massive loss of Crude Oil Treasure is a case related to the Black Swan event, reminding us to be vigilant against unpredictable events in the financial market and to conduct stress tests to cope with potential risks.

In terms of successful experience, the listing of the Shanghai and Shenzhen 300 stock index futures is an example worth learning from. The launch of this derivative has promoted the rapid development of the stock index futures market, provided a risk isolation tool for long-term funds, and promoted innovation in the derivative market. Leo Melamed's advice on the stock index futures market also emphasizes the important role of the derivatives market in maintaining national economic and financial security.

The regulatory experience of the US Commodity Futures Trading Commission (CFTC) over the past 30 years has also provided us with valuable insights. The regulatory structure of CFTC maintains flexibility and can be customized according to market risks, thereby promoting market innovation and competition while ensuring the stable operation of the market. In fig. 2.2 shows experiences and lessons in the development of stock derivatives markets.

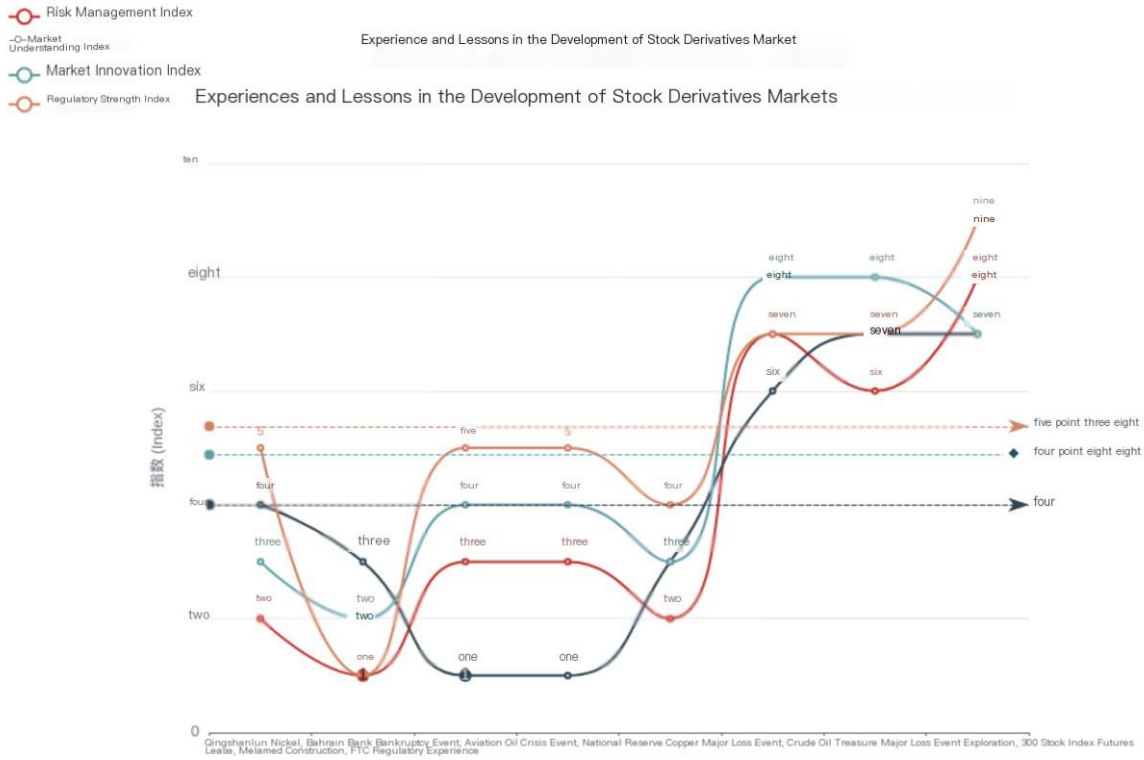

Fig. 2.2 Experiences and lessons in the development of stock derivatives markets

Through summarizing the successful experiences and lessons learned from domestic and foreign stock derivatives markets, as well as comparing and analyzing case studies, this article can draw the following insights: firstly, we should attach importance to risk management and establish a sound risk management system; Secondly, it is necessary to fully understand the market and avoid misjudging risks; Thirdly, we need to promote market innovation and provide investors with more diversified derivative tools; Fourthly, we need to strengthen supervision to ensure fairness, transparency, and standardization in the market. These insights will have important guiding significance for the future development of China's stock derivatives market.

CHAPTER 3

DEVELOPMENT TRENDS OF STOCK DERIVATIVES MARKET

3.1 Technological Innovation

As we witness the swift progression of technological advancements, it is becoming increasingly evident that these new technologies are exerting a profound influence on the financial industry. Among the myriad of innovative technologies, blockchain stands out with its unique attributes of decentralization, resistance to tampering, and exceptional transparency. This groundbreaking technology is progressively making its way into the stock derivatives market, where it is poised to bring about transformative changes that could reshape the very fabric of this sector.

Table 3.1

Stock derivatives market technology innovation cases

Case/Company/Name	Specific situation/impact
The stock exchange applies blockchain technology	Improve the clearing and settlement system to achieve almost real-time completion of transactions, reducing transaction costs and counterparty risks
Asset management company issues digital bonds using blockchain technology	Bonds are issued, traded and cleared through the blockchain network, making the market more flexible and transparent
Securities firms use blockchain technology to issue and manage stocks	Safe and rapid transfer of stock ownership, improving trading efficiency
Barclays Bank tests Corda blockchain platform	Real time sharing of information through a distributed ledger platform to improve transaction efficiency

Continuation of the table. 3.1

Case/Company/Name	Specific situation/impact
Derick Smith, co-founder and CEO of Chainreactor	Believe that blockchain technology can shorten the settlement time of funds, improve transaction time and risk assessment
Moody's, a globally renowned credit rating agency	Publish a report detailing 120 blockchain projects and listing 25 top blockchain application cases
CME Group	The world's largest derivative contract exchange explores new initiatives in collaboration with Crypto Facilities
Ant Chain, Tencent Cloud, Huawei and other blockchain suppliers	Promote China's blockchain industry to enter a stable and mature stage
Wang Yijun and others from Donghai Securities Co., Ltd	Research the application value of blockchain in the over-the-counter derivatives market and propose the B-OTC framework

In terms of application in stock exchanges, blockchain technology has significantly improved clearing and settlement systems. The traditional clearing and settlement process is often cumbersome and time-consuming, involving multiple intermediaries and a series of steps that can take days to complete. However, the introduction of blockchain technology has revolutionized this aspect of financial operations. By leveraging distributed ledger technology, transactions can now be recorded and processed in a decentralized manner, which enables them to be completed almost in real-time. This not only significantly reduces transaction costs by eliminating the need for many intermediaries, but also lowers counterparty risk. The immutable nature of blockchain records ensures that once a transaction is confirmed, it cannot be altered, thereby providing an additional layer of security. For example, some advanced stock exchanges have adopted blockchain technology to optimize their clearing and settlement processes, thereby achieving a more efficient

and secure trading environment. This has led to increased transparency and trust among market participants. In fig. 3.1, which is not displayed here but can be found in the relevant documentation, shows the impact of blockchain technology on stock derivatives market, illustrating how it has streamlined operations and enhanced the overall functionality of the market.

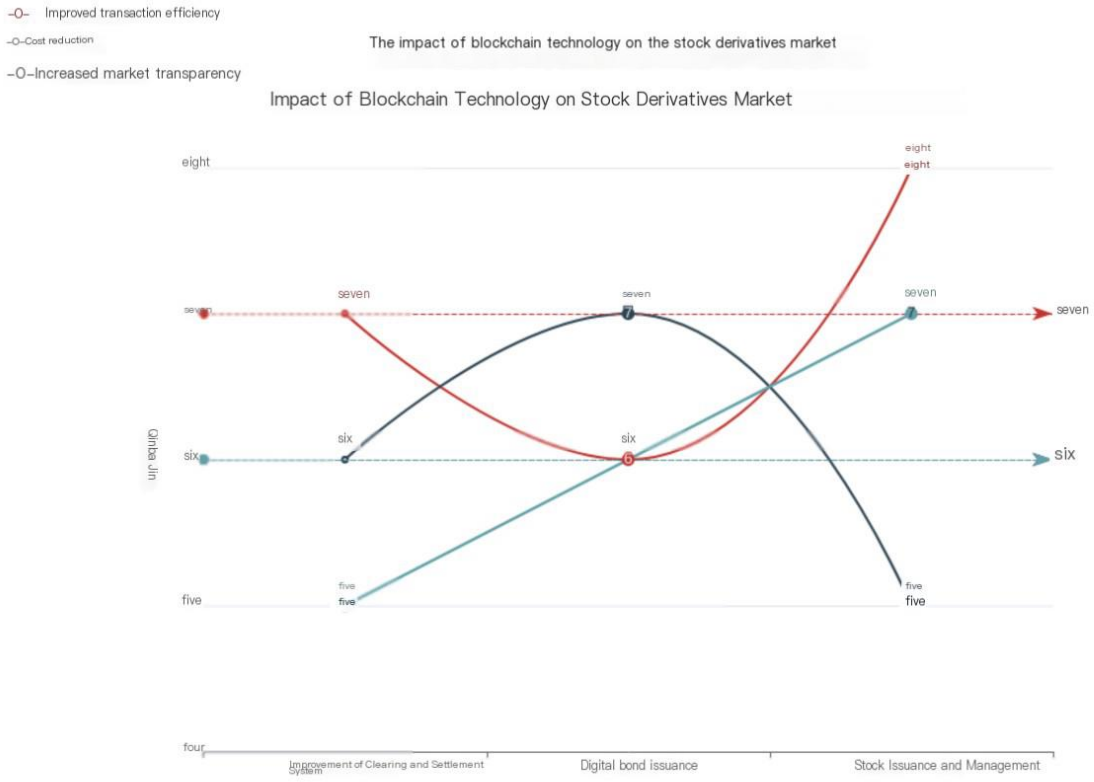

Fig. 3.1 Impact of blockchain technology on stock derivatives market.

Asset management companies are also actively utilizing blockchain technology to issue digital bonds. Through blockchain networks, the issuance, trading, and clearing processes of bonds have become more flexible and transparent. This helps to enhance the liquidity and attractiveness of the market, providing investors with more choices and convenience. The issuance of digital bonds has also reduced the cost and complexity of traditional bond issuance processes [19].

In the securities industry, blockchain technology is used for issuing and managing stocks. With the help of blockchain technology, ownership of stocks can be safely and quickly transferred, thereby improving transaction efficiency.

Blockchain technology also enhances the transparency and traceability of transactions, helping to reduce fraud and market manipulation.

In addition to the active application of financial institutions, some well-known enterprises and institutions are also exploring the integration of blockchain technology with financial markets. For example, Barclays Bank tested the Corda blockchain platform, which further improves transaction efficiency by sharing information in real-time through a distributed ledger platform. The globally renowned credit rating agency Moody's has also released a detailed report on blockchain projects, listing multiple top blockchain application cases[20].

In China, blockchain suppliers such as Ant Chain, Tencent Cloud, and Huawei are also actively promoting the development of the blockchain industry. With the continuous maturity of technology and the increasing richness of application scenarios, China's blockchain industry has entered a stable and mature stage. This provides more possibilities for innovation and development in the financial sector, such as the stock derivatives market.

It is indeed noteworthy that the application of blockchain technology within the stock derivatives market currently encounters a series of challenges and limitations. For instance, the development of technical standards is still in progress and not fully mature, while regulatory policies are also in the process of being perfected. Additionally, concerns regarding data security and privacy protection are paramount and require further attention and improvement. However, as technology continues to advance at a rapid pace and market demand for such innovations sustains its growth trajectory, there is a strong belief that these challenges and limitations will be gradually addressed and overcome.

The impact of blockchain technology on the stock derivatives market is profound and extensive, affecting various aspects of the market's functioning. It not only changes the operation mode and trading mechanism of the market, but also brings more opportunities and challenges to the market participants. The transparency and security offered by blockchain have the potential to revolutionize the way transactions are conducted, making them more efficient and reliable. In the future,

with the continuous development of technology and the expansion of application scenarios, blockchain technology is expected to play an increasingly important role in the stock derivatives market. This evolution could lead to the creation of new financial instruments, enhance market liquidity, and reduce counterparty risks. As the technology matures, it may also foster greater participation from institutional investors, thereby deepening the market and contributing to its overall growth and stability[21].

3.2 Market Globalization and Product Diversification

The arrival of globalization has ushered in a period of profound transformation and evolution within the realm of stock derivatives markets. As the globe becomes more tightly interwoven, the stock derivatives market has observed the arrival of a plethora of novel financial products and services. These advancements have not only broadened the spectrum of investment choices available to market participants but have also had a significant influence on the operational mechanisms of these markets. The advent of innovative financial instruments such as futures, options, and swaps has enabled investors to protect themselves against potential risks and to engage in speculation on future market trends with enhanced accuracy and adaptability. Moreover, the globalization of financial markets has smoothed the path for cross-border trading, allowing investors from diverse nations to enter stock derivative markets that were previously accessible only to local investors. This has resulted in heightened liquidity and efficiency within these markets, as well as a more widespread distribution of risk. The beneficial impact of these new products and services on the stock derivatives market is clearly visible in the escalation of trading volumes and the extension of market influence, rendering it a more vibrant and essential component of the global financial architecture.

Table 3.2

Case study on the globalization of the stock market

Serial number	theme	case analysis	related data
one	The impact of globalization on the stock derivatives market	Globalization of the stock market	The convenience of cross-border capital flow has been improved, stock trading has become more active, market liquidity has been enhanced, transaction costs have been reduced, and market efficiency has been improved.
two	The impact of globalization on the stock derivatives market	Investors allocate assets globally	Investors can more conveniently invest in listed companies around the world, and diversified investment strategies effectively diversify investment risks and improve the overall return of investment portfolios.
three	The emergence of new products and services	Expansion of Financial Derivatives Market	The derivatives market, such as options, futures, swaps, and warrants, is rapidly developing, and the market size and wide range of economic sectors involved have a significant impact on investors and the development of the real economy.
four	The emergence of new products and services	Innovation in the Financial Derivatives Market	It is expected that in the coming years, driven by the international market, the Asian market will experience rapid development, with expanding product categories and increasing trading capacity becoming the main trends in the market.
five	The emergence of new products and services	Enterprise Innovation Case	E-house China: Listed on the New York Stock Exchange on August 8, 2007, becoming the first real estate circulation service company in China to be listed in the United States. Its main business includes three categories: agency sales of first-hand houses, second-hand house intermediaries, and real estate information consulting.
six	The emergence of new products and services	Enterprise Innovation Case	E-house China: From 2004 to 2007, the average commission rate was 2.43%, and the profitability level was significantly higher than that of industry peers.

Continuation of the table. 3.2

Serial number	theme	case analysis	related data
seven	The emergence of new products and services	The impact of emerging economic models on the stock market	For example, sharing economy, digital currency, and green economy are often able to quickly adapt to market demand, provide new services or products, and thus change the competitive landscape of traditional industries.
eight	The emergence of new products and services	Risk Management in the Financial Derivatives Market	The failure cases of Chinese companies in the overseas financial derivatives market (such as China Aviation Oil, China COSCO Shipping, etc.) highlight the high risk of the derivatives market and require strengthened risk management and regulatory mechanisms.
nine	Future development direction	Regional specialization of derivative markets	Banks form different regional characteristics based on their geographical location and customer needs. For example, the main customers of European banks come from European countries, while the main customers of Asian banks come from the Asian market.
ten	Future development direction	Market Regulation and Risk Management of Derivatives	More refined and improved adjustments need to be made in policy formulation and regulatory mechanisms to ensure the safety and stability of the financial market.

The trend of globalization has had a profound impact on the stock derivatives market. With the advancement of globalization in the stock market, the convenience of cross-border capital flows has significantly improved, and stock trading activities are becoming increasingly frequent[22]. This not only enhances market liquidity, but

also reduces transaction costs, thereby improving the overall efficiency of the market. In this process, investors are able to more conveniently allocate global assets, effectively diversify risks through diversified investment strategies, and enhance the return of investment portfolios. In fig. 3.2, the development of the stock derivatives market under the influence of globalization is depicted, showing how the market has evolved and adapted to the new economic landscape.

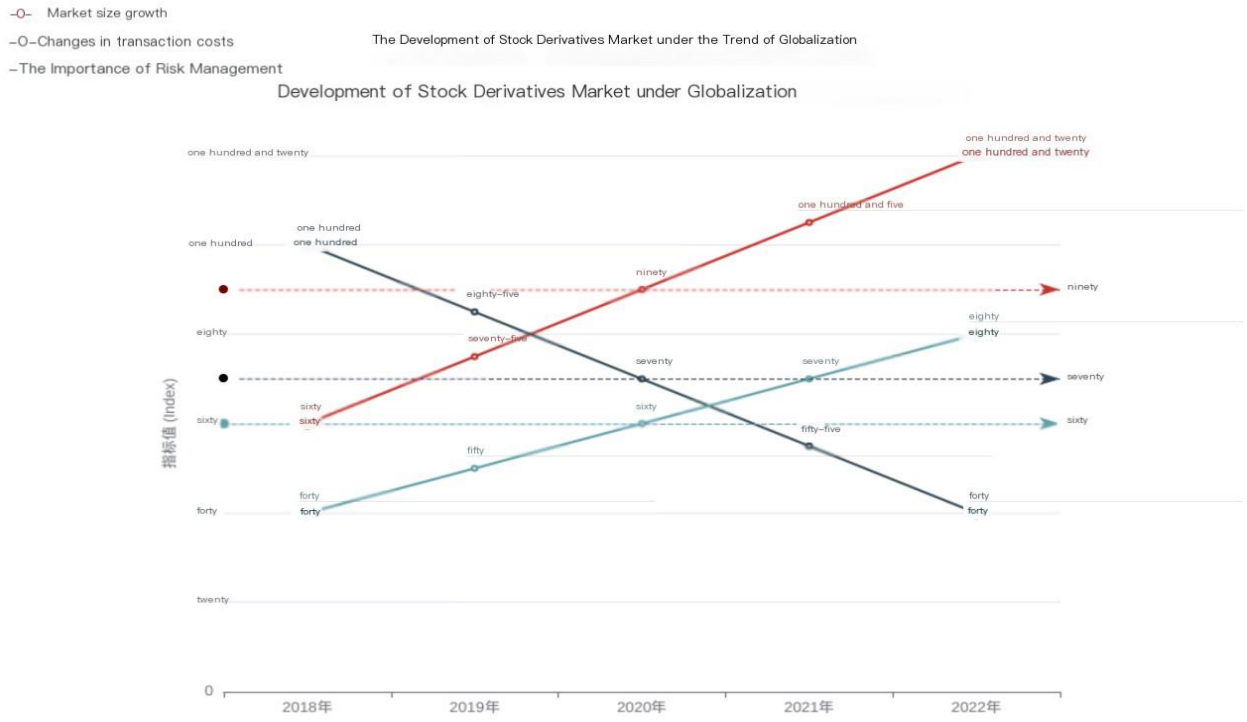

Fig. 3.2 Development of stock derivatives market under globalization

The advent of innovative products and services is fundamentally altering the structure of the stock derivatives marketplace. The swift growth and proliferation of financial derivatives instruments, including options, futures, and swaps, have not only enlarged the overall market size but have also deeply integrated a multitude of economic sectors, exerting a profound influence on investors and the progression of the actual economy. Particularly within the Asian market, as the international market continues to advance and gain momentum, it is anticipated that the derivatives market will undergo a period of swift expansion in the upcoming years. This anticipated growth is expected to be characterized by the expansion of product offerings and the

enhancement of trading capabilities, which are poised to become the prevailing trends[23].

It is indeed noteworthy that a number of corporations have managed to secure substantial accomplishments within the stock derivatives market by means of innovation. For instance, E-house China, which stands as the pioneering domestic real estate circulation service enterprise to be listed in the United States, has managed to attain a profit level that surpasses that of its counterparts within the industry. This has been accomplished primarily through its core business operations, which encompass first-hand housing agency sales, second-hand housing intermediaries, and real estate information consulting services. This remarkable achievement not only highlights the market value that is associated with corporate innovation but also underscores the positive influence that new products and services can have on reshaping the market landscape[24].

However, the rise of emerging economic models such as the sharing economy, digital currency, and green economy is also having significant new impacts on the stock derivatives market. These models, characterized by their flexibility and innovation, are able to quickly adapt to market demands, provide new services or products, and thus change the competitive environment of traditional industries[25]. This transformation necessitates that participants in the stock derivatives market closely monitor market dynamics and adjust their strategies in a timely manner to adapt to the new economic environment. In doing so, they must remain vigilant and proactive, as the rapid evolution of these new economic models can lead to both opportunities and challenges that were previously unforeseen. The ability to anticipate and respond to these changes will be a key determinant of success in the evolving landscape of the stock derivatives market.

On the other hand, it is imperative that we do not overlook the high risk associated with the financial derivatives market. The numerous instances of Chinese companies encountering significant difficulties or outright failure in the overseas financial derivatives market have highlighted the critical importance of robust risk management practices. Consequently, it has become evident that strengthening risk

management and enhancing regulatory mechanisms are essential components in the ongoing development and maturation of the derivatives market. This necessitates a more nuanced and comprehensive approach to policy formulation and regulatory practices, with the ultimate goal of ensuring the safety and stability of financial markets[26].

The trend of globalization and the emergence of new products and services have jointly driven the development of the stock derivatives market. As the world becomes more interconnected, the flow of capital and information across borders has accelerated, creating a fertile ground for the expansion of financial instruments such as stock options, futures, and swaps. This expansion has been further fueled by the advent of innovative products and services that cater to the diverse needs of investors and corporations alike. However, with the continuous evolution of the market, the importance of risk management and regulatory mechanisms is becoming increasingly prominent. The complexity and volatility inherent in stock derivatives necessitate robust frameworks to mitigate potential risks and protect market integrity. Only by continuously innovating and improving these aspects can we ensure the sustainable and healthy development of the stock derivatives market in the future. This entails not only the development of new technologies and strategies for risk assessment and management but also the establishment of comprehensive regulatory policies that keep pace with the market's dynamic nature. It is through such proactive measures that the stock derivatives market can continue to serve as a vital component of the global financial system, supporting economic growth and providing essential tools for hedging and investment.

3.3 Regulatory changes

The changes in regulatory policies have had a profound impact on the stock derivatives market. Taking the 2008 global financial crisis as an illustrative example,

this particular crisis made regulatory agencies in various countries acutely aware of the critical importance of strengthening market supervision. In response to this realization, a series of new regulatory regulations have been introduced successively, such as the Basel III international regulatory framework and the Dodd-Frank Wall Street Reform and Consumer Protection Act in the United States. The implementation of these regulations has not only significantly enhanced market transparency and improved market efficiency, but also effectively reduced the risk exposure of investors and financial institutions. In this new regulatory context, derivative trading has gradually shifted from over-the-counter trading to exchanges, thereby further enhancing market transparency and liquidity[28].

In recent years, the China Securities Regulatory Commission has also increased its supervision of the derivatives market. On November 17, 2023, the China Securities Regulatory Commission (CSRC) released the "Measures for the Supervision and Administration of Derivative Trading (Second Draft for Soliciting Opinions)", which emphasizes "restricting excessive speculative behavior in accordance with the law", and adds requirements for derivative development reports, derivative trading performance guarantee rules, and refined regulatory requirements for overseas derivative trading.

This measure aims to prevent and resolve financial risks, and promote the standardized and healthy development of the derivatives market[29]. By comprehensively strengthening institutional supervision, behavioral supervision, functional supervision, penetrating supervision, and continuous supervision of the derivatives market, the aim is to eliminate regulatory gaps and blind spots and ensure the stable operation of the market.

The new regulations also highlight the importance of transparency and accountability in the derivatives market, ensuring that all participants adhere to the highest standards of integrity and ethical conduct. Furthermore, the CSRC has indicated that it will work closely with other regulatory bodies both domestically and internationally to ensure that the derivatives market operates within a robust

framework of oversight, which will help to foster an environment of trust and confidence among market participants.

Subsequently, on November 18, 2023, the China Securities Regulatory Commission revised the "Calculation Standards for Risk Control Indicators of Securities Companies", emphasizing the strengthening of capital constraints and risk prevention, and improving the measurement standards for over-the-counter derivatives.

The introduction of this regulation not only strengthens the supervision of private equity non-standard asset management, custody and other businesses, but also effectively improves the effectiveness of supervision and market stability. The implementation of these measures aims to reduce the overall risk of the market and better protect the interests of investors.

The Central Financial Work Conference, a pivotal event in the financial sector, has underscored the critical importance of comprehensively strengthening financial supervision. This strategic move is essential to effectively prevent and resolve financial risks that could potentially undermine the stability of the financial system.

The policy orientation set forth by this conference has had a profound impact on the derivatives market, prompting it to further intensify its regulatory efforts. The aim is to prevent the proliferation of systemic risks that could ripple through the financial markets. To achieve this, the establishment of several key mechanisms has been undertaken.

These include the derivatives market account system, a trading report repository system, an infrastructure data sharing mechanism, and a cross market monitoring mechanism. These mechanisms have been instrumental in significantly enhancing market transparency[30].

The implementation of these systems ensures that regulatory agencies can gain a clear and comprehensive view of derivative trading activities. This, in turn, enables them to establish a more systematic cross market and cross-border monitoring and control mechanism. The ultimate goal of this comprehensive approach is to prevent risks and safeguard the integrity of the financial system.

Table 3.3

Changes in stock derivatives market regulation policies

time	Changes in regulatory policies	Regulatory policy content	The impact on the stock derivatives market
2008	After the global financial crisis	Regulatory agencies in various countries have introduced a series of new regulatory regulations, such as Basel III and the Dodd Frank Act in the United States	Intended to enhance market transparency, improve market efficiency, and reduce the risk exposure of investors and financial institutions. Derivatives trading is gradually shifting from over-the-counter trading to exchanges, improving market transparency and liquidity.
November 17, 2023	The China Securities Regulatory Commission has released the "Measures for the Supervision and Administration of Derivative Trading (Second Draft for Soliciting Opinions)"	Emphasis on "legally restricting excessive speculative behavior", increasing requirements for derivative development reports, rules for ensuring derivative trading performance, and refining regulatory requirements for overseas derivative trading	Intended to prevent and resolve financial risks, and promote standardized and healthy development. Comprehensively strengthen institutional supervision, behavioral supervision, functional supervision, penetrating supervision, and continuous supervision of the derivatives market, eliminate regulatory gaps and blind spots.
December 16, 2023	Central Financial Work Conference	Emphasizing the comprehensive strengthening of financial supervision and effective prevention and resolution of financial risks	Promote the strengthening of regulation in the derivatives market to prevent the spread of systemic risks.

Continuation of the table. 3.3

time	Changes in regulatory policies	Regulatory policy content	The impact on the stock derivatives market
January 1, 2024	Establishment of derivative market account system, trading report repository system, infrastructure data sharing mechanism, cross market monitoring mechanism, etc	Improve market transparency and ensure that derivative trading is transparent and manageable	We have established a relatively systematic cross market and cross-border monitoring mechanism to prevent risks.

The changes in regulatory policies have had a positive impact on the stock derivatives market. By strengthening regulatory efforts and improving relevant laws and regulations, not only has the transparency and efficiency of the market been improved, but market risks have also been effectively reduced and the interests of investors have been protected[31]. In addition, the enforcement of these policies has led to a more level playing field for all market participants, fostering a healthier competitive environment. As a result, the market has seen an increase in liquidity and a reduction in volatility, which are crucial for the long-term growth of the stock derivatives market.

In the future, with the continuous improvement of regulatory policies and the increasing maturity of the market, the stock derivatives market is expected to usher in a more stable and sustainable development. This evolution is anticipated to bring about a more predictable and secure investment climate, which is beneficial for both institutional and retail investors alike. In fig. 3.3 shows the impact of regulatory changes on stock derivatives market, illustrating how these policy shifts have directly influenced market dynamics and participant behavior.

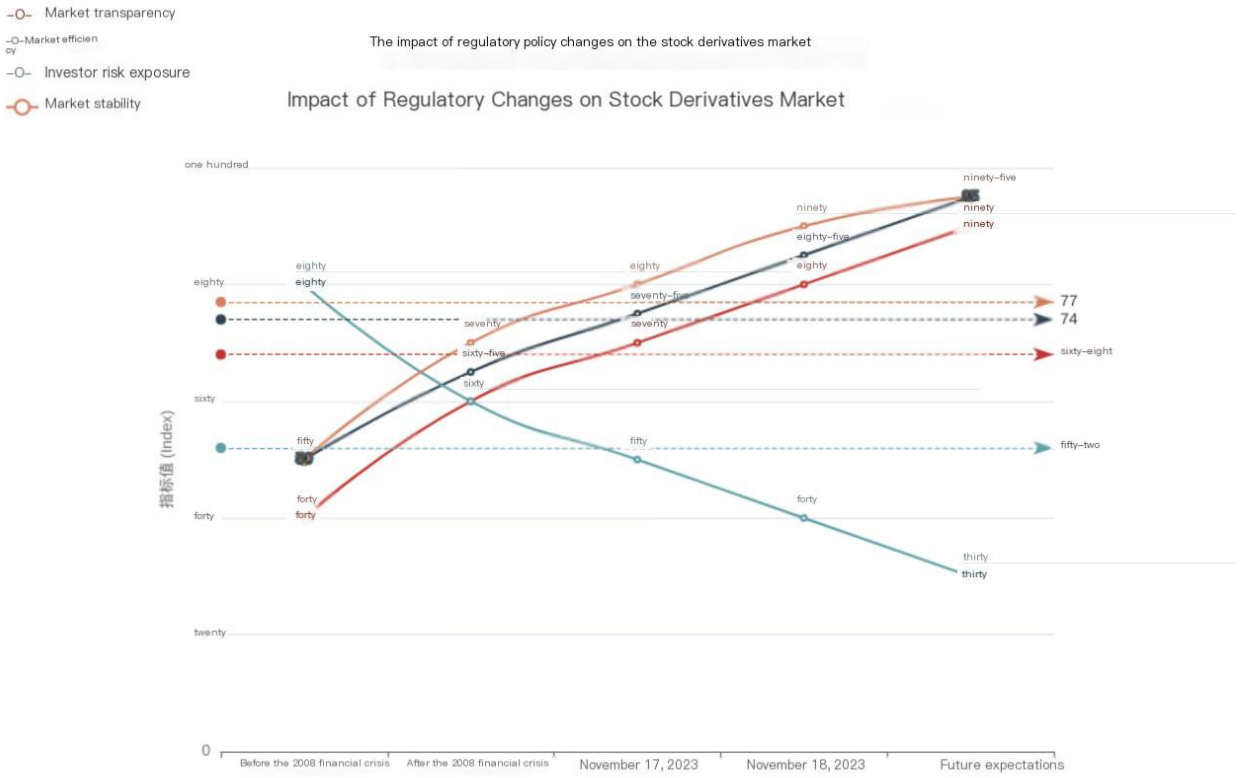

Fig. 3.3 Impact of regulatory changes on stock derivatives market

As can be seen from the graph, changes in regulatory policies have varying degrees of impact on the transparency, efficiency, investor risk exposure, and stability of the stock derivatives market.

CONCLUSIONS

After in-depth research on the stock derivatives market, this study has made the following main findings and conclusions.

The stock derivatives market, which serves as a crucial element within the broader financial market, has been experiencing a continuous growth in both its size and its impact on the global economy. On a worldwide scale, the trading of stock derivatives has emerged as a vital tool for investors to mitigate risks and pursue gains in their investment portfolios. This comprehensive study delves into the intricate details of the stock derivatives market, shedding light on its internal operational mechanisms and the external factors that shape its dynamics. Through a thorough examination of the market's structure, the intricacies of trading mechanisms, and the strategies employed in risk management, the study aims to uncover the underlying principles that govern this complex financial arena.

When it comes to the theoretical underpinnings of pricing, this study embarks on an exploration of a variety of pricing models pertinent to stock derivatives. It meticulously analyzes the pivotal elements that exert influence on the pricing of these financial instruments. Empirical evidence has demonstrated that well-founded pricing models are instrumental in enhancing the transparency and efficiency of market transactions. However, it is also acknowledged that current pricing models are not without their shortcomings, particularly when it comes to addressing the challenges posed by extreme market conditions and the subsequent pricing dilemmas that arise.

Upon conducting a thorough comparative analysis of both domestic and international market case studies, this particular research has uncovered that stock derivatives markets that have achieved significant success typically possess a robust regulatory framework, efficient trading mechanisms, and a base of market participants who are well-versed and mature in their dealings. These successful case studies offer valuable insights and serve as a guide for the ongoing advancement and improvement of China's stock derivatives market.

Nevertheless, this study has also highlighted a number of challenges and deficiencies that require attention. It is evident that market supervision efforts still require enhancement, particularly in the areas of preventing and combating improper market activities such as market manipulation and insider trading. Additionally, there is a pressing need to bolster the risk awareness and risk management capabilities of market participants to mitigate the potential for market risks that may arise from excessive speculation and other related issues.

Addressing the aforementioned challenges and deficiencies, this study puts forth several future development directions and improvement measures. It is recommended that efforts should be made to further refine the regulatory system, ensuring that supervision is more targeted and effective, thereby safeguarding the fairness, impartiality, and transparency of the market. Moreover, it is crucial to intensify risk education for market participants, thereby elevating their risk management awareness and capabilities. Innovation should be actively encouraged to foster the diversification of products and services within the stock derivatives market, ensuring that it can cater to the varying needs and preferences of different investors.

This study undertakes a comprehensive exploration and in-depth analysis of the stock derivatives market, uncovering the intricate operational mechanisms that drive its functionality and forecasting the potential future development trends that may emerge within this sector. By meticulously summarizing successful experiences from various markets and pinpointing the existing problems that currently hinder progress, this study aims to provide valuable insights and guidance that can be instrumental in fostering the healthy development of China's stock derivatives market.

Furthermore, the study has identified that the stock derivatives market is subject to a multitude of influencing factors. Among these, macroeconomic factors such as interest rates, inflation, and economic growth rates play a pivotal role, exerting a profound impact on market volatility and the sentiment of investors. Government policies and regulatory measures, which include alterations in tax policies and the introduction of new regulatory laws, are directly correlated with the operational costs of the market and the behaviors of investors. Investor behavior,

particularly fluctuations in investor sentiment and the evolution of investment strategies, also plays a significant role in shaping the short-term trends of the market. Additionally, technological innovation, especially the rapid advancement of financial technology (fintech), has brought about unprecedented changes to the stock derivatives market. These changes have not only enhanced trading efficiency, reduced transaction costs, but have also introduced new risks and challenges that market participants must navigate.

One of the important conclusions of this study is that risk management in the stock derivatives market is crucial. The types of risks faced by the market are diverse, including market risk, credit risk, liquidity risk, etc., and effective methods of risk identification, measurement, and evaluation, as well as flexible risk management strategies, are needed to respond. Through specific case analyses, this study demonstrates the effectiveness of methods such as hedging and risk diversification in risk management practice, providing valuable experience and insights for market participants.

This study reveals the complexity, dynamism, and importance of the stock derivatives market, emphasizing the diversity of its development trends and influencing factors. In the future, with the continuous changes and innovations in the global financial market, the stock derivatives market will continue to play an important role and will also need to continuously adapt to new challenges and opportunities to achieve sustained and healthy development.

The stock derivatives market, as an important part of the financial market, is expected to be driven by various factors in its future development, while also requiring targeted improvement measures to address potential challenges.

From the perspective of market size and growth rate, the stock derivatives market is expected to continue growing . With the recovery of the global economy and the deepening of financial markets, the demand for risk management tools and asset allocation methods among investors is expected to further increase. Especially in emerging markets, with the opening of financial markets and the popularization of investor education, the participation rate in the stock derivatives market is expected to

significantly improve. To promote this growth, market participants should actively promote product innovation to meet the diverse needs of investors, while strengthening market regulation to ensure fairness, justice, and transparency of the market

In terms of product innovation and diversification, the stock derivatives market will present a richer variety of products. With the development of financial technology, new forms of trading such as smart contracts and decentralized exchanges will gradually integrate into the stock derivatives market, providing investors with a more convenient and efficient trading experience. Stock derivatives tailored to specific industries and regions will also continue to emerge, meeting investors' needs for hedging against specific market risks. To promote this trend, market participants should increase research and development investment, promote the deep integration of technological and financial innovation, and strengthen exchanges and cooperation with international markets to jointly drive product innovation in the stock derivatives market.

In the realm of digital transformation, the stock derivatives market is poised to expedite the adoption of electronic trading platforms. This shift towards electronic trading not only fosters a significant increase in trading efficiency but also brings about a reduction in operational costs. Moreover, it serves to elevate the levels of market transparency and liquidity. Looking ahead, as big data, artificial intelligence, and other cutting-edge technologies become more deeply integrated, the stock derivatives market is expected to undergo intelligent enhancements in trading strategies, risk management methodologies, and customer service protocols. To align with this evolving landscape, market participants must proactively advance the modernization of their trading systems, bolster data security and privacy measures, and cultivate a workforce equipped with digital competencies to bolster the market's overall competitive edge.

Confronting the challenges that the stock derivatives market currently faces, such as market risk and credit risk, market participants are tasked with implementing effective strategies for improvement. On one front, it is imperative to reinforce risk

management and internal control mechanisms, establish a robust risk assessment framework, and enhance the capacity to detect and respond to risks. On another front, the legal and regulatory infrastructure must be refined, with increased market surveillance and enforcement efforts to ensure the stability and healthy progression of the market. Additionally, efforts to educate and protect investors should be intensified, aiming to heighten investors' awareness of risks and their inherent abilities to safeguard their own interests.

The trajectory of future development for the stock derivatives market will be shaped by a multitude of factors. Market participants are encouraged to actively champion advancements in product innovation, digital transformation initiatives, and risk management practices to effectively tackle potential challenges and capitalize on emerging opportunities for growth.

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