

Influence and Promotion of Financial Mathematics on China's Contemporary Financial Market

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Abstract: The financial market is the mechanism used to trade financial assets and determine their prices. The market system that is extensive is composed of multiple branches, including the securities market, stock market, fund market, and others. Due to the development of modern economy, financial mathematics has gradually become an important part of the financial market. By combining its own characteristics with modern science and technology, and exploring the securities theory of the financial market, financial institutions can obtain more precise data resources. Financial mathematics uses mathematical thinking and computer advantages to quantify the financial market. Then constructing mathematical models, analyzing the data, and calculating them, which is a significant way to promote the development of the financial market. This paper mainly explores the impact of financial mathematics on the financial market, with the aim of better promoting social development. In this paper, the method of literature analysis is used to investigate the influence and promotion of financial mathematics in the field of modern financial markets. The conclusion shows that financial mathematics is an important part of the promotion of the market and that this new discipline has unlimited potential.

Keywords: Financial mathematics, Financial market, Social development

1. Introduction

Mathematics is omnipresent in today's society. Without the tools and techniques created by mathematics, many tasks would not have been possible. In the era of rapid economic development, financial mathematics has become the focus of economists as a new discipline that introduces mathematics into the financial market. Financial mathematics is the application of mathematical knowledge to some problems in finance and has a wide range of applications in the financial market. Therefore, financial mathematics can greatly promote the service effect of modern financial markets and promote the orderly development of the equity and securities industry. It creates data source models and performs accurate calculations that play an invaluable role in economic development decision-making. However, there are still many problems in the field of modern Chinese financial market. The main problem is that it is a new discipline that has not yet formed a complete institutional system.

This article first introduces the development of financial mathematics in China, including the new advances in theory and talent development. At the same time, it describes the current situation and development trend of China's modern financial market. It then highlights the influence and

promotion of mathematical finance in China's modern financial market and the new problems that mathematical finance may face in the future.

2. The Development of Financial Mathematics in China

2.1. New Progress in Financial Mathematics Theory

Financial mathematics in China can be traced back to the mid-90s of the 20th century, and this new discipline, as the name implies, is a mathematical discipline applied to the financial field, mainly serving the development of the market. Nowadays, with the rapid development of China's market economy, a deep understanding of the concept of financial mathematical theory is necessary if we want financial mathematics to give full play to its greatest advantages in the modern financial market. With the knowledge of mathematical theory, financial mathematics analyses the situation of modern financial markets to create accurate mathematical models, which play an important role in the analysis and calculation of financial markets. In this way, the certainty and uncertainty of the market can be fully integrated, forming the theoretical basis for an optimal investment portfolio and asset pricing, emphasising the three fundamental ideas of arbitrage, equilibrium and optimum [1]. Only by fully utilising the concepts and principles of financial mathematics and taking into account the national conditions and characteristics of the Chinese market economy can we develop a financial theory that suits China. At the same time, the Chinese market economy also needs to make corresponding adjustments and constantly improve its own physicality so that the Chinese market can be expanded globally to truly play the role of mathematical finance [2].

2.2. Related Talent Development

First, this paper will analyse the future employment direction of financial mathematics talent. Start by analysing the valuation of assets and the financial analysis of shares. In today's society, the position of the stock market in the capital market is becoming more and more important, and financial mathematics is indispensable for stock market analysis. Secondly, in the securities field, the database is designed to manage securities data through mathematical models and other knowledge management such as eXtensible Business Reporting Language (XBRL) Customer Relationship Management (CRM), etc., while predicting the trend and development tendency of modern financial markets [3]. Finally, it can also focus on the insurance industry. The integration of financial mathematics and actuarial science, which is currently widely used in pension and life insurance, can simplify the calculation process, effectively improve efficiency and promote social development.

Secondly, this paper will analyse the development prospects. Since the end of the 19th century, financial mathematics has played an important role in economic and financial circles, and has also gained attention in the mathematical community. Financial mathematics also provides accurate models for economic development, such as the Vasicek model and the CR model, which incorporate mathematical knowledge into people's daily lives and enable people to better understand the financial situation and economic development trend. In addition, economists and economic researchers can use the mathematical theories and models they create to analyse data more accurately and promote modern economic development. We firmly believe that financial mathematics can create more value in the coming decades.

3. The Current Situation and Trend of Financial Market Development in China

3.1. Status Quo

The development of China's financial market shows a steady upward trend, the scale is growing, the division of labour in the market tends to be reasonable, and the financial market continues to improve and develop. In the socialist market economy, it already has the title of "leading" and influences many countries [4]. Compared to many Western countries, however, China's economic development came relatively late, and its scale is incomparable.

3.2. Forecast Financial Market Trends

Firstly, with investment as the main goal, it should be standardised to the main part of the securities market and perfect it. Secondly, we should push forward the development of insurance and finance and look at life and pension insurance from different angles and at different levels. Then, it is necessary to establish and improve the financial supervision mechanism to promote the orderly development of the market economy. Finally, promote financial globalisation, let the Chinese financial market practise the strategy of "going out", connect with the world, learn from its essence, make up for shortcomings, and jointly promote a community with a shared future.

4. The Impact of Financial Mathematics on Chinese Modern Markets

4.1. Positive Influence and Promotion

4.1.1. Strengthen the Precision of Financial Services

In modern financial markets, the accuracy and reliability of financial services play a crucial role and can have a direct impact on the level of development. Inaccurate and unreliable financial services have a negative impact on the financial market, reducing its influence and attractiveness and ultimately leading to customer losses and market stagnation. The emergence of financial mathematics in the modern financial market can optimise and improve business in depth, guide financial enterprises according to the development of the industry itself, improve the financial service model under the premise of meeting the needs of society and customers, and ensure the service quality and level of the industry, financial services have developed effectively. At the same time, financial mathematics can also analyse its own situation, show the development of the financial market through mathematical models, conduct self-control, identify shortcomings and actively improve. In the application of financial mathematics to employees, the computer and enterprise data processing methods are used to ensure the quality of all aspects of work, obtain accurate data information and improve service quality.

4.1.2. Promote the General Development of the Industry

In the application of financial mathematics, many talents have emerged to breathe life into financial mathematics. Firstly, financial talents can use this discipline to evaluate and analyse stock values, especially in the early stage of the development of the financial industry. The technology and quantity of talents are ensured and improved, the quality of work is enhanced, and the stable development of the industry is also promoted. Secondly, the use of financial mathematics can also contribute to the development of the securities market, as long as employees can achieve more accurate analysis of operational data according to data information through the construction of mathematical models, so as to provide reference for enterprises when deciding on development strategy. Thirdly, as financial mathematics is widely used in the market, it can provide high-quality

data and information in a timely manner, so that the financial market can respond to shortcomings, develop and innovate according to market characteristics and trends, and also play an important role in the transformation and upgrading of modern financial enterprises.

4.1.3. Expand the Theoretical Foundations of Financial Markets

The emergence of financial mathematics has provided a large amount of theoretical knowledge for the financial market, and the level of practical handling has also been improved. There is a lot of knowledge in the existing financial mathematical theories, especially in the following points: a. Stochastic Optimal Control Theory. In the 1960s, with the development of control theory, these theories made an in-depth analysis of the theory of optimal consumption in continuous time and came to the conclusion that transactions in the financial industry have limits. The stochastic optimal control theory can also determine different types of financial transactions and search for the implicit laws. b. Martingale Theory. This theory is at the forefront of modern financial markets. Since most investors strive to minimise costs, such theories were born. The core of the research is to minimise investment costs through observation. This is used to solve the problem of derivatives of financial products, including the pricing of imperfect financial products to make them more reasonable and effective. c. The Theory of Differential Countermeasures. Financial markets are fluid, the market is not stable. Once there is a fluctuation in the financial market, it will have an impact on securities, futures or stocks, etc. Existing theories cannot accurately predict uncertainties. The theory of differential countermeasures makes assumptions about instability at the macro level, integrates and optimises our resources, and finally derives a theory of relative financial data. d. The Theory of the Optimal Time Stop. This theory belongs to one of the branches of probability theory and appeared relatively late. Therefore, the research on the relevant theories in China is not thorough enough, and there are few conclusions and no clear application of the theories. Nevertheless, this theory still has great prospects for development and can provide guidance for financial markets. e. Other intelligent theories and empirical theories. With the development of computerisation, the technology of integrating financial mathematics and modern information technology has emerged. For example, the genetic algorithm, wavelet algorithm and other mathematical information technologies are introduced into traditional financial mathematics, and the data is integrated to build a mathematical model, summarise the market rules, and better play the value of financial mathematics.

4.2. Problems of the Application of Financial Mathematics in Chinese Modern Financial Markets

4.2.1. The Problem of Uncertainties

There are two main types of economic models in the traditional financial market in China. One is the Newtonian model, a deterministic model that views the operation of the economy as a deterministic state. The other is the random walk model. These two different models have long been in opposition to each other, which has had a very negative impact on the financial markets. This has also divided experts into two camps. One is the belief that the financial markets exist on their own. Other academics believe that uncertainty in the financial markets is still the majority. The latest research shows that the laws of the financial market are indeed comprehensible, but the uncertainties remain, which limits the application of financial mathematics. Therefore, the following problems still exist in financial mathematics: first, the financial economy is not immutable, and in order to understand the laws, draw conclusions or clarify the monetary conditions for the concretisation of the financial market economy, a deep understanding of the vagueness and pluralism of the stochastic model is required. Secondly, we can also study the monetary system of each country, understand the global demand for money, and create a corresponding supply to make

the constructed monetary model reasonable. Then the financial market is provided with data through the analysis model, the interest rate and tax rate of the financial market are accurately understood, and the actual situation of the financial market and production resources are integrated from various aspects and dimensions to build a data model. With the help of modern digital finance theory, the results can serve the financial field.

4.2.2. Market Surveillance and Management System and Its Deficiency

Although financial mathematics is highly valued in modern financial markets, a perfect market surveillance system is still lacking. Although some market supervision mechanisms play a certain role, they do not analyse the actual situation of the market, nor can they carry out the process of applying financial mathematics, and cannot detect the shortcomings in the work in time, and the work effect is greatly degraded. The government and other departments have not yet clarified the system and standards for the application of financial mathematics, and problems such as unreasonableness and unprofessionalism are common in the application of financial mathematics. It is obvious that the government's policy still needs to be strengthened.

The currency analysis is weak. China still does not have a perfect working model for currency analysis, which may cause problems in the application of financial mathematics, which is very unfavourable to the long-term development of the industry. At the same time, the industry lacks a perfect research system. Thus, the financial mathematical theory is not often used to analyse the global currency situation, and it fails to get more inspiration from the international financial industry, which weakens international competitiveness [5].

4.2.3. The Lack of a Complete Financial Mathematical System

The integrity of China's financial mathematics system needs to be strengthened, and there is no in-depth research on theory content and putting financial mathematics into practice, so much theoretical knowledge and practical operations remain on the surface. The value of financial mathematics can only be fully realised if a reasonable system can be developed that meets the conditions of the market and combines financial mathematics.

5. Conclusion

This paper analyses the importance of financial mathematics and the state of modern financial markets, focusing on the effects and problems of financial mathematics on the market. Financial mathematics is still of great benefit to the modern financial market as it provides a solid data and theoretical basis for the financial industry and promotes the development of the financial market. However, the problem-solving of the modern Chinese financial market has not yet been discussed in depth in this paper. We need to use this expertise flexibly and seize the opportunity to bring China's financial market to another international stage.

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