

Research on the Application of Mathematical Experimental Course System in the Teaching of Financial Mathematics Major in Colleges and Universities

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Abstract: Students majoring in financial mathematics should not only have good financial analysis ability, but also learn to apply mathematical modeling methods to solve practical problems. Therefore, mathematics experiment teaching has become an indispensable part, and the premise of realizing effective mathematics experiment teaching is to establish a sophisticated experimental teaching course system. This paper analyzes the application of mathematics experimental course system in the teaching of financial mathematics in colleges and universities from four aspects: the status quo of financial mathematics and mathematics experiment, curriculum setting, design principles and curriculum optimization practice.

1. Introduction

With the rapid development of China's economy, the development of the financial industry as an economic development accelerator has gradually reached the world-class level. The financial market needs more and more talents who have both theoretical knowledge and practical tools of mathematics and can skillfully apply them to financial analysis. The establishment of Financial Mathematics Specialty makes up for the lack of such talents training in higher education. In recent years, its position in the university curriculum has been improved step by step, and it also attracts more and more attention from outstanding students.

The cultivation of compound financial talents is inseparable from the construction of sophisticated experimental curriculum system. Since the 1990s, many universities in China have successively set up the major of financial mathematics, and set it up in the school of mathematics or the school of economic management according to the comprehensive ability of the school. By improving the course system of financial mathematics, reforming the teaching mode of financial mathematics experimental course, and setting up the course standard of financial mathematics, it has developed into a more professional system. For the students majoring in financial mathematics, they should not only have rich knowledge of mathematical theory and financial theory, but also be able to use software such as data analysis and financial analysis to solve practical economic problems through computer programming language. Also, they should have the ability to obtain information and analyze problems. This makes both mathematics knowledge and practical teaching become the core part of the financial mathematics curriculum, and the mathematics experiment course is extremely important.

2. Teaching Status of Financial Mathematics and Financial Mathematical Experiment

Financial mathematics, also known as analytical finance, is a discipline that applies mathematical tools in the field of financial analysis, such as model building, analytical model, numerical calculation, etc., to find potential patterns of finance to solve practical problems. At the same time, as a new interdisciplinary subject, financial mathematics can also be understood as the application of mathematics and computer knowledge in the field of finance. Generally, the major courses of financial mathematics are economics, probability theory, mathematical analysis, statistics, securities analysis and investment, mathematical finance, financial time series analysis and other theoretical courses. Financial mathematical experiment is a necessary supplement to the theoretical

courses. By setting up courses related to mathematical experiments, students can not only deepen their understanding of theoretical knowledge, but also further master how to use mathematical tools. At the same time, participating in the experimental courses is also an experience of combining financial knowledge and mathematical models, which helps students form their own knowledge system of financial specialty and pave the way for the practical work in the future.

Foreign colleges and universities generally set up the financial mathematics experiment course. It has been a trend to promote the study of Financial Mathematics Specialty through the experiment in the universities of the United States and other countries. The experiment has been proved to be a very effective method to cultivate students' ability to solve problems in the financial field by using mathematical methods, especially the well designed financial mathematics experiment can effectively cultivate students' practical application ability. At present, in the teaching of financial mathematics in domestic colleges and universities, one of the problems strongly reflected by the students is the inadequate combination of theory and practice, so the introduction of mathematics experiment course cannot be delayed.

3. Course Setting for Financial Mathematical Experiments

Based on the research methods and teaching content, financial mathematics can be divided into two branches, namely empirical financial mathematics and normative financial mathematics. The former emphasizes the application of financial principles such as statistics and time series analysis, while the latter emphasizes High-number, probability theory and other theories related to the derivation of financial principles. According to different curriculum settings, the financial mathematics major can be divided into two directions: economic management and science. The study of mathematics experimental courses not only cultivates students' attitudes of rational analysis and standardization, but also improves their independent innovation ability and scientific research ability. The experimental course mainly includes financial risk analysis, investment analysis, pricing of options and derivative products based on mathematical model software of mathematical finance, and sets different difficulty requirements for students in different directions.

4. Principles of Financial Mathematical Experiment Course System Design

The design of financial mathematics experiment course system generally follows the following guidelines.

4.1 Practicability

The practical application of the experimental course is the starting point and the foothold of the course design, therefore it is the primary guiding ideology of the experimental course design. The combination of classical theoretical knowledge of probability and statistics and advanced computer technology has made many practical problem solving methods become the basic knowledge needed. Mathematical experimental teaching is a reasonable selection of teaching content, such as Monte Carlo method, stochastic simulation and other basic methods, focusing on their application of actual data, thus stimulating students' spontaneous learning and innovation ability. In the curriculum arrangement, after the students learn the basic methods of the theory, several practical problems are given. In the course arrangement, after students learn the theory of basic methods, These methods are integrated into data sorting, calculation and analysis, urging students to carry out practical operation, mastering relevant analysis methods and their application through the actual experience of the operation process.

4.2 Interestingness

Interest is the best teacher. Improving the interest of the experimental courses can improve the efficiency of students' learning in a shorter time, and leave them a more profound impression, also can get twice the result with half the effort. However, the intuitiveness of the experimental course makes the interest of the course meet some resistance, which is exactly what teachers need to pay

special attention to. For example, on the principle of standard and strict operation, the experimental operation method should be selected as much as possible to avoid single and too many repeated and onerous requirements, and to leave space for students to innovate independently. When selecting a case, it's better aims to find hot issues and combine them with students' interests.

4.3 Operability

The content of the experimental course needs to be considered whether it is easy to operate, whether the amount of calculation can be done properly, and whether the calculation time is moderate. For content with too many times of calculation, the teacher can debug the parameters in advance to reduce the amount of calculation. For more complex problems, teachers need to perform approximate simulations, simplify the problem, and grasp the essence of the problem, so as to avoid repeated operations.

4.4 Normativity

The purpose and content of the test need to be clarified, the steps need to be clear, and the test specifications need to be listed. In order to get explicit results, it is necessary to assign different data to each student to ensure that each student needs to calculate different content and complete the experiment course exercise independently. At the same time, in the results submitted by students, supplementary charts and data can be added to facilitate teachers to judge whether the test methods selected by students are appropriate and whether the calculated results are correct.

5. Optimization Practice of Financial Mathematics Experimental Course System

The target talents of the financial mathematics major are mainly able to engage in financial analysis, evaluation, pricing, etc. in financial institutions. Therefore, the knowledge and skills contained in the financial mathematics experimental course must be able to meet the methods and principles used in real life. In order to meet the needs above, the setting and teaching arrangement of the mathematics experimental course system also needs to be continuously optimized and adjusted.

5.1 Focus on Group Discussion

Pay attention to the impact of group discussion on students. Students with different ability levels can exchange views through group discussion, which is helpful to enhance students' understanding of financial knowledge.

5.2 Strengthening the Construction of Financial Mathematics Laboratory

Introduce professional financial mathematical experiment teaching software. Due to the high price, high maintenance cost and high requirements for hardware system of professional system, cloud computing center can be built in combination with schools or off campus, and cloud service and virtualization methods can be adopted to reduce the cost of use and maintenance, so as to provide students with a more secure experimental environment. On the other hand, mathematical experiments rely on financial databases, which can open the download authority of financial databases and achieve the purpose of building a teaching resource center.

5.3 Strengthening the Construction of Teachers

Another key factor influencing the quality of mathematics experimental courses is the level of teachers. In order to improve the teaching level, it is necessary to pay attention to the cultivation of teachers' comprehensive abilities, such as financial knowledge, mathematical theory and practice, and computer skills. First, more students should be encouraged to obtain doctoral degrees in financial mathematics to acquire more young teachers. Second, teachers of non-financial mathematics should offer relevant courses and encouraged to participate in further studies and training. Finally, financial mathematics professional teachers should increase their opportunities for training and exchange abroad, understand the research status at home and abroad, and improve their

professional level.

6. Conclusion

Mathematical experimental teaching is an important step for students to transform their theory into practical problem-solving ability. It improves students' ability to analyze and solve problems and their practical ability. It also becomes the most indispensable part of combining theory with practice and improving teaching quality. Financial mathematics, as an emerging interdisciplinary subject, pays particular attention to students' practical ability, therefore, mathematics experimental teaching plays an important role in the major of financial mathematics. In order to effectively improve the level of experimental teaching and improve the curriculum system, it is necessary to increase the investment of funds, ensure the investment of equipment required for teaching, and improve the experimental teaching system to ensure the implementation of the curriculum system.

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