The Application of Various Teaching Methods in the Teaching of Financial Engineering

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***Abstract*—There are different textbooks in the process of "financial engineering" teaching. Each textbook has its own characteristics. Teaching content is complex. There are a lot of formulas and models. The liberal arts students have great difficulty in learning the course. So teachers need to apply comprehensive teaching method such as deductive teaching method, comparative teaching method, practice teaching method and other teaching methods in order to enhance teaching effectiveness.**

***Index terms*—financial engineering; deductive teaching method; comparative teaching method; practice teaching method**

I. INTRODUCTION

"Financial Engineering" is a new discipline emerging from the United States in the late 1980s. It introduces engineering ideas into the financial field and integrates various engineering methods (mathematical models, numerical models and simulation methods). It develops and implements new types of financial instruments and then creatively solves problems. At present, "financial engineering" has been included in the compulsory core professional courses of finance undergraduate students by the Ministry of Education. "Financial engineering" involves a large number of mathematical formulas and models. Teaching effect will be less satisfactory if teachers do not use the teaching methods that accustom to the curriculum characteristics in the teaching process. So we need to use a variety of teaching methods into the "financial engineering" course teaching.

II."FINANCIAL ENGINEERING" HAS UNIQUE CURRICULUM CHARACTERISTICS.

A. Different versions of textbooks are different advantages.

At present, the domestic common materials are Zheng Zhenlong and Chen Rong's "Financial Engineering" (Higher Education Press), Ye Yonggang and Zheng Kangbin's "Introduction to Financial Engineering" (Higher Education Press), John C.Hull "options, futures and other derivative Products "(Machinery Industry Press). John C.Hull "options, futures and other derivative products" content is more close to the real financial market but the teaching content is very much. Teaching time is 32 hours. Teaching time is not enough. Ye Yonggang and Zheng Kangbin's "Introduction to Financial Engineering" introduces option pricing at the beginning. The students that have poor mathematics basis have more difficulties. Zheng Zhenlong and Chen Rong's "financial engineering" arrange chapters from futures to swap and options. Arrangement of chapters is from simple to complex. It is easy for students to learn the course step by step. However, it mainly introduces the relative pricing method and lack guidance cases. Each version of the textbooks has their own characteristics. Single textbooks can not meet the teaching requirements at the same time. Teachers can use one of them as the main teaching materials and reference to other textbooks.

B. Teaching content is numerous and complex.

Teaching content of "Financial engineering" is very much. We take Zheng Zhenlong and Chen Rong's "financial engineering" as an example. The teaching content includes overview of financial engineering, overview of forward and futures, forward and futures pricing, forward and futures using, stock index futures , forex forward, interest rate forward and interest rate futures, overview of swap, swap pricing and risk analysis, swap using, options and options markets, options returns and price analysis, black-scholes-merton options pricing model, option pricing method, option trading strategy and its use, option price sensitivity and option hedge, stock index options, foreign exchange options, futures options and interest rate options, exotic options and risk management. Although the overall teaching content is the logical order of forward, futures, swaps and options, almost every chapter deals with higher mathematics related knowledge. The options section is also related to probability theory and random mathematical content. Some financial derivatives have not yet launched the market in China. Students can only understand from the book abstractly. Teachers have difficulty in grasping the focus of the course. It is difficult for students to learn it.

C. There are many formulas and models.

We take Zheng Zhenlong and Chen Rong's "financial engineering" as an example. "Chapter 1 forward and futures overview" introduces the common compounding calculation and continuous compound interest calculation at first. The impact is not small for liberal arts students. Then, the part of forward and futures has the forward contract pricing model and the spot forward parity principle. According to the underlying assets, forward contracts are also divided into non-profit assets forward contract pricing, known cash income assets forward contract pricing and known yield assets forward contract pricing. Swap contracts are divided into two major categories that include currency swaps and interest rate

swaps. Then the forward pricing method and bond pricing method are introduced. The bond pricing method also involves the fixed-rate bond pricing model and the floating-rate bond pricing model. The part of option is more complicated. option contracts are divided into European options and American options. After that, writers introduced the Black - Scholes - Morton option pricing model and option pricing numerical methods. The students need to use software to prepare programs to support the calculation. Mathematical calculation and computer programming are daunting task of liberal arts Students. The finance profession recruits the liberal arts students in majority. The liberal arts students more remember various kinds of knowledge and summary when the liberal arts students study in secondary school. They less analyze mathematical questions. They suddenly contact a large number of mathematical models after they enter the university. They need some time to cultivate the mathematical analysis ability.

III. TEACHER SHOULD USE A VARIETY OF TEACHING METHODS INTEGRATE.

A. Deductive teaching method.

The deductive teaching method is the teaching method that applies the deductive reasoning process. Teachers start from the general principles or rules and apply these rules to specific or individual things observation. Deductive teaching method is conducive for students to comprehensively understand the entire knowledge. Students can understand the more knowledge in depth. Teachers can also exercise students' logical thinking ability by deductive teaching method.

Let us take the forward and futures pricing model as an example. First of all, teachers should teach the students to learn the principles of financial engineering pricing. It is easy for students to use the general principles or rules in long-term contract pricing. Teachers and students can first review the definition of the relative pricing method, so students know that the relative pricing method is a method that derives derivative securities prices based on the relationship between underlying asset price and derivative securities prices. Then, teachers can use the relative pricing method in the non-profit assets forward contract pricing. Specifically, the teacher constructs two combinations. The combination A is a forward contract plus the appropriate cash. The combination B is a unit of the underlying asset. The two combinations are equal when the forward contract is expired. According to the principle of no arbitrage, the final value is equal. Then the value of these two combinations at the current moment must be equal. To write the value of combination A and combination B, we can deduce the forward contract pricing model of non-profit assets.

B. Comparative teaching method

Teachers will show two things or two methods of solving the problem to students in the same teaching time when teachers use comparative teaching method. The use of comparative teaching methods can help students to develop their own thinking ability and analyzing ability. It also helps to cultivate students' ability of reasoning and classifying complex things. It helps to cultivate students' analytical ability of finding out the essential differences from the surface phenomena, too. The correct use of comparative teaching method can help students to acquire access to regular knowledge.

Let us take the forward and futures pricing model as an example. The writers do not mention how to use the absolute pricing method in long-term contract pricing. Teachers can combine other teaching materials and some academic literature and sort out the model derivation process by absolute pricing method. Financial forward contracts are contracts that the parties have agreed to buy and sell a certain amount of certain financial assets at a certain time in the future.

Buyer of no income assets forward contracts will spend the right cash in purchasing the underlying assets. Absolute pricing is based on the characteristics of the future cash flow of securities. We should use appropriate discount rate and discount this cash flow to present value. The present value is the reasonable price of this security. The future cash flow discounting model can be deduced if we follow the principle that the expenditure is negative and the purchase is positive. Of course, teachers can also use the icon teaching method and draw graphics to help students understand. It is helpful to extend students' vision if teachers introduce the relative pricing method and the absolute pricing method.

C. Practice teaching method.

The practice teaching is a mode of teaching practice that teachers use demonstration simulation and case analysis in order to guide students to solve the problems in the actual work situation. It is helpful for students to enhance their learning ability. a way of teaching practice teaching ability. Teachers that adopt practice teaching require selecting materials and select materials and equipment according to teaching needs. Practice teaching enables students to obtain knowledge and ability. Practical teaching ability becomes an indispensable ability for teachers nowadays. The teacher can give a leading case before teacher introduce relative pricing method to derive the pricing model of the forward contracts with no income assets. Specifically, consider a 3 month period of non dividend stock forward contract. Assuming that the current stock price is $40, the risk-free rate for the 3 month period is $5% per year. Assuming the forward price is relatively high, for $43, how will the arbitrager do? Assuming forward price is relatively low, for $39, how will the arbitrager do? What circumstances don't arbitrage opportunities exist? Teacher can lead the students to understand the principle of no arbitrage pricing through this case. Students can obtain a better understanding of the latter derivation of the relative pricing process. The teacher can immediately arrange classroom thinking after he completes teaching the asset pricing model. Teacher lets the students think the question at first. Then the teacher explains the question. This will help students to deepen the understanding of the pricing model. For example, a teacher may adopt

such question. Supposing that the current market price of a non dividend paying stock is 20 Yuan, the free risk and continuous compound interest rate is $10%. What is the forward price of the stock for a period of 3 months? What is the value of the forward contract of the 100 transaction amount for the long position if the market price of the stock is 15 Yuan after three month? To solve this example, students should use the zero income asset forward contracts pricing model that they studied just now. The question has moderate difficulty and can consolidate the basic concepts of students.

IV.CONCLUSION

Teachers can guide students to use the financial trading software besides classroom and after-school exercises. Students can use software to understand the financial derivatives trading status every day. Students can analysis chart diagram and average index. These can help the students to understand the financial derivative product market more intuitively. In addition, teachers can guide students to participate in some national financial derivatives trading competition in order to enhance students' interest in learning and comprehensive analysis ability.

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