

**NATIONAL TAIWAN UNIVERSITY**  
**Department of International Business**  
**Options and Futures (選擇權與期貨)**

**Professor Jr-Yan Wang (王之彥)**  
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**Spring 2023**  
**Monday 9:10-12:10**  
**02-33664987**

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**COURSE DESCRIPTION**

The major goal of this course is to give students comprehensive understanding of **financial derivatives** (金融衍生性商品). A derivative instrument is a contract between two parties whose payoff depends on the values of the **underlying variables on a future specified date**. The prices of any commodity assets (such as gold or oil) or financial assets (such as equity shares or bonds) can be the underlying variables, and these assets are called **underlying assets** (標的物).

Three main categories of derivatives will be covered in this course, including **forwards** (遠期合約), **futures** (期貨合約), and **options** (選擇權). Students will learn how and where to trade these derivatives. In addition, the methods to calculate the **theoretical values** (理論價值) of these derivatives are also introduced. Moreover, several **trading and hedging strategies** (交易與避險策略) associated with these financial derivatives will be discussed.

It is strongly recommended that students who are interested in this course should already learn some basic Finance courses before, such as **Investments** (投資學), **Financial Management** (財務管理), or **Corporate Finance** (公司理財). To maintain the fluency of my lecture, I assume students know some basic financial knowledge, e.g., the time value of money, the simple vs. compound interest calculation, the term structure of interest rates, the present vs. future values, the fundamental classes of financial assets, etc. The last thing should be noted is that this course is designed for undergraduate students. For graduate students, if you never learned similar courses before, welcome to take this course. However, you need to keep in mind that the content and exams in this course may be too simple to satisfy your appetite for knowledge.

**Special rule in this semester: If there is no foreign student enrolled in the class, this course will be taught in Chinese.**

## **TEXT AND LECTURE NOTES**

Lecture Notes: <http://homepage.ntu.edu.tw/~jryanwang/> → Course Information → Options and Futures (undergraduate level).

(The most updated PowerPoint files for the lecture each week are available after 9:00 p.m. every Sunday.)

(DO NOT access NTU COOL for the syllabus and lecture notes.)

Required Text: Fundamentals of Futures and Options Markets (global edition), by John C. Hull, 8th ed., 2017. (The representative bookstore of this book in Taiwan is 雙葉書局. If you intend to purchase the text book together, you can contact Mr. 劉懷生 via (02) 2368-4198 ext. 14 or 0932125906.)

(The teaching assistant and I do not involve in ordering the text book for students, since I cannot guarantee that 雙葉書局 offers us the lowest price for the text book.)

Lecture Video: The each-week lecture video will be posted on NTU COOL within 24 hours after the class dismissed. If not, please remind me via sending me an email. The videos on NTU COOL are only available for the enrolled students to review the lecture but not accessible for audit students.

## **EXAMS AND GRADING**

Midterm exam	45% (April 10 <sup>th</sup> )
Final exam	45% (June 5 <sup>th</sup> )
Homework (about option trading strategies)	10% (due on June 12 <sup>th</sup> )
Checking attendance (maximum three times)	+0-3%

- ※ The exam dates are regulated by NTU. Please ensure that you will be available to attend these two exams before you decide to take this course.
- ※ The need of travel or leaving Taiwan before the final exam cannot be the excuse to miss the exams.
- ※ If you cannot attend the exams due to some emergent events, you need to notify me in advance and show me some proofs, e.g., a medical diagnosis or Covid-19 rapid test result. Any late notification is not acceptable.
- ※ The range for each exam depends on the speed of my lecture. On average, I will teach one chapter in a three-hour lecture. The range is not accumulative for the final exam.
- ※ The format for the two exams: 30% for term explanation and 70% for calculation

- problems. All calculation problems are collected from the quizzes and questions at the end of each chapter in the required text with minor modifications.
- ※ The problem sheet is expressed in English, but the answers in either English or Chinese are acceptable.
  - ※ The rule of **alternate seating (梅花座)** will be enforced if possible. Any dishonesty in the exams will lead to a failed result.
  - ※ Students should prepare your personal calculators for the two exams. Note the calculators should at least be able to compute the exponential and natural log functions. Financial or Scientific calculators are allowed. However, smart phones or calculators with memorizing functions are forbidden.
  - ※ Please attend the class on April 17<sup>th</sup> to take your graded examination sheets back. Do not take away graded examination sheets on behalf of other classmates. However, grades of the final exam will not be released.
  - ※ The problem sheet of the homework assignment will be handed out on the final exam day. You need to fill in the answers on the problem sheet and submit the scanned problem sheet via a Google forms link (provided on the problem sheet) before the midnight of June 12<sup>th</sup>.
  - ※ To maintain fairness in the class, there are no make-up exams or other alternative measures for the two exams and homework assignment. I will ignore all emails asking for any alternative way to make up your grades.
  - ※ I will curve your final grades such that the average of the grades in this class is comparable to other courses offered by College of Management of NTU.
  - ※ Special rules that will be applied once distance teaching is enforced: (1) The midterm exam will take place immediately and physically on the following Monday morning; (2) you will learn the lecture from the video on NTU COOL thereafter; (3) if the distance teaching is continuously enforced to the end of the semester, there will be no final exam; (4) if there is no final exam, the final grade is determined only by the graded results of the midterm exam (70%) and homework assignment (30%).

### **RULES IN CLASS**

- ※ **Do not distract other students** from listening to my lecture, e.g., do not chat with other students when I am talking.
- ※ If you have any questions during my lecture, feel free to interrupt me by raising your hand.
- ※ Due to the pandemic of COVID-19, please **wear a facial mask** in the classroom, especially when approaching to the lectern to ask me questions. Moreover, eating

and drinking (except water) are not allowed in the classroom.

## COURSE SCHEDULE

Week	Date	Topic	Reading
1	Feb. 20	Course overview Introduction of different types of derivatives	Syllabus Ch. 1
2	Feb. 27	<b>Bridge holiday for Peace Memorial Day (a national holiday)</b>	<b>No lecture</b>
3	Mar. 6	Different traders and why derivatives are used Mechanics of futures markets	Ch. 1 Ch. 2
4	Mar. 13	Mechanics of futures markets Hedging strategies using futures	Ch. 2 Ch. 3
5	Mar. 20	Hedging strategies using futures	Ch. 3
6	Mar. 27	Interest rates	Ch. 4
7	Apr. 3	<b>Bridge holiday for Children's Day (a national holiday)</b>	<b>No lecture</b>
8	Apr. 10	<b>Midterm exam</b>	
9	Apr. 17	Interest rates Determination of forward and futures prices	Ch. 4 Ch. 5
10	Apr. 24	Determination of forward and futures prices	Ch. 5
11	May 1	Mechanics of options markets	Ch. 9
12	May 8	Properties of stock options	Ch. 10
13	May 15	Introduction to binomial trees	Ch. 12
14	May 22	Valuing stock options: The Black-Scholes model	Ch. 13
15	May 29	Trading strategies involving options	Ch. 11
16	June 5	<b>Final exam</b>	

- ※ To speed up the lecture, there is some simple, descriptive content (written in gray) in the PowerPoint lecture notes. Please study it by yourselves.
- ※ Note that the above schedule is an estimated version, I will dynamically adjust the speed of my lecture according to the feedback of students.
- ※ Chapter 8 (the credit crisis in 2007) and Chapter 14 (employee stock options) are skipped in order to introduce more content in the limited time of this semester.
- ※ If time is enough, Chapter 7 (Swaps) will be briefly introduced near the end of the semester. However, the teaching content in this chapter will “not” be included in the final exam.

## **OFFICE HOURS**

Monday 15:10-16:30 and Thursday 15:10-16:30

Room 712, Building 2, College of Management

- ※ It is not suggested to ask academic questions in emails. First, it is almost impossible to discuss academic issues in emails. Second, I believe that the face-to-face communication is the best way to make me understand your questions and give you the most accurate instruction to solve your problems.
- ※ If you have difficulties in solving exercise questions at the end of each chapter, please ask the teaching assistant first. It is preferred to make an appointment with the teaching assistant rather than ask him questions in emails.
- ※ Try to fully utilize the office hours before making an individual appointment.

## **SPECIAL NOTE**

- ※ I need two volunteers to help me to turn on the PC and projector, download the lecture notes, and borrow the portable wireless microphone (from the reception office in Building 2, College of Management) before each-week lecture. The final scores of the two volunteers will be awarded additional three points.

## **TEACHING ASSISTANT**

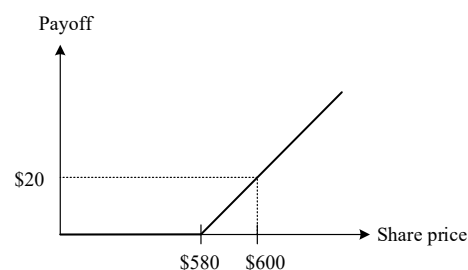
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## Forward and futures contract (遠期合約與期貨合約) (Chapters 2, 3, 5, 6)

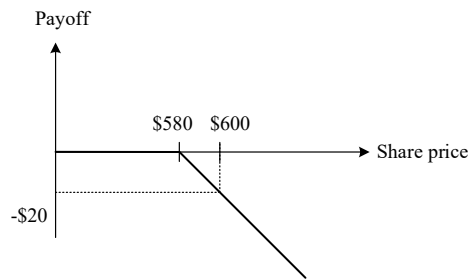
- Definition on Slide 1.6: An agreement (with both the right and obligation for two trading parties) to buy or sell an asset (the underlying asset (標的物)) at a certain time point in the future (the delivery or maturity date (交割日或是到期日)) for an agreed price (the delivery price (交割價)).
- Examples:  
Agreement to buy 100 oz. of gold @ US\$1750/oz. in December (long position).  
Agreement to sell 1,000 bbl. of oil @ US\$85/bbl. in April (short position).
- Profit at maturity:  
If the gold price is US\$1600/oz. in December, the profit is  $-\$150 \times 100 = -\$15,000$ .  
US\$1800/oz. in December, the profit is  $\$50 \times 100 = \$5,000$ .  
If the oil price is US\$75/bbl. in April, the profit is  $\$10 \times 1000 = \$10,000$ .  
US\$90/bbl. in April, the profit is  $-\$5 \times 1000 = -\$5,000$ .
- Differences between forward and futures
  - Futures are traded in exchanges (交易所). The delivery price of a futures contract is determined by the trading demand and supply. Thus, for both buyers (sellers) of futures, they take a long (short) position of the futures with the current delivery price.
  - For forwards, they are traded in OTC markets (櫃檯買賣市場) and their delivery prices are determined by dealers (usually financial institutions).

## Options (選擇權) (Chapters 9-17)

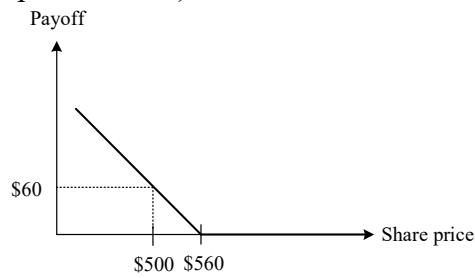
- Definition on Slide 1.19: A right to buy or sell an asset (the underlying asset (標的物)) at a certain time point in the future (the maturity date (到期日)) for a specified price (the strike price (執行價)).
- The right to buy is termed “call option” (買權), and the right to sell is termed “put option” (賣權).
- Four different types of positions for trading options:
  - Buy a call: purchase a right to buy 1 share of Google at \$580/share in December. (purchasing at the ask price \$35.30)



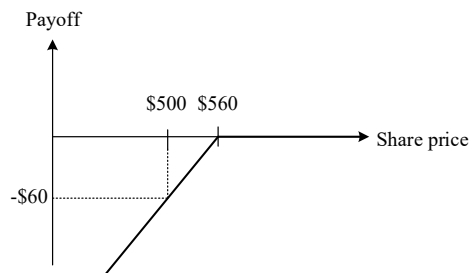
- Sell a call: sell a right such that the trading counterparty can buy 1 share of Google at \$580/share in December. (selling at the bid price \$34.50)



- Buy a put: purchase a right to sell 1 share of Google at \$560/share in September. (purchasing at the ask price \$28.60)



- Sell a put: sell a right such that the trading counterparty can sell 1 share of Google at \$560/share in September. (selling at the bid price \$28.10)



- For options, in addition to different maturities, there are several strike prices for each maturity date that traders can choose.