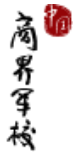




PHBS
北京大学汇丰商学院



FIN-529

Financial Derivative Analytics

Spring Semester, Module 3, 2021-2022

Course Information

Instructor:

Fritz Koger, CFA, PhD

Office: PHBS Building, Room 752

Phone: It is best to contact me via email.

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Office Hours: Tuesdays 12:20-13:20, or by appointment.

Teaching Assistant:

~~Grace, 朱晓慧, ZHU, Xiaohui; 1901212686 in 2019 Finance WeChat: huihuizhu97;
cell phone: 186 1193 8053~~

TA Review Sessions: N/A

Classes:

Lectures: Tuesday and Friday, 10:30 – 12:20

Venue: PHBS Building, Room 403 (Final Exam: Room 501)

Course Website:

N/A

1. Course Description

1.1 Context

Course overview:

This course is intended for the student who wishes to learn how to analyse and utilize financial derivative products, especially with respect to managing risk. The student will learn how to value derivatives, at inception, during their lives, and at expiration. Key concepts include valuing derivatives, determining their payoffs, and their utility in the context of portfolios, especially with respect to managing risk. To a lesser extent, we study how speculators can place highly levered bets via derivative products. We also study how arbitrageurs use derivatives, and how the no-arbitrage principle is at the heart of risk-neutral valuation.

The course will focus on options, forwards, swaps and futures, where several types of underlying assets are considered, including assets that generate cash flows during the life of the derivative (e.g., stocks, stock funds and indexes, coupon-paying bonds, interest rates, foreign currencies, etc...), investment assets and consumption assets.

Option models such as Black-Scholes-Merton and the binomial model (including Monte Carlo analysis) are reviewed. We also review options embedded inside other financial products, e.g., callable/puttable coupon-paying bonds. As time permits, real options will be explored.

Forwards will be studied in detail, especially in the context of their powerful hedging capabilities. Relatedly, futures contracts will be addressed.

Regarding swap contracts, various types will be explored, especially fixed-for-floating rate and various types of cross-currency contracts. We study how swaps can transform the nature of assets and/or liabilities, especially with respect to hedging risks such as floating interest rates and foreign currency exposures.

Course Prerequisites:

Either:

- (i) (a) *Corporate Finance* or *Financial Markets*, (b) *Financial Economics*, and (c) *Investments*; or
- (ii) 2nd year PHBS economics students with adequate finance training per professor’s assessment; or
- (iii) 2nd year NUS students; or
- (iv) proper finance background per professor’s assessment.

Per school policy, the school reserves the right to evaluate a student’s background for preparedness.

1.2 Textbooks and Reading Materials

KOGER, F. H., ``Financial Derivative Analytics. The professor will distribute the book to the student.

2. Learning Outcomes

2.1 Intended Learning Outcomes

Learning Goals	Objectives	Assessment
1. Our graduates will be effective communicators.	1.1. Our students will produce quality business and research-oriented documents.	
	1.2. Students are able to professionally present their ideas and also logically explain and defend their argument.	
2. Our graduates will be skilled in team work and leadership.	2.1. Students will be able to lead and participate in group for projects, discussion, and presentation.	
	2.2. Students will be able to apply leadership theories and related skills.	
3. Our graduates will be trained in ethics.	3.1. In a case setting, students will use appropriate techniques to analyze business problems and identify the ethical aspects, provide a solution and defend it.	
	3.2. Our students will practice ethics in the duration of the program.	
4. Our graduates will have a global perspective.	4.1. Students will have an international exposure.	
5. Our graduates will be skilled in problem-solving and critical thinking.	5.1. Our students will have a good understanding of fundamental theories in their fields.	
	5.2. Our students will be prepared to face problems in various business settings and find solutions.	
	5.3. Our students will demonstrate competency in critical thinking.	

2.3 Assessment/Grading Details

Course Guidelines: There are two overarching themes: the professor's aims are to (1) be as fair as possible to everyone, and (2) create the optimal learning environment for everyone. The professor firmly believes that treating individuals differently is inherently unfair. Thus, everyone will be treated the same.

The student's final grade will be

$$\begin{aligned} & \mathbf{20\% \text{ (Professor's Subjective Evaluation)}} \\ & \mathbf{+ 30\% \text{ (Average of student's Group Project Scores*)}} \\ & \mathbf{+ 50\% \text{ (Individual Exam Score).}} \end{aligned}$$

***Group Peers' Subjective Evaluation:** Each student will self-select into groups of six (6) students. (The professor will assign any student to a group who chooses not to self-select.) Evaluations from each student's group peers will be done during the final week of the module. *NO HUMAN BEING OTHER THAN THE PROFESSOR WILL SEE ANY STUDENT'S EVALUATIONS; NOT EVEN THE TA.* These evaluations will factor into the "Average of student's Group Project Scores". So a student who receives his/her proportional weight from his peers' evaluations will have a factor of 100%. A student who receives more (less) than his/her proportional weight will have a factor greater (less) than 100%.

Subjective Evaluation: 20% of the student's final score will be a subjective evaluation, based in part, on his/her punctuality, attendance, classroom behavior, preparedness, etc... The student is expected to attend lectures and to be punctual so as to not disturb an ongoing lecture. In short, this captures whether or not the student is doing what he/she should do. Inappropriate actions will be penalized.

No cell phones are allowed during lectures. Students may take photos of whiteboard information when the professor says so, though it is all in the course textbook.

There is no need to inform the professor that the student will be absent or to explain an absence afterward. The student should refrain from sending corresponding emails. The professor treats each student as an adult, and as such, does not judge the student's absences per reasons. There is no prejudice regarding absences.

EXAM: If the student has actively participated in all project work, if the student has attended all lectures, if the student has kept up with textbook lecture readings, and if the student has studied carefully any lecture notes provided by the professor, then the exam will be straightforward. *Otherwise, the student will likely be incapable of negotiating it.*

EXAM GUIDELINES: TBD

Professor's Subjective Evaluation: Students are expected to consume materials provided by the professor.

2.4 Academic Honesty and Plagiarism

This class will be conducted in full accordance with PKU's policies regarding academic integrity. Anyone caught cheating will be punished as severely as the school permits.

On group projects, each group is to work independently of other groups. Whereas it is OK for students between different groups to consult each other, each group's deliverable should be independently developed. Simply copying one group's project by another group will result in penalties for *both* groups. For the final (individual) exam, no consultation between students is allowed. The final (individual) exam is to be solely developed by each individual, with no assistance of any kind from any other person. Again, policies are designed with fairness in mind.

Educational Norms and Expectations: The student is responsible for material covered in any class. If a student misses a class, he/she should retrieve lecture notes from a classmate. It is in the student's best interest to *read any assigned material BEFORE the lecture*. That way, the student will find the lecture period to be much more productive.

Suggestions for improving the course: The professor is committed to making this course as good as possible. If the student has suggestions to improve the course, he/she should inform the professor, *IN PRIVATE*. (During a lecture is *not* the appropriate time for such feedback, as there is no time during the lecture for such discussions.) The course is obviously for the student's benefit, not the professor's. So any feedback is greatly appreciated and is seriously considered.

Add/Drop the Course: Per PHBS policy, the student is not allowed to add or drop this course after the first week.

Any issue not specifically addressed here will be handled at the discretion of the professor.

It is important for a student's effort and credit to be recognized through class assessment. Credits earned for a student work due to efforts done by others are clearly unfair. Deliberate dishonesty is considered academic misconducts, which include plagiarism; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; or altering, forging, or misusing a University academic record; or fabricating or falsifying of data, research procedures, or data analysis.

All assessments are subject to academic misconduct check. Misconduct check may include reproducing the assessment, providing a copy to another member of faculty, and/or communicate a copy of this assignment to the PHBS Discipline Committee. A suspected plagiarized document/assignment submitted to a plagiarism checking service may be kept in its database for future reference purpose.

Where violation is suspected, penalties will be implemented. The penalties for academic misconduct may include: deduction of honour points, a mark of zero on the assessment, a fail grade for the whole course, and reference of the matter to the Peking University Registrar.

For more information of plagiarism, please refer to *PHBS Student Handbook*.

3. Topics & Teaching Schedule

Day	Dates	Chs.*	Primary Text Book Chapters* and Topics	Projects; Comments
1	Feb 22	Ch. 1-6	Forward contracts: arbitrage-free price; value during its life; payoffs and profits; hedging an asset; hedging a liability;	Sign-up sheet; English names; brief syllabus; Distribute textbooks;
2	Feb 25	Ch. 1-6	Forward contracts: arbitrage-free price; value during its life; payoffs and profits; hedging an asset; hedging a liability;	Sign-up sheet; Team compositions due Thur 3/03, 13:00
3	Mar 1	Ch. A Ch. 1-6	Excel Review (copy/paste, data tables, etc...) Long and short rates of returns; L1 Calculating Returns (L1 More on Returns SOLN) Forward contracts: arbitrage-free price; value during its life; payoffs and profits; hedging an asset; hedging a liability; L2 Hedging Non-Divid Pay Stk L3 Hedging Divd Paying Stk SOLN	Review Syllabus; Team compositions due Thur 3/03, 13:00
				Team compositions due Thur 3/03, 13:00
4	Mar 4	Ch. B Ch. 7	Wiener process; generalized Wiener process; Ito process; Ito's lemma; BSM differential equation and solutions; Review interest rates; (L5 Interest Rates SOLN)	
5	Mar 8	Ch. 8 Ch. 9	Interest rate forwards; L5 FRA Float for Fix Asset&Liab; Futures Pricing; L6 Futures Pricing	
6	Mar 11	Ch. 9 Ch. 10	Futures contracts: arbitrage-free price; margins; marking to market; L6 Futures MTM; Futures: Hedging, Basis, Cross Hedging; L6 Futures Hedge;	
				Project #1, Sat., Mar. 12, 20:00
7	Mar 15	Ch. 11	Floating-for-fixed interest rate swaps; L7 Swap Floating For Fixed;	
8	Mar 18	Ch. 12	Currency swaps; L8 Swap Currencies SOLN;	
9	Mar 22	Ch. 13	Options: payoffs, profits; baskets (portfolios) of options; L9 A Option Ports Pays Profs; (L9 Option Ports Pays Profs (2) SOLN); L9 B VBA Options Payoffs Profits.xlsm;	
10	Mar 25	Ch. 15	Put-call spot parity; Black-Scholes-Merton model; L10 BSM; comparative statics; L10 BSM Greeks (SOLN);	
				Project #2, Sat., Mar. 26, 20:00
11	Mar 29	Ch. 16	Binary options; Gap options;	

		Ch. 24	L11 Binary; L11 Gap SOLN; Futures options; L11 Futures Options SOLN;	
12	Apr 1	Ch. 18	Static replications of barrier options L12 Static Replications SOLN;	
13	Apr 6	Ch. 19 Ch. 20	Binomial model; option value via: (1) delta hedge, (2) replicating portfolio, (3) risk-neutral probabilities; comparative statics; Multi-period binomial model; L13 L14 Binomial Model;	
14	Apr 8	Ch. 20	Continue Excel worksheet multi-period binomial model; Continue L13 L14 Binomial Model;	
				Project #3, Sat., Apr 09, 20:00
15	Apr 12	Ch. 21	Chooser options and Compound options; L15 Choosers; L15 Cmpnd Optns;	
16	Apr 15	Ch. 22	Rainbow options and path-dependent options; L16 Path Dep Options; L16 Shouts;	
				Project #4, Sat., Apr 16, 20:00
17	Apr 19	Ch. 22	Binomial model plus Monte Carlo analysis: L17 Cliquet SOLN; L17 Rainbows SOLN; L17 Exchange SOLN;	
18	Apr 22	Ch. 23	Valuing bonds with Embedded options. L18 Bonds embedded options SOLN;	
Final Exam	Apr 26?		<u>Sunday, April 26???</u>	

*Chapters refer to the course textbook, ``Financial Derivative Analytics'' by F.H. KOGER, where the brief table of contents are shown on the next page.

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