Econ 0113 – Advanced Economics of Finance

Lecturer information

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What will you learn about?

In this course we will study modern asset pricing, the problem of how to value any financial asset using economic theory. What this means is that we will take the characteristics of the asset as given and determine how they are valued.

The emphasis is on the economics of finance, not on markets as in an MBA-style course. Many practical issues will be discussed, but the emphasis will be on the economics underlying them. The focus is on generality, adapting the material covered in graduate courses in the subject to the level of mathematics expected at an undergraduate course. The benefit of this approach relative to the standard undergraduate or MBA course, structured around CAPM (a specific model), is that it should allow students to see all of asset pricing in a unified manner: whereas CAPM is mainly applied to equities, this course will cover fixed income (term structure of interest rates), equities (beta and factor pricing models, including CAPM) and derivatives using the same economic principles. It also allows students to have a clearer view of how finance is related to other areas of economics, hence allowing them to apply their general economic knowledge and intuition to finance and vice-versa.

We aim to cover the following topics over the 10-weeks.

1. The role of time and uncertainty in determining the value of an asset.
2. The origins and generality of the stochastic discount factor methodology, from individual preferences and simple partial equilibrium consumption-savings problem to general equilibrium and the link to precluding arbitrage opportunities (no free lunch).
3. The main characteristics of the major asset classes: fixed income, equities and derivatives. How the seemingly different methods used for different asset classes have a common universal underpinning linked to optimal choice under uncertainty.
4. The term structure of interest rates (fixed income) and basic elements of dynamic asset pricing using the stochastic discount factor, the beta representation and factor ricing models (equities) and their link to CAPM and mean-variance analysis, and how to price forwards and options (derivatives) and link to the risk-neutral approach.
5. The relationship between finance and other fields of economics, in particular macroeconomics and econometrics.

6. The challenges facing empirical finance and some of the well-known empirical regularities and puzzles, as well as the theories that attempt to address them.

Is this course right for you?

Students are required to have completed the core 2nd year microeconomics compulsory module ECON0013 (previously ECON2001) or a suitable alternative that meets the requirements below prior to taking this course. You should be very familiar with general equilibrium using a mathematical approach (marginal utility, constrained consumer choice and marginal rates of substitution). Because uncertainty plays a key role you must have a firm understanding of statistics. You must not only be able to manipulate and calculate an expectation, variance and covariance, but have good intuition for each of these concepts as they play a key role.

The course is open to Affiliate Students but they must be comfortable working with microeconomic models similar to those covered by UCL students in second year as well as a solid understanding of statistics. *You should be aware that a less advanced version of this course proved to be too challenging for many affiliate students in the past. If you are not sure whether the course is suitable for you please get in touch with the course lecturer.*

The course is most suited to students who enjoy applying economic models to real world situations. You need to be able to apply and interpret abstract theoretical results to solve problems and discuss real world phenomena. You should enjoy microeconomics. Asset pricing is essentially applied microeconomics under uncertainty. You should be familiar with general equilibrium using a mathematical approach (marginal utility, constrained consumer choice and marginal rates of substitution). <u>Because uncertainty plays a key role you must have a firm understanding of statistics. You must not only be able to manipulate and calculate an expectation, variance and covariance, but have good intuition for each of these concepts as they play a key role</u>.

<u>This course may not be for you</u> if:

- you are not comfortable learning abstract concepts and independently applying them to solve problems and understand practical phenomena;
- you do not have a strong microeconomics and statistics background;
- you are not willing to invest the time and effort needed during the term to keep on top of lecture materials and homework.

What will you know (better) by the end of the course?

The aim of this course is to provide students with the analytical skills needed to assess the main determinants of the prices and returns of any asset or investment. By the end of the course, you will be able to see how finance fits within economics and use your general economic knowledge applied to real life investment decisions. It should serve as a solid base for graduate studies in the subject or for pursuing a career in finance.

The desired learning outcomes are that on completion of the course you are able to:

1. Apply economic models and tools to value uncertain payoffs of arbitrary nature.

2. Explain the fundamental economic forces and characteristics of investments that determine their value.
3. Articulate the way the characteristics of different asset classes determine what approach is used to price them.
4. Understand the challenges for empirical asset pricing and some of the avenues of research attempting to address them.
5. Understand the link between finance and other fields of economics.

What have students thought of the course in the past?

Students have found this a conceptually challenging course. There is a lot of abstract material that builds cumulatively throughout the course. In response to this feedback there will be more empirical evidence and discussion of real world applications discussed this year without expanding the scope of the material covered.

How do you learn on this course?

The course is taught using a mix of lectures and tutorials. Students are expected to work independently outside the classroom.

Lectures

There are ten two-hour lectures that will be pre-recorded and available on Moodle. In addition there will be weekly online live sessions, every Friday at 2pm in Term 1 and weekly office hours. In addition there will be separate pre-recorded discussions of empirical evidence and real world applications and I will post recordings with general feedback and discussion of problem sets along with detailed solutions. There is also a revision lecture in the Exam term.

The **lectures** are used to present the formal material of the course. The material is very abstract and conceptually challenging. Even some of the applications will feel very general and hence somewhat abstract. I attempt to include as many concrete and simple examples in the lectures, but independently working through the exercises provided with each lecture is a key part of the course. Students are strongly encouraged to ask questions in each lecture.

I will upload lecture materials (lecture notes and pre-recorded lectures) on Moodle at the beginning of each week. **You must review these in advance of the live sessions on Friday.** This will ensure that you get the most out of the live sessions and enable you to focus your attention on those elements that remain unclear. I do not necessarily work through all the material provided in lecture notes. You are responsible for covering all of the material in lecture notes.

Given the lack of standard textbooks covering the material at an undergraduate level, you will learn best by reading lecture notes and recorded lectures ahead of interactive weekly session were guidance on applications and questions will be answered.

Lectures will cover (list of topics is indicative and maybe adjusted):

0. (Background review material) Choice under uncertainty
    Preferences, expected utility, risk aversion, risk premia
1. Fundamental Asset Pricing Equation: simple consumption-based model
    Consumption-savings decision, intertemporal marginal rate of substitution and stochastic discount factor, role of time and risk
2. Fundamental Asset Pricing Equation: equilibrium approach
    Arrow-Debreu equilibrium, state-prices, contingent claims, market completeness, aggregate vs. idiosyncratic risk and risk sharing, risk-neutral probabilities
3. Fundamental Asset Pricing Equation: no-arbitrage
    Law of One Price, no arbitrage and existence stochastic discount factors, role of complete vs. incomplete markets
4. Introducing Dynamics
    Multi-period extension of FAPE, implications for empirical asset pricing
5. Fixed Income
    Application to term-structure of interest rates
6. Beta Representation and Factor Pricing Models
    Conditional and unconditional beta-representation(s) of FAPE, linear factor models of SDF, link to econometrics: two-step estimation, famous factor models (CAPM, CCAPM, ICAPM, APT)
7. Mean-Variance Approach and the Capital Asset Pricing Model
    From SDF to mean-variance efficient frontier, role of diversification, two-fund portfolio separation theorem, CAPM: beta-representation in mean-variance world
8. Derivative Pricing
    No-arbitrage/risk-neutral pricing, replication of forwards, options, put-call parity, binomial trees and Black-Scholes, role of time and volatility
9. Applications of Options
    Generating different payoff profiles, leverage, risk management, completing the market, value of the firm, real options, understanding bubbles
10. Discussion and Extensions
    Different approaches (SDF, beta-factor models, risk-neutral) for different asset classes (bonds, equities, and derivatives), generality and limitations, discussion of frictions ignored and extensions to basic framework with emphasis on empirical evidence

Tutorials

There are four one-hour tutorials. In tutorials, students get hands-on opportunities to discuss the application of the theory in practice. These will allow students to discuss the questions assigned at the end of each lecture as well as the feedback on homework. For the tutorials to work as intended you should attempt all of the exercises provided each week in advance for the class discussion. You are encouraged to come to office hours during term if you have any questions on the material covered.

Attendance in tutorials is, in line with Department policy, compulsory. Please only attend the tutorial on your timetable. Let the economics department know at the start of term if there is a clash with another tutorial or lecture. If you have a genuine reason for missing a tutorial, please inform the class tutor at the earliest possible time. You will be marked as 'Excused' on the register if you provide a reasonable explanation.

Homework

You will get individual feedback on four submitted problem sets during term in addition to detailed solutions on Moodle. Marks and feedback will appear with a two week lag after the problem set is due to accommodate extra time that some students may be given for Extenuating Circumstances. *Feedback will only be provided if you have attached and completed the Department Feedback Form.*

We also provide answers for the suggested exercises at the end of each lecture note on Moodle with a one week lag so you first work on them without solutions.

Details of all homework assignments will be available on Moodle and you must submit all work via Turnitin. Late homework is normally not marked. However, if you have a genuine reason for not submitting work, or for submitting work late, please inform the class tutor at the earliest possible time.

> *You will be awarded a mark of 0% or Grade F in any examination, or other summative assessment component (essay, multiple choice questions, projects, etc.) where you: (1) are absent from the summative assessment component or, (2) do not attempt the summative assessment component or, (3) attempt so little of the summative assessment component that it cannot be assessed. Please check the UCL Academic Manual (Section 3.11) for information on the consequences of not submitting or engaging with any of your assessment components.*

> *If you are a re-sitting student or taking deferred assessment the academic regulations for 2017/18 apply to you. In this case if you do not complete or take an assessment component that is worth more than 20% of the total assessment you will be considered incomplete. This means that you can not pass the module. If this is your first attempt you may be entitled to LSA in the component. Please discuss with the Departmental Tutor (f.witte@ucl.ac.uk) if you are unsure of the consequences for you.*

> *If you have extenuating circumstances that affect your ability to engage with any of the module assessment components please apply for alternative arrangements to the Economics Department as soon as possible. See details in Section 6 of the Academic Manual and send your request to economics.ug@ucl.ac.uk.*

> *If you have a disability or long-term medical condition, you may be entitled to adjustments for assessments. Please see Section 5 of the Academic Manual for information on how to apply for adjustments. If part of your assessment includes an in-class quiz and you feel that you are unable to complete it in the time allocated please contact the Departmental Tutor, Dr Frank Witte (f.witte@ucl.ac.uk) and the UG Admin team (economics.ug@ucl.ac.uk). Do not contact the course lecturer about this.*

Readings

Lectures will be based on self-contained lecture notes. You are responsible for covering all of the lecture notes. Unfortunately currently there are no undergraduate textbooks covering this material.

The following suggested readings are only meant for students who desire to go beyond what is necessary for this course (they are typically aimed at master level or above, and hence *not required*). Lecture notes will include references to the appropriate pages in these textbooks.

Cochrane, J., *Asset Pricing*, Princeton,Univ. Press any edition. Chapters 1-6, 9, 17 contain a more advanced treatment of much of the material covered in this course (aimed at PhD). Also covers the econometric theory, so good reference to have if you think you will study finance further. A more recent graduate textbook that is more up to date and also very similar to the structure and emphasis of this course is John Campbell's *Financial Decisions and Markets, A Course in Asset Pricing*, Princeton,Univ. Press 2018.

Danthine and Donaldson, *Intermediate Financial Theory*, Pearson Education, any edition. Useful as a supplement, closer in level to this course (aimed at master level).

Hull, J., *Options, Future and other Derivatives*, Pearson Education, any edition. In-depth treatment of derivatives (last two lectures of this course).

Assessment

Your overall grade for the course is based on your performance in four submitted problem sets and the final exam. The marks are allocated as follows:

- Problem sets: 40%
    - First problem set: 50% (of problem sets mark)
    - Average of the best two of the last three submitted problem sets 50% (of problem sets mark)
- Final exam (2 hours): 60%

So first problem set is worth 20% of your final mark, the best two of the remaining three problem sets are worth 10% of final mark each, and the final exam is worth 60% of the final mark. Each component of the assessment is marked out of 100, with the weights above applied to give a final total mark.

The structure of the weights serves two related purposes: (1) it encourages students to engage with the material early on, as the first problem set carries a significant weight of the final mark and is worth more than remaining problem sets; and (2) it corresponds to the relative importance of the first few weeks of the course which cover the core asset pricing theory, with later weeks devoted to specific topics. The importance of the material in the first 3 weeks of the course cannot be overstated.

The exam and homework are marked using the Department Grade Descriptors as published in the Department of Economics Undergraduate Handbook. You are expected to provide concise and well-structured answers to the specific question asked. Your answers should be based on economic theories and models from the course, making use of mathematical analysis, diagrams, literature references and discussion.