

IB911-15 Asset Pricing and Risk

26/27

Department

Warwick Business School

Level

Taught Postgraduate Level

Module leader

Roman Kozhan

Credit value

15

Module duration

10 weeks

Assessment

20% coursework, 80% exam

Study location

University of Warwick main campus, Coventry

Description

Introductory description

Asset Pricing and Risk is a core module for all students in the first (autumn) term of the MSc in Mathematical Finance. The objective of this module is to provide a rigorous, in-depth introduction to the theoretical foundations and empirical applications of Asset Pricing. It focuses primarily on the investor's perspective and analyses individual's consumption and portfolio choice and their implications for equilibrium asset prices. In addition, contingent claims valuation techniques based on the absence of arbitrage are presented.

[Module web page](#)

Module aims

The main aim of this module is to introduce students to modern theories of Asset Pricing and Portfolio Theory in both static and dynamic settings. The key is the modelling and measurement of uncertainty (risk), how investors make decisions in the presence of such uncertainty, and how such behaviours drive both time series and cross-section of asset prices and returns in equilibrium. The module is designed specifically for MSMF students and builds on their unique background profile.

The main objectives are to develop ...

1. a solid understanding of the theoretical framework,
2. the ability to interpret and critically evaluate existing and new theoretical and empirical literature, and
3. the skills and methodologies to apply the theory to practical problems, such as for example to ...

3.a) build empirical tests to validate different models,

3.b) derive and implement strategies for optimal asset allocation or risk management, and to

3.c) devise and implement methods to assess the performance of such strategies.

As the “foundation stone” of one of the four pillars of the MSMF architecture, this module is closely integrated with the other Term 1 core modules (for example, the mathematical and statistical skills required for the applied part of IB911 are built in core modules Stochastic Calculus and Financial Statistics, while the theory developed in IB911 provides applications for the latter.)

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Introduction to Markets and Instruments. Net Present Value

Fixed Income securities markets

Valuation of discount and coupon bonds

Spot, forward rates, yield-to-maturity

Interest rate risk

Corporate bonds, Pricing of green bonds

Modelling Investor Preferences in the Presence of Uncertainty

The "Axioms of Choice"

Utility Functions and Risk Premium

Building a Theory of Portfolio Allocation on the Basis of Utility Framework

Foundations from Utility Theory

Diversification; Efficient Portfolios; Optimal Asset Allocation

Combining "Portfolio Theory" with Market Equilibrium

The Capital Asset Pricing Model (CAPM)

Factor Models: Empirical Evaluation

Extending the Basic CAPM: Multi-Factor Models

Zero-Beta CAPM

Conditional CAPM

Arbitrage Pricing Theory

Basic Model of Asset Pricing under Uncertainty without Preferences

States, Pay-Offs, Prices and Arbitrage

Arrow-Debreu Prices, Completeness

Risk-Neutral Pricing, the Stochastic Discount Factor

Multi-Period Models: Dynamic Completeness, Martingales

Contingent Claims: Arbitrage, Pricing, and Hedging

Dynamic Optimality and Equilibrium

Efficient Markets. Introduction to Behavioural Finance

Learning outcomes

By the end of the module, students should be able to:

- Define and explain, intuitively and formally, the fundamental trade-off between risk and return, and how this can be modelled and quantified.
- Demonstrate full understanding of how individuals make decisions in the presence of uncertainty, and how these affect asset prices and returns in equilibrium
- Demonstrate full understanding of how the principle of “absence of arbitrage” is used for valuation and hedging of “contingent claims” in both static and dynamic models
- Use a variety of quantitative and statistical tools to analyse data and implement/assess quantitative solutions to problems in Asset Pricing

Indicative reading list

[Reading lists can be found in Talis](#)

Research element

The students will work on group project which involves research activity, summary of literature review and creative solutions, data work and coding

Interdisciplinary

The module naturally spans Finance, Economics, Mathematics and Statistics aspects

International

The case studies cover international markets and practices.

Subject specific skills

Design and implement empirical methodology to a) estimate the parameters of, and b) assess the validity of, a variety of asset pricing models.

Design and implement optimal strategies for asset allocation or risk management; devise and apply measures of performance of such strategies.

Transferable skills

Demonstrate academic writing skills.

Critically evaluate empirical research.

Study

Study time

Type	Required
Lectures	10 sessions of 2 hours (13%)
Seminars	9 sessions of 1 hour (6%)
Project supervision	(0%)
Private study	121 hours (81%)
Total	150 hours

Private study description

18 hours preparation for seminars/tutorials; 20 hours preparation for/ex-post revision of lectures; 1 â 2 hours office hour consultation; 32 hours self-study (reading, selfassessment, exercise, 48 hrs for assessment

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Students can register for this module without taking any assessment.

Assessment group D4

Assessment component	Weighting	Study time	Eligible for self-certification
Group Project 2,500 word report	20%		No
Reassessment component is the same			
Centrally-timetabled examination (On-campus) Beginning of term 2.	80%		No

Weighting **Study
time**

**Eligible for self-
certification**

- Answerbook Pink (12 page)
- Students may use a calculator

Reassessment component is the same

Feedback on assessment

Cohort-level feedback (incl. detailed solution notes) after the class test. Formative and summative individual written feedback for the project report. Cohort-level feedback (incl. detailed solution notes) after final exam.

[Past exam papers for IB911](#)

Availability

Courses

This module is Core for:

- Year 1 of TIBS-N3G2 Postgraduate Taught Mathematical Finance