RoME Master In Economics

Asset Pricing (Part I)

Nicola Borri*

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1 Presentation

1.1 Course Description

The topics and approach of this class combine macroeconomics and finance, with an emphasis on developing and testing theories which involve linkages between financial markets and the macro economy. This course is based on three ideas:

1. First, returns are not random walks but are predictable over business cycle and longer horizons. Thus, we need macroeconomic models that generate predictability - through time-varying risk aversion for example - and appropriate empirical methods to estimate them.

2. Second, all financial assets can be understood using a stochastic discount factor M and a description of their payoff X. The price P of a financial asset is then simply $= E(MX)$. Macroeconomic models give us ideas about the form of the

*Nicola Borri: Room 530, Department of Economics and Finance, LUISS University, Viale Romania 32. Tel: 0685225959. Email: nborri@luiss.it. Web: http://docenti.luiss.it/borri/. Office hours: By appointment.

stochastic discount factor M. GMM estimators give us a natural framework to test these ideas.

3. Third, time varying risk premium dramatically changes portfolio theory, leading to new computing issues and solutions to old Merton problems.

This course is thus a survey of both asset pricing theory and empirical methods. We will cover the modern stochastic discount factor approach to asset pricing theory, with applications to stocks, bonds and currencies. We will cover empirical methods, including how to evaluate asset pricing models and how to evaluate forecasting techniques. We will go back and forth between macroeconomic and financial theories and empirical tests of these theories.

The course is designed for students who are interested in financial economics.

- I will assume you have a good knowledge of basic finance facts, instruments and results. To check your memory and knowledge of basic finance you can skim through a set of lectures notes prepared by John Cochrane.

- There will be computational problems and replication exercises. I strongly recommend Matlab (or similar software, as Python), and hints or answers to the problems will be provided in Matlab code. Tutorials can be found online on the following websites: Ian Cavers' An Introductory Guide to Matlab at UBC, Paul Fackler's Matlab Primer at North Carolina State University, Matlab Summary and Tutorial at Florida University, Edward Neuman's Matlab Tutorials at Southern Illinois University, Kermit Sigmon's Matlab Tutorial at Utah University. For Python, a great reference is Hilpisch (2016). To learn Python with economics applications, the best reference is Thomas Sargent's website quantitative economics.

1.2 Student Evaluation

Final grade is based on a in-class final exam and 5 problem sets. Students are encouraged to form study groups, but each student is expected to hand in one solution. Solutions should be typed and will be discussed in class. The weight of the problem sets on the final grade is 20%. Students' participation in the in-class discussion of problem sets will be evaluated and part of the problem sets' grade.

1.3 Textbooks

The following textbook is *required*: Cochrane (2005). The following textbooks are useful additional references: Campbell (2017), Singleton (2006) and Campbell et al. (1997). Three big surveys should be read over the course of the class: Cochrane (2017), Cochrane (2006) and Campbell (1999). An excellent intermediate textbook you can refer to if you want to review basic topics in finance is Danthine and Donaldson (2014).

2 Course Outline

The following pages detail the theoretical and empirical topics that will be covered in class. Lecture notes on each topic (with additional references), published articles and working papers will be available online.

2.1 Consumption-based Asset Pricing

Topics:

- Utility-based asset pricing: Stochastic discount factor; Prices, payoffs and returns;
- Risk-free rates: Certainty case; Uncertainty case;

- Risky assets: Risk correction; Idiosyncratic risk; Expected return-beta representation and market price of risk; Mean-variance frontier; Equity premium puzzle; Random walks and time-varying expected returns.

- Stylized facts about asset pricing and returns.

Required reading: Cochrane (2005), chapter 1-2 and Cochrane (1999).

Additional readings: Campbell and Shiller (1988), Lucas Jr (1978) Cochrane (2007), Cochrane (2011)

2.2 Contingent Claims, Discount Factors and Mean-Variance Frontiers

Topics:

- Contingent Claims: Definition; Risk-neutral probabilities; Risk sharing; State diagram and price function;

- Discount factors: Law of one price and existence of discount factor; No arbitrage and positive discount factors;

- Mean-variance frontier and Beta representations: Lagrangian approach to Mean-variance frontier; Orthogonal characterization; Hansen-Jagannathan bounds;

- Relation between discount factors, betas and mean-variance frontiers: From discount factors to beta representation; From mean-variance frontier to a discount factor and beta representation; Factor models and discount factors; Implications of equivalence theorems.

- Conditioning information: Scaled payoffs; Conditional and unconditional moments; Scaled factors.

Required reading: Required reading: Cochrane (2005), chapter 3-4 and Hansen and Jagannathan (1991).

Additional reading: Hansen and Richard (1987).

2.3 Models

2.3.1 Factor Pricing Models

Topics:

- Capital Asset Pricing Model (CAPM): Two-period quadratic utility; Exponential utility, normal distribution; Log utility; Linearization.
- Arbitrage Pricing Theory (APT)
- Estimation of a factor model.

Reading: Fama and MacBeth (1973), Fama and French (1992) and Cochrane (2005), chapter 9.

Additional reading: Fama and French (1996), Fama and French (1993)

2.3.2 Heterogenous agents

Topics: Constantinides and Duffie (1996)'s model with heterogenous agents

Required reading: Constantinides and Duffie (1996)

2.3.3 Habits

Topics:

- Campbell and Cochrane (1999)'s Model: Preferences; Risk-free rates; Key mechanism;
- Simulation: Fixed-point method; Series method;

- Extensions: Bonds; Exchange rates

Required reading: Cochrane (2005) chapter 21.2; Campbell and Cochrane (1999).

Additional readings: Wachter (2006), Verdelhan (2010).

2.3.4 Long Run Risk

Topics:

- Epstein and Zin (1991)'s Model: Preferences; Stochastic discount factor;
- Bansal and Yaron (2004): Consumption and dividend growth processes; Linear approximation; Interpretation;
- Extensions: Value and momentum puzzle; Bonds.
- Time-varying probability of disaster.

Required readings: Epstein and Zin (1991), Bansal and Yaron (2004).

Additional readings: Bansal et al. (2006), Piazzesi and Schneider (2006).

2.3.5 Disaster Risk

Topics: Barro's Model (2009)

Required reading: Barro (2006) and Gourio (2012).

2.3.6 Sovereign Risk

Topics: Models with endogenous default and the price of sovereign debt; Borri and Verdelhan (2013)s model.

Required reading: Arellano (2008) and Borri and Verdelhan (2013)

Additional readings: Aguiar and Gopinath (2006) and Neumeyer and Perri (2005).

2.3.7 Currency Risk

Topics: Models that explain deviations from the uncovered-interest rate parity (UIP) and carry-trade returns.

Required reading: Lustig and Verdelhan (2007) and Lustig et al. (2011)

Additional readings: Borri and Shakhnov (2017)

2.3.8 Cryptocurrency

Topics: what are the cryptocurrencies? what are their risk-return characteristics?

Required reading: David (2013), Gandal et al. (2018), Liu and Tsyvinski (2018)

Additional reading: Borri (2018) and Borri and Shakhnov (2018)

2.4 Empirical Asset Pricing

Topics:

- General Method of Moments: General Formulas; Asset Pricing; Pre-specified weighting matrix W and spectral matrix S; Linear Discount Factors;
- Regression-Based Tests of Linear Factor Models: Time-Series Regressions; Cross-sectional Regressions; Fama-McBeth Procedure;
- Maximum Likelihood: General formulas; Excess returns as factors; Other cases;

Required readings: Cochrane (2005), chapter 10 and 11 and Hansen and Singleton (1982), Hansen and Jagannathan (1997).

Additional readings: Lettau and Ludvigson (2001); Yogo (2006); Shanken and Zhou (2007); Jagannathan and Wang (2007)

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