UNIVERSITY OF CHICAGO
BOOTH SCHOOL OF BUSINESS

Business 34902-50
(cross-listed as Economics 35060)
Asset Pricing II

Winter 2023

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Thursday 8:30 AM - 9:50 AM
HC 3A

PRELIMINARY – TO BE UPDATED

Students in this class are required to adhere to the standards of conduct in the Chicago Booth Honor Code and Standards of Scholarship

Course Description

This course builds on Asset Pricing I. We cover empirical methods for uncovering and estimating the cross-sectional and time-series variation of risk premia. Weak economic restrictions lead us to reduced-form factor models, including equity factor models and term-structure models, as a parsimonious representation of the stochastic discount factor. We examine models of subjective belief formation of investors and models based on frictions as explanations for the empirically observed risk premium variation.

Readings

Further below is a reading list for each session. This is a preliminary list. We may update it as we proceed throughout the semester.

Weeks 5 (Th) - 9 (Nagel): For most sessions, I assigned chapters from a work-in-progress book draft that I am developing with Ian Martin (LSE). They are listed

on the reading lists as "MN". I will post these chapters on canvas and I will update them as we go along in the course. Note that our draft is incomplete and still very much unpolished. References are incomplete and there may be many typos and errors lurking in the draft. For this reason, please do not share the draft with anybody outside the class. (Suggestions and corrections are highly welcome!)

Office hours

(Nagel) You are welcome to stop by at my office. It may be most efficient to send me an email to arrange a suitable time for a meeting.

Course requirements and grading

Exams
There will be a final exam covering weeks Nagel's portion of the course.

Grading
The overall grade for this course will be based the average of the grade from the first half (Hansen) and second half (Nagel). The grade for the second half (Nagel) is based on class participation (20%) mid-term exam (40%) and problem sets (40%).

Accommodations

If you require any accommodations for this course, please provide us with a copy of your *Accommodation Determination Letter* (provided to you by the Student Disability Services office) so that you may discuss with us how your accommodations may be implemented in this course. The University of Chicago is committed to ensuring the full participation of all students in its programs. If you have a documented disability (or think you may have a disability) and, as a result, need a reasonable accommodation to participate in class, complete course requirements, or benefit from the University's programs or services, you are encouraged to contact Student Disability Services as soon as possible. To receive reasonable accommodation, you must be appropriately registered with Student Disability Services. Please contact the office at 773-702- 6000/TTY 773- 795-1186 or disabilities@uchicago.edu, or visit the website at `disabilities.uchicago.edu`. Student Disability Services is located at 5501 S. Ellis Avenue.

Below is a preliminary outline of the sessions and topics for the second half of the course. We may change this as we go along, depending on our progress.

Second half of the course, taught by Stefan Nagel

Session 5B: Cross-section of expected stock returns

Topics: Stock characteristics and expected returns, absence of near-arbitrage, factor models

Readings:

- MN Chapter 7 as background
- MN Chapter 8
- Kozak, Serhiy, Stefan Nagel, and Shrihari Santosh, 2018, Interpreting factor models, *Journal of Finance* 73, 1183–1223
- Kozak, Serhiy, and Stefan Nagel, 2022, When do cross-sectional asset pricing factors span the stochastic discount factor?, Working paper, University of Chicago

Session 6A: Estimation and Evaluation of Linear Factor Models

Topics: Moment conditions for linear factor model estimation, specification tests, model comparison, goodness of fit assessment

Readings:

- MN Chapter 9
- Fama, Eugene F., and Kenneth R. French, 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33, 23–49
- Lettau, Martin, and Sydney C. Ludvigson, 2001, Resurrecting the (c)capm: A cross-sectional test when risk premia are time-varying, *Journal of Political Economy* 109, 1238–1287
- Lewellen, Jonathan, Stefan Nagel, and Jay Shanken, 2010, A skeptical appraisal of asset-pricing tests, *Journal of Financial Economics* 96, 175–194

Session 6B: Machine learning approaches to the cross-section of stock returns

Topics: Regularized estimation, trees, neural networks

Readings:

- Nagel, Stefan, 2021. *Machine Learning in Asset Pricing* (Princeton University Press, Princeton, NJ), Chapter 3
- Chapter 2 and 4 in `https://web.stanford.edu/~hastie/StatLearnSparsity_files/SLS_corrected_1.4.16.pdf`
- Gu, Shihao, Bryan Kelly, and Dacheng Xiu, 2020, Empirical asset pricing via machine learning, *Review of Financial Studies* 33, 2223–2273

Session 7A: Machine learning with economically motivated regularization

Topics: Regularization motivated by economic priors, maximum Sharpe ratio penalties

Readings:

- Kozak, Serhiy, Stefan Nagel, and Shrihari Santosh, 2020, Shrinking the cross-section, *Journal of Financial Economics* 135, 271–292
- Bryzgalova, Svetlana, Markus Pelger, and Jason Zhu, 2021, Forest through the trees: Building cross-sections of stock returns, Working paper, Stanford University

Session 7B: Time-Series Predictability of Returns

Topics: Present-value identity, finite-sample bias in predictive regressions, out-of-sample vs. in-sample predictability

Readings:

- MN Chapter 10
- Section 2 of Stambaugh, Robert F., 1999, Predictive regressions, *Journal of Financial Economics* 54, 375–421

- Welch, Ivo, and Amit Goyal, 2008, A comprehensive look at the empirical performance of equity premium prediction, *Review of Financial Studies* 21, 1455–1508

Sessions 8A: Dynamic Term Structure Models

Topics: Affine term structure models

Readings:

- MN Chapters 13.1 to 13.4
- Cochrane, John H., and Monika Piazzesi, 2008, Decomposing the yield curve, Working paper, Stanford University

Sessions 8B: More on Dynamic Term Structure Models

Topics: Bond risk premia, unspanned factors, bond pricing under subjective beliefs

Readings:

- MN Chapters 13.5 and 13.6
- Duffee, Gregory R, 2011, Information in (and not in) the term structure, *Review of Financial Studies* 24, 2895–2934
- Cieslak, Anna, 2018, Short-rate expectations and unexpected returns in treasury bonds, *Review of Financial Studies* 31, 3265–3306

Session 9A: Bayesian Learning and Return Predictability

Topics: PV identity with subjective beliefs, Bayesian learning

Readings:

- MN Sections 17.1, 17.2
- Lewellen, Jonathan, and Jay Shanken, 2002, Learning, asset-pricing tests and market efficiency, *Journal of Finance* 57, 1113–1145
- Adam, Klaus, and Stefan Nagel, 2022, Expectations data in asset pricing, Working paper, NBER

Session 9B: Equilibrium pricing with subjective uncertainty

Topics: Anticipated utility models, priced parameter uncertainty, learning with fading memory

Readings:

- MN Sections 17.3 - 17.6
- Collin-Dufresne, Pierre, Michael Johannes, and Lars A Lochstoer, 2016, Parameter learning in general equilibrium: The asset pricing implications, *American Economic Review* 106, 664–698
- Nagel, Stefan, and Zhengyang Xu, 2022, Asset pricing with fading memory, *Review of Financial Studies* 35, 2190–2245