**FIN512 Empirical Asset Pricing II**

**Autumn 2016**

**Course Outline and Syllabus**

**Contact Information:**

Professor Lars A. Lochstoer

Uris Hall 405B

Phone: +1 (212) 851-2119

Email: [LL2609@columbia.edu](mailto:LL2609@columbia.edu)

# Description

This course is a PhD level course in empirical asset pricing. The asset pricing field is vast, but we will focus primarily on two core ideas:

1. time-series properties of asset returns (predictability, volatility, correlations with other variables, etc.)
2. cross-sectional properties of asset returns implied by equilibrium asset pricing models (including CAPM, consumption-based asset pricing, factor models, etc.)

We’ll also examine the bond market and look at some simple term structure models, as well as the pricing of equity index derivative securities. Finally, we will discuss some recent research on the commodity futures markets.

We will use a variety of econometric techniques, including GMM and maximum likelihood, as well as various time-series models. We view these econometric techniques as a way of answering economic questions, rather than being interested in the econometric methodology per se.

# Prerequisites

The course is designed for second year doctoral students in finance. The prerequisites are a PhD level course in theoretical asset pricing, as well as some exposure to econometrics.

# Materials

I will distribute lecture notes in class. You are required to yourself download and, if you want, print copies of any journal articles that we will cover. References are given in the back of this document, and I will in class let you know which articles we will focus on for each class.

We will read substantial parts of the following book:

Cochrane, John, 2005, *Asset Pricing: Revised Edition* Princeton, NJ: Princeton University Press

It is referred to as (**AP**) in the reading list.

Other excellent reference books are the following:

Campbell, John Y., Andrew W. Lo, and A. Craig MacKinlay, 1997, *The Econometrics of Financial Markets*, Princeton, NJ: Princeton University Press

Duffie, Darrell, 2001, Dynamic Asset Pricing Theory, 3rd Edition, Princeton, NJ: Princeton University Press

Singleton, Kenneth J., 2006, *Empirical Dynamic Asset Pricing*, Princeton, NJ: Princeton University Press

Hamilton, James D., 1994, *Time Series Analysis*, Princeton, NJ: Princeton University Press

You will need access to Matlab, Gauss or some other matrix programming language.

The Reading List includes both classics that you should read at some point and newer material to give you an idea of how people are approaching the subject more recently.

# Requirements

There will be a substantial required homework assignment, which will be due by the end of the semester (usually sometime in November). I expect students to spend two weeks on finishing this assignment. Most people do not acquire a deep understanding of empirical issues without actually doing empirical work. Therefore you will be assigned exercises that require dealing with data and estimating models. You are free to use any software available to you to perform this empirical work. Matlab, Stata, and Eviews are recommended.

Class participation is mandatory. You are expected to be prepared to discuss and answer questions related to the required readings.

There will be a final exam at the end of the semester which counts for 55% of the grade. The problem set will count for 35% of the grade. Class participation will account for the remaining 10% of the grade.

**Class Schedule**

September 14 – 16, 2016: 10:00 to 16:00, room to be determined.

December 8 – 9, 2016: 09:30 to 15:30, room to be determined.

The homework will be handed out September 16th and is due in the morning of December 8th in class. We will then go through the homework in detail and discuss recent developments in empirical asset pricing such as models with financial frictions and intermediaries in the remainder of the class time on December 8th and 9th.

**Tentative Reading List**

# We may deviate from this reading list. I will let you know about any such deviations in class.

1. **The CAPM and an econometric review**

*a. Methodology: CAPM, OLS, and early tests of the CAPM*

* Any source to review CAPM theory. In AP, it is Ch. 9, but this chapter depends on Chapters 4, 5, and 6 as well.
* Time-series tests: Gibbons, Ross and Shanken (1989). AP Ch. 12.
* Cross-sectional tests: AP pp. 434 - 452.
* Other references: Shanken (1987), Shanken (1992), Black, Jensen, and Scholes (1972), Fama and MacBeth (1973)

*b. Landmark critique of the unconditional CAPM*

* Fama and French (1992)

*c. Methodology: review of asymptotics for OLS and robust standard errors*

* Any graduate-level econometrics textbook (e.g., Hamilton, referenced above).

**2. Multifactor models I: Methodology, linear K-factor models, and anomalies**

*a. The Fama-French Model and critiques*

* Fama and French (1993)
* AP Ch. 9
* MacKinlay (1995)
* Lo and MacKinlay (1990)
* Berk (1995)
* Daniel and Titman (1997)

*b. General linear factor models*

* AP Ch. 13

*c. Anomalies and establishing a new stylized fact*

* Momentum: Jegadeesh and Titman (1993), Asness, Moskowitz, and Pedersen (2009)
* Liquidity: Pastor and Stambaugh (2003)
* Idiosyncratic volatility: Ang, Hodrick, Xing, and Zhang (2006, 2009)
* Social networks: Cohen, Frazzini, and Malloy (2008)
* Inattention: Cohen and Frazzini (2008)

*d.* *Factor models and fund performance measurement*

* Background reading: Carhart (1997), Berk and Green (2004)
* Mutual fund performance: Kosowski, Timmermann, Wermers, and White (2006)
* Hedge fund performance: Fung, Hsieh, Ramadorai, and Naik (2008)

**3. Time-series properties of returns I: Predictability**

* AP Ch. 20.1
* Shiller (1981)
* Fama and French (1989)
* Campbell and Shiller (1988)
* Lettau and Ludvigsson (2001a)
* Hodrick (1992)
* Stambaugh (1999)
* Boudoukh, Michaely, Richardson, and Roberts (2007)
* Ang and Bekaert (2006)
* Cochrane (2008)
* Pastor and Stambaugh (2009)

**4. Beyond the unconditional CAPM**

*a. Conditional linear factor models*

* AP Ch. 8.
* Lettau and Ludvigsson (2001b)
* Lewellen and Nagel (2006)
* Nagel and Singleton (2011)
* Other references: Jagannathan and Wang (1996), Ferson and Harvey (1999), Petkova and Zhang (2005)

*b. Value, growth, and duration*

* Campbell (1991)
* Campbell and Mei (1993)
* Dechow, Sloan, and Soliman (2004)
* Campbell and Vuolteenaho (2004)
* van Binsbergen, Brandt, and Koijen (2010)
* Other references: Campbell (1993), Cohen, Polk, and Vuolteenaho (2003), Cohen, Polk, and Vuolteenaho (2006), Lettau and Wachter (2007)

**5. Methodology: GMM tests of models with an observable stochastic discount factor**

* Hansen and Singleton (1982)
* AP Ch. 10, 11
* Other references: Hansen, Heaton and Yaron (1996)

Required reading (although you do not need to follow in detail all of the math in the Hansen papers, especially when nonnegativity is imposed). The Jagannathan and Wang paper was suggested reading earlier in the semester. Here it is included because it develops an estimation methodology for the HJ-distance.

* Hansen and Jagannathan (1991)
* Hansen and Jagannathan (1997)
* AP The material on H-J bounds in Chapter 5, and Chapters 13 - 16 (they are short chapters)
* Jagannathan and Wang (1996)
* Hodrick and Zhang (2001)
* Li, Xu, and Zhang (2010)

We will not discuss this related paper. It works out the econometrics of the HJ-distance when the null is that the econometrician has the wrong stochastic discount factor.

* Hansen, Heaton, and Luttmer (1995)

**6. Consumption-based asset pricing**

* *The standard Consumption CAPM (CCAPM) and general background material:* AP Ch. 21, Campbell (2003), Working (1960), Parker and Julliard (2005)
* *The conditional CCAPM (e.g., habit)*: Lettau and Ludvigsson (2001b)
* *Long-run risk*: Bansal, Kiku and Yaron (2007)
* *Euler equation errors*: Lettau and Ludvigson (2009)
* *Heterogeneous agents*: Vissing-Jorgensen (2002), Mankiw and Zeldes (1991)
* *Heterogeneous goods*: Yogo (2006), Piazzesi, Schneider, and Tuzel (2007), Lochstoer (2009)
* *Consumption disaster risk*: Barro, Nakamura, Steinsson, and Ursua (2009)
* *Learning:* Johannes, Lochstoer, and Mou (2010)
* *Other references*: Mehra and Prescott (1985), Campbell and Cochrane (1999), Bansal and Yaron (2004), Rietz (1988), Barro (2009).

**10. The term structure**

*a. Motivation and some facts:*

* AP, Chapter 19
* Litterman and Scheinkman (1991)
* Campbell and Shiller (1991)
* Bekaert and Hodrick (2001)
* Cochrane and Piazzesi (2006), Cieslak and Povala (2011)
* Bekaert, Hodrick, and Marshall (2001)

*b. Formal modeling:*

A good background source on this topic include

* Piazzesi (2003)

We will discuss some features of the following papers

* Dai and Singleton (2000)
* Duffee (2002)
* Ang and Piazzesi (2003)
* Duffee (2010)

**11. Financial Frictions**

Some background theory: Bernanke and Gertler (1989; agency costs, imperfect contracts, and business cycle fluctuations), Shleifer and Vishny (1997; limits to arbitrage), Kyotaki and Moore (1997; borrowing constraint related to market value of collateral in business cycle model), Brunnermeier and Pedersen (2008; funding liquidity, margin constraints).

Pro-cyclical leverage of financial intermediaries: Adrian and Shin (2010)

Financial Crisis and Consumption: Muir (2016)

Broker-Dealer leverage growth and the xsec of stock returns: Adrian, Etula, and Muir (2013)

Betting on Beta: Frazzini and Pedersen (2013)

Embedded leverage: Frazzini and Pedersen (2013)

Limits to arbitrage and market segmentation: Evidence from commodity markets

Some background: Sundaresan (1981), Fama and French (1986).

* *Facts and Fantasies:* Gorton and Rouwenhorst (2006)
* *Speculator capital*: Etula (2010), Tang and Xiong (2010), Mou (2010)
* *Producer hedging and commodity prices:* Acharya, Lochstoer, and Ramadorai (2013)