

Class 1: Introduction, Lectures, and Assignments

Taking the empirical asset pricing class as a first-year PhD student was the best experience in my entire PhD career. The realization that real-world financial data contains information about risk aversion, a concept exists only in the abstract, made a strong impression on me. By today's standard, it may sound incredibly naive, but it was truly an eye-opening moment. Once the door was open, learning about the financial markets and extracting information from the data became something I really enjoyed doing. My academic career has its ups and downs, but knowing that the markets will always be there is a comforting thought. I might take issues with the current status of our field of asset pricing. There were also times when I came out of Finance seminars, feeling thoroughly uninspired. But the markets and their endless uncertainties always managed to pick me up, pushing me to pay attention to a world that is much larger than my immediate surroundings. So it gives me joy to teach this class, to share with you why studying financial markets – big or small, young or mature, calm or volatile – can be as interesting as reading novels, playing video games, or watching movies. Put aside your cynicism, and give yourself the opportunity to be awed. It is only 6 weeks, 12 days, and 24 classes, after which, you can go back to where you were before.

1 An Overview of the Lectures

In preparing for this class, I went through a large collection of syllabi of empirical asset pricing classes taught elsewhere. I realize that there is a great cross-sectional variation, with professors teaching the content they are more familiar with, often concentrating on their own past work. There has also been a significant time-series shift. The current syllabi bear only a mild resemblance of the topics that was covered twenty years ago. In deciding on the topics to cover, my intention is to give you as broad a coverage as possible, although I am bound by my own limitations.

Week One: I would like to cover two distinct approaches in Finance: structural estimation in the tradition of Hansen and Singleton (1982, 1983) and cross-sectional estimation popularized by the work of Fama and French (1992, 1993). Coming out of Stanford's PhD program in 2000, I was very much the product of the structural-estimation approach. I began to learn

about the Fama and French factors only after I became an assistant professor and had to teach the materials to the MBA students at MIT Sloan. Although I have migrated toward the latter approach over the years, along with the rest of our profession, I find the early training on structural estimation enormously beneficial. For this reason, I would like to push you to master both approaches in this class. *There are two mandatory assignments: one on Hansen and Singleton (1982) and the other on Fama and French (1992).*

Week Two: Collectively, we the finance profession spend a lot of effort in analyzing just one time series, that of the S&P 500 index returns. Focusing on the first moment of this time series, there emerged the predictability literature, led by Campbell and Shiller (1988a,b) and Fama and French (1988a,b). The literature is huge, so are the collective interests, but the empirical evidence has been rather weak. Focusing on the second moment of this time series, there emerged the literature on time-varying volatility – the ARCH model by Engle (1982) and the GARCH model by Bollerslev (1988). Relative to this time-series, I would like to introduce the option-pricing literature, which has its root in Black and Scholes (1973) and Merton (1973). Let’s see what the option data on the S&P 500 index can tell us about this very important time-series. Our focus will be on stochastic volatility and market crashes. For this, I will use my job-market paper, Pan (2002). *Optional assignment: use option data to replicate the results of Bakshi, Cao, and Chen (1997).*

Week Three: This week covers the US Treasury market and the currency market. Of all markets, the US Treasury market is the most important for the global economy. It is the primary financing channel for the US federal government, a risk-free benchmark for all other financial instruments, a safe-haven asset, and important Repo collateral. It is also where the US Federal Reserve implements its monetary policy, and, with US dollar’s status as the world’s reserve currency, where countries such as China and Japan park substantial shares of their foreign-exchange reserves. We will first study the Treasury yield curve, focusing on the key empirical facts of this market; then study the yield curve in connection with the monetary policy and macro-economy conditions; time permitting, we will look at some of the very famous term-structure models and their impact on the evolution of the fixed-income market on Wall Street. Moving on to the currency market, we will start with a brief history of the currency wars – a topic made interesting by the current trade war and potential incoming finance war. We will then come back to the finance domain and study the key empirical facts about this market. Among others, the focus will be on the US dollar as the reserve currency, the Japanese yen as the funding currency and safe-haven currency, and the future of Chinese yuan. *Optional assignment: fit the Treasury yield curve and estimating the market liquidity as in Hu, Pan, and Wang (2013).*

Week Four: The main topics include credit, banking, and financial crises. Credit is an important component of finance and the markets for credit instruments are huge, varying in structure from fixed- and floating-rate bonds to credit derivatives; in issuer from sovereign countries to government sponsored agencies to corporations; in maturity from short-term repo financing to commercial papers to medium-term notes to long-term bonds. Central to the pricing of credit-sensitive instruments are two components: probability of default and the loss given default. Our focus will be on the US corporate bonds with the structural model of default by Merton (1974) as the main pricing framework. We will also study the price discovery in the Chinese corporate bond market. On the second day of the week, we will study the most important player in the credit market – banks, whose main business model is to supply long-term credit via short-term financing. We will also cover the key episodes of financial crises, focusing in particular on credit crises and failures of banks and other large financial intermediaries. *Optional assignment: replicate the results in Geng and Pan (2019) for the Chinese credit market.*

Week Five: In our first class, asset pricing is done at the aggregate level with a representative agent, but, in practice, decision making happens at the individual level. Motivated by this observation, we examine the role of financial intermediation, behavioral finance, and household finance. We will first cover the empirical studies on US mutual funds and hedge funds; study the future of financial intermediation in the era of FinTech with a focus on China. The second day of the week provides a brief overview of behavioral finance the household finance. *Optional assignment: measure the flow-performance sensitivity of the Chinese mutual funds as in Hong, Lu, and Pan (2019).*

Week Six: Different from most of the asset-pricing models, which operate at a rather high-level with loose and abstract connections to the markets, the academic field of market microstructure attempts to make a closer link between financial theories and financial markets. Over the past two decades, the empirical work in this area has been fueled by the rapid growth of high-frequency trading and the wealth of high-frequency data. We will focus on two central questions: the price discovery mechanism of the markets and the measures of market liquidity. *Two optional assignments: replicate the pre-FOMC announcement drift as documented in Lucca and Moench (2011); replicate the corporate bond liquidity measure documented by Hu, Pan, and Wang (2011).*

2 Course Schedule

1. Nov 11: **Structural Estimations**

- Class 1: Introduction
- Class 2: Consumption-based asset pricing models
- 2. Nov 12: **Cross-Sectional Estimation**
 - Class 3: Fama and French (1992, 1993)
 - Class 4: Other cross-sectional patterns
- 3. Nov 18: **Time-Series Analysis**
 - Class 5: Predictive regressions
 - Class 6: Time-varying volatility
- 4. Nov 19: **Options**
 - Class 7: Option-pricing models
 - Class 8: Empirical studies on options
- 5. Nov 25: **Fixed Income**
 - Class 9: Yield curves and term-structure models
 - Class 10: Monetary policy
- 6. Nov 26: **Currency**
 - Class 11: History of currency wars
 - Class 12: Key risk factors in currency
- 7. Dec 2: **Credit Market**
 - Class 13: Default pricing in the US corporate bond market
 - Class 14: Price discovery and market segmentation in China's credit market
- 8. Dec 3: **Banking and Financial Crises**
 - Class 15: Understanding banks' balance sheets
 - Class 16: History of financial crises
- 9. Dec 9: **Financial Intermediaries**
 - Class 17: Mutual funds and hedge funds
 - Class 18: Financial intermediation in the era of FinTech

10. Dec 10: **Behavioral Finance and Household Finance**

Class 19: Behavioral economics and finance

Class 20: Household finance

11. Dec 16: **Microstructure**

Class 21: Price discovery and market-moving news

Class 22: Measures of liquidity

12. Dec 17: **Questions and Answers**

Class 23: What makes a good empiricist? (my personal view)

Class 24: Questions from students

3 Assignments and Exercises

Working on assignments and exercises is the most effective way for you to get a taste of what empirical research is all about. Coming to lectures is of course important, but working on the assignments is many times more important; listening to my lectures might not be 100% fun, but working on the assignments will be, at least for those empirically minded researchers. Your course workload includes small-scale empirical exercises, designed for the MBA-level classes I taught at MIT Sloan, and large-scale assignments.

Empirical Exercises

All four empirical exercises are required, each accounting for 5% of your final grade:

1. Empirical analysis of stock returns (TA: Qing Liu, Due: November 18)
2. Time-series analysis of stock returns (TA: Zhiyuan Yu, Due: November 25)
3. Options (TA: Qing Liu, Due: December 2)
4. Fixed-Income (TA: Zhiyuan Yu, Due: December 9)

Mandatory Assignments

Both assignments are required, each accounting for 15% of your final grade:

1. Hansen and Singleton (1982) (TA: Qing Liu, Due: November 25)
2. Fama and French (1992) (TA: Zhiyuan Yu and Meiling Chen, Due: December 16)

Elective Assignments

Pick two out of the six assignments. The due dates for both assignments are January 13, 2020, each accounting for 10% of your final grade.

1. Options: Bakshi, Cao, and Chen (1997). (TA: Qing Liu)
2. Treasury yield curves: Hu, Pan, and Wang (2013). (TA: Zhiyuan Yu)
3. Chinese credit market: Geng and Pan (2019). (TA: Qing Liu and Zhe Geng)
4. Flow-performance in China's mutual funds: Hong, Lu, and Pan (2019). (TA: Zhiyuan Yu and Linchen Liu)
5. Pre-FOMC drift: Lucca and Moench (2011). (TA: Qing Liu)
6. Corporate bond liquidity: Bao, Pan, and Wang (2011). (TA: Zhiyuan Yu)