Quantitative Asset Management

MGMTMFE 431 LEC 4

Spring 2019

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Office: Room C-413
Class: Tuesdays 8:30am–11:20am, room D-301

Teaching Assistant: TBD
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TA Sessions: Thursdays 10:00am-11:00am, room D307

Overview

The objective of the class is to provide you with the knowledge to manage a large portfolio of assets or to knowledgeably select and monitor someone who does so for you. Standard portfolio theory tells all investors to choose the same portfolio of risky assets. We start by highlighting the limitations of standard mean-variance analysis, and we describe newer alternatives like risk parity investing which equalizes the total risk contribution coming from each asset class. Along the course, we will study the Fama and French five-factor model, momentum (both cross-section and time-series), volatility, commodities, currency. We will also study smart-beta strategies such as betting against beta and quality minus junk. We will study return predictability, mutual fund and hedge fund performance. Finally, we will discuss p-hacking and the limitations of anomaly-based investing.

To achieve these objectives, this class builds on key concepts of modern portfolio theory and empirical asset pricing already studied in the previous MFE classes. The class draws on recent advances in empirical asset pricing. Until the 70's, teaching investments was very straightforward but rather boring. There was only market risk, because the CAPM ruled. Portfolio advice was a one-liner. Returns were thought to be completely unpredictable coin flips, so there was no room for market timing. The new paradigm in finance has abandoned all of these views. There is whole range of priced risk factors, not just market risk. In addition, returns are widely thought to be somewhat predictable, sometimes we cannot do much better than a coin flip, but often that's enough to create market timing opportunities that deliver high Sharpe ratios and profitable momentum trading strategies in bond, equity, currency and commodity markets. All of these new insights will be the building blocks for this class.

Contact

My preferred mode of communication is email: bernard.herskovic@anderson.ucla.edu.

Course Requirements

This course relies heavily on concepts introduced in your core finance, econometrics, and statistics classes. This course is quantitative and requires programming skills. It is highly recommended to be fluent in R or Python. All the problem sets should be coded in R or Python, otherwise they will not be graded.

Assessment and Format

The class makes heavy use of problem sets and academic papers to illustrate and apply the concepts. Grades in this class will be assigned on the basis of class participation (10%), four problem sets (7.5% each), a final project (25%), and a take-home exam (35%). All problem sets will be available at the beginning of the quarter.

The take-home exam is similar to a problem set. The take-home exam will be posted on June 13, 2019, at 6pm, and it will be due on June 14, 2019, at 6pm. This is a 24-hour exam. Late submissions are not be accepted. There an in-class presentation of the final project week 10, and cannot be rescheduled except for valid reasons.

There are four problem sets. These are individual assignments. You can discuss the problem sets with your classmates, but you should submit your own work. There is one final project, and you can work on this project in group of up to 5 people. All assignments will be graded.

This class is heavily based on academic papers. I will assign three to four papers for each lecture. These papers will be presented and discussed in class. I expect you to read the required readings. Optional and recommended readings are not required, but I'd urge to take a look at these anyway.

Class attendance is required. You will have to sign in every week. If you cannot attend class for a valid reason, you should notify me by email ahead of time. Multiple missed classed are not accepted. Class participation will be graded, and I will cold call on students. I implement a no-laptop policy. I will make the slides available online at the beginning of each week.

Course Text

The reading list contains a list with all the papers assigned to each lecture. The reading list also contains hyperlinks to the readings. Detailed slides will be posted on-line for each class. You need to be logged into the Anderson VPN to access these readings.

I will not follow a textbook, but recommended books for additional (optional) reading are:

- (highly recommended, graduate level) 'Empirical Asset Pricing: The Cross Section of Stock Returns,' by Turan G. Bali, Robert F. Engle, and Scott Murray (Wiley, 2016)
- (highly recommended, graduate level) 'Empirical Asset Pricing: Models and Methods', by Wayne Ferson (The MIT Press, 2019)
- (graduate level) 'Asset Pricing,' by John Cochrane (Princeton University Press, 2001),
- (more basic with many examples) 'Asset Management: A Systematic Approach to Factor Investing,' by Andrew Ang (Oxford University press, 2014).

Problem Set Grading Guidelines

- 100 points: Professional work, perfect exposition of results. All answers are correct, the code is checked and runs well. The student shows outstanding coding criteria (very high standard and very unlikely grade).
- 95 points: Excellent exposition of the results. Almost all answers are correct; the work is thoughtful and coherent (hopefully somewhat likely grade).
- 90 points: Very good exposition (most likely grade).
- 85 points: Fair exposition. Some red flags showing inconsistent and incomplete write-up and code (somewhat likely grade).
- 80 points: Poor exposition. Copied and pasted code. Some answers are correct, but others are just off. The write-up is not well exposed, and it displayed lack of interest and effort (hopefully unlikely grade).
- 60 points: on-time write-up only submission (no code).
- 40 points: on-time code-only submission (no write-up).

Late Submissions:

- 10-point deduction for on-time write-up submission but late code submission (up to 2hrs late).
- 10-point deduction for on-time code submission but late write-up submission (up to 2hrs late).
- Late submissions are not accepted after 2hrs being late.
- No grade reduction for write-up or code submission late up to 15 minutes.

Outline

Tentative Schedule

Lecture		Material and Assignments Due
1	April 2	Black-Litterman, $1/N$, and Risk Parity Investing
2	April 9	Asset Growth, Profitability, and Fama and French Five-Factor Model Problem Set 1 due Sunday 4/14
3	April 16	Momentum Problem Set 2 due Sunday 4/21
4	April 23	Time Series Momentum and Volatility
5	April 30	Commodity, Short-selling, and Comomentum Problem Set 3 due Sunday 5/5
6	May 7	Return Predictability
7	May 14	BAB, QMJ, Currency Problem Set 4 due Sunday 5/19
8	May 21	Mutual Fund and Hedge Fund Performance
9	May 28	Factor Zoo and Data Mining
10	June 4	Final Project Presentations Final project report due Tuesday 6/4 by 8:30am
11	**June 13–14** Thursday/Friday	**24-hour take-home final exam** from 6/13/2019 6pm to 6/14/2019 6pm

Readings

Week 1: Black-Litterman, $1/N$, and Risk Parity Investing

- (required) Intuition behind Black-Litterman: Guangliang He and Robert Litterman. The intuition behind black-litterman model portfolios. 1999.
  - *Very Important*: Sections 2-3 (pages 2-7)
- (required) $1/N$ rule: Victor DeMiguel, Lorenzo Garlappi, and Raman Uppal. Optimal versus naive diversification: How inefficient is the 1/n portfolio strategy? *The review of Financial studies*, 22(5):1915–1953, 2007.
  - *Very Important*: Sections 1, 2, and 3 (pages 1921–1936), and Tables 3, 4, and 5 (Panel A).
- (required) Risk Parity: Clifford S Asness, Andrea Frazzini, and Lasse H Pedersen. Leverage aversion and risk parity. *Financial Analysts Journal*, 68(1):47–59, 2012.
  - *Very Important*: entire paper, but focus on understanding Figure 1 and Table 2 (Panel A). Read Appendix A as well.
- (required) More on Risk Parity: Denis Chaves, Jason Hsu, Feifei Li, and Omid Shakernia. Risk parity portfolio vs. other asset allocation heuristic portfolios.
  - *Very Important*: Tables 2 and 3.
- (optional) Mean variance recap: Andrew Ang. Mean-variance investing. 2012.

Week 2: Asset Growth, Profitability, and Fama and French Five-Factor Model

- (required) Asset Growth: Michael J Cooper, Huseyin Gulen, and Michael J Schill. Asset growth and the cross-section of stock returns. *The Journal of Finance*, 63(4): 1609–1651, 2008.
  - *Very Important*: Tables 1, 2, 3 (Panel A)
- (required) Profitability: Robert Novy-Marx. The other side of value: The gross profitability premium. *Journal of Financial Economics*, 108(1):1–28, 2013.
  - *Very Important*: Figure 1, and Tables 1 (Panel A), 2, 4 (Panel A), 6

- (required) Fama and French five-factor model: Eugene F Fama and Kenneth R French. A five-factor asset pricing model. *Journal of Financial Economics*, 116(2): 1–22, 2015.
  - *Very Important*: Tables 3, 5, 6
- (recommended) Size and Value: Eugene F Fama and Kenneth R French. The cross-section of expected stock returns. *the Journal of Finance*, 47(2):427–465, 1992.
- (recommended) Size and Value: Eugene F Fama and Kenneth R French. Common risk factors in the returns on stocks and bonds. *Journal of financial economics*, 33(1): 3–56, 1993.
- (optional) Asset growth in international markets: Xi Lia and Rodney N Sullivanb. Investing in the asset growth anomaly across the globe. *Journal Of Investment Management*, 13(4):87–107, 2015
- (optional) Value investing: Clifford Asness, Andrea Frazzini, Ronen Israel, and Tobias Moskowitz. Fact, fiction, and value investing. *The Journal of Portfolio Management*, 42(1):34–52, 2015
- (optional) Deep value: Clifford Asness, John Liew, Lasse Pedersen, and Ashwin Thapar. Deep value. 2017

Week 3: Momentum

- (required) Narasimhan Jegadeesh and Sheridan Titman. Returns to buying winners and selling losers: Implications for stock market efficiency. *The Journal of finance*, 48 (1):65–91, 1993.
- (required) Jonathan Lewellen. Momentum and autocorrelation in stock returns. *The Review of Financial Studies*, 15(2):533–564, 2002.
- (required) Clifford S Asness, Tobias J Moskowitz, and Lasse Heje Pedersen. Value and momentum everywhere. *The Journal of Finance*, 68(3):929–985, 2013.
- (required) Kent Daniel and Tobias J Moskowitz. Momentum crashes. *Journal of Financial Economics*, 122(2):221–247, 2016.
- (optional) Momemtum investing: Adrienne Ross, Ronen Israel, Tobias Moskowitz, and Laura Serban. Implementing momentum: What have we learned? 2017

Week 4: Time Series Momentum and Volatility

- (required) Tobias J Moskowitz, Yao Hua Ooi, and Lasse Heje Pedersen. Time series momentum. *Journal of Financial Economics*, 104(2):228–250, 2012.
- (required) Andrew Ang, Robert J Hodrick, Yuhang Xing, and Xiaoyan Zhang. The cross-section of volatility and expected returns. *The Journal of Finance*, 61(1): 259–299, 2006.
- (required) Alan Moreira and Tyler Muir. Volatility-managed portfolios. *The Journal of Finance*, 72(4):1611–1644, 2017.
- (optional) John H Cochrane. New facts in finance. *Economic Perspectives*, 23(3): 36–58, 1999a.
- (optional) John H Cochrane. Portfolio advice for a multifactor world. *Economic Perspectives*, 23(3):59–61, 1999b.

Week 5: Commodity, Short-selling, and Comomentum

- (required) Short-selling: Itamar Drechsler and Qingyi Freda Song Drechsler. The shorting premium and asset pricing anomalies. 2016.
- (required) Comementum: Dong Lou and Christopher Polk. Comomentum: Inferring arbitrage activity from return correlations. 2013.
- (required) Commodity: Gary Gorton and K Geert Rouwenhorst. Facts and fantasies about commodity futures. *Financial Analysts Journal*, 62(2):47–68, 2006.
- (required) Commodity: Marta Szymanowska, Frans Roon, Theo Nijman, and Rob Goorbergh. An anatomy of commodity futures risk premia. *The Journal of Finance*, 69(1):453–482, 2014.

Week 6: Return Predictability

- (required) Ivo Welch and Amit Goyal. A comprehensive look at the empirical performance of equity premium prediction. *The Review of Financial Studies*, 21(4): 1455–1508, 2007.
- (required) John H Cochrane. Presidential address: Discount rates. *The Journal of finance*, 66(4):1047–1108, 2011. Read pages 1047–1058.
- (required) Davide Pettenuzzo, Allan Timmermann, and Rossen Valkanov. Forecasting stock returns under economic constraints. *Journal of Financial Economics*, 114(3):517–553, 2014.

- (required) John Y Campbell and Samuel B Thompson. Predicting excess stock returns out of sample: Can anything beat the historical average? *The Review of Financial Studies*, 21(4):1509–1531, 2007.
- (optional) Martin Lettau and Stijn Van Nieuwerburgh. Reconciling the return predictability evidence: The review of financial studies: Reconciling the return predictability evidence. *The Review of Financial Studies*, 21(4):1607–1652, 2007.

Week 7: BAB, QMJ, Currency

- (required) Andrea Frazzini and Lasse Heje Pedersen. Betting against beta. *Journal of Financial Economics*, 111(1):1–25, 2014.
- (required) Clifford S Asness, Andrea Frazzini, and Lasse Heje Pedersen. Quality minus junk. 2014.
- (required) Hanno Lustig, Nikolai Roussanov, and Adrien Verdelhan. Common risk factors in currency markets. *The Review of Financial Studies*, 24(11):3731–3777, 2011.
- (optional) Betting against correlation: Clifford S Asness, Andrea Frazzini, Niels Joachim Gormsen, and Lasse Heje Pedersen. Betting against correlation: Testing theories of the low-risk effect. 2016
- (optional, fun!) Andrea Frazzini, David Kabiller, and Lasse Heje Pedersen. Buffett's alpha. 2013.

Week 8: Mutual Fund and Hedge Fund Performance

- (required) Mark M Carhart. On persistence in mutual fund performance. *The Journal of finance*, 52(1):57–82, 1997.
- (required) Ilia D Dichev and Gwen Yu. Higher risk, lower returns: What hedge fund investors really earn. *Journal of Financial Economics*, 100(2):248–263, 2011.
- (required) Jakub W Jurek and Erik Stafford. The cost of capital for alternative investments. *The Journal of Finance*, 70(5):2185–2226, 2015.
- (required) Mark Mitchell and Todd Pulvino. Characteristics of risk and return in risk arbitrage. *the Journal of Finance*, 56(6):2135–2175, 2001.
- (required) Mark Broadie, Mikhail Chernov, and Michael Johannes. Understanding index option returns. *The Review of Financial Studies*, 22(11):4493–4529, 2009.

Week 9: Factor Zoo and Data Mining

- (required) Campbell R Harvey, Yan Liu, and Heqing Zhu. and the cross-section of expected returns. *The Review of Financial Studies*, 29(1):5–68, 2016.
- (required) R David McLean and Jeffrey Pontiff. Does academic research destroy stock return predictability? *The Journal of Finance*, 71(1):5–32, 2016.
- (required) Kewei Hou, Chen Xue, and Lu Zhang. Replicating anomalies. Technical report, National Bureau of Economic Research, 2017.
- (required) Kewei Hou, Chen Xue, and Lu Zhang. Replicating anomalies. Technical report, National Bureau of Economic Research, 2017.

  The Wall Street Journal also published an article about this paper: An Algorithm, an ETF and an Academic Study Walk Into a Bar (May 11,2017).
- (optional) Shihao Gu, Bryan Kelly, and Dacheng Xiu. Empirical asset pricing via machine learning. Technical report, National Bureau of Economic Research, 2018.

References

Andrew Ang. Mean-variance investing. 2012.

Andrew Ang, Robert J Hodrick, Yuhang Xing, and Xiaoyan Zhang. The cross-section of volatility and expected returns. *The Journal of Finance*, 61(1):259–299, 2006.

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