PhD Module on Anomalies in the Cross-Section of Stock Returns

Reading List & Coding Assignments

Background materials

Background Readings:

This really is background material. I'll assume you know the basics and are familiar with the material in these:

1. Cochrane, J., 2011, Discount rates, Journal of Finance 66, 1047-1108.
2. Fama, E. F. (1970). "Efficient Capital Markets: A Review of Theory and Empirical Work". Journal of Finance.
3. Fama, E. F., 1976, *Foundations of Finance*, chapters 1-5
4. Fama, E. F., Efficient Capital Markets II, Journal of Finance, 46 (December 1991) 1575-1617.
5. Fama, E. F. (2013). "Two Pillars of Asset Pricing" (PDF). Prize Lecture for the Nobel Foundation.
6. Schwert, G. W. (2003). "Anomalies and market efficiency". Handbook of the Economics of Finance.

Coding Resource:

1. [MATLAB for Economics and Econometrics: A Beginner's Guide](#) by Frain

Useful links for PhD students:

These are links that I found helpful during my PhD years. I highly recommend you watch #1 (I found it quite funny) and all the interviews in #2 below. Lasse Pedersen's guide (#3) is also a must in my opinion. Thompson's guide (#8) is about econ PhD students, but it has some very valuable insights about navigating PhD life more generally.
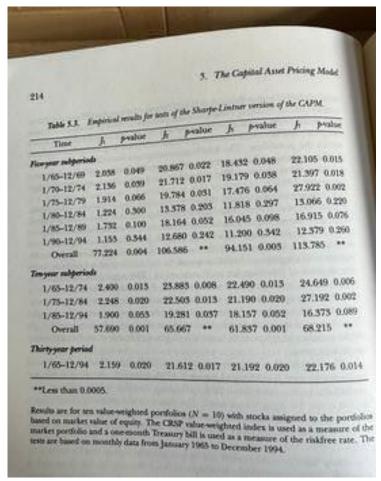
1. Asset Pricing Theory Explained
2. AFA's Masters of Finance Interview series.
3. How to succeed in academia by Pedersen
4. Writing Tips for Ph.D. Students by Cochrane
5. How to avoid disaster in presentations by Piazzesi
6. What's Hot in Finance (2008-2012) by Bhattacharya
7. What's Hot in Finance (2011-2015) by Bhattacharya
8. Being a graduate student in economics by Thompson (Chapter will be posted on CANVAS)

Topic 1: Cross-section of stock returns: CAPM to FF3

<u>Data exercise:</u>

Generally speaking, whenever I ask you for replications, you should replicate the results qualitatively. For example, Black, Jensen, and Scholes (1972) uses 1926-1965 for their sample. If you start your sample in 1963 or later, that's fine, as long as you run the same test for the latter sample.

1) Qualitatively replicate the main result in Black, Jensen, and Scholes (1972)
   a. The flat SML (Figure 1)
2) GRS test
   a. Qualitatively replicate the result for J_1 for the full sample in Campbell-Lo-MacKinlay Table 5.3 (let me know if you need a copy of the book):

5. The Capital Asset Pricing Model

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Table 5.3. Empirical results for tests of the Sharpe-Lintner version of the CAPM.

Time	J_1	p-value	J_2	p-value	J_3	p-value	J_4	p-value
Five-year subperiods								
1/65–12/69	2.058	0.049	20.867	0.022	18.432	0.048	22.105	0.015
1/70–12/74	2.136	0.039	21.712	0.017	19.179	0.038	21.397	0.018
1/75–12/79	1.914	0.066	19.784	0.031	17.476	0.064	27.922	0.002
1/80–12/84	1.224	0.300	13.378	0.203	11.818	0.297	13.066	0.220
1/85–12/89	1.732	0.100	18.164	0.052	16.045	0.098	16.915	0.076
1/90–12/94	1.155	0.344	12.680	0.242	11.200	0.342	12.379	0.260
Overall	77.224	0.004	106.586	**	94.151	0.005	113.785	**
Ten-year subperiods								
1/65–12/74	2.400	0.013	23.883	0.008	22.490	0.013	24.649	0.006
1/75–12/84	2.248	0.020	22.503	0.013	21.190	0.020	27.192	0.002
1/85–12/94	1.900	0.053	19.281	0.037	18.157	0.052	16.373	0.089
Overall	57.690	0.001	65.667	**	61.837	0.001	68.215	**
Thirty-year period								
1/65–12/94	2.159	0.020	21.612	0.017	21.192	0.020	22.176	0.014

**Less than 0.0005.

Results are for ten value-weighted portfolios ($N = 10$) with stocks assigned to the portfolios based on market value of equity. The CRSP value-weighted index is used as a measure of the market portfolio and a one-month Treasury bill is used as a measure of the riskfree rate. The tests are based on monthly data from January 1965 to December 1994.

3) Explore the relation between size, valuations, and average returns.
   a. Qualitatively replicate the results with beta, ME and BE/ME on the RHS of Table III (that is, rows 1-4, 7, from Fama and French (1992))
   b. Find something you didn't know (not necessarily a new result in the literature, just something new to you). Could be looking at different time periods, different types of stocks, alternative measures for value, etc.

4) GRS test
    a. Estimate, report, and interpret a GRS test for the CAPM and FF3 using the 25 size-book-to-market portfolio from Fama and French (1993) as test assets (no need to add the bonds)
        i. Look at their Table 9c for reference

Recommended Readings:

1. Black, Fischer, Michael C. Jensen, and Myron Scholes. 1972. "The Capital Asset Pricing Model: Some Empirical Tests." In Studies in the Theory of Capital Markets, edited by M. C. Jensen. New York: Praeger.
2. Fama, Eugene F. and James D. MacBeth, 1973, Risk, Return, and Equilibrium: Empirical Tests, Journal of Political Economy 81, 607-636.
3. Chen, Nai-Fu; Roll, Richard; Ross, Stephen (1986). "Economic Forces and the Stock Market" (PDF). Journal of Business. 59 (3): 383–403.
4. Connor, Gregory and Korajczyk, Robert, (1988), Risk and return in an equilibrium APT: Application of a new test methodology, Journal of Financial Economics, 21, issue 2, p. 255-289.
5. Gibbons, M.R., S. A. Ross and J. Shanken, 1989, A test of the efficiency of a given portfolio, Econometrica 57, 1121-1152.
6. Shanken, Jay. (1992). On the Estimation of Beta-Pricing Models. Review of Financial Studies. 5. 1-33. 10.1093/rfs/5.1.1.
7. Fama, E. F.; French, K. R. (1992). "The Cross-Section of Expected Stock Returns". The Journal of Finance. 47 (2): 427.
8. Fama, E. F.; French, K. R. (1993). "Common risk factors in the returns on stocks and bonds". Journal of Financial Economics. 33: 3–56

Relevant Readings:

1. Blume, Marshall E., and Irwin Friend. "A New Look at the Capital Asset Pricing Model." The Journal of Finance, vol. 28, no. 1, 1973, pp. 19–33.
2. Black, Fischer, Capital Market Equilibrium with Restricted Borrowing, The Journal of Business, 1972, vol. 45, issue 3, 444-55
3. Mayers, D. (1972) Nonmarketable Assets and Capital Market Equilibrium under Uncertainty. In: Jensen, M.C., Ed., Studies in the Theory of Capital Markets, 223-248.
4. Merton, Robert C. "An Intertemporal Capital Asset Pricing Model." Econometrica, vol. 41, no. 5, 1973, pp. 867–887.
5. Brennan, Michael J., Taxes, market valuation and corporate financial policy, National Tax Journal, vol. 23, no. 4, 1970, pp. 417–427.
6. Litzenberger, R. H. and K. Ramaswamy, 1979, The effects of personal taxes and dividends on capital asset prices: theory and empirical evidence, Journal of Financial Economics, 7, 163—195.
7. Solnik, B.H. (1974) An Equilibrium Model of the International Capital Market. Journal of Economic Theory, 8, 500-524.

8. John B. Long Jr, Stock prices, inflation and the term structure of interest rates, Journal of Financial Economics, 1 (no. 2) (1974)

9. The Demand for Risky Assets under Uncertain Inflation Irwin Friend, Yoram Landskroner and Etienne Losq, Journal of Finance, 1976, vol. 31, issue 5, 1287-97

10. P. Sercu, A Generalization of the International Asset Pricing Model, Revue de l'Association Francaise de Finance, 1 (1980), pp. 91-135

11. R. Stulz, A Model of International Asset Pricing, Journal of Financial Economics, 9 (1981), pp. 383-406

12. M. Adler, B. Dumas, International Portfolio Choice and Corporation Finance: a Synthesis, Journal of Finance, 38 (1983), pp. 925-984

13. STULZ, R.M. (1983), On the Determinants of Net Foreign Investment. The Journal of Finance, 38: 459-468.

14. Elton, E.J. (1999), Presidential Address: Expected Return, Realized Return, and Asset Pricing Tests. The Journal of Finance, 54: 1199-1220.

15. French, Kenneth, (1980), Stock returns and the weekend effect, Journal of Financial Economics, 8, issue 1, p. 55-69,

16. Roll, Richard, "Vas ist Das? The Turn-of-the Year Effect and the Return Premia of Small Firms," Journal of Portfolio Management, Winter 1983, 18–28

17. Reinganum, Marc R., "The Anomalous Stock Market Behavior of Small Firms in January: Empirical Tests for Tax-loss Selling Effects," Journal of Financial Economics, June 1983, 89–104.

18. Basu, S. (1977): "Investment Performance of Common Stocks in Relation to their Price-Earnings Ratios", Journal of Finance, 32, 3, 663-682.

19. Ball, Ray, (1978), Anomalies in relationships between securities' yields and yield-surrogates, Journal of Financial Economics, 6, issue 2-3, p. 103-126

20. Jaffe, J., Keim, D.B. and Westerfield, R. (1989), Earnings Yields, Market Values, and Stock Returns. The Journal of Finance, 44: 135-148.

21. Banz, Rolf W., "The Relationship between Return and Market Value of Common Stock," Journal of Financial Economics, 1981, 9, 3–18.

22. Basu, S. (1983): "The relationship between earnings yield, market value, and return for NYSE common stocks: Further evidence", Journal of Financial Economics, 12, 129-156.

23. De Bondt, Werner F. M. and Richard H. Thaler, "Does the Stock Market Overreact?" Journal of Finance, July 1985, 793–805.

24. Stattman, D. (1980): "Book Values and Stock Returns", The Chicago MBA: A Journal Of Selected Papers, 4, 25-45.

25. Barr Rosenberg, Kenneth Reid, Ronald Lanstein, Persuasive evidence of market inefficiency, The Journal of Portfolio Management Apr 1985, 11 (3) 9-16

26. Bhandari, L.C. (1988), Debt/Equity Ratio and Expected Common Stock Returns: Empirical Evidence. The Journal of Finance, 43: 507-528.

27. Jegadeesh, N. (1990), Evidence of Predictable Behavior of Security Returns. The Journal of Finance, 45: 881-898.
28. Jegadeesh, N. and Titman, S. (1993), Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. The Journal of Finance, 48: 65-91.
29. Merton, R. (1973). An Intertemporal Capital Asset Pricing Model. Econometrica, 41(5), 867-887.
30. Ross, Stephen (1976). "The arbitrage theory of capital asset pricing". Journal of Economic Theory. 13 (3): 341–360.
31. Chamberlain, Gary and Michael Rothschild, "Arbitrage, Factor Structure, and Mean Variance Analysis on Large Asset Markets." Econometrica 51 (September 1983): 1281-1304.
32. Ingersoll, Jonathan E., Jr., "Some Results in the Theory of Arbitrage Pricing." Journal of Finance 39 (September 1984): 1021-1039.
33. Sun, Yeneng & Khan, Mohammed. (2001). Asymptotic Arbitrage and the APT With or Without Measure-Theoretic Structures. Journal of Economic Theory. 101. 222-251.
34. Bruce N. Lehmann and David M. Modest, The empirical foundations of the arbitrage pricing theory, Journal of Financial Economics, 1988, vol. 21, issue 2, 213-254
35. Jones, Christopher. (2001). Extracting factors from heteroskedastic asset returns. Journal of Financial Economics. 62. 293-325.
36. Daniel, Kent, and Sheridan Titman, 1997, Evidence on the Characteristics of the Cross Section of Expected Returns, Journal of Finance 52, 1-33.
37. Davis, James L., Eugene F. Fama, and Kenneth R. French, 2000, Characteristics, Covariances, and Average Returns: 1929 to 1997, Journal of Finance 55, 389-84.
38. Petkova, Ralitsa (2006). "Do the Fama–French Factors Proxy for Innovations in Predictive Variables?". Journal of Finance. 61 (2): 581–612.
39. Fama, Eugene F. and Kenneth R. French 1996, Multifactor Explanations of Asset Pricing Anomalies, Journal of Finance 51, 55-84

Topic 2: Behavioral anomalies: technical predictors (anomalies based on past performance) & limited attention anomalies

Data exercise:

1) Are long-run reversals distinct from value and size? If not, which is subsumed and by what? Show empirical evidence!
   a. May want to see the discussion in Fama and French (1996)
2) The standard momentum construction by now (e.g., FF's UMD factor) is last year's return skipping the most recent month. Novy-Marx (JFE, 2012) further decomposes that momentum signal into intermediate horizon past performance and recent past performance. Show which one of the two is stronger in the data.
3) Look at industry momentum, both short-horizon (1-month) and one year (12-2, like UMD). Which one works better? Are they distinct from momentum in the cross-section of US equities?

Recommended Readings:

1. De Bondt and Thaler, 1985, Does the Stock Market Overreact? Journal of Finance 40, 793-805.
2. Narasimhan Jegadeesh and Sheridan Titman 2011, Momentum, Annual Review of Financial Economics 3, 493-509.
3. Asness, Moskowitz, and Pedersen, 2013, Value and Momentum Everywhere, Journal of Finance 68, 929-985.
4. Novy-Marx, R., 2012, Is momentum really momentum?, Journal of Financial Economics, 103 (3), 429-453
5. Moskowitz, T., & Grinblatt, M. (1999). Do Industries Explain Momentum? The Journal of Finance, 54(4), 1249-1290.

Relevant Readings:

1. Jegadeesh, N. (1990), Evidence of Predictable Behavior of Security Returns. The Journal of Finance, 45: 881-898.
2. Jegadeesh, N. and Titman, S. (1993), Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. The Journal of Finance, 48: 65-91.
3. Novy-Marx, Robert, 2015, Fundamentally, momentum is fundamental momentum, Working paper.
4. Daniel, Kent, and Tobias Moskowitz, 2016, "Momentum Crashes," Journal of Financial Economics 122, 221–247.
5. Cooper Michael, Roberto Gutierrez, and Allaudeen Hameed, 2004, "Market states and momentum," Journal of Finance 59, 1345–1365
6. Chan, L. K., N. Jegadeesh, and J. Lakonishok (1996). Momentum strategies. The Journal of Finance 51(5), 1681–1713.
7. Johnson, T. C., 2002. Rational momentum effects. Journal of Finance 57: 585-608.
8. Liu, L., and L. Zhang. 2008. Momentum profits, factor pricing and macroeconomic risk. Review of Financial Studies 21: 2417-48
9. Sadka R., 2006. Momentum and post-earnings-announcement drift anomalies: the role of liquidity risk. Journal of Financial Economics 80: 309-49.
10. Sagi, J., and M. Seasholes. 2007. Firm-specific attributes and the cross-section of momentum. Journal of Financial Economics 84: 389-434.
11. Cohen, L., K. Diether, and C. Malloy (2013a). Legislating stock prices. Journal of Financial Economics 110, 574–595.
12. Cohen, L., K. Diether, and C. Malloy (2013b). Misvaluing innovation. Review of Financial Studies 26, 635–666.
13. Cohen, L. and A. Frazzini (2008). Economic links and predictable returns. Journal of Finance 63, 1977–2011.
14. Cohen, L. and D. Lou (2012). Complicated firms. Journal of Financial Economics 104, 383–400.
15. Cohen, L., C. Malloy, and L. Pomorski (2012). Decoding inside information. Journal of Finance 67, 1009–1043.

16. Hirshleifer, D. and S. H. Teoh (2003). Limited attention, information disclosure, and financial reporting. Journal of Accounting and Economics 36, 337–386.
17. Hou, K. (2007). Industry information diffusion and lead-lag effect in stock returns. Review of Financial Studies 20, 1113–1138.
18. Korniotis, G. and A. Kumar (2013). State-level business cycles and local return predictability. Journal of Finance 68, 1037–1096.
19. Menzly, L. and O. Ozbas (2010). Market segmentation and cross-predictability of returns. Journal of Finance 65, 1555–1580.
20. Parsons, C., J. Sulaeman, and S. Titman (2017). Geographic momentum. Review of Financial Studies, Forthcoming

Topic 3: Investment & Profitability; Factor wars

Data exercise:

1) Investigate the relation between value, profitability, and investment. Does it matter how you measure these? You can look at, for example:
   a. Annual vs quarterly rebalancing for the accounting variables
   b. ROE (as in Lu Zhang's papers) vs profitability
   c. For profitability, you can compare gross (Novy-Marx, 2013) vs operating (Fama-French, 2013) vs cash (Linnainmaa et al. 2016; Fama and French, 2018) profitability measures
   d. For book-to-market, you can compare annual updating of the market capitalization (Fama and French, 1993) vs monthly updating (Asness and Frazzini, 2013)
   e. For investment, you can compare asset growth (Cooper et al., 2008), investment (Chen et al, 2010), and net issuance (e.g., Fama and French, 2008)

Recommended Readings:

1. Zhang, Lu, 2005, Anomalies, NBER Working Paper 11322
2. Cooper, Gulen, and Schill, 2008. Asset Growth and the Cross-Section of Stock Returns, Journal of Finance 63, 1609-1651.
3. Novy-Marx, Robert, 2013. The Other Side of Value: The Gross Profitability Premium, Journal of Financial Economics 108(1), 1-28.
4. Hue, Xue, and Zhang, 2015. Digesting Anomalies: An Investment Approach. Review of Financial Studies (2015) 28 (3): 650-705.
5. Fama, Eugene F., and Kenneth R. French, 2015. A five-factor asset pricing model. Journal of Financial Economics 116(1), 1-22.
6. Francisco Barillas, Jay Shanken (2018), Comparing Asset Pricing Models. The Journal of Finance, 73: 715-754.
7. Detzel, Andrew, Robert Novy-Marx, and Mihail Velikov, 2023, Model Comparison with Transaction Costs, Journal of Finance, 78 (3): 1743-1775

Relevant Readings:

1. Cochrane, J.H. (1991), Production-Based Asset Pricing and the Link Between Stock Returns and Economic Fluctuations. The Journal of Finance, 46: 209-237
2. Cochrane, John, (1996), A Cross-Sectional Test of an Investment-Based Asset Pricing Model, Journal of Political Economy, 104, issue 3, p. 572-621.
3. Anderson, Christopher W., and Luis Garcia-Feijóo. "Empirical Evidence on Capital Investment, Growth Options, and Security Returns." The Journal of Finance, vol. 61, no. 1, 2006, pp. 171–194.
4. Yuhang Xing, Interpreting the Value Effect Through the Q-Theory: An Empirical Investigation, The Review of Financial Studies, Volume 21, Issue 4, July 2008, Pages 1767–1795
5. Titman, S., Wei, K., & Xie, F. (2004). Capital Investments and Stock Returns. The Journal of Financial and Quantitative Analysis, 39(4), 677-700.
6. Lyandres, E., L. Sun, and L. Zhang. 2008. Investment-based underperformance following seasoned equity offerings. Review of Financial Studies 21:2825–55.
7. Pontiff, J. and Woodgate, A. (2008), Share Issuance and Cross-sectional Returns. The Journal of Finance, 63: 921-945
8. Ball, Ray, Gerakos, Joseph, Linnainmaa, Juhani T. and Nikolaev, Valeri V., (2015), Deflating profitability, Journal of Financial Economics, 117, issue 2, p. 225-248.
9. Fama, Eugene F., and Kenneth R. French 2006, Dissecting Anomalies, Journal of Finance 63 (4) 1653-1678.
10. Fama, Eugene and Kenneth R. French, 2016, Dissecting Anomalies with a Five-Factor Model, Review of Financial Studies 29 (1): 69-103
11. Fama, Eugene and Kenneth R. French, 2018, Choosing Factors, Journal of Financial Economics 128(2): 234-252
12. Fama, Eugene and Kenneth R. French, 2017, International Tests of a Five-Factor Asset Pricing Model, Journal of Financial Economics 123 (3) 441-463
13. Fama, Eugene and Kenneth R. French, 2015, Incremental Variables and the Investment Opportunity Set, Journal of Financial Economics 117 (3) 470-488
14. Fama, Eugene and Kenneth R. French, 2019, Comparing Cross-Section and Time-Series Factor Models, Review of Financial Studies, Forthcoming
15. Asness, Clifford and Andrea Frazzini, 2013, The devil in HML's details, Journal of Portfolio Management 39 (4), 49-68
16. Li, Erica X. N., Dmitry Livdan, and Lu Zhang, 2009, Anomalies, Review of Financial Studies 22 (11), 4301-4334.
17. Liu, Laura Xiaolei, Toni M. Whited, and Lu Zhang, Investment-based expected stock returns, Journal of Political Economy 117 (6), 1105-1139
18. Chen, L., R. Novy-Marx, and L. Zhang. 2010. An alternative three-factor model, Working Paper.
19. Zhang, Lu, 2016, Factors war, Tsinghua Financial Review 37, 101-104
20. Zhang, Lu, 2017, The investment CAPM, European Financial Management 23 (4), 545-603.
21. Hou, Kewei, Haitao Mo, Chen Xue, and Lu Zhang, 2019, Which factors? Review of Finance 23 (1), 1-35.
22. Zhang, Lu, 2020, q-factors and investment CAPM, Oxford Research Encyclopedia of Economics and Finance, Forthcoming

23. Hou, Kewei, Haitao Mo, Chen Xue, and Lu Zhang, 2020, An augmented q-factor model with expected growth, Review of Finance, Forthcoming
24. Pastor, Lubos and Stambaugh, Robert, (2003), Liquidity Risk and Expected Stock Returns, Journal of Political Economy, 111, issue 3, p. 642-685.
25. Robert F. Stambaugh, Yu Yuan, Mispricing Factors, The Review of Financial Studies, Volume 30, Issue 4, April 2017, Pages 1270–1315,
26. Kogan, Leonid and Tian, Mary H., Firm Characteristics and Empirical Factor Models: A Data-Mining Experiment (2012). FRB International Finance Discussion Paper No. 1070.
27. Francisco Barillas, Jay Shanken, Which Alpha?, The Review of Financial Studies, Volume 30, Issue 4, April 2017, Pages 1316–1338
28. Kozah, Serhiy, Stefan Nagel, and Shrihari Santosh (2018), Interpreting Factor Models. The Journal of Finance, 73: 1183-1223

Topic 4: Transaction Costs

Data exercise:

1) Pick one of the following figures to replicate. Each of these plots an effective spread estimate in the respective paper. All of these are used in the composite trading cost measure in Chen and Velikov (2023) and (optionally) created by the cookbook.
    a. Figure 3 from Hasbrouck (2009)
    b. Figure 2 from Corwin and Schultz (2012)
    c. Figure 8 from Abdi and Ranaldo (2017)
2) Try to replicate the gross and net returns to three anomaly strategies (pick whichever three you want) from Table 3 in Novy-Marx and Velikov (2016) with whichever trading cost measure you want (look at the cookbook trading costs code for hints).

Recommended Readings:

1. D. Keim, A. Madhavan, 1998. The cost of institutional equity trades, Financial Analyst Journal, 54, pp. 50-69
2. Roll, R. 1984.A simple implicit measure of the effective bid-ask spread in an efficient market. Journal of Finance 39:1127–39
3. Hasbrouck, J. 2009. Trading costs and returns for U.S. equities: Estimating effective costs from daily data. Journal of Finance 64:1446–77.
4. Robert Novy-Marx, Mihail Velikov, A Taxonomy of Anomalies and Their Trading Costs, The Review of Financial Studies, Volume 29, Issue 1, January 2016, Pages 104–147
5. Chen, Andrew and Mihail Velikov, 2023, Zeroing In on the Expected Returns of Anomalies, Journal of Financial and Quantitative Analysis, 58 (3), 968-1004
6. Ang, A., Hodrick, R., Xing, Y., Zhang, X., 2006. The cross-section of volatility and expected returns. Journal of Finance 61, 259–299.

Relevant Readings:

1. Constantinides, G. M. (1986), 'Capital market equilibrium with transaction costs'. Journal of Political Economy 94, 842–862
2. Chen, Z., M.Watanabe, and W. Stanzl. 2005. Price impact costs and the limit of arbitrage, Working Paper.
3. Davis, M., and A. Norman. 1990. Portfolio selection with transaction costs. Mathematics of Operations Research 15:676–713.
4. Engle, R., R. Festenberg, and J. Russel. 2012. Measuring and modeling execution cost and risk. Journal of Portfolio Management 38:14–28.
5. Frazzini, A., R. Israel, and T. Moskowitz. 2015. Trading costs of asset pricing anomalies. Working Paper.
6. Grinblatt, M., and S. Titman. 1989. Portfolio performance evaluation: Old issues and new insights. Review of Financial Studies 2:393–416.
7. Hanna, J. D., and M. J. Ready. 2005. Profitable predictability in the cross section of stock returns. Journal of Financial Economics 78:463–505.
8. Keim, D. B., and A. Madhavan. 1997. Execution costs and investment style: an interexchange analysis of institutional equity trades. Journal of Financial Economics 46:265–92.
9. Korajczyk, R. A., and R. Sadka. 2004. Are momentum profits robust to trading costs? Journal of Finance 59:1039–82.
10. Lesmond, D. A., M. J. Schill, and C. Zhou. 2004. The illusory nature of momentum profits. Journal of Financial Economics 71:349–80.
11. Corwin, S.A. and Schultz, P. (2012), A Simple Way to Estimate Bid-Ask Spreads from Daily High and Low Prices. The Journal of Finance, 67: 719-760
12. Farshid Abdi, Angelo Ranaldo, 2017. A Simple Estimation of Bid-Ask Spreads from Daily Close, High, and Low Prices, The Review of Financial Studies, Volume 30, Issue 12, Pages 4437–4480,
13. DeMiguel, Victor and Martin-Utrera, Alberto and Nogales, Francisco J. and Uppal, Raman, 2019, A Transaction-Cost Perspective on the Multitude of Firm Characteristics, Review of Financial Studies, Forthcoming
14. Patton, Andrew and Brian Weller, 2019, What you see is not what you get: The costs of trading market anomalies, Journal of Financial Economics, Forthcoming
15. Black, Fischer, Capital Market Equilibrium with Restricted Borrowing, The Journal of Business, 1972, vol. 45, issue 3, 444-55

Topic 5: Skeptical evaluations and making sense of the anomaly zoo

Data exercise:

1) Try to apply one of the following combination techniques on the 23 anomalies from Novy-Marx and Velikov (2016):
   a. Average rank
   b. Fama-MacBeth
   c. IPCA
   d. LASSO

You need to combine the 23 signals using one of these techniques and create an "expected return" signal. Then you need to test a trading strategy based on that signal.
   a) Report a table with the average returns to that trading strategy as well as alphas with respect to several Fama-French models (CAPM, 3-, 4-, 5-, and 6-factor models).
   b) How does the strategy perform post-2003? Why do you think that is?
   Hint: check out the anomaly combination section in my JFQA paper. You might also find the run_combination_strategies.m script in the public Github repo for the paper helpful.

Recommended Readings:

1. Fama, Eugene F., and Kenneth R. French 2006, Dissecting Anomalies, Journal of Finance 63 (4) 1653-1678.
2. Novy-Marx, R. 2016. Backtesting strategies based on multiple signals. Working paper.
3. Campbell R. Harvey, Yan Liu, Heqing Zhu, … and the Cross-Section of Expected Returns, The Review of Financial Studies, Volume 29, Issue 1, January 2016, Pages 5
4. Huang, Jing-Zhi and Zhijian James Huang. 2013. "Real-Time Profitability of Published Anomalies: An Out-of-Sample Test". Quarterly Journal of Finance 3.
5. McLean, R. David and Jeffrey Pontiffs (2016), Does Academic Research Destroy Stock Return Predictability?. The Journal of Finance, 71: 5-32
6. Bryan T. Kelly, Seth Pruitt, Yinan Su, 2019, Characteristics are covariances: A unified model of risk and return, Journal of Financial Economics, Volume 134, Issue 3
7. Chen, Andrew Y. and Zimmermann, Tom, 2020, Publication Bias and the Cross-Section of Stock Returns, Review of Asset Pricing Studies, 10 (2) 249-289
8. Joachim Freyberger, Andreas Neuhierl, and Michael Weber, 2020. Dissecting Characteristics Nonparametrically, Review of Financial Studies, 33, 2326-2377

Relevant Readings:

1. Schwert, W. 2003. Anomalies and market efficiency. In Handbook of the economics of finance, vol. 1B, eds. Constantinides G. M., Harris M., and Stulz R. M., 939–74.
2. Hou, Kewei, Chen Xue, and Lu Zhang, 2019, Replicating anomalies, Review of Financial Studies, Forthcoming
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Topic 6: Machine Learning

<u>Recommended Readings:</u>

1. Gu, S., Kelly, B., and Xiu, D. (2020). Empirical asset pricing via machine learning. The Review of Financial Studies, 33(5):2223–2273.
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