

University of Nevada Las Vegas—Lee Business School
Finance FIN 761 Seminar on Theoretical Asset Pricing

Instructor: Steven Ho Ph.D,
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Class Hours: TBA
Grader: TBA
Email: TBA

Description:

This class will discuss financial markets and asset pricing from the perspective of economic theory. While the stress will be on modeling and tools, the course will also introduce the empirical methodologies and the calibration techniques used in financial economics, as well as some of the most recent evidence on asset prices.

Learning Objectives:

This is a rigorous course focused on an economic approach to asset pricing. In addition to learning the theories, we will also have exposures to actual financial data. Topics include stochastic calculus, consumption-based asset pricing, factor pricing models and empirical tests, long-run risk model and equity premium puzzle, habit formation model, market microstructure, and a brief introduction to behavioral finance if time permits. You will need to master the SAS statistical program for the purpose of the course project by reading the SAS resources listed at the end of the syllabus. You should finish reading all items listed under heading 1 to 6 in the SAS resources section, as soon as possible.

Course Material:

The required text of this course is:

Cochrane, J., Asset Pricing, Princeton University Press, Revised Edition, 2005.

Additional papers will be assigned for reading.

The following resources are helpful:

William H. Greene, Econometric Analysis, 4th Edition, Prentice Hall, 2000.

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

Grading Scale

Percent Grade	Letter Grade
93% and over	A
90%	A-
88%	B+
82%	B
80%	B-
78%	C+
72%	C
Below 72%	F

Tentative Evaluation Methods:

Note: the exact percentage that homework makes up is subject to change as the semester progresses

0% Homework [answer keys will be distributed, as practice, not to be turned-in]

25% Project

35% Midterm

40% Final Exam

Additional Policies:

For the class project, you will need a personal computer with Windows installed. If you use Mac, you will need to install Windows with boot camp (or other methods depending on your Mac model), or use your group teammate's PC. People have attempted in the past but Mac OS X is not supported.

Class Project (Finding Alpha):

Similar to the discovery of the momentum strategy, you will test out a trading strategy with real financial data to gain some practical knowledge. You will either propose a new trading strategy by sorting stocks on a characteristic of your choice [one that has not been tested yet in the literature], and examine if the associated long-short strategy can be used to generate statistically significant abnormal returns; or, if the discovery of a new alpha strategy is too challenging, you can also replicate the key tables of an existing alpha strategy. If you attempt to discover a new strategy, an insignificant result is still acceptable, although not preferable. You will be asked to write a project report with a length of 15-20 pages to be submitted by the last class. You may work in groups of up to four, though you would be encouraged to work individually if you are serious about applying to a PhD program in Finance. In order to avoid overlap on the choice of trading strategy among the different groups, a brief proposal will be due by the class start time on February 18th. It is to your advantage to submit the proposal much earlier than the deadline since the proposed strategies are taken on a first-come first-serve basis and there can be no significant overlap between the various proposals. More details on the class project will follow. Learning SAS and coding for your own (group) project is your own endeavor/responsibility and I will not be involved in any coding aspect.

For the class project, you need to get an account with WRDS by following the instructions at:
<https://wrds-www.wharton.upenn.edu/register/>

SAS is the official programming language for the class project. WRDS is SAS powered, that is, all WRDS databases are maintained in SAS and the data processes that underlie web access to WRDS libraries are programmed in SAS. I have compiled a list of SAS learning resources that is attached to this syllabus. Please be prepared to spend considerable time on mastering SAS before undertaking the class project.

As long as you have a WRDS account, you should be able to invoke SAS [Unix Version] remotely on WRDS server using SSH and Vcxsrv. Thus, you do not need to install SAS on your local Windows PC.

Course Schedule:

The course schedule is tentative and subject to change

Time	Topic	Readings [optional readings are marked *]
Week 1	Introduction	John Cochrane's AFA presidential address, January 2011 (long version on his web site) Discount Rates Fama, E. (2015). My Life in Finance, Annual Review of Financial Economics , 1-15.
Week 2	Consumption-Based Models	Asset Pricing: Ch. 1.1-1.3
Week 3	Stochastic Calculus	Asset Pricing: Ch. 1.4 Asset Pricing: Appendix on Continuous-time Stochastic Processes
Week 4	Continuous-time Pricing Kernel	Asset Pricing: Ch. 1.5
Week 5	Options	Asset Pricing: Ch. 17
Week 6	Black-Scholes Formula	Asset Pricing: Ch. 17
Week 7	General Equilibrium Models	Asset Pricing: Ch. 2
Week 8	Factor Mimicking Portfolios Capital Asset Pricing Model (CAPM)	Asset Pricing: Ch. 6.3 Asset Pricing: Ch. 9.1
Spring Break		
Week 10	Midterm (Tentative date subject to change)	

Week 11	ICAPM Arbitrage Pricing Theory	Asset Pricing: Ch. 9.2-9.5
Week 12	Fama French Three Factor Model Fama French Five Factor Model GMM in Asset Pricing	Fama Eugene F. and Kenneth R. French, (1992). "The Cross-Section of Expected Stock Returns," Journal of Finance. Fama, Eugene F., and Kenneth R. French. (2015). "A five-factor asset pricing model." Journal of Financial Economics 116.1: 1-22 *Fama, Eugene F., and Kenneth R. French (2006). "Dissecting Anomalies" Journal of Finance 63 (4) 1653-1678 Jegadeesh, Narasimhan, and Sheridan Titman, (1993). Returns to buying winners and selling losers: Implications for stock market efficiency, Journal of Finance 48, 65-91 Daniel, Kent D. (2013). and Tobias J. Moskowitz. "Momentum crashes." Swiss Finance Institute Research Paper 13-61: 14-6 Asset Pricing: Ch. 10
Week 13	Testing of Asset Pricing Models Survey of Empirical Facts Equity Premium Puzzle Long-Run Risk Model / Habit Formation Model	Asset Pricing: Ch. 12 Asset Pricing: Ch. 20 Asset Pricing: Ch. 21 Bansal, Ravi, and Amir Yaron. (2004). "Risks for the long run: A potential resolution of asset pricing puzzles." The Journal of Finance 59.4: 1481-1509 *Bansal, Ravi, Dana Kiku, and Amir Yaron. (2009). An empirical evaluation of the long-run risks model for asset

		prices. No. w15504. National Bureau of Economic Research Campbell, John Y., and John H. Cochrane. (1999) "By Force of Habit: A Consumption-Based Explanation of Aggregate Stock Market Behavior." The Journal of Political Economy 107.2: 205-251.
Week 14	Introduction to Market Microstructure	Kyle, A. S. (1985). Continuous Auctions of Insider Trading, Econometrica, 53(6), 1315- 1336 Glosten, L. R., and P. R. Milgrom (1985). Bid, Ask and Transactions Prices in a Specialist Market with Heterogeneously Informed Traders, Journal of Financial Economics, 14(1), 71-100.
Week 15	Market Microstructure Continued/ Introduction to Prospect Theory and Behavioral Finance	D. Easley, M. O'Hara. (1987). Price, trade size, and information in securities markets, Journal of Financial Economics, 19, 69-90 *Black, F. (1986): Noise, Journal of Finance, 41(3), 529-543 Kahneman, Daniel; Tversky, Amos (1979). "Prospect Theory: An Analysis of Decision under Risk" (PDF). Econometrica 47 (2): 263 *Tversky, Amos; Kahneman, Daniel (1992). "Advances in prospect theory: Cumulative representation of uncertainty". Journal of Risk and Uncertainty 5 (4): 297–323 *Shiller, R.J. (1981). Do Stock Prices Move Too Much to be Justified by Subsequent Changes in Dividends? American Economic Review, 71:421-36 *Barberis, N. (2013). "Thirty Years of Prospect Theory in Economics: A Review and Assessment", Journal of Economic Perspectives 27, 173-196
Exam Week:	Final Exam	

SAS Learning Resources

	Topic
1. Get SAS running	Register (Request) an account [may take several business days] at: https://wrds-www.wharton.upenn.edu/ Softwares to download (one SSH client plus Vcxsrv):

	Either SSH 3.2.9 or Putty [Remember to allow for X11 tunneling in profile and settings] https://www2.vrdc.cornell.edu/news/wp-content/uploads/2011/09/sshsecureshellclient-3.2.9.exe or https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html and X11 (always run this program in background before launching SSH, after enabling X11 tunneling in your SSH client): Vcxsrv: http://sourceforge.net/projects/vcxsrv/ (The alternative to Vcxsrv is Cygwin: http://x.cygwin.com/docs/ug/setup.html) Log-on SAS UNIX server through SSH client: <i>wrds-cloud.wharton.upenn.edu</i> Once logged-in with the WRDS server, invoke SAS with the <i>qsas</i> command Set Home directory in SAS LIBNAME mylib '/home/unlv/youraccountname'; Text Editor on UNIX: <i>nedit</i> Introduction to WRDS Databases [not necessarily subscribed]: https://wrds-www.wharton.upenn.edu/pages/about/data-vendors/ Contact Library for University Databases: https://www.library.unlv.edu/ Basic Linux Commands: https://www.kellogg.northwestern.edu/rc/docs/BasicUnixandSAS.pdf
2. Readings on SAS Basics	SAS Libraries https://online.stat.psu.edu/stat480/lesson/2/2.2 SAS Overview https://stats.idre.ucla.edu/sas/modules/introduction-to-the-features-of-sas/ Overview of Procedures https://stats.idre.ucla.edu/sas/modules/an-overview-of-the-syntax-of-sas-procedures/ Format vs Informat http://libguides.library.kent.edu/SAS/Informats-Formats Character vs Numeric http://www.pauldickman.com/teaching/sas/char_to_num.php SAS Variable Creation https://stats.idre.ucla.edu/sas/modules/creating-and-recoding-variables-in-sas/ More on Variables

	https://stats.idre.ucla.edu/sas/modules/using-sas-functions-for-making-and-recoding-variables/ Subsetting https://stats.idre.ucla.edu/sas/modules/ubsetting-data-in-sas/ Labelling https://stats.idre.ucla.edu/sas/modules/labeling/ Operators http://support.sas.com/documentation/cdl/en/lrcon/62955/HTML/default/viewer.htm#a000780367.htm Caveat on Lag() http://pages.stern.nyu.edu/~adesouza/sasfinphd/index/node24.html Caveat on the effect of missing value on Max() and other functions http://www.lexjansen.com/nesug/nesug06/cc/cc31.pdf http://support.sas.com/documentation/cdl/en/lrdict/64316/HTML/default/viewer.htm#a000245913.htm Sort, BY, First.var Last.var https://data-flair.training/blogs/variables-in-sas/ Conditionally delete observations https://documentation.sas.com/?cdcId=pgmsascdc&cdcVersion=9.4_3.5&docsetId=basess&docsetTarget=n0qtlsi3ev0rmtn17ggve9lohd00.htm&locale=en Merge using (Data; Merge ;) https://online.stat.psu.edu/stat481/lesson/15 https://online.stat.psu.edu/stat481/lesson/16 Merge using Proc SQL, Inner join, Left join, Right join, Full join http://www2.sas.com/proceedings/sugi25/25/cc/25p109.pdf More on Merge https://www.kellogg.northwestern.edu/rc/docs/SASmerging.ppt https://www.kellogg.northwestern.edu/rc/docs/SAS_Programming_Skills.pdf More on Proc SQL https://support.sas.com/resources/papers/proceedings/proceedings/sugi29/268-29.pdf Ten useful SAS functions in Proc SQL https://support.sas.com/resources/papers/proceedings13/257-2013.pdf Dates and Formats https://online.stat.psu.edu/stat481/lesson/22 More on Dates http://pages.stern.nyu.edu/~adesouza/sasfinphd/index/node23.html
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	INTNX Function http://support.sas.com/documentation/cdl/en/lefunctionsref/63354/HTML/default/viewer.htm#p10v3sa3i4kfxfn1sovhi5xzxh8n.htm Data Cleaning https://stats.idre.ucla.edu/wp-content/uploads/2016/02/ss123.pdf Finding Duplicates http://www2.sas.com/proceedings/sugi31/164-31.pdf Regression Diagnostics https://stats.idre.ucla.edu/sas/webbooks/reg/chapter2/regressionwith-saschapter-2-regression-diagnostics/ Collapsing Observations https://stats.idre.ucla.edu/sas/modules/collapsing-across-observations-in-sas/ Proc EXPAND http://www.lexjansen.com/wuss/2004/tutorials/i_tut_time_series_magic_usi.pdf Macro and the %Do loop https://stats.idre.ucla.edu/sas/seminars/sas-macros-introduction http://blogs.sas.com/content/publishing/2015/01/30/sas-authors-tip-getting-the-macro-language-to-perform-a-do-loop-over-a-list-of-values/ http://stackoverflow.com/questions/19263975/iterating-over-multiple-txt-files-and-creating-a-new-dataset-for-each-in-sas Quotation in Macro https://stats.idre.ucla.edu/wp-content/uploads/2016/02/bt185.pdf
3. Basics of CRSP Database	CRSP Overview https://wrds-www.wharton.upenn.edu/pages/support/data-overview/wrds-overview-crsp-us-stock-database/ CRSP Variable Description http://cloudc.chass.utoronto.ca/ds/crsp/en/manuals/data_descriptions_guide.pdf Linking Compustat with CRSP https://wrds-www.wharton.upenn.edu/pages/support/applications/linking-databases/linking-crsp-and-compustat/ Linking IBES with CRSP https://wrds-www.wharton.upenn.edu/pages/support/applications/linking-databases/linking-ibes-and-crsp-data/ CRSP Adjustments for Stock Splits http://www.crsp.org/products/documentation/crsp-calculations Other Caveats:

	1. Do not use the ELSE statement in conjunction with IF in SAS, you can always spell out multiple IF conditions, the ELSE statement sometimes generates unexpected behaviors 2. When commenting, /**/ is preferred over *; and do not put any symbol, such as ' inside the comment
4. 1 st Example, Fama French	https://wrds-www.wharton.upenn.edu/pages/support/applications/risk-factors-and-industry-benchmarks/fama-french-factors/ Practice. Implement the Fama French Five-Factor model: http://www8.gsb.columbia.edu/programs/sites/programs/files/finance/Finance%20Seminar/spring%202014/ken%20french.pdf
5. 2 nd Example, Momentum	https://wrds-www.wharton.upenn.edu/pages/support/applications/portfolio-construction-and-market-anomalies/replicating-momentum-strategies-jegadeesh-and-titman-jf-1993/
6. 3 rd Example, Governance Index Strategy	https://wrds-www.wharton.upenn.edu/pages/support/applications/portfolio-construction-and-market-anomalies/portfolios-gompers-ishii-metrick-governance-index/
7. Additional Resources	Forums for asking SAS questions: https://communities.sas.com/ http://stackoverflow.com/questions/tagged/sas Forums for asking WRDS questions: http://groups.google.com/d/forum/wrdsas Official SAS documentation: http://support.sas.com/documentation/ WRDS Research Applications: https://wrds-www.wharton.upenn.edu/pages/support/applications/ Books on learning SAS: *Learning SAS by Example: A Programmer's Guide, SAS Institute *Applied Statistics and the SAS Programming Language, 5th Edition, by Ronald P. Cody, Jeffrey K. Smith

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