

George Washington University School of Business

FINA 8397 — Fall 2019

Continuous-Time and Asset Pricing Seminar

<http://savickas.net/8397/>

Section #: 10	Professor: Robert Savickas, Ph.D.
CRN: 96118	Office: Fungler 501R
Class time: Thu. 10:00–12:30	Office hours: Thu., 14:00–15:00, 18:30–19:30
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Description: The course covers main tools in stochastic calculus and their applications, as well as main theoretical concepts and some empirical results in asset pricing. The emphasis is on the underlying intuition; this is not a math or statistics course. The goal of the course is to help students acquire a framework for understanding and following the large literature in derivatives and asset pricing and for producing their own research. The course also prepares the students for a more exhaustive study of empirical asset pricing in a subsequent doctoral seminar. Towards the end of the semester, extra attention is placed on the ICAPM, as it may not receive detailed treatment in other courses.

Readings: Required: Class handouts and reasearch papers.

Highly Recommended:

1. Salih N. Neftci *An Introduction to the Mathematics of Financial Derivatives*, second edition, Academic Press.
2. John H. Cochrane *Asset Pricing*, revised edition (2005), Princeton University Press.
3. Robert A. Merton *Continuous-Time Finance*, Blackwell Publishing.

Background: Students should be familiar with differential calculus and the concepts of White Noise, Random Walk, Martingales, Wiener Process, as well as the different types of convergence (convergence in distribution, convergence in probability, almost sure convergence, and convergence in mean-square). MSF/MBA-level knowledge of Investments is also helpful.

Grading: Midterm: 50%, Final: 50%.

Questions: Please feel free to ask questions during the lectures, office hours, by e-mail, my office phone, or any time you see me.

Web site: <http://savickas.net/8397/> Please check the class web site regularly (at least three times a week). The web site provides additional resources and links, and will contain important and time-sensitive information on the class assignments, possible extensions to the lecture material, handouts, announcements, due dates, and hints. Note: this website is maintained by the instructor and is **not** in any way associated with the Blackboard, so please do not look for it there.

E-mailing list: Students will be subscribed for the electronic mailing list for this class. This will allow the instructor to efficiently broadcast an important message to the entire class, answer a common question, and it will allow students to post any information/question for the rest of the class. Everyone who has signed up for the list can send a message to the rest of the class.

GWU Policy on Religious Holidays: 1. Students should notify faculty during the first week of the semester of their intention to be absent from class on their day(s) of religious observance. 2. Faculty should extend to these students the courtesy of absence without penalty on such occasions, including permission to make up examinations. 3. Faculty who intend to observe a religious holiday should arrange at the beginning of the semester to reschedule missed classes or to make other provisions for their course-related activities.

GWU Policy on Disability: Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Rome Hall, Suite 102, to establish eligibility and to coordinate reasonable accommodations. For additional information please refer to gwired.gwu.edu/dss/

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GWU Academic Integrity Code: Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and the fabrication of information. For full text of the Code, see www.gwu.edu/integrity/code.html

Schedule:

In this schedule, *JC* refers to the book by John Cochrane "Asset Pricing," and *SN* refers to the book by Salih Neftci "An Introduction to the Mathematics of Financial Derivatives." The numbers in brackets [.] refer to the articles in the reference list of this syllabus.

Aug. 29: Introduction. Ito's Lemma and Stochastic Calculus. Derivations of BS and Vasicek p.d.e. *SN Ch. 9, 10, 13.*

Sep. 5: Girsanov's Theorem and Equivalent Martingales. Application: Solving BS using Equivalent Martingales. *SN Ch. 14, 15.*

Sep. 12: Kolmogorov's Backward Equation and Feynman-Kac Formula.

Sep. 19: Using numeraires.

Sep. 26: Midterm.

Oct. 3: Introduction to Asset Pricing. Consumption and asset returns. *JC Ch. 1.*

Oct. 10: Stochastic discount factors. *JC Ch. 4.*

Oct. 17: Stochastic discount factors continued. *JC Ch. 4.*

Oct. 24: Beta and mean-variance frontier representations. *JC Ch. 5, 6.*

Oct. 31: CAPM. *JC Ch. 5, 6, 9, [1], [2].*

Nov. 7: Factor Models and APT. *JC Ch. 5, 6, 9, [3], [4].*

Nov. 14: Conditional CAPM. Intertemporal CAPM. *JC Ch. 9, [5], [6].*

Nov. 21: Savickas is teaching for GWSB in Suzhou, China. No class.

Nov. 28: Thanksgiving. No class.

Dec. 5: Intertemporal CAPM continued. *JC Ch. 9, [6], [7], [8], [9], [10], [11].*

TBD: Review and Extensions. *[12], [13].*

TBD: Final Exam.

References

- [1] Sharpe, W. (1964), "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," *Journal of Finance* 19, 425–442.
- [2] Black, F., M. Jensen, and M. Scholes (1972), "The Capital Asset Pricing Model: Some Empirical Tests," *Studies in the Theory of Capital Markets* Editor: M. Jensen, Praeger, NY, .
- [3] Ross, S. (1976), "The Arbitrage Theory of Capital Asset Pricing," *Journal of Economic Theory* 13, 341–360.
- [4] Chen, N., R. Roll, and S. Ross (1986), "Economic Forces and the Stock Market," *Journal of Business* 59, 383–403.
- [5] Jagannathan, R. and Z. Wang (1996), "The Conditional CAPM and the Cross-Section of Expected Returns," *Journal of Finance* 51, 3-54.
- [6] Merton, R. (1973), "An Intertemporal Asset Pricing Model," *Econometrica* 41, 867–887.
- [7] Campbell, J. (1993), "Intertemporal Asset Pricing without Consumption Data," *American Economic Review* 83, 487–512.
- [8] Campbell, J. (1996), "Understanding Risk and Return," *Journal of Political Economy* 104, 298–345.
- [9] Campbell, J. and T. Vuolteenaho (2004), "Bad Beta, Good Beta," *American Economic Review* 94, 1249–1275.
- [10] Brennan, M., A. Wang, and Y. Xia (2004), "Estimation and Test of a Simple Model of Intertemporal Asset Pricing," *Journal of Finance* 59, 1743–1775.
- [11] Guo, H., R. Savickas, Z. Wang, and J. Yang (2007), "Is the Value Premium a Proxy for Time-Varying Investment Opportunities: Some Time Series Evidence," *Journal of Financial and Quantitative Analysis* 44, 133–154.
- [12] Lewellen, J., S. Nagel, and J. Shanken (2010), "A Skeptical Appraisal of Asset Pricing Tests," *Journal of Financial Economics* 96, 175-194.
- [13] Loewenstein M. and G. Willard (2006), "The Limits of Investor Behavior," *Journal of Finance* 61, 231–258.