

UNIVERSITY OF VIRGINIA

Department of Economics

ECON 8350- Theoretical Macroeconomics

Fall 2015

Ana Fostel

Office: Monroe Hall 222

Email: alf8p@virginia.edu

LECTURE: Tuesday-Thursday 12.30-1.45pm Monroe Hall 113.

OFFICE HOURS: Wednesday 12.30-2.30 by appointment only.

COURSE DESCRIPTION

This is an advance macro/finance graduate course devoted to study topics in finance with particular emphasis in financial markets and problems in their functioning. The first part of the course will cover standard theories of finance in general equilibrium models. We will first cover the case of complete markets and then move on to consider general finance properties in the context of incomplete markets.

The second part of the course will cover in detail models of general equilibrium with incomplete markets and collateral developed during the last decade. We will study how leverage can be endogenously determined in equilibrium. We will also study the effect of collateral on asset prices and real allocations. We will cover the theory of the leverage cycle and we will show how when multiple leverage cycles are considered, we can explain cross-market properties such as flight to collateral and contagion. Finally, we will also show how these models can be used to study other financial innovations, beyond leverage, such as securitization, tranching and credit default swaps.

LEARNING OUTCOMES

As a result of completing this course, students will be able to:

1. Understand canonical models of general equilibrium with complete markets, with incomplete markets and their applications to finance.
2. They should be able to critically read a paper in the frontier of the field, after getting exposed to general equilibrium models with collateral in the second part of

the course. This means not only to understand the paper but also be able to think about problems and possible extensions.

3. Students should be able to come up with interesting and relevant unsolved problems that could potentially serve as dissertation topics.

COURSE REQUIREMENTS AND GRADING:

1. Class Participation: 20 %

Regular attendance and active class participation are mandatory. Furthermore, students are expected to read the required material in advance for each class so as to be able to participate in classroom discussions. Class notes will always be emailed in advance. Class participation will also take into account attendance to our Macro seminar.

2. Midterm: 30 %

The midterm will be a written, closed book examination and will cover topics I, II and III. It will be on Wednesday November 18th, from 10-30-11.45 in room 114.

3. Research Project Presentation 50%

Students will be required to present during our last class on December 8th a research project proposal. This should be a short presentation no longer than 15 minutes. The presentations should have a clear motivation, a clear and precisely defined question, as well as road map of how to solve it. You are more than welcome to use office hours to discuss this in advance with me. This may not end up being your final PhD dissertation project. But going through this process will help you a long way into that. I still have some of my questions and projects that I wrote down when I took a similar course with John Geanakoplos back in 2002 at Yale University. Some of those never saw the light of the day, but others became journal articles, some of which you will study during these weeks. So don't be afraid!!

COURSE TOPICS:

I. General Equilibrium Theory and Finance with Complete Markets.

I.1. Walrasian economies. Existence. Regularity.

I.2. Efficiency. Arrow Debreu economies. Uncertainty.

II. General Equilibrium Theory with Incomplete Markets.

II.1. General equilibrium theory with incomplete markets.
Radner Economies. Arbitrage. Farkas' Lemma.

II. 2. GEI and GEI* models. Market Completeness. Spanning. Arrow Securities. Arrow Theorem. Modigliani-Miller. Existence and Efficiency problems.

III. GEI and Finance.

III.1. Stochastic Discount Factor. Martingale Pricing. Efficient Market Hypothesis. Covariance.

III. 2. CAPM.

III. 3. Personal Discounting.

IV. Endogenous Leverage and Asset Prices in a Static Model of Collateral.

A first on GEI with collateral: C and C*-models. Endogenous Leverage and the Credit Surface. Leverage and Asset Prices. Over-valuation. A numerical introduction to Collateral Values.

V. Leverage Cycles.

Theory of Leverage Cycle. Difference with Credit Cycles. Multiple Leverage Cycles: Contagion, Flight to Collateral and Issuance Rationing.

VI. Collateral and Financial Innovation.

Tranching, Securitization and Credit Default Swaps in models with Collateral. Effects of financial innovation on asset prices and investment.

VII. Binomial Economies

The Binomial Non-Default Theorem. A Complete characterization of leverage.

VIII. General Collateral Model

The General Model. Endogenous Leverage. Liquidity Value, Liquidity Wedge. Asset Pricing. Collateral Values and Deviations from Market Efficiency.

OUTLINE:

The following outline gives a guide to the material that will be covered in the course. Lectures are indicative: I may well find that some topics require more or less time to cover.

October

20: I.1.

22: I.2.

27: II.1.

29: II.2.

November

3: III.1.

5: III.2.

10: III.3.

12: IV.

17: V.

18: Make up for 23. Midterm.

19: VI.

23: No Class.

25: Thanksgiving

December

2: VII.

3: VIII.

8: Students presentations.

CLASS POLICIES

1. There will be **no make-up** midterm. You should have **prior** approval (for example for participation in a University sponsored event) or valid documentation (in case of an illness) for missing the midterm. In the case of a missed midterm, I will determine, based on each particular situation, any extra-work the student should do. Without prior approval or documentation, a score of zero will be assigned to the midterm.

2. The deadline for the Project Presentations is absolutely firm. No exceptions. All presentations must be done on December 8nd during class. A score of zero will be assigned to the student in the failure to deliver the report on that day.

REFERENCES:

This reference list is by no means exhaustive. This is specially true for the second part of the course after topic IV.

I. General Equilibrium Theory and Finance with Complete Markets.

Debreu Gerard. Theory of Value.

Geanakoplos John. Notes on General Equilibrium. Cowles Foundation. (available upon request).

Lengwiler Yvan. Microfoundations of Financial Economics. An Introduction to General Equilibrium Asset Pricing. Princeton Series in Finance. Chapter 2.

Mas-Colell, A., Whinston M.D., and Green J.R. Microeconomic Theory. Oxford University Press.

II. General Equilibrium Theory with Incomplete Markets.

Geanakoplos John. Notes on General Equilibrium. Cowles Foundation. (available upon request).

Geanakoplos John. An Introduction to General Equilibrium with Incomplete Markets. Journal of Mathematical Economics. 19 (1990).

Lengwiler Y. Microfoundations of Financial Economics. An Introduction to General Equilibrium Asset Pricing. Princeton Series in Finance. Chapter 3.

Magill, M. and Quinzii M. Theory of Incomplete Markets, Volume 1. MIT Press, Cambridge.

Magill, M. and Shafer W. Incomplete Markets in W. Hildenbrand and H. Sonnenschein, eds, Handbook of Mathematical Economics. Vol IV, North Holland, Amsterdam, Chapter 30.

Stephen LeRoy and Jan Werner. Principles of Financial Economics. Cambridge University Press.

III. GEI and Finance.

Cochrane J. Asset Pricing. Princeton University Press. Chapters 1-4.

Geanakoplos John. Notes on General Equilibrium. Cowles Foundation. (available upon request).

Geanakoplos John. An Introduction to General Equilibrium with Incomplete Markets. Journal of Mathematical Economics. 19 (1990).

Huang C. and Lizenberger R. Foundation for Financial Economics. Prentice Hall.

Lengwiler Y. Microfoundations of Financial Economics. An Introduction to General Equilibrium Asset Pricing. Princeton Series in Finance. Chapter 5.

Magill, M. and Quinzii M. Theory of Incomplete Markets, Volume 1. MIT Press, Cambridge.

Stephen LeRoy and Jan Werner. Principles of Financial Economics. Cambridge University Press.

IV. Endogenous Leverage and Asset Prices in a Static Model of Collateral.

Fostel A, Geanakoplos J. 2012b. "Tranching, CDS and Asset Prices: How Financial Innovation can Cause Bubbles and Crashes." *American Economic Journal: Macroeconomics*. 2012, 4(1): 190-225.

Fostel A, Geanakoplos J. 2012b. "Financial Innovation Collateral and Investment." *Forthcoming American Economic Journal: Macroeconomics*.

Fostel A, Geanakoplos J, 2014. Endogenous Collateral Constraints and the Leverage cycle. *Annual Review of Economics*.

Other related:

Garleanu N, Pedersen L. 2011. "Margin-Based Asset Pricing and the Law of One Price." *Review of Financial Studies*, vol. 24 (2011), no. 6, pp. 1980-2022.

Harrison M, Kreps D. 1978. "Speculative investor behavior in a stock market with heterogenous expectations" *Quarterly Journal of Economics*, pp 323-336.

Fostel A, Geanakoplos J. 2012a. "Why Does Bad News Increase Volatility and Decrease Leverage." *Journal of Economic Theory*. 147(2): 501-525.

IV. Leverage Cycles.

Geanakoplos J. 2003. "Liquidity, Default, and Crashes: Endogenous Contracts in General Equilibrium." In *Advances in Economics and Econometrics: Theory and Applications, Eighth World Conference, Vol. 2*, 170-205. *Econometric Society Monographs*.

Geanakoplos J. 2010. "The Leverage Cycle." In *NBER Macroeconomics Annual 2009*, ed. Daron Acemoglu, Kenneth Rogoff, and Michael Woodford, 1-65. Chicago: University of Chicago Press.

Fostel A, Geanakoplos J. 2008. "Leverage Cycles and the Anxious Economy." *American Economic Review* 2008, 98:4, 1211-1244.

Fostel A, Geanakoplos J, 2014. Endogenous Collateral Constraints and the Leverage cycle. *Annual Review of Economics*.

Other related:

Acharya, V, Viswanathan S. 2011. "Leverage, Moral Hazard, and Liquidity." *Journal of Finance*, 66(1): 99-138.

Acharya, V, Gale D, Yorulmazer T. 2011. "Rollover Risk and Market Freezes." *Journal of Finance* , 66(4), 1177-1209.

- Adrian T, Shin H. 2010. "Liquidity and Leverage." *Journal of Financial Intermediation*, 19(3): 418-37.
- Adrian T, Boyarchenko N. 2012. "Intermediary Leverage Cycles and Financial Stability" Federal Reserve Bank of New York Staff Reports, Number 567.
- Araujo A, Kubler F, Schommer S. 2012, "Regulating Collateral-Requirements when Markets are Incomplete." *Journal of Economic Theory*.147 (2): 450-476.
- Bernanke B, Gertler M. 1989. "Agency Costs, Net Worth, and Business Fluctuations." *American Economic Review* , 79(1): 14-31.
- Brunnermeier M, Pedersen L. 2009. "Market Liquidity and Funding Liquidity." *Review of Financial Studies*, vol 22,6,2201-2238.
- Brunnermeier M, Sannikov Y. 2013. "A Macroeconomic Model with a Financial Sector." Working Paper.
- Calvo G, Mendoza E. 2000. "Contagion, Globalization, and the Volatility of Capital Flows". In *Capital Flows and the Emerging Economies: Theory, Evidence, and Controversies*, ed. Sebastian Edwards, 15?41. Chicago: University of Chicago Press.
- Corsetti G, Pesenti P, Roubini N. 1999. "Paper Tigers? A Model of the Asian Crisis" *European Economic Review*, 43(7): 1211?36.
- Gromb D, Vayanos D. 2002. "Equilibrium and welfare in markets with financially constrained arbitrageurs." *Journal of Financial Economics*. 66,361-407.
- Kiyotaki N, Moore J. 1997. "Credit Cycles." *Journal of Political Economy* , 105(2): 211-248.
- Kodres L, Pritsker M. 2002. "A Rational Expectations Model of Financial Contagion." *Journal of Finance*, 57(2): 768?99.
- Kyle A, Xiong W. 2001. "Contagion as a Wealth Effect." *Journal of Finance*, 56(4): 1401?40.
- Mendoza E. 2010. "Sudden Stops, Financial Crises, and Leverage." *American Economic Review*. 2010, Vol 100. N 5, pp. 1941-66.
- Pavlova A, Rigobon R. 2008. "The Role of Portfolio Constraints in the International Propagation of Shocks." *Review of Economic Studies*, 75, pp.1215-1256.
- Poledna, S, Thurner, S, Farmer D, Geanakoplos J. 2013. "Leverage-Induced Systemic Risk under Basle II and other Credit Risk Proposals", University of Vienna working paper.
- Simsek A. 2013. "Belief Disagreements and Collateral Constraints." *Econometrica*, Volume 81, Issue 1, p.1-53.

Thurner, S. Farmer D. Geanakoplos J. 2012. "Leverage Causes Fat Tails and Clustered Volatility". *Quantitative Finance*. 12(5): 695 ? 707.

Vayanos, D. 2004. "Flight to Quality, Flight to Liquidity, and the Pricing of Risk." Unpublished.

Vayanos D, Wang J. 2012. "Liquidity and Asset Prices under Asymmetric Information and Imperfect Competition." *Review of Financial Studies*, 2012, 25, 1339-1365.

VI. Collateral and Financial Innovation.

Fostel A, Geanakoplos J. 2012b. "Tranching, CDS and Asset Prices: How Financial Innovation can Cause Bubbles and Crashes." *American Economic Journal: Macroeconomics*. 2012, 4(1): 190-225.

Fostel A, Geanakoplos J. 2012b. "Financial Innovation Collateral and Investment." Forthcoming *American Economic Journal: Macroeconomics*.

VII. Binomial Economies

Fostel A, Geanakoplos J. 2013. "Leverage and Default in Binomial Economies: A Complete Characterization." Forthcoming *Econometrica*.

VIII. General Collateral Model

Geanakoplos J. 1997. "Promises, Promises." In *The Economy as an Evolving Complex System II*, ed. W. Brian Arthur, Steven Durlauf, and David Lane, 285-320. Reading, MA: Addison-Wesley.

Geanakoplos J, Zame W. 2014. "Collateral Equilibrium: A Basic Framework." *Economic Theory*.

Other related:

Hindy A. 1994. "Viable prices in financial markets with solvency constraints". *Journal of Mathematical Economics*. 24 105-135.

Hindy and Huang. 1995. "Asset Pricing with Linear Collateral Constraints". Unpublished manuscripts.

