University of Oregon – Economics 607. Fall 2007
Advanced Topics in Macroeconomics. TuTh 10:00 – 11:50
Professor George W. Evans

This course analyzes expectations and learning in modern dynamic stochastic macroeconomic models. We develop techniques for solving for the rational expectations equilibrium (REE) and examine whether agents following adaptive or statistical learning schemes will converge over time to rational expectations. When there are multiple REE, we will be interested in determining which of them can be possible points of convergence under learning, and whether REE exhibiting endogenous fluctuations can be stable under learning. We will also consider cases in which learning can lead to non-REE learning dynamics. A substantial part of the course will be devoted to studying the implications of learning for macroeconomic policy.

The first half of the course will focus on learning theory, in some standard set-ups, and will mainly be based on my book with Seppo Honkapohja, *Learning and Expectations in Macroeconomics*, (LEM). Some material from the Farmer book and other sources will also be used. The second half of the course will emphasize applications of learning and will mainly be based on recent journal articles. We will cover a selection of the papers listed, depending on the time available and depending in part on the preferences of students.

THEORY

1. Introduction to expectations and adaptive learning. Convergence to rational expectations of least squares learning in the cobweb – Lucas model. Stochastic recursive algorithms. Expectational stability.

LEM, Ch. 1 and Ch. 2.

2. Variations: Learning steady states. Misspecified models. Learning in some standard models: OG, IS-LM-PC and Increasing Social Returns models.

LEM, Ch. 3, sections 3, 4 and 6, LEM, Ch. 4, sections 1, 2, 3, and 6.

3. Further topics in learning: Learning in univariate dynamic linear expectations models. Minimal State Variable solutions and the full set of solutions. Models with lags. Weak and strong E-stability. Learning in nonlinear univariate models. 2-state SSEs.

LEM, Ch. 8. LEM, Ch. 11, 12.

4. Solutions to linearized multivariate RE models. Basic RBC model and extensions. Learning in multivariate models.

Farmer, Chapter 1, 2, 3, 5.4, 7.
Software: Matlab. McCallum and Nelson. Dynare.
LEM, Ch. 10.

5. Persistent learning dynamics. Hysteresis and endogenous fluctuations in the ISR model. Sargent's inflation model.

LEM, Ch 13.2, Ch. 14.1, 14.3-14.4.

APPLICATIONS

Applications of learning to monetary policy in the "New Keynesian" model.

(i) The New Keynesian Model:

Carl Walsh, *Monetary Theory and Policy*, 2nd Edition, Section 5.4 of Chapter 5 and pp. 230-256 and 263-268.

(ii) Overviews of Learning and Monetary Policy in the New Keynesian Model:

G. W. Evans and S. Honkapohja, "Adaptive Learning and Monetary Policy Design," Journal of Money, Credit and Banking, Vol. 35, 1045-1072.

G. W. Evans and S. Honkapohja, "Expectations, Learning and Monetary Policy: an overview of recent research," mimeo. 2007.

(iii) Learning and Taylor-rules

J. Bullard and K. Mitra, "Learning about monetary policy rules," Journal of Monetary Economics, Vol. 49, 2002, pp. 1105-1129.

J. Bullard and K. Mitra, "Determinacy, learnability and monetary policy inertia," Journal of Money Credit and Banking, forthcoming.

S. Honkapohja and K. Mitra, "Are non-fundamental equilibria learnable in models of monetary policy," Journal of Monetary Economics, Vol. 51, 2004, 1743-1770.

G. W. Evans and B. McGough, "Monetary policy, indeterminacy and learning," Journal of Economic Dynamics and Control, Vol. 29, 2005, pp. 1809-1840.

G. W. Evans and Bruce McGough, "Monetary policy and stable indeterminacy with inertia," Economics Letters, Vol. 87, 2005, pp. 1-7.

(iv) Learning and Optimal Monetary Policy

G. W. Evans and S. Honkapohja, "Expectations and the stability problem for optimal monetary policies," Review of Economic Studies, Vol. 70, 2003, pp. 807-824.

G. W. Evans and S. Honkapohja, "Monetary policy, expectations and commitment," Scandinavian Journal of Economics, Vol. 108, 2006, pp. 15 – 38.

S. Honkapohja and K. Mitra, "Performance of Monetary Policy with Internal Central Bank Forecasting," Journal of Economic Dynamics and Control, Vol.29, 2005, pp. 627-658.

G. W. Evans and Bruce McGough, "Optimal constrained interest-rate rules," Journal of Money, Credit and Banking, Vol. 39, 2007, 1335-1356.

(v) Long-horizon learning

B. Preston, "Learning about monetary policy rules when long-horizon expectations matter," International Journal of Central Banking, Vol. 1, 2005, 81-126.

B. Preston, "Adaptive learning, forecast-based instrument rules and monetary policy," Journal of Monetary Economics, Vol. 53, 2006, pp. 1187-1211.

G. W. Evans, S. Honkapohja and K. Mitra, "Anticipated fiscal policy and adaptive learning," mimeo. 2007.

Sunspots and learning in irregular RBC models.

LEM Ch. 10.

S. Schmidt-Grohe and M. Uribe, "Balanced-budget rules, distortionary taxes and aggregate instability," Journal of Political Economy, Vol. 105, 1997, pp. 976-1000.

G. W. Evans and B. McGough, Stable sunspot solutions in models with predetermined variables, Journal of Economic Dynamics and Control, Vol. 29, 2005, pp. 601-625.

G. W. Evans and B. McGough, Indeterminacy and the stability puzzle in non-convex economies," Contributions to Macroeconomics, Vol. 5, Issue 1, 2005.

J. Duffy and W. Xiao, "Instability of sunspot equilibria in real business cycle models under adaptive learning," Journal of Monetary Economics, Vol. 52, 2007, pp. 879-903.

Monetary policy with constant gain learning

A. Orphanides and J. Williams, "Imperfect knowledge, inflation expectations and monetary policy" in *The Inflation -Targeting Debate*, eds. B. Bernanke and M. Woodford, U. Chicago Press, 2005.

G. W. Evans and G. Ramey, "Adaptive expectations, underparameterization and the Lucas critique," Journal of Monetary Economics, Vol. 53, 2006, 249-264.

I.-K. Cho, N. Williams and T. J. Sargent, "Escaping Nash equilibria", Review of Economic Studies, Vol. 69, 2002, pp. 1-40.

B. McGough, "Shocking escapes", Economic Journal, Vol. 116, 2006, pp. 507-528.

Empirical Studies of Monetary Policy, Expectations and Learning

T. Cogley and T. Sargent, "The conquest of US inflation: learning and robustness to model uncertainty," Review of Economic Dynamics, Vol. 8, 2005, 1661-1707.

W. Branch and G. Evans, "A simple recursive forecasting model," Economics Letters Vol. 91, 2006, 158-166.

A. Orphanides and J. Williams, "The decline of activist stabilization policy: natural rate perceptions, learning and expectations," Journal of Economic Dynamics and Control, Vol. 29, 2005, pp. 1927-1950.

J. Bullard and Euseppi, "Did the great inflation occur despite policymaker commitment to a Taylor rule?," Review of Economic Dynamics, Vol. 8, 2005, pp. 324-359.

F. Milani, "Adaptive learning and inflation persistence," mimeo. 2005

F. Milani, "Expectations, learning and macroeconomic persistence," Journal of Monetary Economics, 2007, in press.

Hyperinflation

A. Marcet and J. P. Nicolini, "Recurrent hyperinflations and learning," American Economic Review, Vol. 93, 2003, pp. 1476-1498.

G. W. Evans, S. Honkapohja and R. Marimon, "Convergence in monetary inflation models with heterogeneous learning rules," Macroeconomic Dynamics, Vol. 5, 2001, pp. 1-31.

K. Adam, G. W. Evans, S. Honkapohja, "Are hyperinflationary paths learnable?" Journal of Economic Dynamics and Control, Vol. 30, 2006, pp. 2725-2748.

Exchange rates and learning

K. Kasa, “Learning, large deviations and currency crises,” International Economic Review, Vol. 45, 2004, pp. 141-173.

L.-F. Zanna, “PPP rules, macroeconomic (in)stability and learning,” mimeo.

A. Chakraborty and G. W. Evans, “Can perpetual learning explain the forward-premium puzzle?”, mimeo.

Monetary and Fiscal Policy Interaction

B. T. McCallum, “Indeterminacy, bubbles and the fiscal theory of price level determination,” Journal of Monetary Economics, Vol. 47, 2001, 19-30.

C. Giannitsarou, “Supply-side reforms and learning dynamics,” Journal of Monetary Economics, Vol. 53, 2006, pp. 291-309.

G. W. Evans and S. Honkapohja, “Policy interaction, learning and the fiscal theory of prices,” forthcoming Macroeconomic Dynamics.

W. A. Branch, T. Davig and B. McGough, “Monetary-Fiscal Policy Interactions under Implementable Monetary Policy Rules,” forthcoming Journal of Money, Credit and Banking.

Liquidity Traps

J. Benhabib, S. Schmitt-Grohe and M. Uribe, “The perils of Taylor-rules,” Journal of Economic Theory, Vol. 96, 2001, pp. 40-69.

G. W. Evans and S. Honkapohja, “Policy interaction, expectations and the liquidity trap,” Review of Economic Dynamics, Vol. 8, 2005, pp. 303-323.

G. W. Evans, E. Guse and S. Honkapohja, “Liquidity traps, learning and stagnation,” mimeo.

Dynamic predictor selection

W. A. Brock and C. H. Hommes, “A Rational route to randomness,” Econometrrica, Vol. 65, 1997, pp. 1059-1095.

W. A. Branch and G. W. Evans, “Intrinsic heterogeneity in expectation formation,” Journal of Economic Theory, Vol. 127, 2006, 264-295.

W. A. Branch and G. W. Evans, “Model uncertainty and endogenous volatility” Review of Economic Dynamics, Vol. 10, 2007, 158-166.

K. Adam, “Experimental evidence on the persistence of output and inflation,” Economic Journal, Vol. 117, 603-636.

W. Branch, “The theory of rationally heterogeneous expectations: evidence from survey data on inflation expectations,” Economic Journal, Vol. 114, 2004, 592-621.

W. Branch, “Sticky information and model uncertainty in survey data on inflation expectations,” Journal of Economic Dynamics and Control, Vol. 31, 2007, pp. 245 – 276.

Textbook References

George W. Evans and Seppo Honkapohja, *Learning and Expectations in Macroeconomics*, Princeton University Press, Princeton NJ, 2001. (LEM)

Roger E. A. Farmer, *The Macroeconomics of Self-Fulfilling Prophecies*, 2nd edition, MIT Press, Cambridge MA, 1999.

Other sources of papers on learning in macroeconomics

Cambridge University website on Adaptive Learning in Macroeconomics:

http://www.econ.cam.ac.uk/research/learning/

St. Louis FRB "Learning Week" program for 2006 and 2007:

http://research.stlouisfed.org/conferences/learningconf/index.html

Grading. There will be several problem sets, a midterm, a short paper and the final examination. Each will count 25% of the grade. You can work on problem sets together, but should write up your answers separately. The paper should usually be based on an article or working paper connected with the course, either one of the above papers, not covered in the lectures, or a recent paper on learning found from the above websites or elsewhere.

The midterm is on Thursday, November 1 and the final examination is on Friday, December 7 at 8am – 10am.

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