

ECON899 - Computational Methods

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Syllabus

This class teaches techniques to compute and estimate dynamic structural models with heterogeneous agents to answer questions in macroeconomics on incomplete credit markets and firm dynamics. The class is organized around the following matrix of topics:

	Households	Firms
continuum	Huggett	Hopenhayn
finite	Krusell/Quadrini/Rios-Rull	Ericson/Pakes

The equilibrium concept for “continuum” economies is competitive while for “finite” economies it is Markov perfection.

There will be Matlab or Fortran computer assignments every week that can be done in groups and a final project which must be done individually. Final project suggestions are listed at the bottom of this syllabus.

Some books that might prove useful are:

Judd, K. 1998. Numerical Methods in Economics, Cambridge: MIT Press.

Press, W., S. Teukolsky, W. Vetterling, B. Flannery. 1996. Numerical Recipes in Fortran 90, Cambridge: Cambridge University Press.

Stokey and Lucas. 1989. Recursive Methods in Economic Dynamics. Cambridge: Harvard University Press.

Some great websites to complement this course are Victor Rios-Rull, Jesus Fernandez Villaverde, Makoto Nakajima, and Pablo D’Erasmus.

Part 1a. Understanding the U.S. Distribution of Wealth (“*”

denotes papers covered in class or problem sets)

Aiyagari, R. 1994. “Uninsured Idiosyncratic Risk and Aggregate Saving”, *Quarterly Journal of Economics*, 109, p. 659-84.

*Athreya, K. 2002. “Welfare Implications of the Bankruptcy Reform Act of 1999”, *Journal of Monetary Economics*, 49(8), p. 1567-1595.

*Budria Rodriguez, S., J. Diaz Gimenez, V. Quadrini, V. Rios-Rull. 2002. “Updated Facts on the U.S. Distributions of Earnings, Income, and Wealth”, *Federal Reserve Bank of Minneapolis Quarterly Review*, Summer, p. 2-35.

*Chatterjee, S., D. Corbae, M. Nakajima, and V. Rios-Rull. 2007. “A Quantitative Theory of Unsecured Consumer Credit with Risk of Default”, *Econometrica*, 75(6), p. 1525-1589.

Corbae, D. and E. Quintin. 2013. “Leverage and the Foreclosure Crisis”, mimeo.

*Diaz Gimenez, J., A. Glover, and V. Rios-Rull. 2011. “Facts on the Distributions of Earnings, Income, and Wealth in the United States: 2007 Update”, *Federal Reserve Bank of Minneapolis Quarterly Review*, February, p. 2-35. (DGR uses 2007 SCF)

Heathcote, J., K. Storesletten, and G. Violante. 2009. “Quantitative Macroeconomics with Heterogeneous Households”, Federal Reserve Bank of Minneapolis Research Department Staff Report #420.

*Huggett, M. 1993. “The risk-free rate in heterogeneous-agent incomplete-insurance economies”, *Journal of Economic Dynamics and Control*, 17, p. 953-69.

*Huggett, M. 1996. “Wealth distribution in life-cycle economies”, *Journal of Monetary Economics*, 38, p. 469-94.

*Krussell, P. and A. Smith. 1998. “Income and Wealth Heterogeneity in the Macroeconomy,” *Journal of Political Economy*, 106, p. 867-96.

Miao, J. 2006. “Competitive equilibria of economies with a continuum of consumers and aggregate shocks,” *Journal of Economic Theory*, 128, p. 274-298.

Rios-Rull, V. 1997. “Computation of Equilibria in Heterogeneous Agent Models”, *Federal Reserve Bank of Minneapolis Staff Report 231*.

Paulson, A., R. Townsend, A. Karaivanov. 2006. “Distinguishing Limited Liability from Moral Hazard in a Model of Entrepreneurship,” *Journal of Political Economy*, 114, p. 100-44.

*Tauchen, G. 1986. “Finite state Markov-chain approximation to univariate and vector autoregressions”, *Economics Letters*, 20, p. 177-81.

Part 1b. Political Economy

*Aiyagari, R. 1995. "Optimal Capital Income Taxation with Incomplete Markets, Borrowing Constraints, and Constant Discounting", *Journal of Political Economy*, 103, p. 1158-75.

*Corbae, D., P. D'Erasmus, B. Kuruscu. 2009 "Politico-Economic Consequences of Rising Earnings Inequality", *Journal of Monetary Economics*, Vol. 56, p.43-61.

Krusell, P., V. Quadrini and V. Ríos Rull. 1997 "Politico-economic equilibrium and economic growth," *Journal of Economic Dynamics and Control*, 21, pp. 243-272.

Krusell, P. and V. Rios-Rull. 1999. "On the Size of U.S. Government: Political Economy in the Neoclassical Growth Model", *American Economic Review*, 89, p. 1156-81.

*Meltzer, A. and S. Richard. 1981. "A Rational Theory of the Size of Government", *Journal of Political Economy*, 89, p. 914-27.

Part 2a. Understanding Entry, Exit, and Firm Dynamics

Clementi, G. and D. Palazzo. 2010. "Entry, Exit, Firm Dynamics, and Aggregate Fluctuations", mimeo.

Davis, S., J. Haltiwanger, S.Schuh. 1996. *Job Creation and Destruction*. Cambridge:MIT Press. See also <http://www.bsos.umd.edu/econ/haltiwanger/download.htm>

Hansen, L. 1982. "Large Sample Properties of Generalized Method of Moments Estimators", *Econometrica*, 50, p. 1029-54.

*Hopenhayn, H. 1992. "Entry, Exit, and Firm Dynamics in Long Run Equilibrium", *Econometrica*, 60, p. 1127-50.

*Hopenhayn, H. and R. Rogerson. 1993. "Job Turnover and Policy Evaluation: A General Equilibrium Analysis", *Journal of Political Economy*, 101, p. 915-38.

*Lee, B.S. and B. Ingram. 1991 "Simulation estimation of time series models", *Journal of Econometrics*, 47, p. 197-205.

*Michaelides, A. and S. Ng. 2000. "Estimating the rational expectations model of speculative storage: A Monte Carlo comparison of three simulation estimators", *Journal of Econometrics*, 96, p. 231-66.

Part 2b. Strategic Interactions among Firms

Abbring, J., J. Campbell, and N. Yang. 2010. "Simple Markov-Perfect Industry Dynamics", mimeo.

*Corbae, D. and P. D’Erasmus. 2013. “Capital Requirements in a Quantitative Model of Banking Industry Dynamics”, mimeo.

*Ericson, R. and A. Pakes. 1995. “Markov-Perfect Industry Dynamics: A Framework for Empirical Work”, *Review of Economic Studies*, 62, p. 53-82.

Pakes, A. 2000. “A framework for applied dynamic analysis in I.O.”, NBER wp #8024.

Weintraub, G.Y., C.L. Benkard, and B. Van Roy. 2008. “Markov Perfect Industry Dynamics with Many Firms”, *Econometrica*, Vol. 76, No. 6 (November, 2008), 1375–1411.

*Weintraub, G.Y., C.L. Benkard, and B. Van Roy. 2008. “Computational Methods for Oblivious Equilibrium”, mimeo. See also Weintraub’s website http://www.columbia.edu/~gyw2105/GYW/Main_Page.html.

Weintraub, G.Y., C.L. Benkard, and B. Van Roy. 2009. “Industry Dynamics: Foundations for Models with an Infinite Number of Firms”, mimeo.

Final Project: Reproduce the results in a paper which uses heterogeneous agent computation techniques of your choice. Some suggestions are:

(Sovereign Debt) Arellano, C. 2008. “Default Risk and Income Fluctuations in Emerging Economies”, *American Economic Review*, 98(3), p. 690-712.

(Corporate Finance) Hennessy, C. and T. Whited. 2005. “Debt Dynamics”, *Journal of Finance*, 60, p. 1129-1165.

(Search Models of Money) Molico, M. 2006. "The Distribution Of Money And Prices In Search Equilibrium," *International Economic Review*, 47(3), p. 701-722.

(Private Information) Williamson, S. 1998. “Payment Systems with Random Matching and Private Information”, *Journal of Money, Credit, and Banking*, 30(3), p. 551-569.