

Macroeconomics
411-1
Fall, 2002
Christiano

Syllabus

1. General Information.

- Lectures are M-W 9-10:50am, 104 Swift Hall (SWT). Recitation: Friday 9-11am, SWT 104. EXCEPTION: The November 20 lecture is cancelled and will meet on November 15, during recitation section, instead. The November 20 recitation will be held during the normal class time on November 20.
- My office number is 3246, Andersen Hall; Phone: 491-8231. Email: l-christiano@northwestern.edu. Office hours: TBA.
- TA: Guido Menzio, office hours, Mondays, 5pm; telephone number, 491-8203; office, 325 Andersen.
- The grades will be determined as follows: homeworks, 10%; midterm, 40%; final, 50%. There will be approximately seven homework assignments. You are requested to work in teams of up to five students on these problem sets, and only one should be submitted per group. With one exception, homeworks should be turned in to the Economics Department office by Wednesday, 5pm, in the week after they are assigned. The exception is the homework due on November 6, which you may turn in on Friday November 8.
- The midterm is on Wednesday, November 6. The final is on Tuesday, December 10, 9-11am, in the regular lecture room.

2. Goals.

Macroeconomics is about two things: (i) developing positive models that can help us understand the dynamics of key macroeconomic variables: employment, unemployment, interest rates, output, etc.; and (ii) using these models to make judgements about what policies the government should, or should not, pursue. Classic questions include

the proper setting of taxes and money over the business cycle. The purpose of the course is to study the tools needed to do research on (i) and (ii), and to review (a subset of) the relevant substantive findings reported in the literature.

To address (i), we will begin by developing the basic building block of modern macroeconomics: the infinite lived, deterministic, homogeneous agent growth model. One set of variations of this model will allow us to review a subset of the modern theory of growth. Another will allow us to review basic results in monetary economics. A third set of variations will allow us to review the theory of business cycles.

To address (ii), we will study the optimal determination of tax rates. We will first study this problem assuming the government can determine at some initial date what the optimal setting of these variables is for all time, and all possible circumstances, and that it can then commit itself credibly to actually implementing these policies. We will go on to study the more realistic (though more complicated, too) case where the government lacks the ability to commit.

- The textbook for the course is S-L:

Nancy L. Stokey and Robert E. Lucas, Jr., with Edward C. Prescott, *Recursive Methods in Economic Dynamics*, Harvard University Press.

Another excellent text is Ljungqvist and Sargent's, *Recursive Macroeconomic Theory*, MIT Press, 2000 (for related materials, see <http://www.stanford.edu/~sargent/>).

- Additional reading materials will be made available on the course website.

COURSE OUTLINE

There will be 19 lectures (one of the 20 slots is taken by the midterm). The topics are summarized below, with the rough number of lectures expected to be devoted to each given in parentheses. The primary and related readings for each lecture are listed.

1. Infinite Horizon Model With No Uncertainty and Fixed Labor.
 - (a) (four lectures) Efficient Allocations.
 - i. Sequence Approach (S-L: pp. 8-13, sec. 4.5).
 - ii. Function Space and Dynamic Programming (S-L; pp. 13-16, sec. 4.2, sec. 6.1).
 - (b) (one lecture) Equilibrium Concepts (S-L: sec. 2.3; Cooley-Prescott, 1995, pp. 8-10).
 - i. Sequence concepts:
 - A. Date 0 Arrow-Debreu.
 - B. Sequence-of-Markets.
 - ii. Recursive Competitive Equilibrium.
 - (c) (five lectures) Application: Growth Theory (Jones and Manuelli, 1997).
 - i. Exogenous growth models.
 - A. Growth generated by ‘disembodied’ technical change (S-L, sec. 5.4; related paper: Christiano (1989)).
 - B. Growth generated by investment-specific technical change (Greenwood, Hercowitz and Krusell, 1997, Hornstein and Krusell, 1996).
 - ii. Endogenous growth models.
 - A. “Ak” models (Christiano and Harrison (1999, Appendix); see also: Rebelo (1991)).
 - B. Learning-by-doing and learning-or-doing (S-L; sec. 5.7).

- C. Increasing variety and specialization (Romer, 1987; Matsuyama, 1999; class notes on Matsuyama).
 - D. Overlapping-generations (Jones and Manuelli, 1997).
- 2. (four lectures) Adding Variable Labor and Money. (See: Albanesi, Chari, and Christiano, (2002a); Christiano and Rostagno, (2002); see also Cole and Kocherlakota, 1998).
 - (a) Necessary and Sufficient Conditions for Private Sector Equilibrium In Cash in Advance Economies.
 - (b) Multiplicity of Private Sector Equilibria.
 - (c) The Optimal Private Sector Equilibrium, and the Type of Monetary Policies that Can Support it.
- 3. (three lectures) Adding Uncertainty and Variable Labor: the Real Business Cycle (RBC) Model.
 - (a) Business Cycle Implications (Cooley and Prescott (1995); see also: Prescott (1986), Summers (1986), Boldrin, Christiano and Fisher (2001)).
 - (b) RBC model with multiple equilibria and sunspot equilibria (see: Christiano and Harrison (1999), Shleifer (1983), class notes on Shleifer; related readings: Bryant (1981,1983), Cass and Shell (1983); Cooper and John (1988); Diamond and Dybvig (1983); Diamond (1982); Farmer (1993); Farmer and Guo (1994,1995); Farmer and Woodford (1984); Gali (1994a,b); Krugman (1991); Woodford (1986,1991)).
- 4. (three lectures) Optimal Policy
 - (a) The case of full commitment, (Chari (1988); see also Chari, Christiano and Kehoe (1994); Lucas and Stokey (1983)).
 - (b) The case of no commitment (the ‘time inconsistency problem’) (Chari (1988) and Christiano and Fitzgerald (2002); see also: Chari, Christiano and Eichenbaum (1996); Albanesi, Chari, and Christiano, (2002a,b), Chari and Kehoe (1980); Kydland and Prescott (1977); Stokey (1991)).

References

- [1] Albanesi, Stefania, V.V. Chari and Lawrence J. Christiano, 2002a, 'How Severe is the Time Consistency Problem in Monetary Policy?,' forthcoming in *Advances in Economic Theory and Econometrics*, edited by Lars Hansen and Stephen Turnovsky.
- [2] Albanesi, Stefania, V.V. Chari and Lawrence J. Christiano, 2002b, 'Expectation Traps and Monetary Policy,' NBER Working Paper 8912.
- [3] Azariadis, Costas, 1981, 'Self-Fulfilling Prophecies,' *Journal of Economic Theory*, 25, pp. 380-396.
- [4] Benhabib, Jess, and Roger E. A. Farmer, 1994, 'Indeterminacy and Growth,' *Journal of Economic Theory* 63, pp. 19-41.
- [5] Benhabib, Jess, and Roger E. A. Farmer, 1995, 'Indeterminacy and Sector-Specific Externalities,' manuscript, department of economics, UCLA, May.
- [6] Benhabib, Jess, and Roberto Perli, 1994, 'Uniqueness and Indeterminacy: On the Dynamics of Endogenous Growth,' *Journal of Economic Theory*, 63, pp. 113-142.
- [7] Boldrin, Michele, L. J. Christiano, and Jonas Fisher, 2001, 'Asset Pricing Lessons for Modeling Business Cycles,' *American Economic Review*.
- [8] Bryant, John, 1981, 'Bank Collapse and Depression,' *Journal of Money, Credit and Banking*, XIII, pp. 454-464.
- [9] Bryant, John, 1983, 'A Simple Rational Expectations Keynes-Type Model,' *Quarterly Journal of Economics*, Vol. XCVIII, no. 3.
- [10] Cass, David, and Karl Shell, 1983, 'Do Sunspots Matter?,' *Journal of Political Economy* 91, 193-227.
- [11] Chari, V.V., 1988, 'Time Consistency and Optimal Policy Design,' Federal Reserve Bank of Minneapolis *Quarterly Review*, Fall.
- [12] Chari, V.V., and Patrick J. Kehoe, 1990, 'Sustainable Plans,' *Journal of Political Economy*, vol. 98, no. 4, pp. 783-802.

- [13] Chari, V.V., Lawrence J. Christiano, and Martin Eichenbaum, 1998, 'Expectation Traps and Discretion,' *Journal of Economic Theory*.
- [14] Chari, V.V., Lawrence J. Christiano and Patrick Kehoe, 1994, 'Policy Analysis in Business Cycle Models,' in Thomas F. Cooley, editor, *Frontiers of Business Cycle Research*, Princeton University Press.
- [15] Christiano, Lawrence J., 1989, 'Understanding Japan's Saving Rate: The Reconstruction Hypothesis,' Federal Reserve Bank of Minneapolis *Quarterly Review*, Spring.
- [16] Christiano, Lawrence J., and Terry Fitzgerald, 2002, 'Inflation', manuscript.
- [17] Christiano, Lawrence J., and Sharon Harrison, 1999, 'Chaos, Sunspots and Automatic Stabilizers,' *Journal of Monetary Economics*.
- [18] Cole, Hal and Narayana Kocherlakota, 1998, 'Zero Nominal Interest Rates: Why they are Good and How to Get Them,' Federal Reserve Bank of Minneapolis, *Quarterly Review*, vol. 22, no. 2, pp. 2-10.
- [19] Cooley, Thomas F. and Edward C. Prescott, 1995, 'Economic Growth and Business Cycles,' in Thomas F. Cooley, editor, *Frontiers of Business Cycle Research*, Princeton University Press.
- [20] Cooper, Russell, and Andrew John, 1988, 'Coordinating Coordination Failures in Keynesian Models,' *Quarterly Journal of Economics*, 103, August, pp. 441-463.
- [21] Diamond, Douglas, and Philip Dybvig, 1983, 'Bank Runs, Deposit Insurance, and Liquidity,' *Journal of Political Economy* 91, 3, pp. 401-419.
- [22] Diamond, Peter, 1982, 'Aggregate-Demand Management in Search Equilibrium,' *Journal of Political Economy*, 90, no. 5, pp. 881-894.
- [23] Farmer, Roger E. A., 1993, *The Macroeconomics of Self-Fulfilling Prophecies*, MIT Press.
- [24] Farmer, Roger E. A., and Guo, J.-T., 1994, 'Real Business Cycles and the Animal Spirits Hypothesis,' *Journal of Economic Theory* 63, pp. 42-73.

- [25] Farmer, Roger E. A., and Guo, J.-T., 1995, 'The Econometrics of Indeterminacy: an Applied Study,' *Journal of Monetary Economics*, forthcoming.
- [26] Farmer, Roger E. A., and Michael Woodford, 1984, 'Self-Fulfilling Prophecies and the Business Cycle,' Center for Analytic Research in Economics and Social Science, Working Paper no. 84-12, University of Pennsylvania, April.
- [27] Gali, Jordi, 1994a, 'Monopolistic Competition, Business Cycles, and the Composition of Aggregate Demand,' *Journal of Economic Theory* 63, pp. 73-96.
- [28] Gali, Jordi, 1994b, 'Monopolistic Competition, Endogenous Markups and Growth,' *European Economic Review* 38, pp. 748-756.
- [29] Hornstein, Andreas and Per Krusell, 1996, 'Can Technology Improvements Cause Productivity Slowdowns?', *Macroeconomics Annual*.
- [30] Jones, Larry, and Rodolfo Manuelli, 1997, 'The Sources of Growth', *Journal of Economic Dynamics and Control*, vol. 21, no. 1.
- [31] Greenwood, Jeremy, Zvi Hercowitz and Per Krusell, 1997, 'Long-Run Implications of Investment-Specific Technological Change,' working paper, Rochester Center for Economic Research, *American Economic Review*.
- [32] Kiyotaki, Nobuhiro, and Randall Wright, 1993, 'A Search-Theoretic Approach to Monetary Economics,' *American Economic Review*, 83, March, pp. 63-77.
- [33] Krugman, Paul, 1991, 'History Versus Expectations,' *Quarterly Journal of Economics*, vol. CVI, no. 2, pp. 651-667.
- [34] Kydland, Finn, and Edward C. Prescott, 1977, 'Rules Rather than Discretion: The Inconsistency of Optimal Plans,' *Journal of Political Economy*, vol. 85, pp. 473-491.
- [35] Lucas, Robert E., Jr., and Nancy L. Stokey, 1983, 'Optimal Fiscal and Monetary Policy in an Economy Without Capital,' *Journal of Monetary Economics*, vol. 12, pp. 55-93.

- [36] Matsuyama, Kiminori, 1999, ‘Growing Through Cycles,’ *Econometrica*.
- [37] Prescott, Edward, 1986, ‘Theory Ahead of Business Cycle Measurement,’ Carnegie-Rochester Conference on Public Policy 24:11-44, Reprinted in Federal Reserve Bank of Minneapolis *Quarterly Review* 10:9-22.
- [38] Rebelo, Sergio, 1991, ‘Long-Run Policy Analysis and Long-Run Growth,’ *Journal of Political Economy*, 99, 3, June, 500-521.
- [39] Romer, David, 1996, *Advanced Macroeconomics*, McGraw-Hill.
- [40] Romer, Paul, 1987, ‘Growth Based on Increasing Returns Due to Specialization,’ *American Economic Review*, 77, 2, (May), 56-62.
- [41] Romer, Paul, 1989, ‘Capital Accumulation in the Theory of Long-Run Growth,’ in Robert Barro, ed. *Modern Business Cycle Theory*, Harvard University Press.
- [42] Shleifer, A., 1986, Implementation cycles, *Journal of Political Economy* 94, 1163–1190.
- [43] Stokey, Nancy, 1991, ‘Credible Public Policy,’ *Journal of Economic Dynamics and Control*, vol. 15, pp. 627-656.
- [44] Summers, Lawrence, 1986, ‘Some Skeptical Observations on Real Business Cycle Theory,’ Federal Reserve Bank of Minneapolis *Quarterly Review*.
- [45] Woodford, Michael, 1986, ‘Stationary Sunspot Equilibria in a Finance Constrained Economy,’ *Journal of Economic Theory*, vol. 40, no. 1, October.
- [46] Woodford, Michael, 1991, ‘Self-Fulfilling Expectations and Fluctuations in Aggregate Demand,’ in N. Gregory Mankiw and David Romer, editors, *New Keynesian Economics, vol. 2, Coordination Failures and Real Rigidities*, MIT Press.