Macroeconomic Theory I

Economic Growth

(and Introduction to Dynamic General Equilibrium Economies)

The first half of the semester is an introduction to the techniques and the applications of dynamic general equilibrium models, with particular emphasis on models of economic growth.

There are seven sections. The basic readings for each section are indicated by stars. The non-star items are selected articles which you may want to refer to if you get excited with the particular topic; they are not required for the course.

The lectures will alternate two modes. When we introduce a benchmark paradigm, such as in the case of the Neoclassical Growth Model, the presentation of the model and the derivation of the results will be quite detailed, with emphasis on both the techniques and the economics. The presentation will instead be more "chatty" and brief when we consider applications or extensions, such as those in Sections 4 and 7.

As organized below, the material is supposed to take 14 lectures, which of course violates our budget constraint. If we are fast enough, we might be able to cover everything; otherwise, we will adjust as we proceed.

If you are an MIT Econ PhD student, you have to take the course (or pass the waiver). Otherwise, please come and see me to discuss whether this course is appropriate for you.

1. A Prelude to Growth Facts and Growth Models (2 lectures)

Topics: "Why growth theory?"; stylized facts on world growth and world income distribution; the Solow Model; steady state, golden rule, and transitional dynamics; productivity shocks and policy effects; conditional convergence; exogenous technological change; two sectors, *AK*, and the general convex growth model; nonconvexities and poverty traps.

* Barro, R.J., and X. Sala-i-Martin (1995), *Economic Growth*, chapters 1 and 12.

* Romer, D. (2001), *Advanced Macroeconomics*, chapters 1 and 3-A.

* Jones, C. (1997), "On the Evolution of the World Income Distribution," *Journal of Economic Perspectives* 11, 19-36.

* Mankiw, N.G., D. Romer, and D. Weil (1992), "A Contribution to the Empirics of Economic Growth," *Quarterly Journal of Economics* 107, 401-437.

Barro, R., *Determinants of Economic Growth: A Cross-Country Empirical Study*, MIT Press, 1997.

Hall, R., and C. Jones (1999), "Why Do Some Countries Produce So Much More Output than Others?" *Quarterly Journal of Economics* 114, 83-116.

Solow, R.M. (1956), "A Contribution to the Theory of Economic Growth", *Quarterly Journal of Economics* 70, 65-94.

Solow, R.M. (1970), *Growth Theory: An Exposition*, Clarendon Press.

2. The Neoclassical Growth Model (2 lectures)

Topics: Introducing DGE and refreshing dynamic programming, optimal control, and dynamic systems; the Neoclassical Growth Model (Ramsey-Cass-Koopmans-Brock-Mirman); the steady state, the modified golden rule, and the transitional dynamics; productivity shocks, taste shocks, and policy shocks.

* Barro, R.J., and X. Sala-i-Martin (1995), *Economic Growth*, chapters 2 and 3.

* Blanchard, O., and S. Fischer (1989), *Lectures on Macroeconomics*, chapter 3.

* Stokey, N.L., and R.E. Lucas, Jr., *Recursive Methods in Economic Dynamics*, chapter 2.

Cass, D. (1965), "Optimum Growth in an Aggregative Model of Capital Accumulation," *Review of Economic Studies* 32, 233-240.

Cass, D. (1966), "Optimum Growth in an Aggregative Model of Capital Accumulation: A Turnpike Theorem," *Econometrica* 34, 833-850.

Lucas, R.E., Jr. (1990), "Why Doesn't Capital Flow from Rich to Poor Countries?" *American Economic Review* 80, 92-96.

Ramsey, F.P. (1928), "A Mathematical Theory of Saving," *Economic Journal* 38, 543-559.

Romer, D. (2001), *Advanced Macroeconomics*, part A of chapter 2.

Skiba, A.K. (1978), "Optimal Growth with a Convex-Concave Production Function," *Econometrica* 46, 527-539.

3. Applications I: Open Economies, Overlapping Generations, Money (2 lectures)

Topics: Open economies; adjustment costs and Tobin's *q*; finite horizons in the neoclassical growth model (the Blanchard model); OLG economies (the Diamond model); public debt, bubbles, social security; life-cycle consumption and savings; altruism and bequests; Ricardian equivalence; money (the Sidrausky model).

* Barro, R.J., and X. Sala-i-Martin (1995), *Economic Growth*, chapter 3 and appendix to chapter 3.

* Blanchard, O., and S. Fischer (1989), *Lectures on Macroeconomics*, chapter 3 and sections 5.1-5.2.

* Barro, R.J (1974), "Are Government Bonds Net Wealth?" *Journal of Political Economy* 82, 1095-1117.

* Blanchard, O. (1985), "Debt, Deficits and Finite Horizons," *Journal of Political Economy* 93, 223-247.

* Diamond, P. (1965), "National Debt in a Neoclassical Growth Model," *American Economic Review* 55, 1126-1150.

Abel, A., and O. Blanchard (1983), "An Intertemporal Equilibrium Model of Saving and Investment," *Econometrica* 51, 675-692.

Abel, A.B., N.G. Mankiw, L.H. Summers, and R.J. Zeckhauser (1989), "Assessing Dynamic Inefficiency: Theory and Evidence," *Review of Economic Studies* 56, 1-20.

Caballero, R.J., and M.L. Hammour, "Speculative Growth," MIT mimeo.

Feldstein, M. (1985), "The Optimal Level of Social Security Benefits," *Quarterly Journal of Economics* 100, 303-320.

Modigliani, F. (1986), "Life Cycle, Individual Thrift, and the Wealth of Nations," *American Economic Review* 76, 297-313.

Romer, D. (2001), *Advanced Macroeconomics*, chapter 2, part B.

Samuelson, P.A. (1958), "An Exact Consumption Loan Model of Interest with and without the Social Contrivance of Money," *Journal of Political Economy* 1958, 467-482.

Sidrausky, M. (1967), "Rational Choice and Patterns of Growth in a Monetary Economy," American Economic Review 77, 534-544.

Tirole, J. (1985), "Asset Bubbles and Overlapping Generations," *Econometrica* 53, 1499-1528.

4. Applications II: Fluctuations, Asset Pricing, Public Finance, Behavioral (2 lectures)

Topics: Introduction to SDGE; aggregate uncertainty and RBC; Arrow-Debreu markets; the Consumption-CAPM; tax smoothing, debt management, and capital taxation; hyperbolic preferences.

* Blanchard, O., and S. Fischer (1989), *Lectures on Macroeconomics*, sections 10.1 and 11.3.

* Romer, D. (2001), *Advanced Macroeconomics*, section 7.5

* Stokey, N.L., and R.E. Lucas, Jr., *Recursive Methods in Economic Dynamics*, chapter 2.

* Lucas, R.E, Jr. (1978), "Asset Prices in an Exchange Economy," *Econometrica* 46, 1429-1445.

* Barro, R. (1999), "Ramsey Meets Laibson in the Neoclassical Growth Model," *Quarterly Journal of Economics* 114, 1125-1152.

Angeletos, G.M. (2002), "Fiscal Policy with Non-Contingent Debt and the Optimal Maturity Structure," *Quarterly Journal of Economics* 117.

Barro, R.J. (1979), "On the Determination of the Public Debt," *Journal of Political Economy* 87, 940-71.

Barro, R.J. (1989), "The Neoclassical Approach to Fiscal Policy," in R. Barro, ed., *Modern Business Cycle Theory*, Harvard University Press.

Baxter, M., and R. King (1988), "Fiscal Policy in General Equilibrium," *American Economic Review* 78, 315-334.

Blanchard, O., and R. Perotti (2001), "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes Output," *Quarterly Journal of Economics*, forthcoming; NBER Working Paper 7269.

Brock, W., and L.J. Mirman (1972), "Optimal Economic Growth and Uncertainty: The Discounted Case." *Journal of Economic Theory* 4, 197-513.

Chamley, C. (1986), "Optimal Taxation of Capital Income in General Equilibrium with Infinite Lives," *Econometrica* 54 (May), 607-22.

Chari, V.V., and P. Kehoe (1999), "Optimal Fiscal and Monetary Policy," NBER Working Paper 6891.

King, R., and S. Rebelo (1999), "Resuscitating Real Business Cycles," in M. Woodford and J. Taylor, ed., *Handbook of Macroeconomics*.

Kydland, F., and E.C. Prescott (1982), "Time to Build and Aggregate Fluctuations," *Econometrica* 50, 1345-1370.

Laibson, D. (1997), "Golden Eggs and Hyperbolic Discounting," *Quarterly Journal of Economics* 112, 443-478.

Lucas, R.E, Jr., and N.L. Stokey (1983), "Optimal Fiscal and Monetary Policy in an Economy without Capital," *Journal of Monetary Economics* 12, 55-93.

Romer, D. (2001), *Advanced Macroeconomics*, chapter 7.

Summers, L. (1981), "Capital Taxation and Accumulation in a Life Cycle Growth Model," *American Economic Review* 71, 533-544.

5. Endogenous Growth I: *AK*, Spillovers, Human Capital (2 lectures)

Topics: The general *AK* model; endogenizing *A*; externalities and spillovers (Romer); public goods (Barro); human capital and learning-by-doing (Lucas); macroeconomic complementarities; policy effects (Rebelo).

* Barro, R.J., and X. Sala-i-Martin (1995), *Economic Growth*, chapters 4 and 5

* Romer, P. M. (1986), "Increasing Returns and Long-Run Growth," *Journal of Political Economy* 94, S1002-S1037.

* Lucas, R.E., Jr. (1988), "On the Mechanics of Economic Development," *Journal of Monetary Economics* 22, 3-42.

* Barro, R.J. (1990), "Government Spending in a Simple Model of Endogenous Growth," *Journal of Political Economy* 98, S103-S125.

Aghion, P., and P. Howitt (1998), *Endogenous Growth Theory*, chapter 10.

Caballero, R., and A. Jaffe (1993), "How High Are the Giants' Shoulders?" NBER Macroeconomics Annual.

Jones, L. and R. Manuelli (1990), "A Convex Model of Equilibrium Growth," *Journal of Political Economy* 98, 1008-1038.

Lucas, R.E., Jr. (1993), "Making a Miracle," *Econometrica* 61, 251-272.

Rebelo, S. (1991), "Long-Run Policy Analysis and Growth," *Journal of Political Economy* 99, 500-521.

Rivera-Batiz, L., and P. Romer (1991), "Economic Integration and Endogenous Growth," *Quarterly Journal of Economics* 106, 531-556.

Young, A. (1993), "Invention and Bounded Learning by Doing," *Journal of Political Economy* 101, 443-472.

6. Endogenous Growth II: *R&D*, Innovation, Technological Change (2 lectures)

Topics: Expanding varieties (Romer); Schumpeterian growth and quality ladders; directed technological change; international trade and growth; technology diffusion.

* Barro, R.J., and X. Sala-i-Martin (1995), *Economic Growth*, chapters 6 and 7

* Romer, P.M. (1990), "Endogenous Technological Change," *Journal of Political Economy* 98, 71-102.

* Aghion, P., and P. Howitt (1992), "A Model of Growth Through Creative Destruction," *Econometrica* 60, 323-351.

* Acemoglu, D. (2001), "Directed Technological Change," NBER Working Paper 8287.

Acemoglu, D., and J. Ventura (2001), "The World Income Distribution," NBER Working Paper 8083.

Aghion, P., and P. Howitt (1998), *Endogenous Growth Theory*, chapters 1-3.

Barro, R., and X. Sala-i-Martin (1992), "Public Finance in Models of Economic Growth," *Review of Economic Studies* 59, 645-662.

Barro, R., and X. Sala-i-Martin (1995), "Technological Diffusion, Convergence, and Growth," *Journal of Economic Growth* 2, 1-26.

Brezis, E., P.R. Krugman, and D. Tsiddon (1993), "Leapfrogging in International Competition: A Theory of Cycles in National Technological Leadership," *American Economic Review* 83, 1211-1219

Grossman, G.M. and E. Helpman (1991), "Quality Ladders in the Theory of Economic Growth," *Review of Economic Studies* 58, 43-61.

Jones, C. (1995), "R&D-Based Models of Economic Growth," *Journal of Political Economy* 103, 759-784.

Krugman, P.R. (1979), "A Model of Innovation, Technology Transfer, and the World Distribution of Income," *Journal of Political Economy* 87, 253-266.

Parente, S.L., and E.C. Prescott (1994), "Barriers to Technology Adoption and Development," *Journal of Political Economy* 102, 298-321.

Ventura, J. (1997), "Growth and Interdependence," *Quarterly Journal of Economics* 112, 57-84.

7. Beyond *K*, *H*, and *R&D*: Markets, Institutions, Wealth Distribution (2 lectures)

Topics: Financial markets and growth; precautionary savings and risk taking; incomplete markets and wealth distribution; institutions and growth; social norms.

* Acemoglu, D., and F. Zilibotti (1997), "Was Prometheus Unbound by Chance? Risk, Diversification, and Growth," *Journal of Political Economy* 105, 709-751.

* Galor, O., and J. Zeira (1993), "Income Distribution and Macroeconomics," *Review of Economic Studies* 60, 35-52.

* Cole, H., G. Mailath and A. Postlewaite (1992), "Social Norms, Savings Behavior, and Growth," *Journal of Political Economy* 100, 1092-1125.

Acemoglu, D., S. Johnson and J. Robinson (2000) "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review*, forthcoming.

Angeletos, G.M. (2003), "Entrepreneurial and Capital Income Risk in the Neoclassical Growth Model," MIT mimeo.

Aiyagari, S.R. (1994), "Uninsured Idiosyncratic Risk and Aggregate Saving," *Quarterly Journal of Economics* 109, 659-84.

Banarjee, A., and A. Newman (1993), "Occupational Choice in the Process of Development," *Journal of Political Economy* 101, 274-298.

Bernanke, B., and M. Gertler (1989), "Agency Costs, Collateral, and Business Fluctuations," *American Economic Review* 79, 87-114.

Caballero, R. (1990), "Consumption Puzzles and Precautionary Saving," *Journal of Monetary Economics* 25, 113-136.

Caselli, F., and J. Ventura (2000), "A Representative Consumer Theory of Distribution," *American Economic Review* 90, 909-926.

Greenwood, J., and B. Jovanovic (1990), "Financial Development, Growth, and the Distribution of Income," *Journal of Political Economy* 98, 219-240.

Obstfeld, M. (1994), "Risk-Taking, Global Diversification, and Growth," *American Economic Review* 84, 1310-1329.

Weil, P. (1993), "Precautionary Savings and the Permanent Income Hypothesis," *Review of Economic Studies* 60, 367-383.