

## **Economic Growth**

Spring 2006

The basic text for the course is:

Barro, R. J., and X. Sala-i-Martin, *Economic Growth*, 2. ed., MIT Press 2003, henceforth B & S.  
In addition, journal articles and lecture notes will be used.

### **Course plan (final)**

Author names refer to items in the syllabus list.

#### **I. Setting the stage**

- A. Some facts about growth and world income distribution. Compound rates of growth: B & S Introduction.
- B. Refresher: Neoclassical production function, the Solow model, Harrod-neutral technical progress, transitional dynamics: B & S 23-44, 51-55.
- C. The concepts of  $\sigma$  convergence and  $\beta$  convergence: B & S 44-56, 462. Cursory: Dalgaard & Vastrup (2001).
- D. Divergence – big time; world income distribution. Cursory: Pritchett (1997), Jones (1997a).
- E. Adjustment speed. Addition of human capital: B & S 56-60.
- F. Simple AK model. Asymptotic AK model. Poverty traps: B & S 61-71, 74-77.

#### **II. Optimizing households. Exogenous technical progress**

- A. Brush-up of the Ramsey model (basic representative agent model); transitional dynamics: B & S 85-118 (111-118 only cursory).
- B. Household heterogeneity and dynamics of wealth distribution: B & S 118-121.
- C. Government and taxation: B & S 143-149, 150, 1. 19, - 152.
- D. Structural change: Kongsamut et al. (2001).
- E. Open economy: B & S 161-65 cursory.

#### **III. Accumulation-based endogenous growth**

- A. The AK model: B & S 205-211.
- B. Reduced-form AK models.
  - 1. Two kinds of capital produced by the same technology (to be read in connection with IV.A below): B & S 211-212.
  - 2. Learning-By-Investing (the Arrow model and Romer's 1986 model). Semi-endogenous growth vs. fully endogenous growth: B & S 212-220.
- C. Productive government services and public finance.
  - 1. The Barro (1990) model and a model with congestion: B & S 220-225.
  - 2. Income distribution, political economy and growth: Alesina & Rodrik (1994). Cursory: Perotti (1996).
- D. Necessary conditions for fully endogenous growth in a one-sector model: B & S 232-235.

#### **IV. Two-sector models with physical and human capital**

- A. The degenerate case: same technology in both sectors: B & S 239-242, cursory: 243-46.
- B. Different technologies.
  - 1. The general case. Lecture note 10, § 4. Cursory: B & S 247-251.
  - 2. No physical capital in the educational sector (the Uzawa-Lucas model):  
Lecture note 11.
- C. Static comparative advantage vs. dynamics of learning by doing: Lecture note 10, § 5.
- D. Necessary conditions for accumulation-based fully endogenous growth in a two-sector model.  
Cursory: B & S 268-271.
- E. A Mincerian approach to human capital: Jones (2002).

#### **V. Innovation-based endogenous growth**

- A. A model of U.S. growth in a world of ideas: Jones (2002).
- B. Horizontal innovations: increasing-variety models.
  - 1. A simple model: B & S 285-297.
  - 2. Discussion: B & S 297-305 (301-305 very cursory).
  - 3. Erosion of monopoly power; how should patents be designed?: B & S 305-309.
  - 4. The Romer 1990 model with physical capital and knowledge externalities. Cursory: B & S 310-313, Romer (1990) and Alvarez & Groth (2005).
  - 5. Scale effects, semi-endogenous growth: Jones (1995) (excl. § 4-5).
  - 6. Discussion: Groth (2006a, § 1, 2.1 and 3). Cursory: Kremer (1993) (short version: § 3.7 in D. Romer 2001); Dalgaard & Kreiner (2001), § 1-3 and 5.
- C. Vertical innovations: increasing product quality and creative destruction (quality ladder models).  
Introduction: Groth (2006a, § 2.2 and 4).

#### **VI. Further empirical issues.**

- A. Growth accounting vs. sources of growth: B & S 433-460 (437-438 and 447-456 only cursory).
- B. Key role of technology differences, technology transfer, catching-up? Bernard & Jones (1996).
- C. Empirical analysis of a cross section of countries. Cursory: B & S 462, 511-541; very cursory: Islam (2003).

#### **VII. Natural resources and economic growth**

- A. Non-renewable natural resources. Limits to growth? Groth (2006b, only § 3-4).
- B. Renewable resources. Is economic growth compatible with preserved environmental quality?  
Smulders (1995) (§ 2 only cursory).

#### **VIII. Policy for growth.**

Igniting growth and sustaining growth: Rodrik (2004).

Apart from the B & S book, the texts are downloadable for students with access to the course pack at the course website.

In order to go in for the final written exam (four hours, closed book) at the end of the semester it is required that the *midterm paper* (beginning of April) has been accepted.

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## Syllabus for Economic Growth Spring 2006

- Alesina, A., and D. Rodrik, 1994, Distributive Politics and Economic Growth, *Quarterly Journal of Economics* 109, no. 2.
- Alvarez, M. J., and C. Groth, 2005, Too Little or Too Much R&D? *European Economic Review* 49, 437-456. Cursory.
- Barro, R. J., and X. Sala-i-Martin, 2003, *Economic Growth*, 2. ed., MIT Press, Cambridge (Mass.). Selected parts, see Course Plan.
- Bernard, A. B., and C. I. Jones, 1996, Technology and Convergence, *Economic Journal* 106, 1037-44.
- Dalgaard, C.-J., and J. Vastrup, 2001, On the Measurement of **F**-convergence, *Economics Letters* 70, 283-87. Cursory.
- Dalgaard, C.-J., and C. T. Kreiner, 2001, Is Declining Productivity Inevitable? *Journal of Economic Growth* 6, § 1-3 and 5. Cursory.
- Groth, C., 2006a, What Have We Learnt From the Robustness Debate? Working paper. Only § 1-4.
- Groth, C. 2006b, A New-Growth Perspective on Non-renewable Resources. Working paper. Only § 3-4.
- Islam, Nazrul, 2003, What have we learnt from the convergence debate? *Journal of Economic Surveys* 17, 3, 309-362. Cursory.
- Jones, Charles I., 1995, R&D-based Models of Economic Growth, *Journal of Political Economy* 103 (excl. § 4 and 5).
- Jones, Charles I., 1997, On the Evolution of World Income Distribution, *Journal of Economic Perspectives* 11, no. 3, 19-36. Cursory.
- Jones, Charles I., 2002, Sources of U-S. Economic Growth in a World of Ideas, *American Economic Review* 92, 1, 220-239.
- Kongsamut, P., S. Rebelo and D. Xie, 2001, Beyond balanced growth, *Review of Economic Studies* 68, 869-882.
- Kremer, M., 1993, Population Growth and Technological Change: One Million B.C. to 1990, *Quarterly Journal of Economics* 108, no. 3, 681-716. Cursory.
- Perotti, R., 1996, Growth, Income Distribution, and Democracy: What the Data Say, *Journal of Economic Growth* 1, 149-87. Cursory.
- Pritchett, L., 1997, Divergence, Big Time, *Journal of Economic Perspectives* 11, no. 3. Cursory.
- Rodrik, D., 2004, Growth Strategies. Manuscript for a chapter in *Handbook of Economic Growth*, ed. by P. Aghion and S. Durlauf.
- Romer, P. M., 1990, Endogenous technological change, *Journal of Political Economy* 98, (supplementary issue) S71-S103. Cursory.
- Smulders, S., 1995, Entropy, Environment, and Endogenous Economic Growth, *International Tax and Public Finance* 2, 319-340, § 2 only cursory.

In addition lecture notes, available on the course website.

The items in the above list (apart from lecture notes) are referred to in the course plan. Some items are classified as only cursory reading. This implies that you should read them in order to obtain general knowledge of the main point while you do not have to master the technicalities involved.

It is recommended to check the correction lists (referring to the main textbook, articles and lecture notes) that are available on the course website.

Useful *supplementary texts* are:

Jones, C., *Introduction to Economic Growth*, 2<sup>nd</sup> ed., Norton, New York 2002  
Valdés, B., *Economic Growth. Theory, Empirics, and Policy*, Edward Elgar 1999. These two are more elementary than B & S, include entertaining discussions.  
Aghion, P., and P. Howitt, *Endogenous Growth Theory*, MIT Press 1998 (more demanding).  
Aghion, P., and S.N.Durlauf, eds., *Handbook of Economic Growth*. Vol. 1A-1B. Amsterdam 2006 (a voluminous up-to-date handbook for researchers; also many useful things for students).

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### **Learning by doing**

Tell me and I will forget  
Show me and I will remember  
Involve me and I will understand  
Step back and I will act

(Chinese proverb on learning)

### **Midterm paper**

At the end of March you will be given a mandatory examination problem. Your written answer is due two weeks later. You are encouraged to do it together with fellow students (max. four students per group). Readable handwriting is OK. During working on the problem you are most welcome to consult me (more about this later). One of the two weeks there will be no lectures. I evaluate your paper. In order to go in for the final written exam (four hours, closed book) at the end of the semester, it is required that the term paper is accepted.