

15I026

6 ECTS

Economic Growth and Development

Overview and Objectives

The course is about fundamental models used to analyze theoretical and empirical issues in economic growth and development.

Course Outline

The broad structure of the course is:

- A. Important Facts**
- B. The Solow Model: Theory with Empirical Implications and Applications**
- C. Neoclassical Growth Theory**
- D. Human Capital, Externalities, and Ideas**
- E. Institutions, Trade, and Economic Development**

The detailed outline of the course is:

A. Important Facts

1. Long run growth in the world
2. Constant/balanced growth?
 - 2.1. US Growth on absolute and ratio scale
 - 2.2. Balanced growth elsewhere?
 - 2.3. The coming US growth slowdown?
 - 2.4. Growth acceleration at the end of 1990
 - 2.5. Growth slowdown since 1950?
3. Long run level effects of growth differentials
4. Real wages and the labor share of output
5. Interest rates
6. Convergence/Divergence
7. Economic growth in France and Germany after World War II
8. Real Output Comparisons, Purchasing Power Parity, Exchange Rates, and the Balassa-Samuelson Effect

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- 8.1. Real output comparisons over time
- 8.2. Income/output comparisons across countries: a first method based on exchange rates
- 8.3. Income/output comparisons across countries: a second method (PPP)
- 8.4. Price levels, PPP and real exchange rates
- 8.5. Real exchange rates around the World/China
9. Global PPP income comparisons
10. Schooling (human capital) and wage inequality
 - 10.1. Wage differences and schooling levels
 - 10.2. Wage inequality and percentiles of distributions
11. Real wage growth in developed countries
12. Past failed predictions
 - 12.1. Real wages and the Industrial Revolution
 - 12.2. Population growth and income per capita

B. The Solow Model and its Applications

1. Proximate causes and deep causes of rising output per worker
 - 1.1. From proximate and deep causes
 - 1.2. Proximate causes
 - 1.2.1. Capital
 - physical capital
 - different types of capital
 - measuring capital: the perpetual inventory method
 - investment and capital per worker in the US
 - what is in investment and effect on GDP accounting
 - tangible versus intangible investment
 - 1.2.2. Technology, knowledge, and ideas
 - the efficiency of production
 - new ideas and knowledge accumulation
 - research and development in the US and the world
 - 1.2.3. Human capital
 - types of human capital
 - schooling
 - education levels and wages in the US
 - education levels in US and around the world
 - causal effect of schooling on wages

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2. Why the Solow model?

- 2.1. Focus on the accumulation of physical capital
- 2.2. Capital accumulation and savings alone cannot explain long-run growth
- 2.3. A dynamic general equilibrium (GE) model
- 2.4. Still, many things are left out of the Solow model

3. Static and dynamic general equilibrium models

- 3.1. GE models
- 3.2. Static GE models
- 3.3. Dynamic GE models
- 3.4. The snapshot of an economy with capital as a production factor
- 3.5. From the static to the dynamic model

4. The Solow model at a moment in time

4.1. A model of output and factor prices given factor stocks

- 4.1.1. Households, preferences, and endowments
 - representative household?
- 4.1.2. Firms and production
 - 4.1.2.1. The production function
 - Cobb-Douglas production function
 - production factors and technology
 - 4.1.2.2. Labor-augmenting technology
 - efficiency workers and labor in efficiency units
 - 4.1.2.3. Properties of the neoclassical production function
 - a. Constant returns to scale and implications
 - output per worker and capital per worker (capital intensity)
 - output and capital per efficiency worker
 - b. Positive, decreasing marginal factor products
 - marginal product of capital (MPK)
 - marginal product of labor (MPL)
 - three-dimensional production function
 - scale independent MPK and MPL
 - MPK and MPL and capital per efficiency worker
 - production function per efficiency worker
 - all in one graph (output per efficiency worker, MPK, MPL)
 - c. Inada conditions
 - d. A representative firm?
 - e. Where do production functions in macro come from?

4.1.3. Market structure and equilibrium

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4.2. The static equilibrium

4.2.1. Labor market

- evidence on hours worked per person
- income versus substitution effect in labor supply

4.2.2. Rental market for capital

4.2.3. Summarizing the static equilibrium

4.2.4. Interesting related issues

- 4.2.4.1. Profits in the model and in US data
- 4.2.4.2. Hicks-neutral technology and factor prices
- 4.2.4.3. Factor biased technological change
- 4.2.4.4. Can technology reduce wages?
- 4.2.4.5. Can capital accumulation reduce wages?
- 4.2.4.6. The size of firms and their capital intensity

5. Savings, investment, and the credit market equilibrium

5.1. Savings, investment, and banks

5.2. Neoclassical investment theory

- 5.2.1. The decision to buy investment goods: a one-step-at-a-time approach
- 5.2.2. The user cost of capital definition in discrete time
- 5.2.3. The user cost of capital in one-sector growth models
- 5.2.4. The user cost of capital, the desired future capital stock
- 5.2.5. The user cost of capital, investment, and the demand for credit/loans
- 5.2.6. Investment, the demand for credit/loans, and the real interest rate

5.3. The credit market equilibrium and equilibrium capital accumulation

- 5.3.1. Summarizing the credit/loan market equilibrium
- 5.3.2. The equilibrium capital accumulation equation

6. The dynamics of economic growth

6.1. The dynamics of capital accumulation

- 6.1.1. The three main state variables, exogenous (E,L) and endogenous (K)
- 6.1.2. From three to one state variable: simplifying the Solow dynamics by focusing on variables measured per efficiency worker
- 6.1.3. The simple math of percentage changes
- 6.1.4. The equilibrium capital accumulation equation for capital per efficiency worker $K/(LE)$
- 6.1.5. Key questions about the dynamics of economic growth and how to answer them
- 6.1.6. A graphical analysis of the dynamics of economic growth
 - 6.1.6.1. The 'Solow A' graph: the time change in $K/(LE)$
 - 6.1.6.2. The 'Solow B' graph: the growth rate of $K/(LE)$
- 6.1.7. Three main results

6.2. From capital accumulation to growth of output per worker

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- 6.2.1. More simple math of percentage changes, applied to Cobb-Douglas production function
- 6.2.2. The Cobb-Douglas production in per worker form and economic growth

6.3. Real wage growth and changes in the real interest rate

7. The economy in the long run

- 7.1. Economic growth in the long run (in the balanced growth path)
- 7.2. Output per worker in the long run (in the balanced growth path)

8. Quantitative features of the Solow model

- 8.1. Effect of savings on long run income
- 8.2. The speed of convergence and predicted growth paths
- 8.3. Income per capita versus output per worker

9. Important issues in economic growth

9.1. (Economic) Growth accounting, with applications

- 9.1.1. Conceptual framework
- 9.1.2. Efficiency (TFP) growth and long-run economic growth
- 9.1.3. Applications to rapidly growing South-East Asian countries
- 9.1.4. Alternative approach to growth accounting with US application

9.2. Productivity level accounting

- 9.2.1. Conceptual framework
- 9.2.2. Mincerian wage regressions and measures of the human capital stock
- 9.2.3. Measuring human capital and the capital-output ratio relative to the US
- 9.2.4. Results

9.3. Looking behind aggregate TFP differences

- 9.3.1. Aggregate TFP differences and misallocation
- 9.3.2. Aggregate versus firm level TFP differences

9.4. Convergence

- 9.4.1. Unconditional and conditional convergence
- 9.4.2. Long-run unconditional convergence, descriptives
- 9.4.3. Conditional convergence world-wide after WW-II
 - 9.4.3.1. Barro growth regressions, significance and example
 - 9.4.3.2. Towards the determinants of economic growth?
 - 9.4.3.3. Conditional convergence and forecasting economic growth

9.5. The marginal product of capital around the world

- 9.5.1. Significance of MPK for growth and capital allocation
- 9.5.2. Measurement and results

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9.6. Growth theory, robots, and the past and future of income inequality

- 9.6.1. The Piketty debate
- 9.6.2. Background data: Inequality and growth
- 9.6.3. Piketty's argument: the two fundamental laws of capitalism
 - 9.6.3.1. Examining the second fundamental law
 - 9.6.3.2. Examining the first fundamental law

C. Neoclassical Growth Theory

1. Household savings behavior

1.1. Keynesian theory

- 1.1.1. The Keynesian consumption function
- 1.1.2. Conceptual and empirical limitations

1.2. Permanent income theory

- 1.2.1. Basic idea and two-period model
- 1.2.2. Closed form solution in a simple case
- 1.2.3. Three and more periods

1.3. Optimal consumption and (savings) in continuous time

- 1.3.1. Finite horizon decision problem in continuous time
- 1.3.2. Intertemporal budget constraint
- 1.3.3. Rate of time preference (time discount rate)
- 1.3.4. First-order condition (optimality between adjacent points in time)
- 1.3.5. Closed-form solution in simple case
- 1.3.6. Deriving the continuous time first-order condition

2. The Ramsey-Cass-Koopmans model

2.1. Equilibrium growth with infinite-horizon households

- 2.1.1. Technology and capital market
- 2.1.2. Household behavior with infinite horizon
- 2.1.3. Dynamic equilibrium system

2.2. Equilibrium growth and optimality

D. Human Capital, Returns to Capital, and Ideas

1. Human capital

1.1. Reconsidering the role of human capital in growth accounting

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- 1.1.1. Human capital quality in productivity level accounting
- 1.1.2. The role of health

1.2. Regression evidence on the effect of human capital on growth and productivity

- 1.2.1. Estimating the aggregate return to schooling
 - 1.2.1.1. The aggregate return to schooling in OECD countries
 - 1.2.1.2. Within country evidence on the aggregate return to schooling
 - a. Evidence from Indonesia
 - b. Evidence using cross-country regional data
- 1.2.2. Estimating schooling externalities
- 1.2.3. Schooling quality and cross-country growth

2. Economic growth: the role of capital or production

2.1. Weak versus strong decreasing returns to capital

- 2.1.1. Importance for effect of savings/investment on long run income
- 2.1.2. Importance for speed of convergence

2.2. Endogenous growth due to non-decreasing returns to capital

- 2.2.1. The AK model
 - 2.2.1.1. Basics
 - 2.2.1.2. Implications for capital income shares
 - 2.2.1.3. Long run AK model
 - 2.2.2.4. AK model with externalities

3. Economic growth: ideas and endogenous technological change

3.1. General framework without capital

- 3.1.1. The idea production function
- 3.1.2. Key parameters
- 3.1.3. Dynamics of economic growth
- 3.1.4. The model with capital

3.2. Application: Ideas and population growth since 1 Million B.C.

- 3.2.1. Population growth and subsistence; The Malthusian hypothesis
- 3.2.2. Exogenous technological change and population growth
- 3.2.3. Kremer's explanation for accelerating population growth

E. Institutions, Trade, and Economic Development

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1. Institutions, colonialism, and economic development

1.1. Why institutions? Measurement of institutional quality

1.2. Estimation issues

- least-square estimation, endogeneity, and omitted variables
- instrumental-variables estimation

1.2. Colonialism, property rights, and economic development

- basic identification strategy
- results

1.3. Institutions, comparative advantage, and economic development

- institutions as a determinant of comparative advantage
- cross-country, cross-industry estimation
- results

1.4. Colonialism and long-run economic development

2. Trade and economic development

2.1. First nature geography, second nature geography, and trade

2.2. Trade and economic development

Evaluation

The final grade will mainly depend on your performance in a final exam administered at the end of the term. Class participation and problem sets will also count. There will be 5 problem sets. You should turn in hand-written solution at the dates announced in class. Problem sets can be done in groups but I want individual hand-written solutions from everybody. 15% of the final grade will depend on the problem sets and 5% on class participation.