Lecture 30
Human Resources and Economic Growth

12 December 2012
Today attempt to put pieces together.

1. How do the aggregate models of chapters 3–4 connect with the sector level studies of chapters 8–15?

2. How does economic history and the Industrial Revolution connect $DE$?
First Question

Two Perspectives:

1. Algebraic
Recall Solow

\[ K(t) = (1 - \delta)K(t) + sY(t) \]

\[ (1 + n)k(t + 1) = (1 - \delta)k(t) + sy(t) \]

Notation:
- \( K(t) \) capital at time \( t \)
- \( Y(t) \) total income at time \( t \)
- \( s \) savings rate (fixed)
- \( \delta \) depreciation rate \((0 < \delta < 1)\)
- \( n \) rate of population growth \( P(t + 1) = (1 + n)P(t) \)
- \( k(t), y(t) \) capital per capita, income per capita

Summary
Insight from the Solow model is that diminishing returns occurs as capital *per capita*. 

Changes in the savings rate, depreciation rate, and population growth affect the *steady state* level of capital *per capita*.

**Prediction:** Absolute convergence.

**Empirical Evidence:** Absolute convergence rejected.
In absence of technical progress ($\pi$) a country can not sustain *per capita* income growth indefinitely.

Introduce *Efficiency* units of labor:

\[
\hat{L}(t) = E(t)P(t)
\]
\[
E(t+1) = (1 + \pi)E(t)
\]

Modified Solow equation becomes:

\[
(1 + n)(1 + \pi)\hat{k}(t+1) = (1 - \delta)\dot{k}(t) + s\dot{y}(t)
\]

Hats denote *per efficiency* unit of labor.

Converges to steady–state capital per efficiency unit of labor.
Prediction: Conditional Convergence

Convergence in growth rate.

Conditional: control for factors that make the steady–state income different across countries.

Empirical evidence: mixed, but remarkable given parsimony of framework.
Growth Accounting

\[ Y(t) = F(K(t), P(t), E(t)) \]

Three factors—capital, labor, and knowledge \( E \), all at time \( t \).

Can use published data to recover \( Y, K, P \) residual is \( E \)

\[
\frac{\Delta Y(t)}{Y(t)} = \sigma_k(t) \frac{\Delta K(t)}{K(t)} + \sigma_p(t) \frac{\Delta P(t)}{P(t)} + \text{TFPG}(t)
\]

\( \sigma_k \) and \( \sigma_p \) are the income shares of capital and labor (about 1/3, 2/3).

Critical: change in total factor productivity.
Growth Accounting

Useful framework to decompose sources of economic growth.

From one period to another (e.g., 1945 to 2000) within a country.
Or between countries at a point in time.

Basic methodology use data to measure income shares and changes in capital stock and labor force ($P$ is labor force)

Can adjust framework for human capital (straightforward, say by using average age of education to proxy quality of labor input).
What is the link between the first and second parts of the course?
The connection is Total factor productivity (TFP)

\[ Y = F(K, L) = AK^\alpha L^{1-\alpha} \]

Total Factor Productivity: \( A \).
Rich Countries

Have a large $A$ and thus more output for a given set of inputs $K, L$. Can think of the topics as trying to understand factors that determine TFP.
Perfect Competition Assumptions

Assumes competitive markets

1. Firms (industry) exhibit CRS.
2. Large number of buyers and sellers.
3. No individual seller or buyer can influence market price.
4. Full information (no uncertainty).

Perfect competition implies:

1. Complete Markets
2. Complete Contracts
3. Perfect Contract Enforcement
Independence of History

History has no role in Solow Model

Indeed, initial conditions do not matter.

Global convergence to steady state (independent of $k_o$).

Perfectly enforceable contracts implies no transaction costs. Costly can not be perfect.
Solow growth model and extensions adopted “representative agent” paradigm.

Many identical firms with technology: $Y = F(K, L)$.

Have same incentives; make same choice.

Natural to separate notions of efficiency and equity.
Chapters 5–15

The basic assumptions of the last 2/3 of course made radically different assumptions.

Dealt with externalities, increasing returns to scale, strategic complementarities, the role of history, expectations, inequality, poverty, risk aversion, limited liability, contract enforcement.

To mention a few of the key ideas.
During 1950s 1960s economic growth focused on accumulation. First accumulation of physical capital \((K)\) and in the 1960s accumulation of human capital \((H)\).

Economic growth — thought of growth of countries with infrastructure as approximated by perfect competitive market. Growth accounting using the available data to determine how much can be explained by accumulation.

Much like a medical diagnostician: Rule out the obvious.
Development economics prior to at least mid–1970s was inhabited by non–neoclassical economists.

Rejected application of neoclassical economics, but did not replace it with analytical framework.

Case studies and institutional facts. Might be able to explain low growth for particular country or setting, but difficult (impossible) to generalize.

Lewis model: dual labor market theory. Non–competing sectors.

Good jobs and bad jobs. Good jobs have high wages and bad jobs have low wages. Tautological?

No analysis of why there is a barrier between sectors.
Economics of information launched in 1970.

Game theory and strategic action — mechanism design (contracts), incentives

Tools permeated economics and eventually influenced development economics.

Work of many, but J. Stiglitz was a leader. Profilic and huge number of co–authors.
Nonseparability of Efficiency and Equity

In the presence of incomplete markets, externalities, market power, imperfect information it is no longer feasible to separate efficiency and equity.

Distribution of resources (equity) affects efficiency.

Example: highly unequal distribution of land ownership. Few large land owners and many small landowners or landless households. Share cropping prevalent and preferred basic of its insurance component, less efficient than fixed rent.

Recall discussion of Chapter 8 on the functional importance of inequality.

Characterizing feature of developing countries is that they are poor. Important to realize that the rich of bygone days had lifestyle far inferior to even a poor resident of America today.
What happens when we weaken one (or more) of the implicit assumptions of neoclassical economics.

Development Economics is the forensic branch of economics — how do economies work in the absence of perfect information, complete markets, complete contracts, perfect enforcement or increasing returns?
By Chapter

- 5 — mechanisms by which history and expectations operate.
- 7 — functional impact of inequality on economic efficiency. Introduction to topics of separate subsequent chapters.
- 8 — poverty, description and consequences of under nutrition
- 9 — population growth may be endogenous.
- 10 — population mobility (rural to urban)
- 11 — Another summary chapter examples of moral hazard, averse selection, limited liability
- 12 — Moral hazard, selection, limited liability applied to land
- 14 — Asymmetric information in credit mkts
- 15 — Asymmetric information in insurance markets.
Second Question: Big Picture: Fundamental Causes

Four basic perspectives on fundamental cause for variation in TFP across countries.

1. Geography. Temperate versus tropical. Disease burden, neighbors, competition and assistance. Pacific Ocean huge compared to Atlantic


3. Culture — shape value, preferences, and beliefs. David Landes’ article.

4. Luck. Interaction of factors of above and timing of events strengthens gains from advantage of backwardness. With multiple equilibrium some countries unlucky and remain poor while others develop.
May also be called globalization.

Distance and climate may be immutable, but transportation, communication, and life style costs have changed substantially.

- Jared Diamond *Guns, Germs, Steel*
- Jeff Sachs *End of Poverty*
- Paul Krugman *NYT*

A/C and rise of American South (obvious and perhaps trivial) Effects of climate offset.
Most common explanation.

Contract enforcement, property rights, legal and political system.

- Why Nations Fail by Acemoglu and Robinson.
- Great Divergence by Pomeranz. China versus Europe.

Political Economy.

Stark: Compare North and South Korea. Same geography and climate. Same culture.
Hard for me to explicate.

I see institutions as embedding the values of culture.

Not all cultures value material gain equally.

Cultures differ on perspective of society and individual. Rise of liberalism (individualism, freedom) in the West it’s ingrained in our perspective, difficult to consider another view. Medieval: society most important, individual to serve the needs of society.
Examples:

- Would Medieval leaders disagree with Stalin’s use of the “serfs” to clear mine fields?
- Personal Observation
  - USA: Individualism. Self-sufficiency; pioneer mentality.
  - Nordic countries: Environment is harsh; perceived homogeneity.
Another term for Luck would be \textit{coordination failure}.

Why individuals can not make changes so that almost everyone can be better off? Geography, institutions, culture impact communication, trust, risk taking, innovation,

Distribution of resources important. Societal gains may be huge, but individual gains may not be. If the currently wealthy or privileged may effectively work against reforms.

Timing matters.
Why cover IR and GEH?

- To offer perspective. Events before 1960 matter ... Highlight empires of Rome, China, India all spectacular yet none produced an IR.
- Highlight the role of international trade. Comparative advantage (Chapter 16).
- As a case study of the importance of luck, culture, institutions, geography. Different pathways followed by today’s rich countries.
- History matters: role of expectations and strategic complementarities.
- Presence of rich countries make today’s development environment fundamentally different than 1800.
You may be able to hide from the IRS . . .
but the UW alumni association will find you.
You have been warned. (Please give generously; great institution, with [wonderful, intelligent, _____] students.)
This completes your journey through Economics 448.