remember book reviews due today by 6 pm
last problem set handed out today, due next Wednesday at 6 pm; we will make them available in the alphabetical slots as soon as they are graded

economic growth (three pillars—labor, capital-human and physical, and technological change), productivity (back to PPF)

[start powerpoints]

show OECD data on different productivity levels
good to do per worker to compare across countries of different population sizes
why are we so high? Because we have lots of capital stock per worker.
note that France is currently at 95, UK at 82, Germany at 93, Mexico at 33

theoretical grounds for growth-encouraging policies

investing this period means PPF is farther out next period!

look at productivity growth rates
http://www.bls.gov/lpc/prodybar.htm

show data on educational attainment

I have been betting on the convergence hypothesis for years by overweighting my investment portfolio in international growth mutual funds

convergence hypothesis: see wikipedia page on this (note data in Limitations section)
http://en.wikipedia.org/wiki/Convergence_%28economics%29
real cottage industry of creating various indexes by which to rank countries and even subunits within countries, and then correlating them with outcomes like productivity growth and GDP growth

look at data on political instability index
http://viewswire.eiu.com/site_info.asp?info_name=social_unrest_table&page=noads&rf=0

look at data on international property rights
http://www.internationalpropertyrightsindex.org/
Economic Growth

- The “three pillars” of growth
- Growth-encouraging policies
- U.S. growth puzzles
- Growth in developing countries

The three pillars of growth

- Physical capital
- Human capital
  - education
  - training
- Technological change

Holding any two constant and increasing the third increases productivity. Of course, all may change at the same time.

<table>
<thead>
<tr>
<th>Country</th>
<th>GDP per Hour of Work 1973 (as percentage of U.S. GDP)</th>
<th>GDP per Hour of Work 1999 (as percentage of U.S. GDP)</th>
<th>Growth Rate</th>
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</thead>
<tbody>
<tr>
<td>United States</td>
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<td>1.5</td>
</tr>
<tr>
<td>France</td>
<td>76</td>
<td>98</td>
<td>2.5</td>
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<td>77</td>
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<td>78</td>
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<td>Brazil</td>
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<td>23</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Growth-encouraging policies

- Promote physical capital formation
- Improve and increase education and training
- Promote research and development
Promote physical capital formation

- synonymous with investment
- investment = flow of resources into the production of new capital

Choosing between Investment and Consumption

Promote investment by:

- lowering interest rates
- changes to tax laws
- technological advances
- higher demand
- greater political stability
- respect for property rights

Improve and increase education and training

- lowering interest rates
- subsidizing directly
- subsidizing through lowered loan rates
- technological advances in provision
- incentives through higher earnings

Promote research and development

- lowering interest rates
- subsidizing directly
- invest physical capital in R&D
- improve education and training
- invest human capital in R&D
- increase payoffs to R&D
U.S. growth puzzles

- Why did productivity slow down in 1973-90?
- Why has productivity sped up since 1990?

Why did productivity slow down in 1973-90?

- Lower investment? But investment/GDP was constant
- Higher energy prices? But energy prices fell in mid-80s while productivity growth stayed low
- Low human capital? But educational attainment and quality measures continued to rise
- Technological slowdown? But continued investment, particularly in computer technology

Perhaps the question should be instead: Why was productivity growth so high from 1947-73?

Why did productivity speed up after 1990?

- Higher investment
- Falling energy prices
- Improved human capital? Less clear.
- Technological improvements, particularly in information technology

Growth in developing countries

- The three pillars revisited
- The convergence hypothesis
- Additional hurdles

The three pillars revisited

- Physical capital
  - low capital stocks and challenges to accumulation
  - development assistance in form of grants and loans
- Human capital
  - low capital stocks and challenges to accumulation
  - development assistance for education system
- Technological change
  - low ability to develop R&D and to make use of existing technologies
  - assistance: FDI investment by multinationals?

The convergence hypothesis

- Alternatively, later developing countries should develop faster because they can use existing technologies rather than having to develop them by themselves
- Then their growth rates would be higher than in the developed countries
Additional hurdles

- Geography
- Health
- Governance
  - political instability
  - ill-defined property rights for individuals and firms