EC2212 Industrial Growth and Competition

- The role of technology in industries, and the role of both in regional/national growth
- Take course notes & seminar form from the front
- Lectures start at 3:05pm
- Study course notes before seminar
- Study other readings by exam term
- Five assignments lead to project
- Choose project topic in next week’s seminar
Weeks of the Course

1. Technology and growth.

Sources of successful technology:

2. Small firms (and regions).
3. Large firms.

Industry competition & technology:

4. Overview.
5. Market leadership change.

7. Sources of firm advantage.

8. Product differentiation.


EC2212 Industrial Growth
and Competition

Lecture 1

Technology Is the Primary Source of Economic Growth
The Manufacture of Pins

• Adam Smith, *The Wealth of Nations* — example of division of labor
• Yet technology, not division of labor nor scale, has driven cost of pins
• 1770s: average worker 4,800 pins per day
• 1970s: average worker 800,000 pins per day
• 2.6% annual productivity growth
Technology and Growth

• Robert Solow won Nobel Prize largely for showing the importance of technology in economic growth
• Previous economists: capital, division, …
• Solow: 12.5% of growth in output per hour, non-farm 1909-49, from capital equipment
• Remaining 87.5% attributed to improved production and skills
Growth is More than Figures Say

- New products not in “basket” of goods to measure consumer price index
  - Yet they have the most rapid price declines
  - Overestimates inflation, underestimates growth
- Quality improvements not reflected in economic growth figures

...Because of New Technology
Worldwide Economic Growth

• Gross world product (GWP):
  – Measured in constant 1995 US dollars
  – $4.9 trillion in 1950
  – $26.9 trillion in 1995
  – 1.6% average annual growth
  – 0.9% average per person

• Output per worker hour has risen 0.9%+ annually
National Growth & Technology

• Compare growth in output per worker hour among leading industrial nations
  – Differences between countries
  – Differences between time periods
  – Convergence among leading industrial nations

• Less-industrialized countries
  – Often different patterns (institutional problems)
  – Not always convergence
Growth Rates (% per year) of GDP per Worker Hour in Sixteen Industrial Countries, 1870-1979

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Figure 4. Postwar Productivity (GDP per work hour) Growth Rate, 16 Industrialized Countries

Country Growth Rate

Regression line

Source: BBW. Fig. 5.6. p. 103.
Figure 8.1. National expenditures for performance of R&D as a percentage of gross national product by country. (These are gross expenditures for performance of R&D including associated capital expenditures [except for the United States, where total capital expenditures data are not available]. Estimates for 1972–80 show that the inclusion of capital expenditures for the United States would have an impact of less than 0.1 percent per year.) Source: National Science Foundation (1985).
Figure 8.2. Nondefense R&D expenditures as a percentage of gross national product by country. Source: National Science Foundation (1987).
UK Technological Progress

- Leadership to 1800 lost by 1900s
- Strong in services not manufacturing
- Strong in pharmaceuticals, military aerospace
- Large government budget to military
  - Benefits those industries
  - But secrecy, use of good personnel
- Little education in eng., app. science
- Culture looks down on engineers
- Oxbridge old-boy network reinforces
- Modest government R&D funding, especially non-military

Walker (1993)
Technology vs. Competitiveness

- Economists care about ensuring competition
- But technological change more important in medium & long term
- Suppose 10% price decrease from better competition
- Same 10% decrease in 20 years by 0.5% more productivity growth (10.6 years by 1% more), & the change keeps working
Joseph Schumpeter

- Pointed to productivity growth, new products, causing growth
- Large firms & monopolies as primary source of rapid growth
- Stopping anti-competitive practices thus may irreparably damage the economy!
- We will discuss more during the course
Economic Growth

• $y = A(t) \times f(k)$
  – $y$ output per person per year
  – $A(t)$ technology factor, changes over time $t$
  – $f(k)$ production function, $k$ capital per person

• $\frac{dk}{dt} = (1 - h)y - \delta k$
  – $h$ fraction of output consumed, $(1-h)$ invested
  – $\delta$ depreciation rate
Production over Time in Growth Model with No Productivity Growth
Production over Time in Growth Model with 3% Annual Productivity Growth
Production over Time in Growth Model with 3% Annual Productivity Growth
You Have Learned

Technology drives economic growth:

• Pins
• Solow’s analysis: causes 80-90% of growth
• Estimates biased downward
• Differences by nation, time; convergence
• UK environment for technology
• Technology vs. competitiveness; Schumpeter
• Economic growth models