ECO 4933 Topics in Theory

Introduction to Economic Growth

Fall 2015

The Economics of Ideas

Chapter 4

The Economics of Ideas

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- The economics models studied so far are "capital-based" theories of economic growth
- Emphasis on physical and human capital
- Importance of technology
- Although technology is at the center is left unmodeled
- Differences in technology across countries are unexplained.

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What is technology?

- Technology = the way inputs are transformed into output
- In the typical Cobb-Douglas PF, *A* is and index of technology
- *Ideas* improve the technology of production
- Example: various uses of tin; Moore's law
- Ideas are no just engineering: soft drinks; Walmart; multiplex

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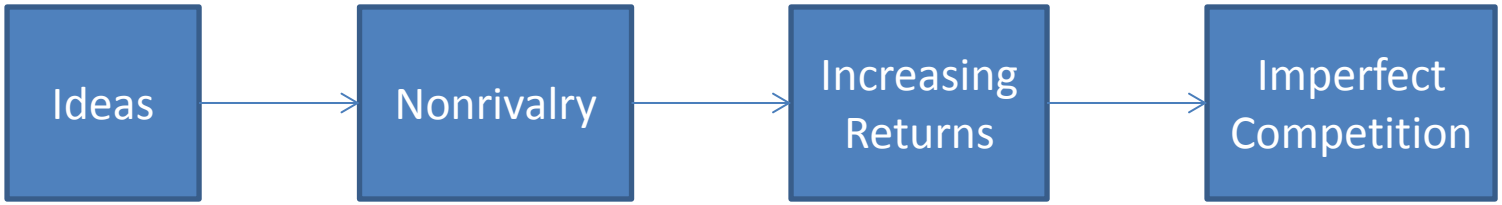

Ideas are nonrivalrous; this implies increasing returns to scale and this need imperfect competition

Most goods (and services) are *rivalrous* in consumption; this is not true for ideas

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- Ideas are *nonrivalrous*. E.g. “just-in-time” inventory management. Once an idea is made public, anybody can use it
- Ideas can be, at least partially, *excludable* (if the user can charge a fee or prevent its use with a patent)
- Rivalry and Excludability vary in degree

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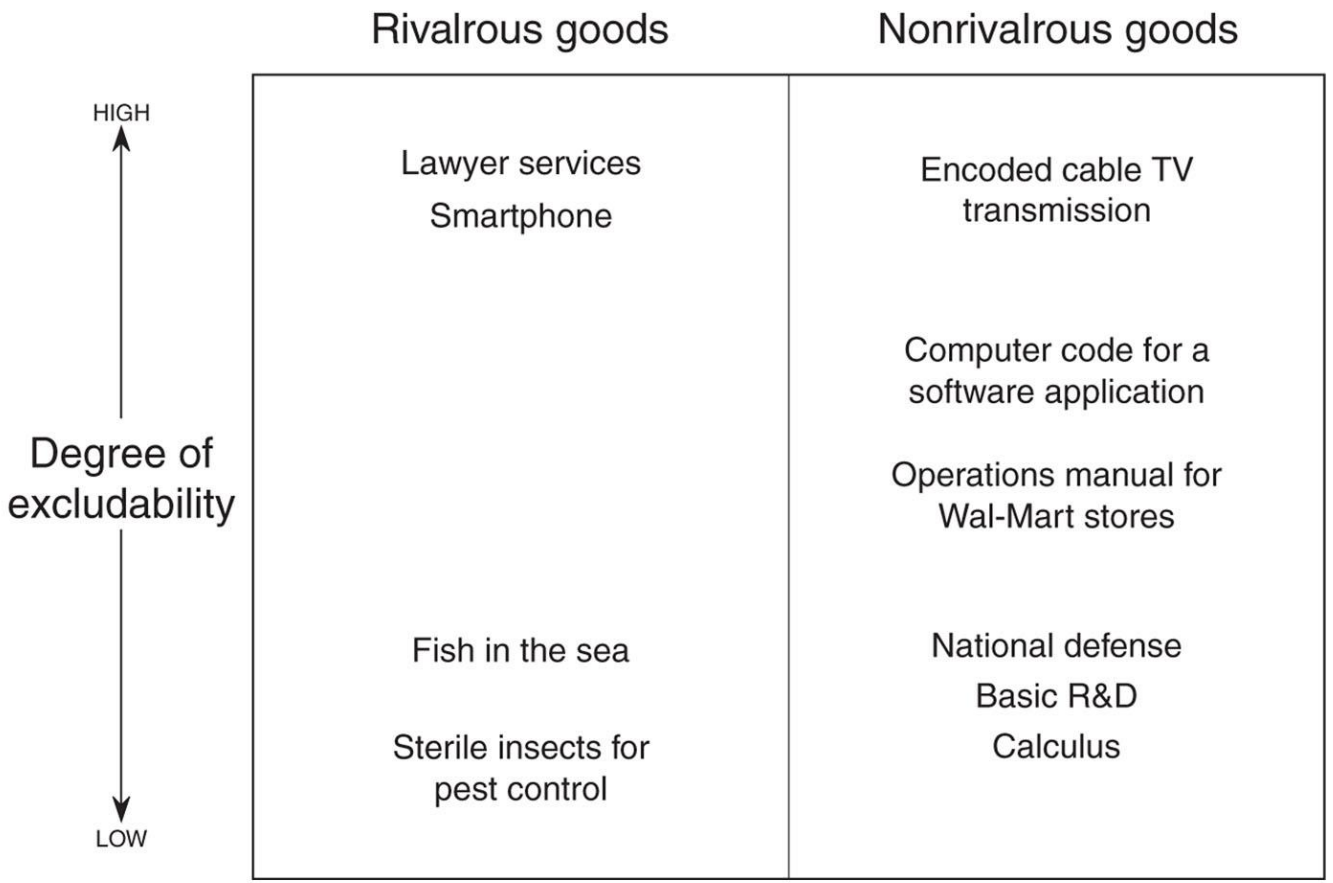
FIGURE 4.1 ECONOMIC ATTRIBUTES OF SELECTED GOODS



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- Food, clothes, cars, etc. are highly excludable
- Goods that suffer from the “tragedy of the commons” have a low degree of excludability
- (inefficient use of resources)
- Goods that are nonrivalrous and nonexcludable are know as Public Goods (e.g. National Defense)

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- Excludable goods let owner capture all the benefits
- Nonexcludable goods generate “spillovers” or positive externalities
- Positive externalities result in underproduction
- Negative externalities result in overproduction

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- The existence of positive externalities justifies provision by the government (e.g. R&D, national defense)
- Negative externalities may require taxes or regulations
- Coase type of solutions are another alternative

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- Rivalrous good have to be constantly produced
- Ideas only need to be produced once (high fixed cost and zero marginal cost)
- For this reason the production of “ideas” exhibits increasing returns to scale and leads to imperfect competition
- See Production Function in Figure 4.2

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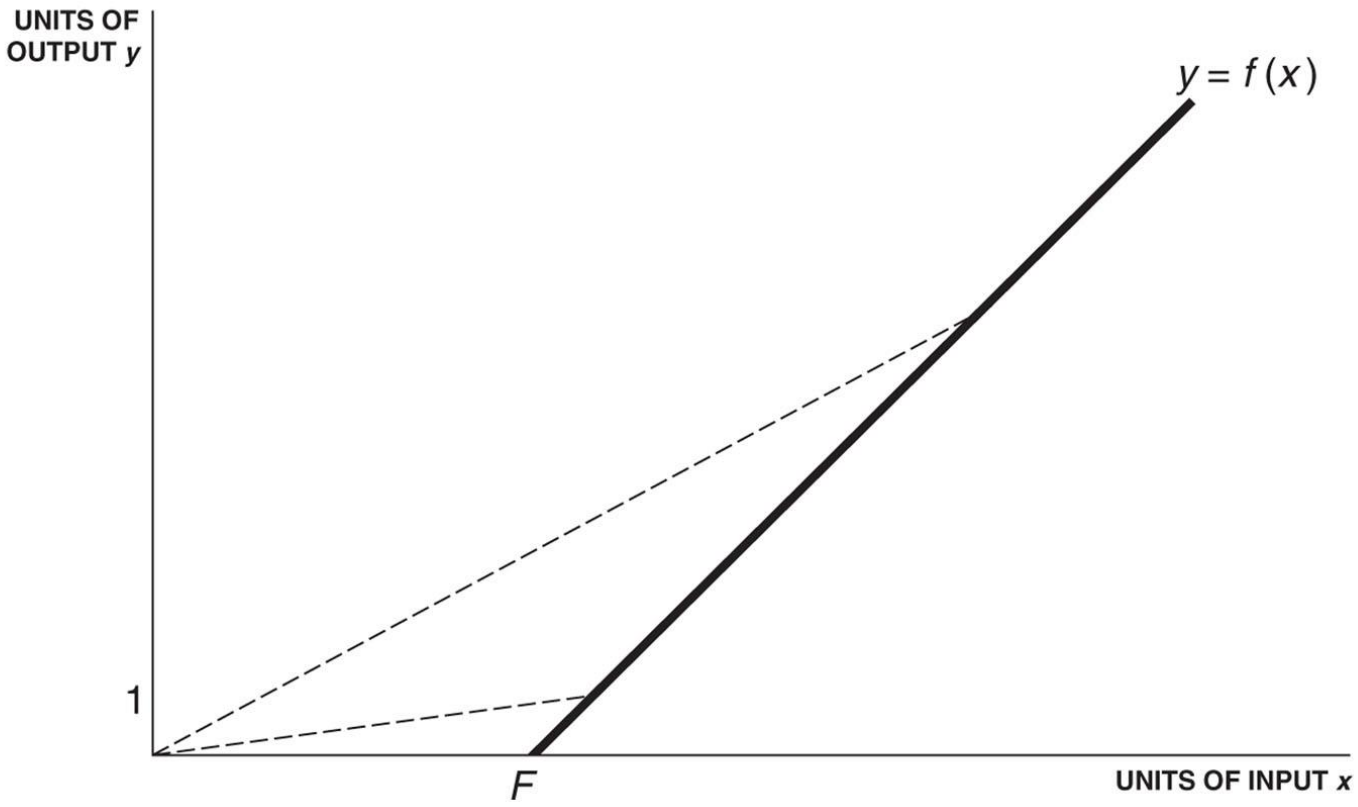
FIGURE 4.2 **FIXED COSTS AND INCREASING RETURNS**



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- PF with constant Mg cost (e.g. Prescription drug)
  $y = f(x) = 100 * (x - F)$
- F = fixed cost (probably very high)
- x = hours of labor
- This PF exhibits IRS if $f(ax) > af(x) \text{ for } a > 1$
- The presence of IRS leads to inefficiency (mg cost pricing vs average cost pricing or higher)

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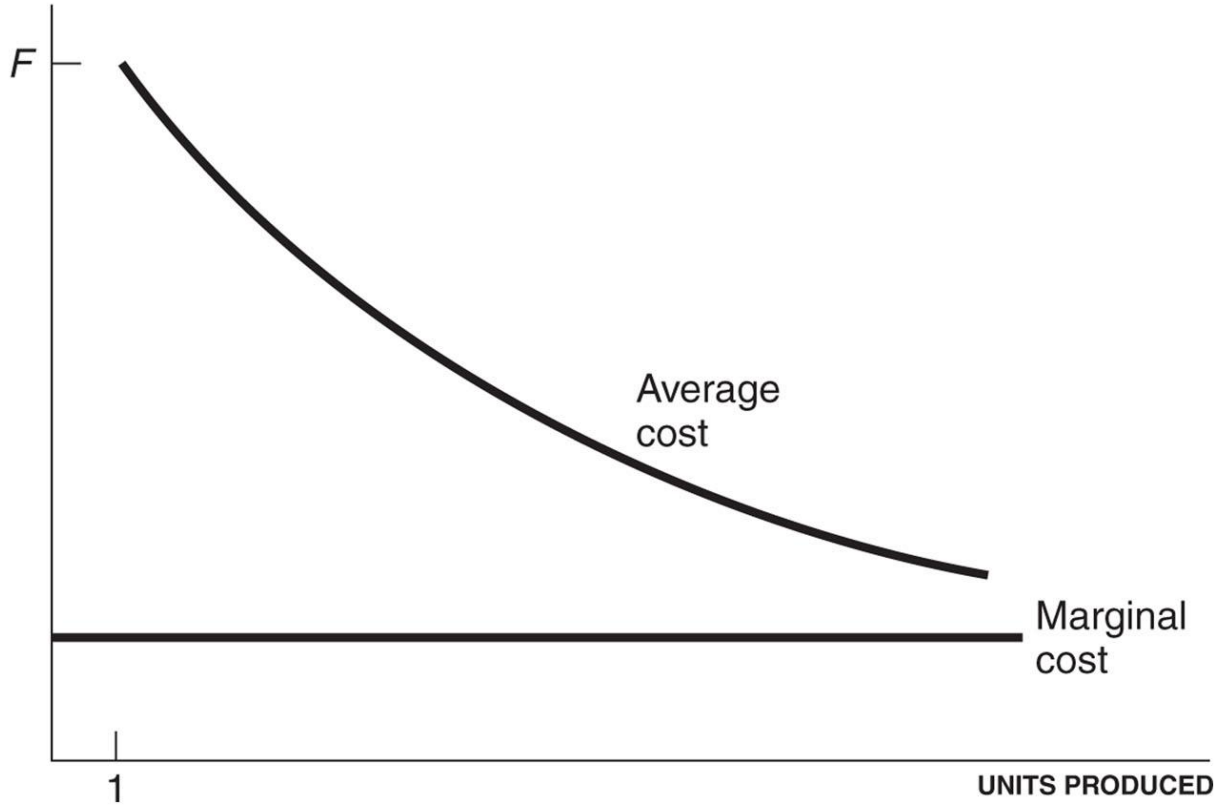
FIGURE 4.3 **FIXED COSTS AND INCREASING RETURNS**



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Intellectual Property Rights and the Industrial Revolution

- Inventors will only incur in one-time high costs of creating something new if there is an expectation of profit
- Patents & copyrights provide a degree of excludability that make profits possible

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Intellectual Property Rights and the Industrial Revolution

- We have mentioned that sustained growth in y is a very recent phenomenon (about 250 years)
- How sustained economic growth got started?
- North argues that the development of intellectual property rights is responsible for modern economic growth

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Intellectual Property Rights and the Industrial Revolution

- Sustained and rapid econ. growth first appeared in the XVIII and XIX century, after centuries of stagnation
- Exactly why? Hard to say
- It is tempting to conclude that the cause is the establishment of institutions that protect intellectual property rights

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Population and Ideas

- Private return provides incentive for innovation
- But the number of potential inventors is also important (directly related with size of pop.)
- Seems at odd with Solow GM
- The Solow model is based on rivalrous goods
- Remember that ideas are nonrivalrous

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Population and Ideas

- As population increases so does the potential number of new ideas
- Since ideas are nonrivalrous, they can be copied an infinite number of times
- The positive effect of population on ideas will be the engine of economic growth (Fig. 4.4)

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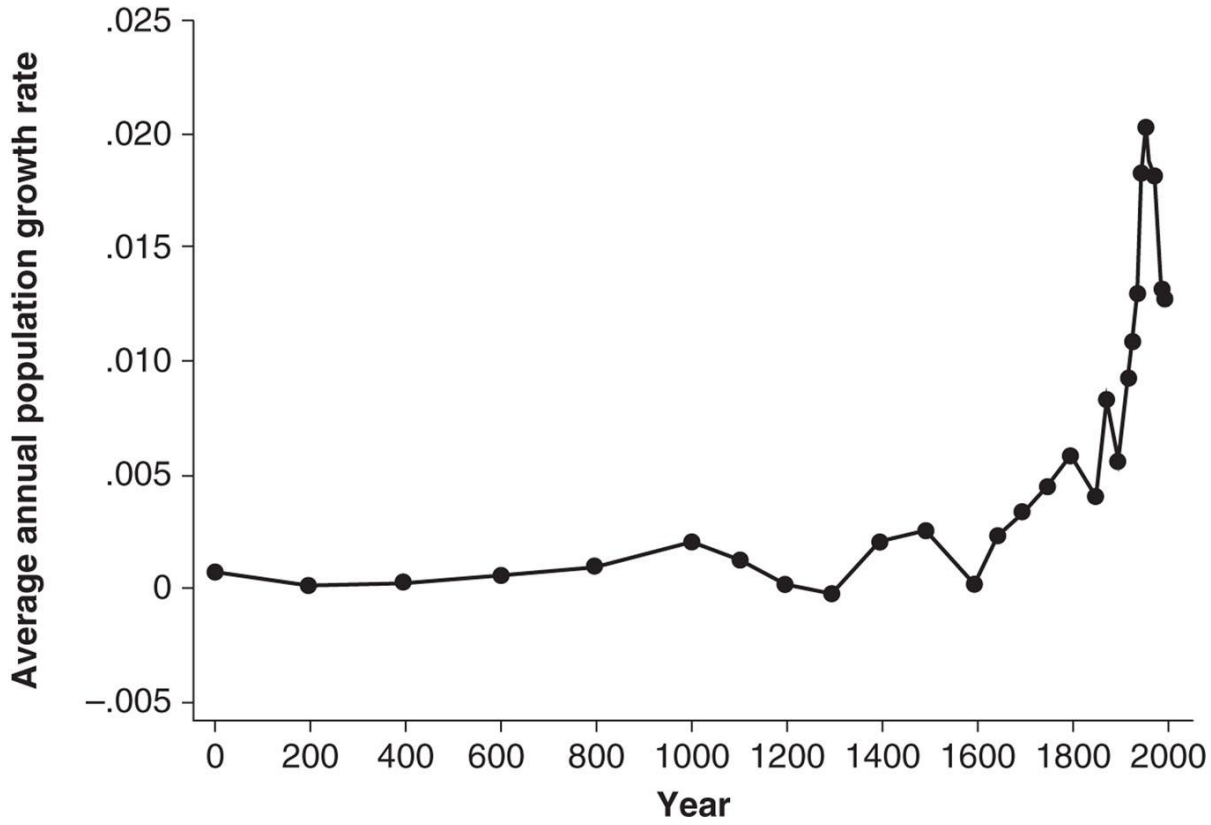
FIGURE 4.4 WORLD POPULATION GROWTH, 1 CE TO 2000 CE.



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Data on Ideas

- It is difficult to measure the input and output in the "production" of ideas
- But there is data on R&D (important input)
- Patents is simple measure of the number of ideas produced
- But… some ideas are not patented, or created with resources labeled as R&D

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Data on Ideas

- A simple count of the number of patents granted does not tell anything about their economic value
- A patent is a legal documents that grants a monopoly to the owner of the invention for period of time (typically 20 years)
- Figure 4.5

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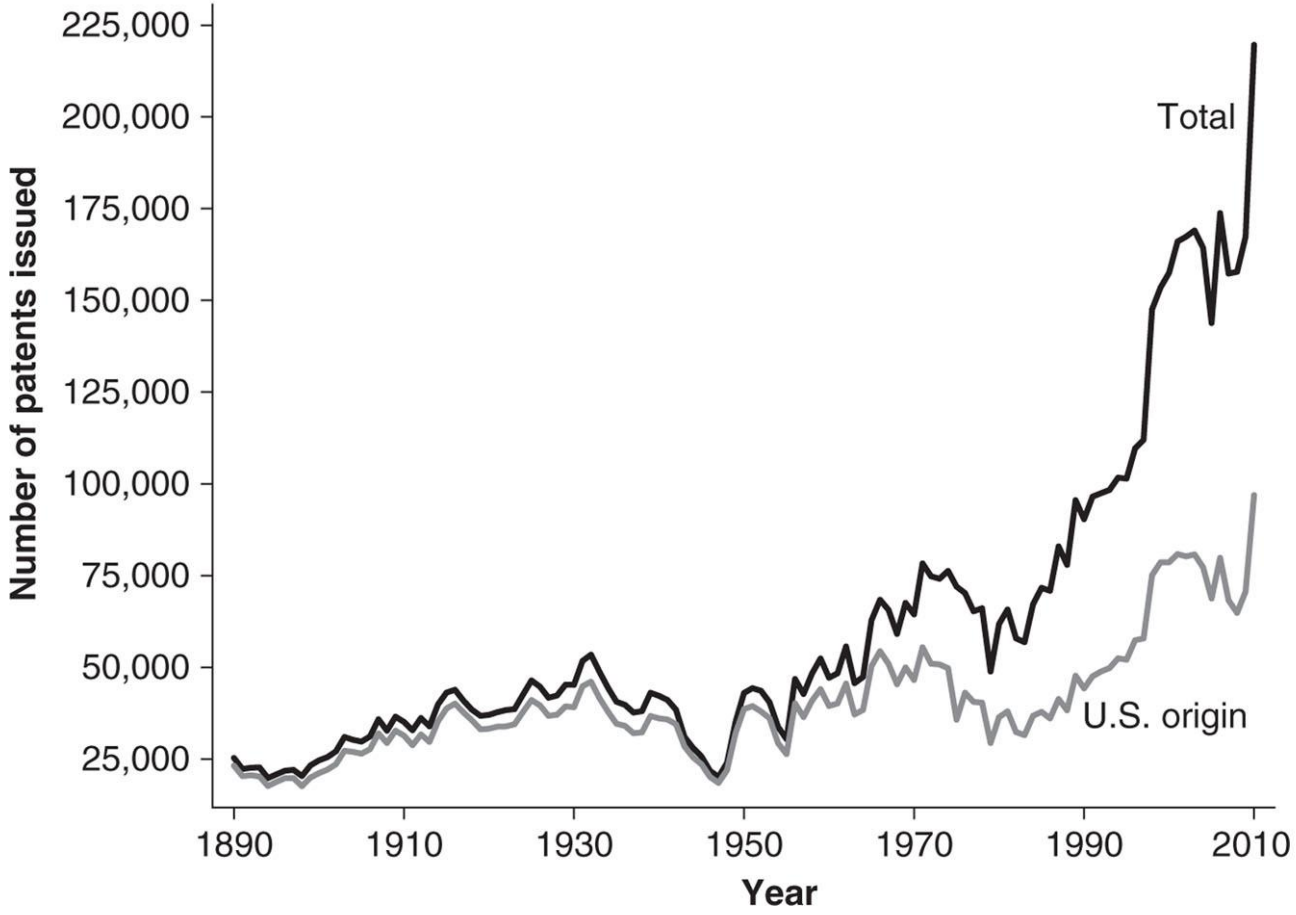
FIGURE 4.5 PATENTS ISSUED IN THE UNITED STATES, 1880–2010



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Data on Ideas

1. Significant increase in the number of patents awarded since 1890
2. Nearly all of the increase in patents over the last century reflects an increase in foreign patents
3. Number of patents awarded in USA to U.S. residents in 1915, 1950 and 1988 was around 40,000

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Data on Ideas

4. Value of patents have increased or fewer ideas are patented (formula for Coca-Cola)

What about inputs in the prod. of ideas?

Figure 4.6

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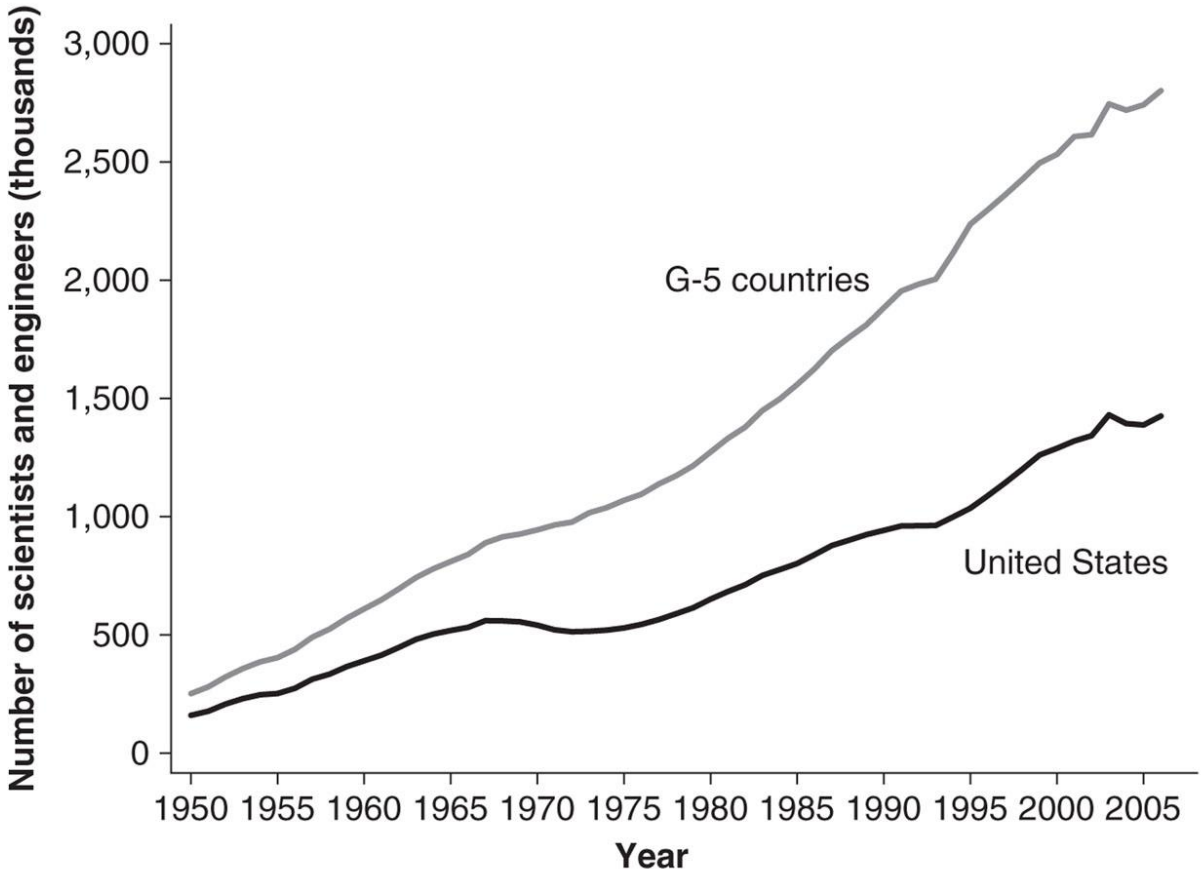
FIGURE 4.6 **SCIENTISTS AND ENGINEERS ENGAGED IN R&D, 1950–2006**



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Data on Ideas

Between 1950 and 2006 resources devoted to R&D increased dramatically in the US

Similar for G-5 (France, Germany, Japan, UK and USA)

Increase in *level* and *share* of resources devoted to R&D

Scientists and engineers: from 0.25 to 1% of LF