

MODULE

18

● 17 Sources of Long-Run Economic Growth

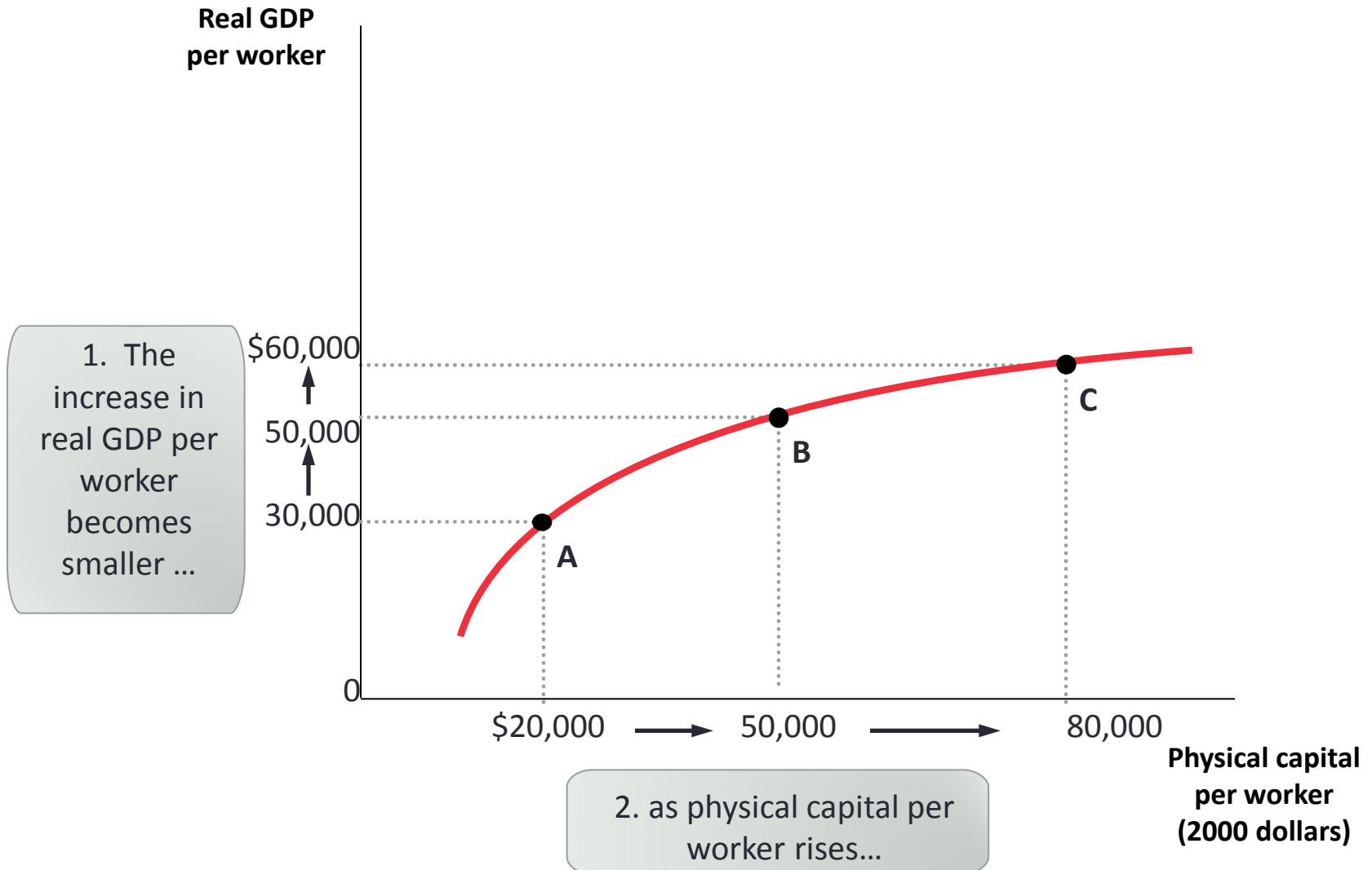
● 18 Productivity and Growth

● 19 Long-Run Growth Policy

The Aggregate Production Function

- The **aggregate production function** is a hypothetical function that shows how productivity (real GDP per worker) depends on the quantities of physical capital per worker and human capital per worker, as well as the state of technology.
- An aggregate production function exhibits **diminishing returns to physical capital** when, holding the amount of human capital and the state of technology fixed, each successive increase in the amount of physical capital leads to a smaller increase in productivity.

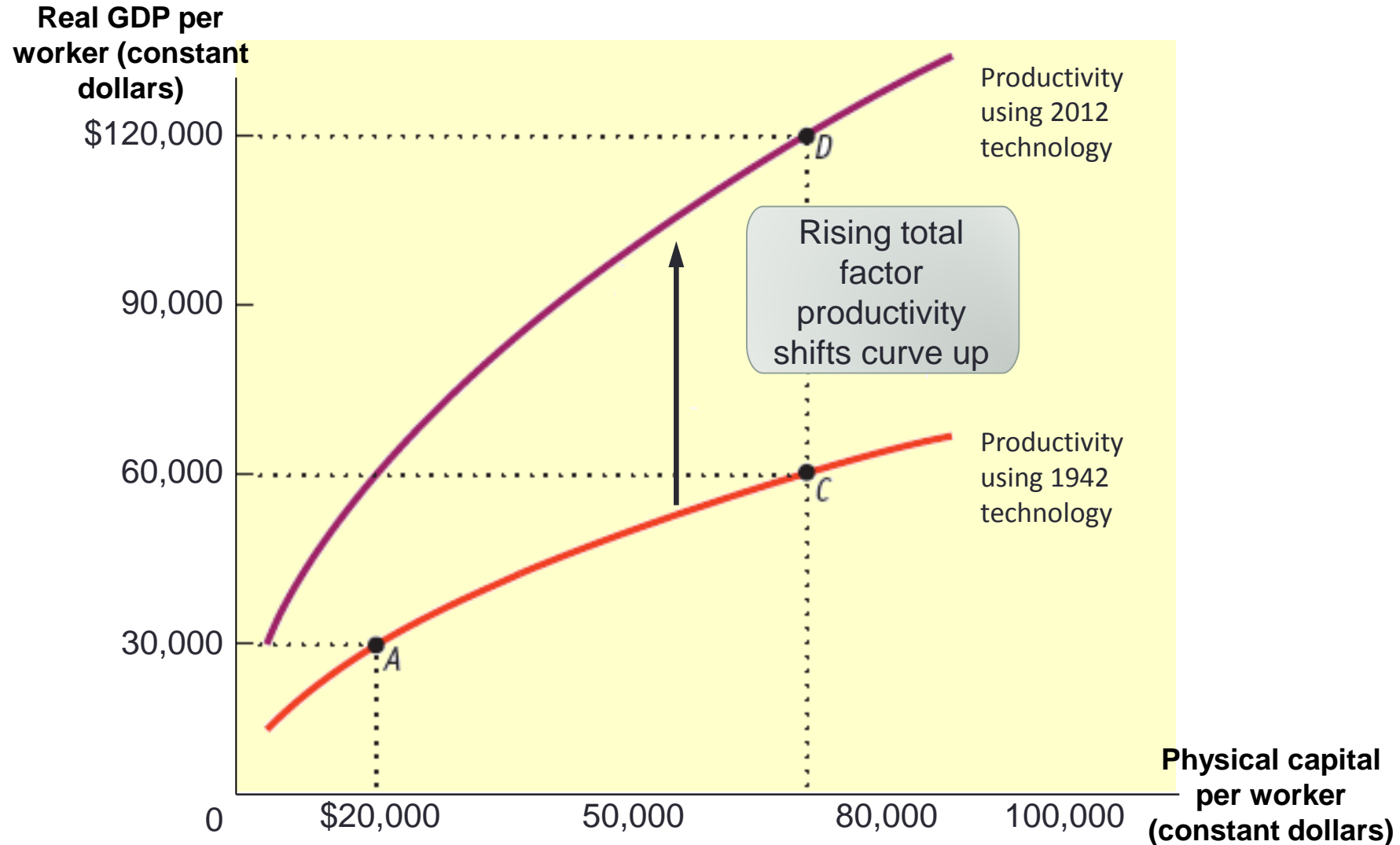
Physical Capital and Productivity



Growth Accounting

- **Growth accounting** estimates the contribution of each factor toward economic growth.
- Physical capital per worker grows about 3% a year.
- According to estimates of the aggregate production function, each 1% rise in physical capital per worker, holding human capital and technology constant, raises output per worker by $\frac{1}{3}$ of 1%, or 0.33%.
- **Total factor productivity** is the amount of output that can be achieved with a given amount of factor inputs.

Total Factor Productivity



What about Natural Resources?

- In the modern world, natural resources are a much less important determinant of productivity than human or physical capital for most countries.

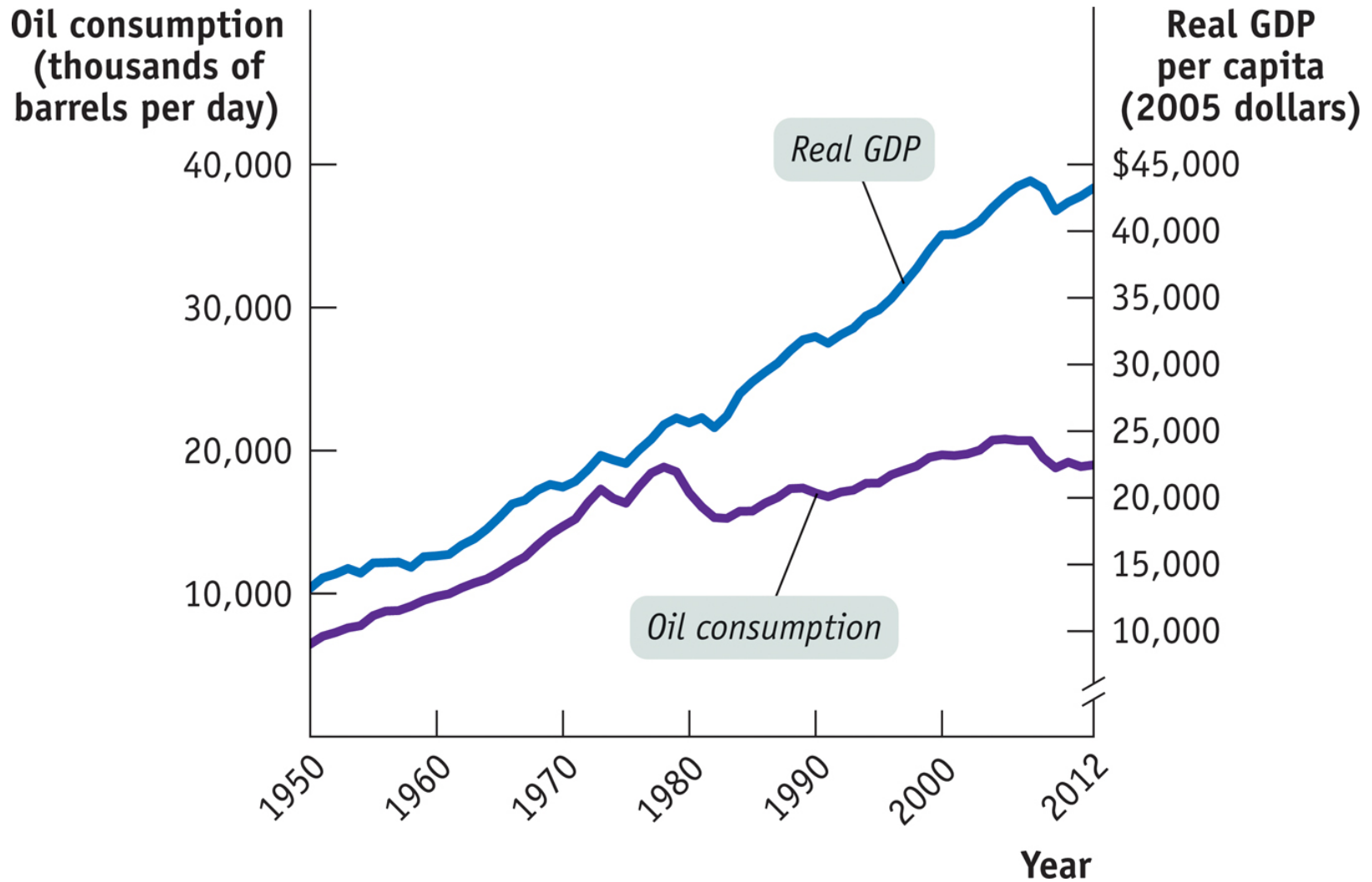


For example, some nations with very high real GDP per capita, such as Japan, have very few natural resources. Some resource-rich nations, such as Nigeria (which has sizable oil deposits), are very poor. This is called the **curse of natural resources**.

Is World Growth Sustainable?

- Long-run economic growth is **sustainable** if it can continue in the face of the limited supply of natural resources and the impact on the environment.
- Differing views about the impact of limited natural resources on long-run economic growth turn on the answers to three questions:
 - How large are the supplies of key natural resources?
 - How effective will technology be at finding alternatives to natural resources?
 - Can long-run economic growth continue in the face of resource scarcity?

U.S. Oil Consumption and Economic Growth



Economic Growth and the Environment

- The limits to growth arising from environmental degradation are more difficult to overcome because overcoming them often requires government intervention.
- The emission of greenhouse gases is clearly linked to growth, and limiting them will require some reduction in growth.

Carbon Dioxide Emissions and Growth

