The Facts of Growth

Intermediate Macroeconomics

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March 18, 2024

Motivation

What determines the level of aggregate output in an economy?

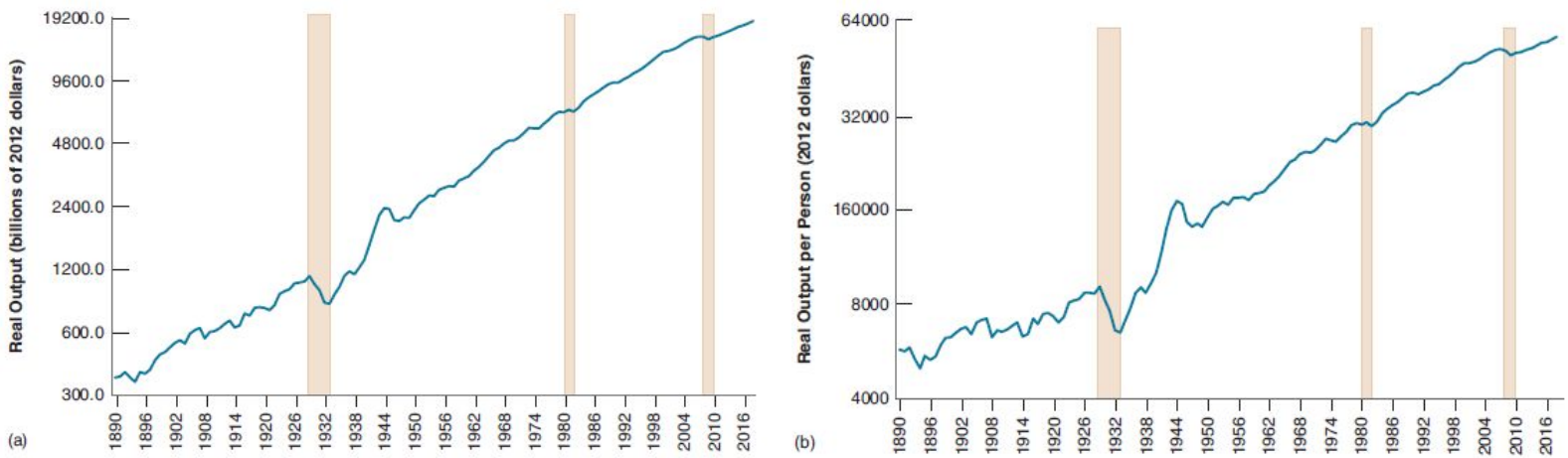
- In the short run, factors that can affect demand for goods such as consumer confidence, government spending
- In the median run, how much the economy can produce which depend on the technology, capital, size of skilled labor force...
- In the long run, factors such as a country's education system, saving rate, quality of its government, and innovation ability...

Outline

- Measuring the Standard of Living
- Growth in Rich Countries since 1950
- A Broader Look across Time and Space
- Thinking about Growth: A Primer

What is Growth?

- Growth is the steady increase in aggregate output over time.
- The effects of output growth on economics welfare strictly dominate the effects of output fluctuations.



(a) Real output

(b) Real output per person

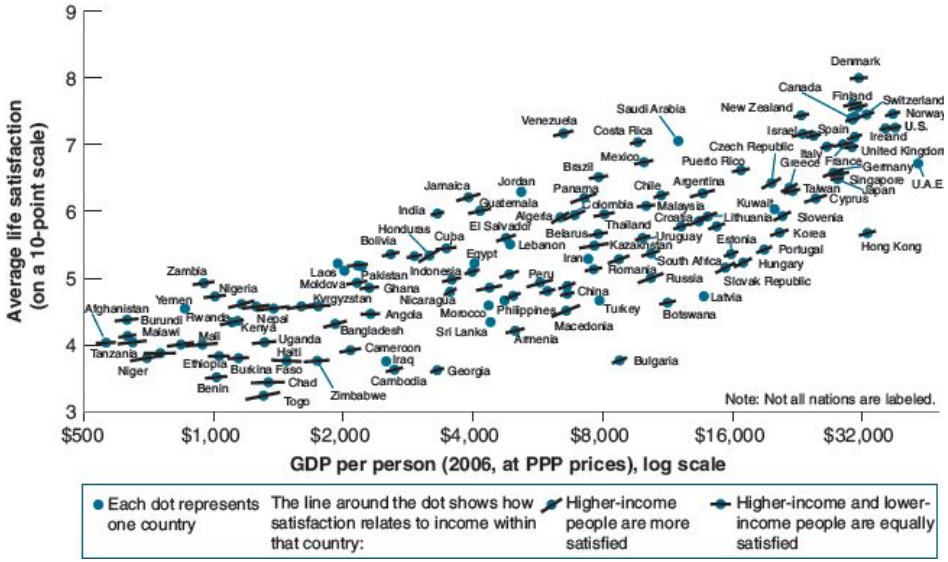
Measuring the Standard of Living

- Living standard measured as **Output per person**, rather than output itself, is the variable we compare over time or across countries.
- We need to correct for variations in exchange rates and systematic differences in prices across countries.
- When comparing the standard of living across countries, GDP(GDP per person) are constructed using a common set of prices for all countries, which adjust the differences in purchasing power across countries.
- Such adjusted real GDP numbers are called purchasing power parity(PPP) numbers.

The Construction of PPP Numbers

- Consider the following example:
  - United States: Each year people buy a new car for $10,000$ dollar and spend another $10,000$ dollar on a yearly bundle of food.
  - Russia: Each year people spend $40,000$ rubles on cars (each lasts for 15 years) a year, and $80,000$ rubles on the same yearly bundle of food.
- If the exchange rate is $1 dollar = 60 rubles$, consumption per person in Russia is only 10% of U.S. consumption per person.
- If we use U.S. prices for both countries and assume people spending all money on food, then consumption per person is 20,000 (10,000+10,000) in the U.S., but only 10,700 in Russia, so Russian consumption per person is 53.5% of U.S. consumption per person.

Does Money Lead to Happiness?



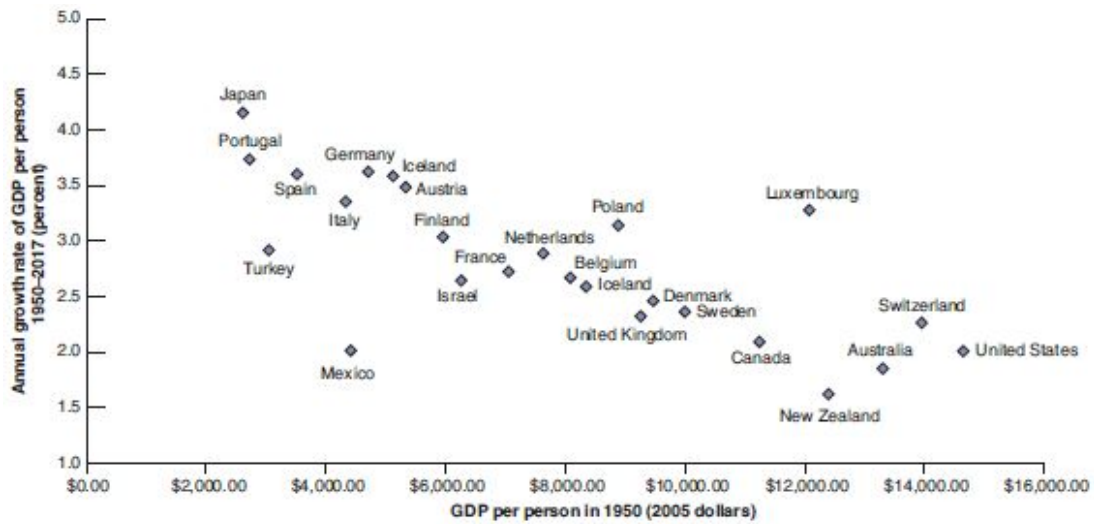
Easterlin paradox: Once basic needs are satisfied, higher income per person does not increase happiness, and the level of income relative to others, rather than the absolute level of income, matters

The Evolution of Output per Person in Four Rich Countries since 1950

	Annual Growth Rate Output per Person (%)	Real Output per Person (2011 dollars)		
	1950–2017	1950	2017	2017/1950
France	2.6	7,025	39,461	5.6
Japan	4.1	2,531	40.374	15.9
United Kingdom	2.1	9,354	39,128	4.2
United States	2.0	14,569	54,995	3.8
Average	2.7	8,370	43,490	5.2

Convergence

- Among OECD countries, countries with lower levels of output per person in 1950 have typically grown faster.
- The pattern remains for a set of countries that had an output per person at least one-fourth of U.S. output per person.

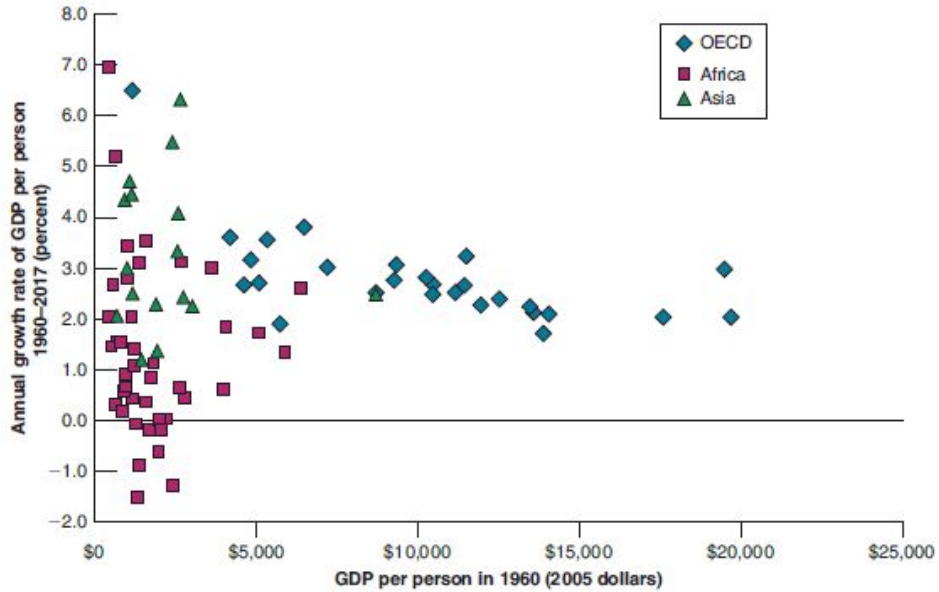


A Broader Look across Time and Space

- From the end of the Roman Empire to roughly year 1500, Europe was in a Malthusian trap or Malthusian era with stagnation of output per person because most workers were in agriculture with little technological progress.
- After 1500, growth of output per person turned positive but still small.
- Between 1820 and 1950, U.S. growth was still 1.5% per year.
- Sustained growth was high since 1950.

Convergence?

There is no clear relation between the growth rate of output since 1960 and the level of output per person in 1960.



- For the OECD countries, there is clear evidence of convergence.
- Convergence is also visible for many Asian countries, especially for those with high growth rates, called the four tigers: Singapore, Taiwan, Hong Kong, and South Korea.
- Most African countries were very poor in 1960, and some of them had negative growth of output per person between 1960 and 2017 due in part to internal or external conflicts.

The Aggregate Production Function

- Aggregate production function:

$$Y = F(K, N),$$

  where Y is output, K is capital and N is labor.
- The production function F depends on the state of the technology.
- Constant returns to scale:

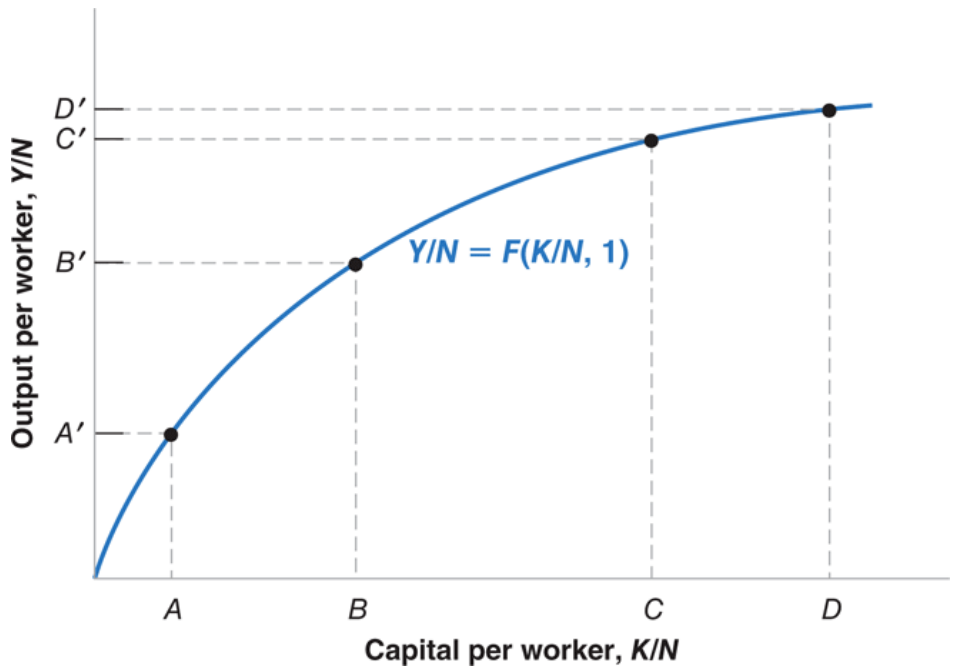
$$xY = F(xK, xN).$$

- The constant return to scale property implies a simple relation between output per-worker(Y/N) and capital per worker(K/N):

$$\frac{Y}{N} = F(\frac{K}{N}, \frac{N}{N}) = F(\frac{K}{N}, 1)$$

Output per Worker and Capital per Worker

- Decreasing returns to capital: Increases in capital per worker lead to smaller and smaller increases in output per worker.



The Sources of Growth

- Increase in output per worker can come from:
  - increase in the capital per worker(move along the curve)
  - improvements in the state of technology(shift up the curve)
- Growth comes from capital accumulation (a higher saving rate) and technological progress (the improvement in the state of technology).