Economic growth: Interesting Facts and Examples
The Basics of Economic Growth

U.S. real GDP per person and the standard of living tripled between 1960 and 2010.

We see even more dramatic change in China, where incomes have tripled not in 50 years but in the 13 years since 1999.

Incomes are growing rapidly in some other economies of Asia, Africa, and South America.

What are the forces that make real GDP grow?
Economic growth is the sustained expansion of production possibilities measured as the increase in real GDP over a given period.

Calculating Growth Rates

The **economic growth rate** is the annual percentage change of real GDP.

The economic growth rate tells us how rapidly the total economy is expanding.
The Basics of Economic Growth

The standard of living depends on real GDP per person.

**Real GDP per person** is real GDP divided by the population.

Real GDP per person grows only if real GDP grows faster than the population grows.
Economic Growth Versus Business Cycle Expansion

Real GDP can increase for two distinct reasons:

1. The economy might be returning to full employment in an expansion phase of the business cycle.

2. *Potential* GDP might be increasing.

The return to full employment in an expansion phase of the business cycle isn’t economic growth.

The expansion of potential GDP is economic growth.
The Basics of Economic Growth

This Figure illustrates the distinction.

A return to full employment in a business cycle expansion is a movement from inside the PPF (point A) to a point on the PPF (point B).

Economic growth is the outward shift of the PPF from $PPF_0$ to $PPF_1$ and the movement from point B on $PPF_0$ to point C on $PPF_1$. 
**Growth Rates Matter**

**Compound Interest**
We all know the power of compound interest, but it is worth reminding ourselves of it.
Consider a fifty year time period. The table below shows what happens to output per head at different growth rates:

<table>
<thead>
<tr>
<th>Growth Rate</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1% per annum</td>
<td>Increases 182.7%</td>
</tr>
<tr>
<td>1.5% per annum</td>
<td>Increases 110.5%</td>
</tr>
<tr>
<td>3.0% per annum</td>
<td>Increases 338.4%</td>
</tr>
<tr>
<td>1.0% per annum</td>
<td>Increases 64.5%</td>
</tr>
<tr>
<td>4.0% per annum</td>
<td>Increases 610.7%</td>
</tr>
</tbody>
</table>
Productivity Growth Slowdown

The growth rate of real GDP per person slowed after 1970. How costly was that slowdown?

The answer is provided by a number that we’ll call the Lucas wedge.

The *Lucas wedge* is the dollar value of the accumulated gap between what real GDP per person would have been if the 1960s growth rate had persisted and what real GDP per person turned out to be.
Growth Rates Matter

This Figure illustrates the Lucas wedge.

The red line is actual real GDP per person.

The thin black line is the trend that real GDP per person would have followed if the 1960s growth rate of potential GDP had persisted.

The shaded area is the Lucas wedge.
1. Before the Industrial Revolution in about 1800, standards of living differed little over time and across countries.

- There appeared to have been essentially no improvement in standards of living for a long period of time prior to 1800.
- Though population and aggregate income grew, with growth sometimes interrupted by disease and wars, population growth kept up with growth in aggregate income, so that there was little change in per capita real income.
- Living standards did not vary much across the countries of the world. In particular, Western Europe and Asia had similar standards of living.
Growth Facts

World GDP over the last two millennia
Total output of the world economy; adjusted for inflation and expressed in 2011 international dollars.

Growth Facts

2. Since the Industrial Revolution, per capita income growth has been sustained in the richest countries. In the United States, average annual growth in per capita income has been about 2% since 1900.
The slope of the natural log of a time series is approximately equal to the growth rate. What is remarkable about the figure is that a straight line would be a fairly good fit to the natural log of per capita income in the United States over this period of 111 years. In other words, average per capita income growth in the United States has not strayed far from an average growth rate of about 2% per year for the whole period, except for major interruptions like the Great Depression (1929–1939) and World War II (1941–1945).
3. There is a positive correlation between the rate of investment and output per worker across countries.

Note: The data is for 2007
4. There is a negative correlation between the population growth rate and output per worker across countries.

**Note:** Per capita income is for 2007. Population growth rate is the average annual population growth rate for 1960–2007.
5. Differences in per capita incomes increased dramatically among countries of the world between 1800 and 1950, with the gap widening between the countries of Western Europe, the United States, Canada, Australia, and New Zealand, as a group, and the rest of the world.
6. There is essentially no correlation across countries between the level of output per capita in 1960 and the average rate of growth in output per capita for the years 1960–2007.

**Figure 7.4 Growth Rate in Per Capita Income vs. Level of Per Capita Income**

There is no correlation between the two variables in the figure, indicating no tendency for convergence in per capita incomes in the world over the period 1960–2007. There is much greater divergence in growth experience for the poor countries of the world than for the rich ones.
7. Richer countries are much more alike in terms of rates of growth of real per capita income than are poor countries.
The Rule of 70

The **Rule of 70** states that the number of years it takes for the level of a variable to double is approximately 70 divided by the annual percentage growth rate of the variable.
The Rule of 70

Applying the Rule of 70

This Figure shows the doubling time for growth rates.

A variable that grows at 7 percent a year doubles in 10 years.

A variable that grows at 2 percent a year doubles in 35 years.

A variable that grows at 1 percent a year doubles in 70 years.
Catch-up Effect

Real GDP Growth in the World Economy

This Figure shows the growth in the rich countries.

Japan grew rapidly in the 1960s, slower in the 1980s, and stagnated during the 1990s.

Growth in Europe Big 4, Canada, and the United States has been similar.
Catch-up Effect

This Figure shows the growth of real GDP per person in a group of poor countries.

The gaps between real GDP per person in the United States and in these countries have widened.
Cross-Country Income Differences

A typical Malian family with their possessions.
Cross-Country Income Differences

A typical English family with their possessions.
Three Big Macroeconomic Questions

Cross-country differences in income per capita

According to PWT 9.0, in 1985, the average income per person (PPP-adjusted, yearly) in the richest 5% of the countries in the world was \textbf{35 times} that of the poorest 5%. In the sample of 115 countries (oil based economies have been omitted from the richest 5%; and countries with population less than 1 million have been omitted from the sample):

- The richest 5%: U.S.A., Switzerland, Norway, Canada, Australia and Sweden
- The poorest 5%: Ethiopia, Liberia, Cambodia, Uganda, Mali, Mozambique
In 2014, the average income per person (PPP-adjusted, yearly) in the richest 5% of the countries in the world was 61 times that of the poorest 5%. In the sample of 143 countries (oil based economies have been omitted from the richest 5%; and countries with population less than 1 million have been omitted from the sample):

The richest 5%: Norway, Singapore, Switzerland, U.S.A., Ireland, Netherlands, Germany
The poorest 5%: Mozambique, D. R. Congo, Malawi, Niger, Liberia, Burundi, Central African Republic

**Poorest country:** Central African Republic, Income per person : $600 / year  
**The richest country:** Norway, Income per person: $78,293 / year

**The Position of Bangladesh:**  
116-th, Income per person: $2,917 / year  
≈ BDT 20,000/month  
Without PPP-adjustment, average income per person:  
Around BDT 7,000/month
Growth Miracles and Growth Disasters

**Growth miracles** are episodes where growth in a country far exceeds the world average over an extended period, with the result that the country moves rapidly up the world income distribution.

Some prominent growth miracles are:

- Japan from the end of World War II to around 1990
- The newly industrializing countries (NICs) of East Asia: South Korea, Taiwan, Singapore, and Hong Kong starting around 1960
- China starting around 1980

Average incomes in the NICs, for example, have grown at an average annual rate of over 5 percent since 1960. As a result, their average incomes relative to that of the United States have more than tripled.
Growth disasters are episodes where a country’s growth falls far short of the world average.

Two very different examples of growth disasters are Argentina and many of the countries of sub-Saharan Africa.

- In 1900, Argentina’s average income was only slightly behind those of the world’s leaders, and it appeared poised to become a major industrialized country. But its growth performance since then has been dismal, and it is now near the middle of the world income distribution.

- Sub-Saharan African countries such as Chad, Ghana, and Mozambique have been extremely poor throughout their histories and have been unable to obtain any sustained growth in average incomes. As a result, their average incomes have remained close to subsistence levels while average world income has been rising steadily.
More Complicated Growth Patterns

Other countries exhibit more complicated growth patterns:

• Côte d’Ivoire was held up as the growth model for Africa through the 1970s. From 1960 to 1978, real income per person grew at an average annual rate of 3.2 percent. But in the three decades since then, its average income has not increased at all, and it is now lower relative to that of the United States than it was in 1960.

• To take another example, average growth in Mexico was very high in the 1950s, 1960s, and 1970s, negative in most of the 1980s, and moderate—with a brief but severe interruption in the mid-1990s—since then.
Another example: If real income per person in the Philippines continues to grow at its average rate for the period 1960–2001 of 1.5 percent, it will take 150 years for it to reach the current U.S. level. If it achieves 3 percent growth, the time will be reduced to 75 years. And if it achieves 5 percent growth, as the NICs have done, the process will take only 45 years.

To quote Robert Lucas (1988):

“Once one starts to think about [economic growth], it is hard to think about anything else.”
Economic Growth: A Fascinating Area of Economic Research

Frequency of the Phrase “Economic Growth” in Journal Article Titles or Abstracts

- 1981-1985: 5 occurrences
- 1986-1990: 7 occurrences
- 1996-2000: 22 occurrences
- 2001-2005: 28 occurrences
- 2006-2010: 35 occurrences
Economic Growth: A Fascinating Area of Economic Research

- A large portion of our course is therefore devoted to economic growth. We will investigate several models of growth.

- Although we will examine the models’ mechanics in considerable detail, our goal is to learn what insights they offer concerning worldwide growth and income differences across countries.

- Indeed, the ultimate objective of research on economic growth is to determine whether there are possibilities for raising overall growth or bringing standards of living in poor countries closer to those in the world leaders.