Topic 15
The Science of Macroeconomics

The whole of science is nothing more than the refinement of everyday thinking.

__ *Albert Einstein*

A Tour of The World

A Tour of the World

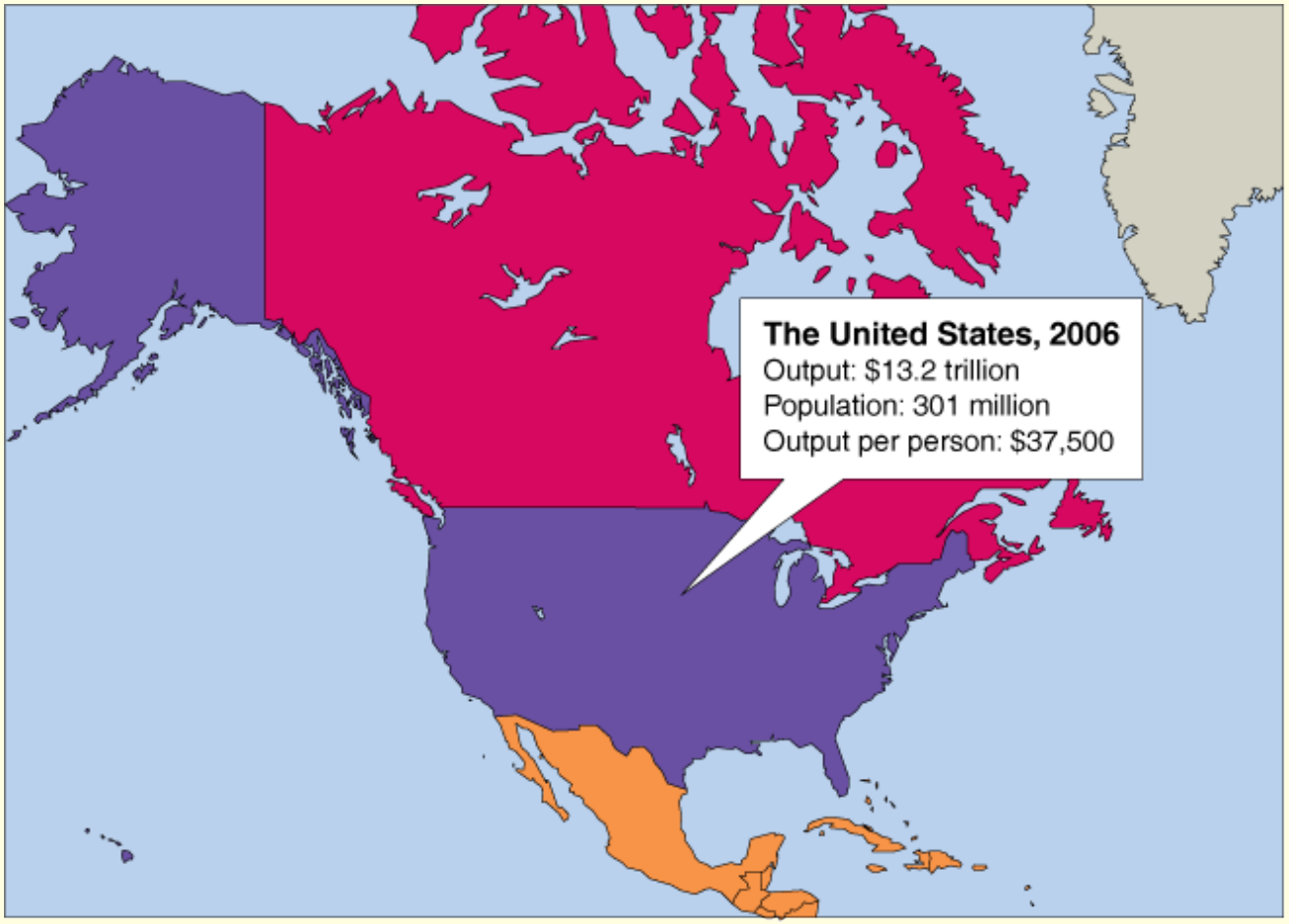


Figure 1 - 1

The United States

1-1 The United States

•When macroeconomists study an economy, they first look at three variables:

- Output
- The unemployment rate
- The inflation rate

1-1 The United States

Table 1-1 Growth, Unemployment, and Inflation in the United States Since 1970

	1970–2006 (average)	1996–2006 (average)	2006	2007	2008
Output growth rate	3.1%	3.4%	3.3%	2.1%	2.5%
Unemployment rate	6.2	5.0	4.6	4.6	4.8
Inflation rate	4.0	2.0	2.9	2.6	2.2

Output growth rate: annual rate of growth of output (GDP). Unemployment rate: average over the year. Inflation rate: annual rate of change of the price level (GDP deflator).

- The period 1996-2006 was one of the best decades in recent memory:
  - The average rate of growth was 3.4% per year.
  - The average unemployment rate was 5.0%.
  - The average inflation rate was 2.0%.

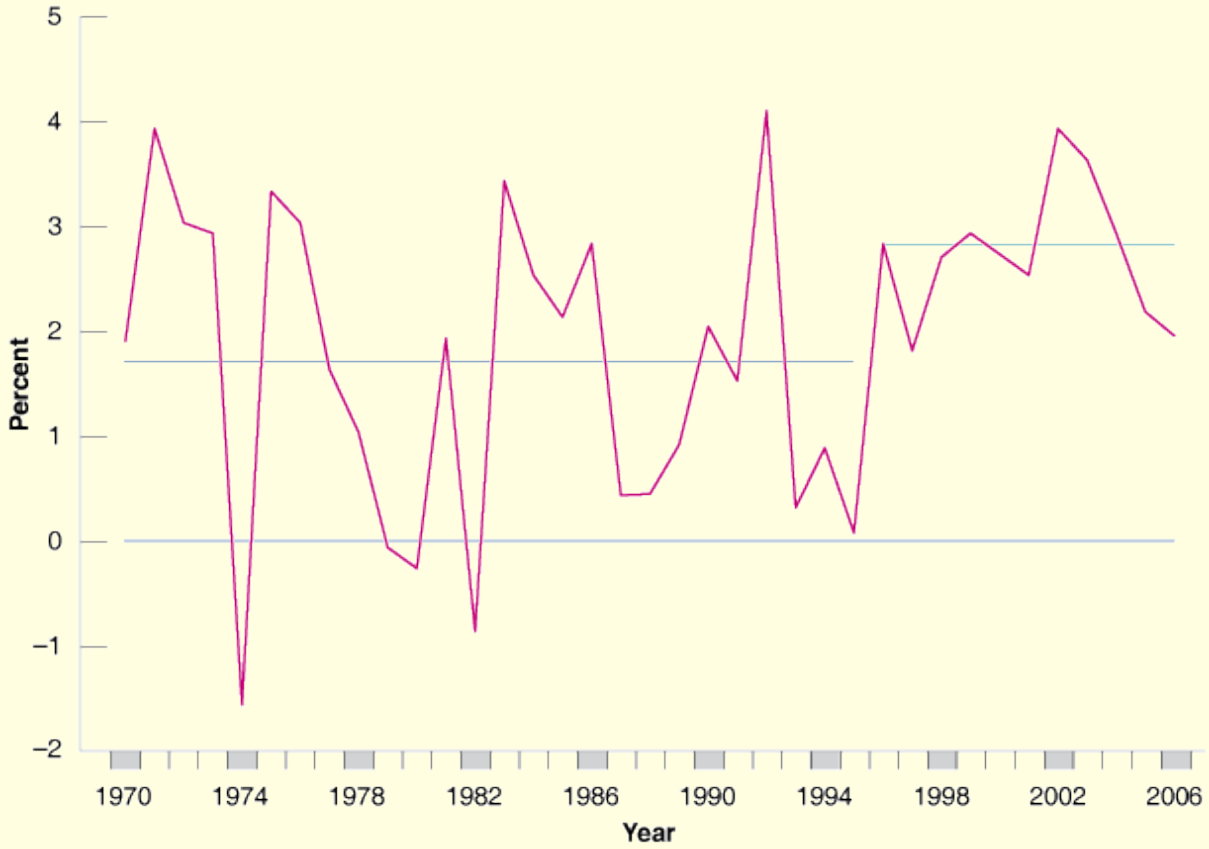
1-1 The United States

- Has the United States Entered a New Economy?

Figure 1 - 2

Rate of Growth of Output per Hour in the United States Since 1960.

The average rate of growth of output per hour appears to have increased again since the mid-1990s.



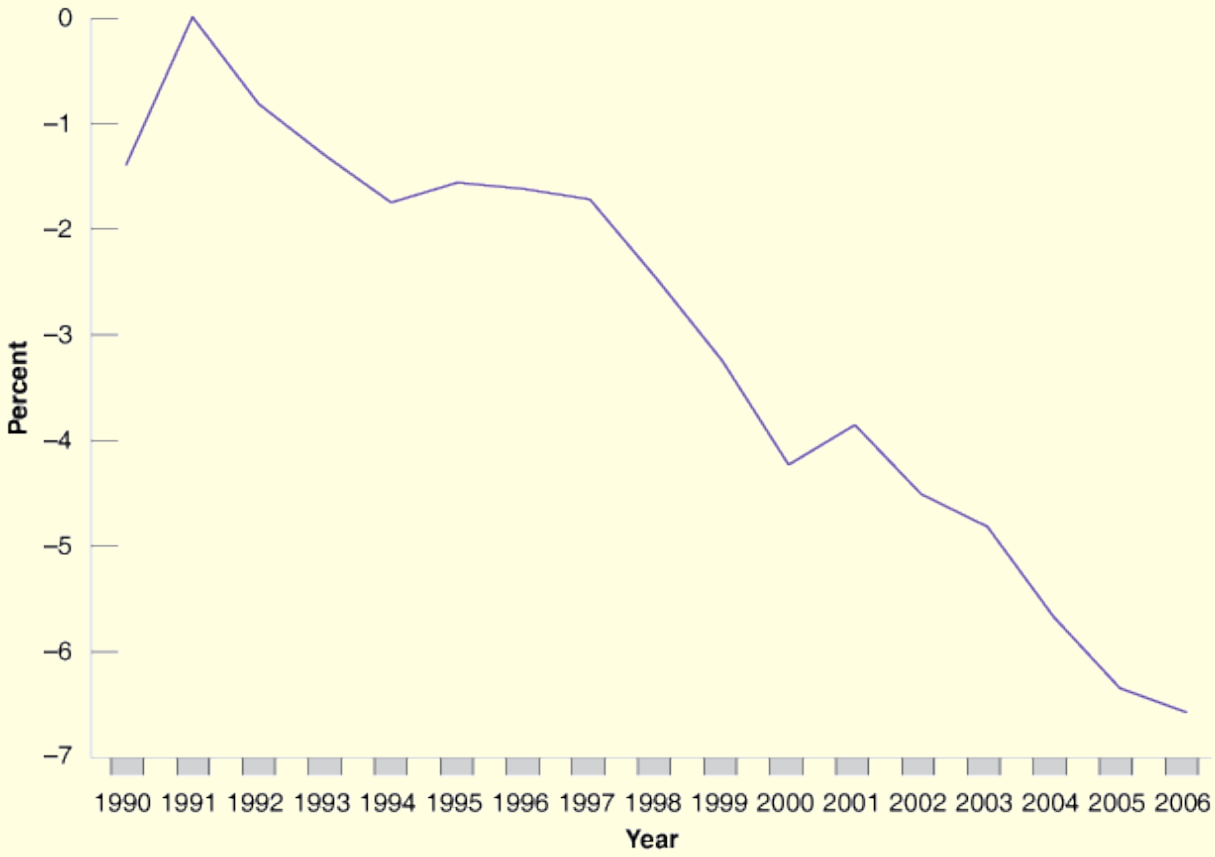
1-1 The United States

Should We Worry About the U.S. Trade Deficit?

Figure 1 - 3

The U.S.Trade Deficit Since 1990

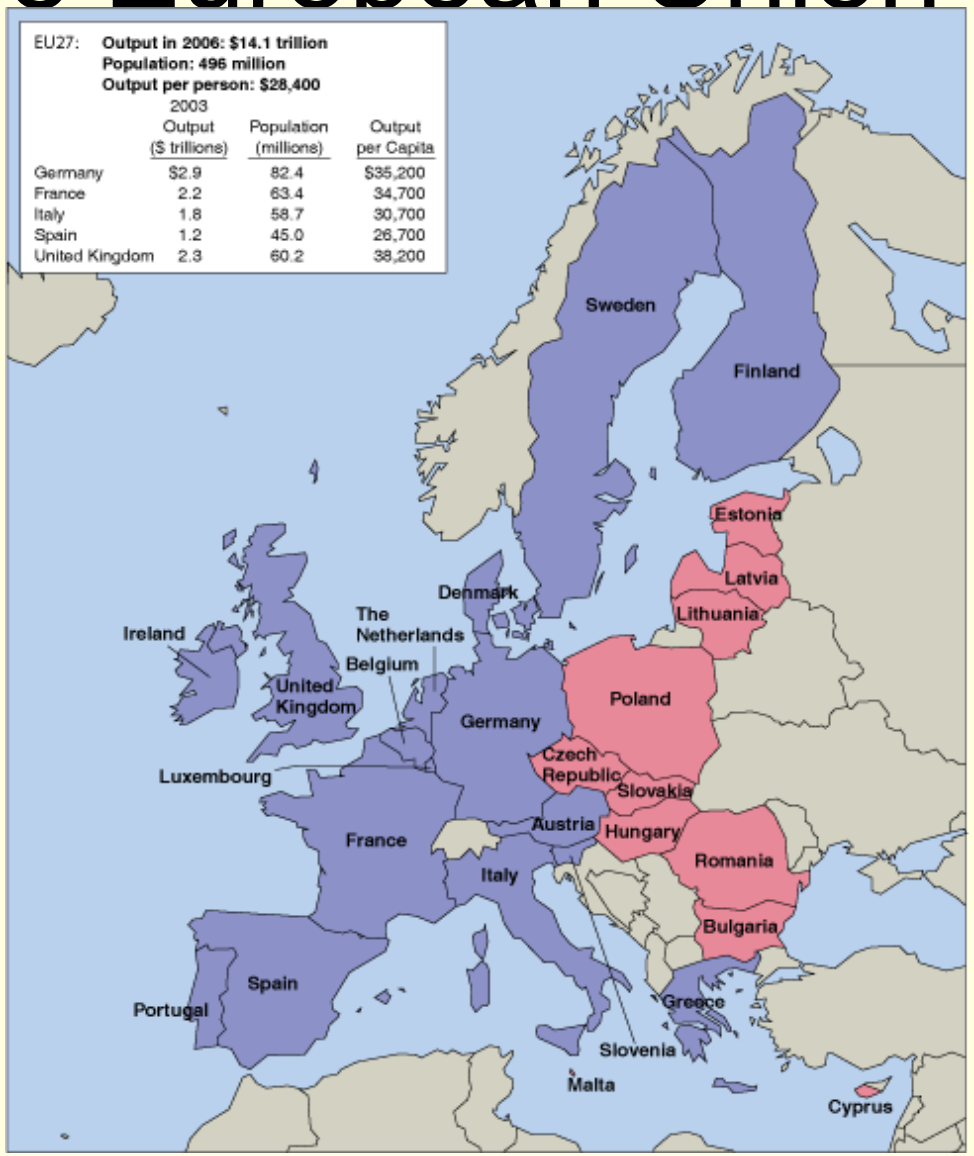
The trade deficit increased from about 1% of output in 1990 to about 6% of output in 2006.



1-2 The European Union

Figure 1 - 4

The European Union



1-2 The European Union

Table 1-2 Growth, Unemployment, and Inflation in the Five Major European Countries Since 1970

	1970–2006 (average)	1996–2006 (average)	2006	2007	2008
Output growth rate	2.3%	2.0%	2.7%	2.6%	2.2%
Unemployment rate	7.4	8.7	7.6	7.0	6.7
Inflation rate	5.4	1.8	1.7	1.8	2.2

Output growth rate: annual rate of growth of output (GDP). Unemployment rate: average over the year. Inflation rate: annual rate of change of the price level (GDP deflator).

1-2 The European Union

The economic performance of the five countries in Table 1-2 has been far less impressive than that of the United States over the same period:

- Average annual output growth from 1996 to 2006 was only 2.0%.
- Low-output growth was accompanied by persistently high unemployment.
- The only good news was about inflation. Average annual inflation for these countries was 1.8%, much lower than the 5.4% average over the period 1970 to 2006.

1-2 The European Union

Two issues dominate the agenda of European macroeconomists:

- High unemployment
- Common currency

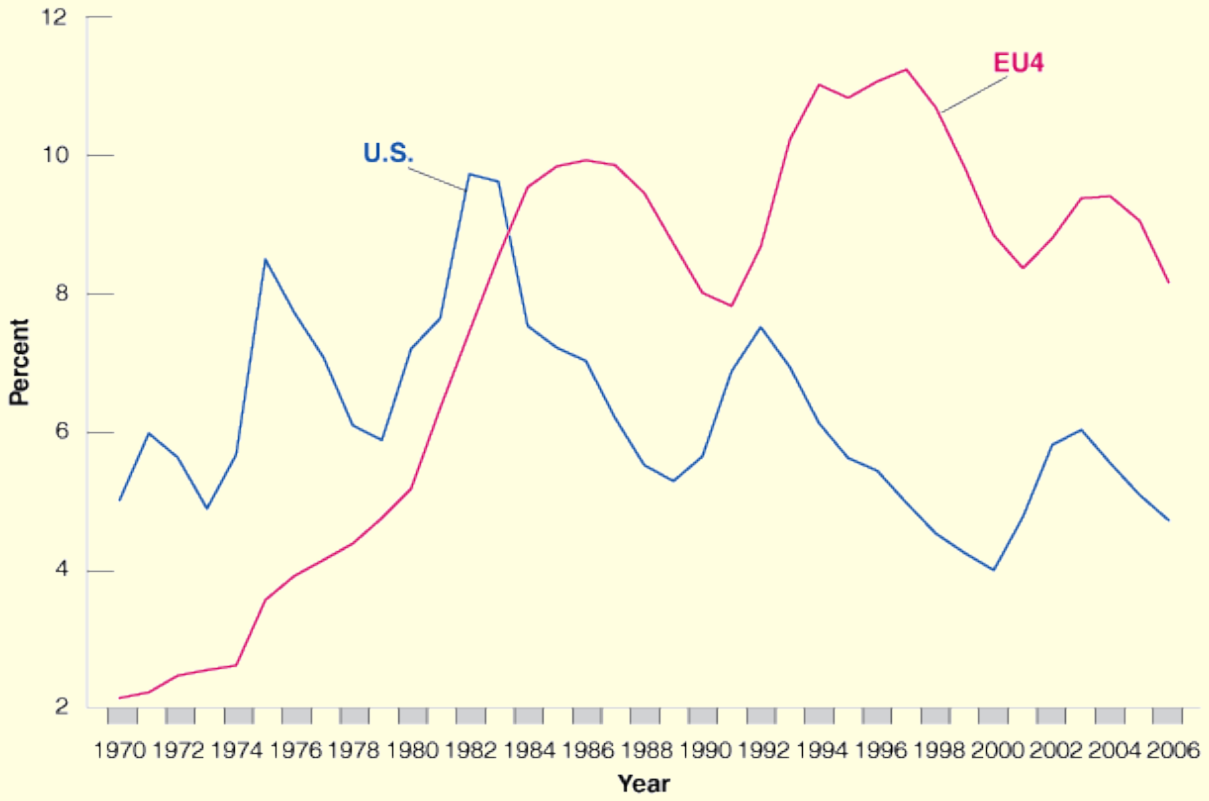
1-2 The European Union

How Can European Unemployment Be Reduced?

Figure 1 - 5

Unemployment Rates: Continental Europe Versus the United States Since 1970

The unemployment rate in the four largest continental European countries has gone from being much lower than the U.S. unemployment rate to being much higher.



1-2 The European Union

How Can European Unemployment Be Reduced?

There is still disagreement about the causes of high European unemployment:

- Politicians often blame macroeconomic policy.
- Most economists believe, however, that the source of the problem is labor market institutions.
- Some economists point to what they call labor market rigidities.
- Other economists point to the fact that unemployment is not high everywhere in Europe.

1-2 The European Union

What Will the Euro Do for Europe?

- Supporters of the Euro point first to its enormous symbolic importance.
- Others worry that the symbolism of the euro may come with some economic costs.

1-3 China

Figure 1 - 6

China

1-3 China

Table 1-3 Growth and Inflation in China Since 1980

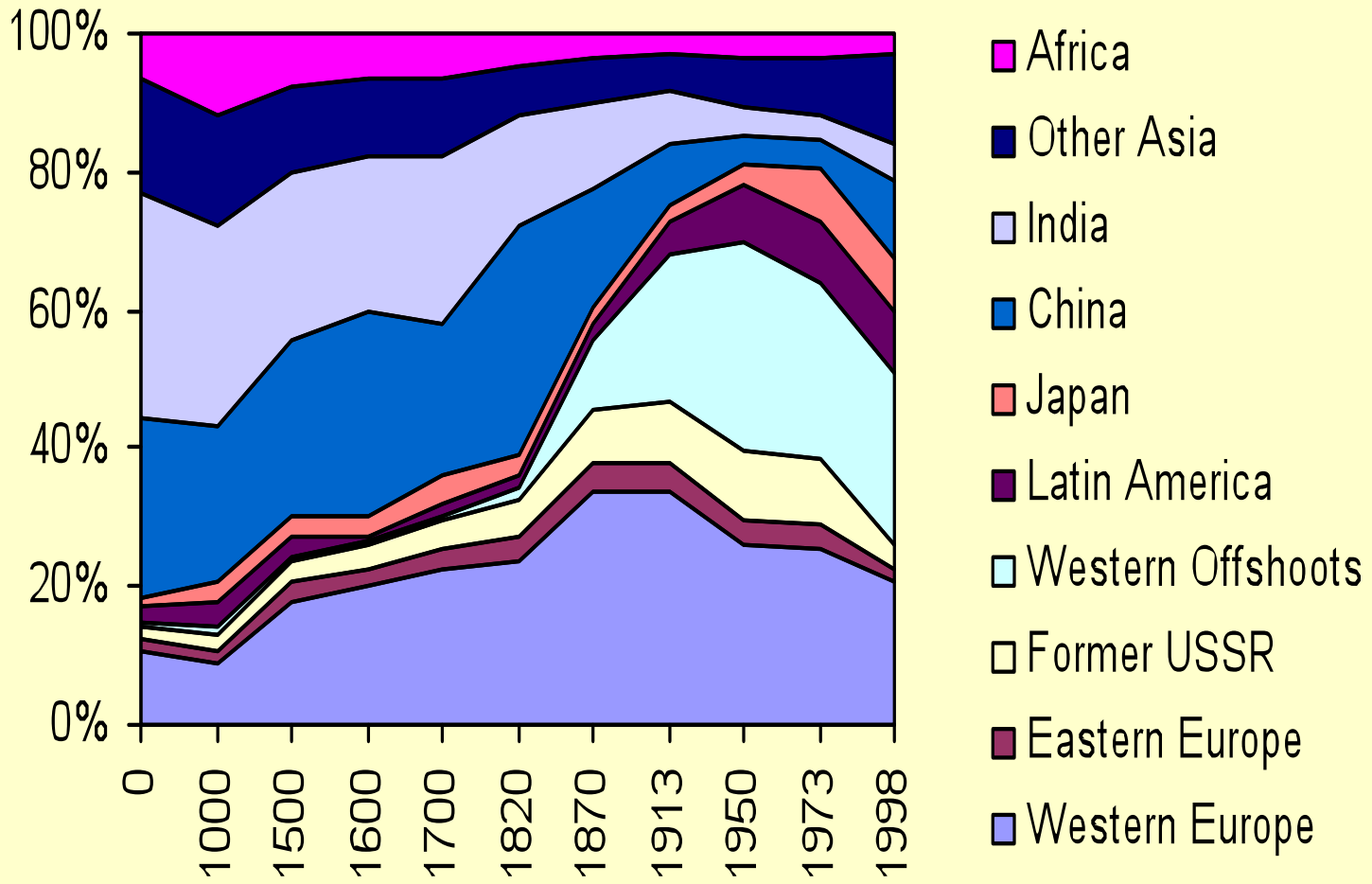
	1980–2006	1996–2006	2006	2007	2008
Output growth rate	9.3%	8.8%	10.7%	10.0%	9.5%
Inflation rate	5.4	3.3	1.5	2.5	2.2

Output growth rate: annual rate of growth of output (GDP). Inflation rate: annual rate of change of the price level (GDP deflator).

Since 1980, Chinese output has grown at close to 10% per year, and the forecasts are for more of the same.

This is a truly astonishing number: Compare it to the 3.1% number achieved by the U.S. economy over the same period. At that rate, output doubles every 7 years.

Regional Distribution of World GDP



1-4 Looking Ahead

These are the questions to which you have been exposed in this chapter:

- What determines expansions and recessions? Can monetary policy be used to prevent a recession in the United States? How will the Euro affect monetary policy in Europe?
- Why is inflation so much lower today than it was in the past? Can Europe reduce its unemployment rate? Should the United States reduce its trade deficit?
- Why do growth rates differ so much across countries, even over long periods? Has the United States entered a New Economy, in which growth will be much higher in the future? Can other countries emulate China and grow at the same rate?

Gathering Macro Data

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- International organizations, such as the **Organization for Economic Cooperation and Development** (OECD), gather data for the richest countries.
- For countries that are not members of the OECD, one of the main sources of information is the International Financial Statistics (IFS), published by the **International Monetary Fund** (IMF).
- The IMF also publishes, twice a year, the **World Economic Outlook**, an assessment of macroeconomic developments in various parts of the world.
- In the United States, an extremely good annual resource is the **Economic Report of the President**, prepared by the Council of Economic Advisors.

Part B

The Data of Macroeconomics

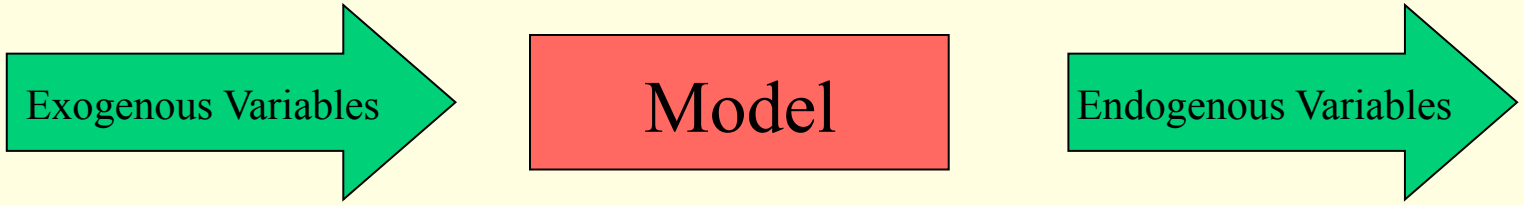
B1 What Macroeconomists Study

- Why have some countries experienced rapid growth in incomes over the past century while others stay mired in poverty?
- Why do some countries have high rates of inflation while others maintain stable prices?
- Why do all countries experience recessions and depressions and how can government policy reduce the frequency and severity of these episodes?
- ***Macroeconomics***, the study of the economy as a whole, attempts to answer these and many related questions.

B2 How Economists Think

Theory as Model Building

Models have two kinds of variables: endogenous variables and exogenous variables.



- This chapter focus on the three economic statistics that economists and policymakers use most often.

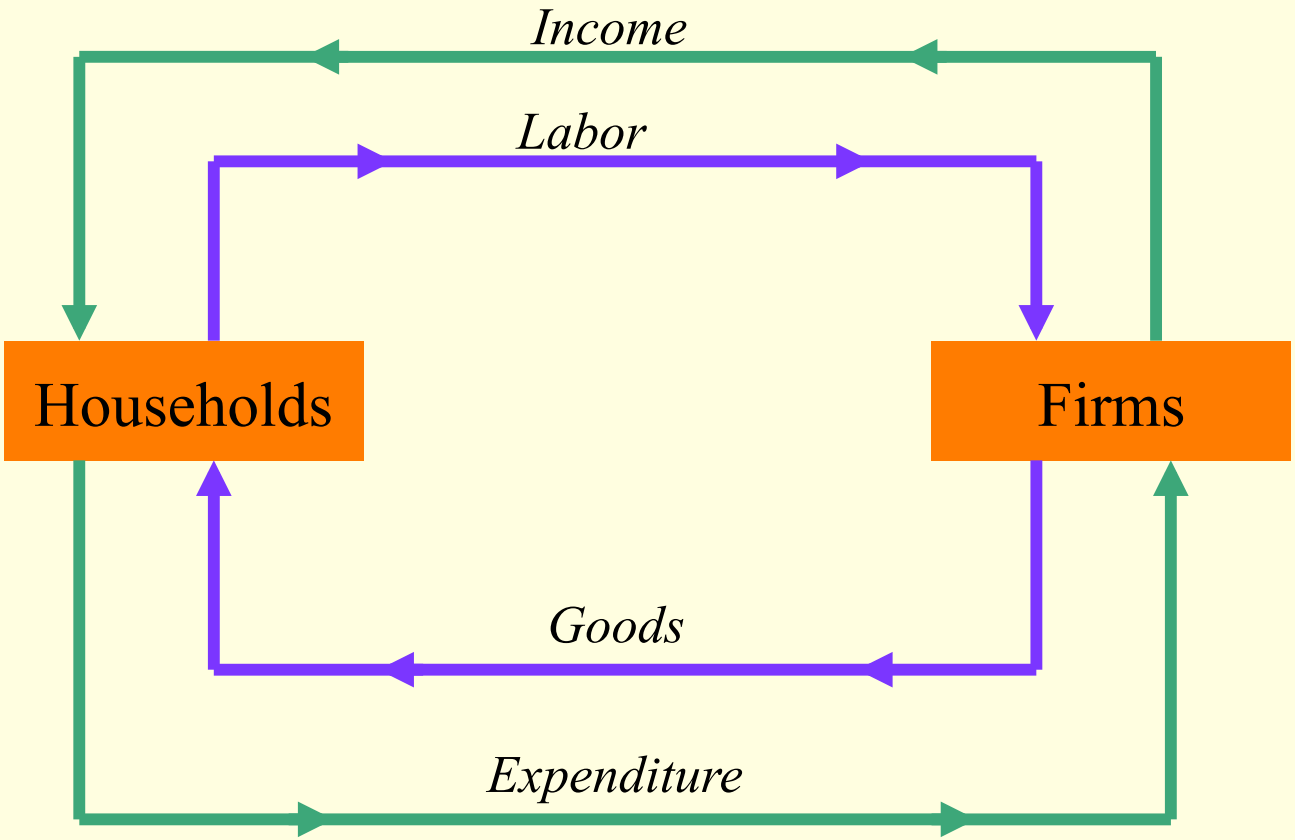
➢ Gross domestic product (GDP)

➢ Consumer price index (CPI)

➢ Unemployment rate

2-1 Aggregate Output

Income, Expenditure and the Circular Flow



2-1 Aggregate Output

•National income and product accounts are an accounting system used to measure aggregate economic activity.

GDP: Production and Income

The measure of aggregate output in the national income accounts is gross domestic product, or GDP.

2-1 Aggregate Output

GDP: Production and Income

•There are three ways of defining GDP:

1. GDP is the value of the final goods and services produced in the economy during a given period.

   - A **final** good is a good that is destined for final consumption.

   - An **intermediate good** is a good used in the production of another good.

Nominal GDP

- We start by measuring the money value of each activity
- The total for the economy is Nominal GDP
- Consider apples and bananas

4 apples @ $4 = $16

2 bananas @ $2 = $4

Total value of output (nominal GDP) = $20

2-1 Aggregate Output

GDP: Production and Income

There are three ways of defining GDP:

2. GDP is the sum of value added in the economy during a given period.

   - Value added equals the value of a firm's production minus the value of the intermediate goods it uses in production.

GDP is measured by *VALUE ADDED* and not total value

Level	Product	Price	Salaries	Profits
Lumberyard	Wood	$1000	900	100
Manufacturer	10 tables	@$200 each	700	300
Retailer	10 tables	@$400 each	1200	800

Value = price x quantity

Total value = sum of the values for all activities

1000 +10x200 +10x400=7000

Problem: we are double and triple counting (the value of wood being included three times):

Value added = value – cost of inputs

GDP=Total value added

1000+ (10x200-1000) +(10 x (400-200))=4000

2-1 Aggregate Output

GDP: Production and Income

There are three ways of defining GDP:

3. GDP is the sum of incomes in the economy during a given period.

Table 2-1 The Composition of GDP by Type of Income, 1960 and 2006

	1960	2006
Labor income	66%	64%
Capital income	26%	29%
Indirect taxes	8%	7%

2-1 Aggregate Output

Nominal and Real GDP

- Nominal GDP is the sum of the quantities of final goods produced multiplied by their current price.

- Nominal GDP increases over time because:

  - The production of most goods increases over time.

  - The prices of most goods also increase over time.

- Real GDP is constructed as the sum of the quantities of final goods multiplied by *constant* (rather than *current*) prices.

2-1 Aggregate Output

Nominal and Real GDP

Example 1

Year 1
4 apples @ $4 = $16
2 bananas @ $2 = $4
Total value of output = $20

Year 2
2 apples @ $4 = $8
4 bananas @ $2 = $8
Total value = $16

- Has GDP decreased or stayed the same?

2-1 Aggregate Output

Nominal and Real GDP

Example 2

Year 1
4 apples @ $4 = $16
2 bananas @ $2 = $4
Total value of output = $20

Year 2
4 apples @ $5 = $20
2 bananas @ $2 = $4
Total value = $24

- Has GDP stayed the same or increased?
- Answer: Nominal GDP has increased
- BUT total output has stayed the same
- Only a price has changed

2-1 Aggregate Output

Nominal and Real GDP

Year	Quantity of Cars	Price of cars	Nominal GDP	Real GDP (in 2000 dollars)
1999	10	$20,000	$200,000	$240,000
2000	12	$24,000	$288,000	$288,000
2001	13	$26,000	$338,000	$312,000

To construct real GDP, multiply the number of cars in each year by a *common* price. Suppose we use the price of the car in 2000 as the common price. This approach gives us, in effect, real GDP in chained (2000) dollars.

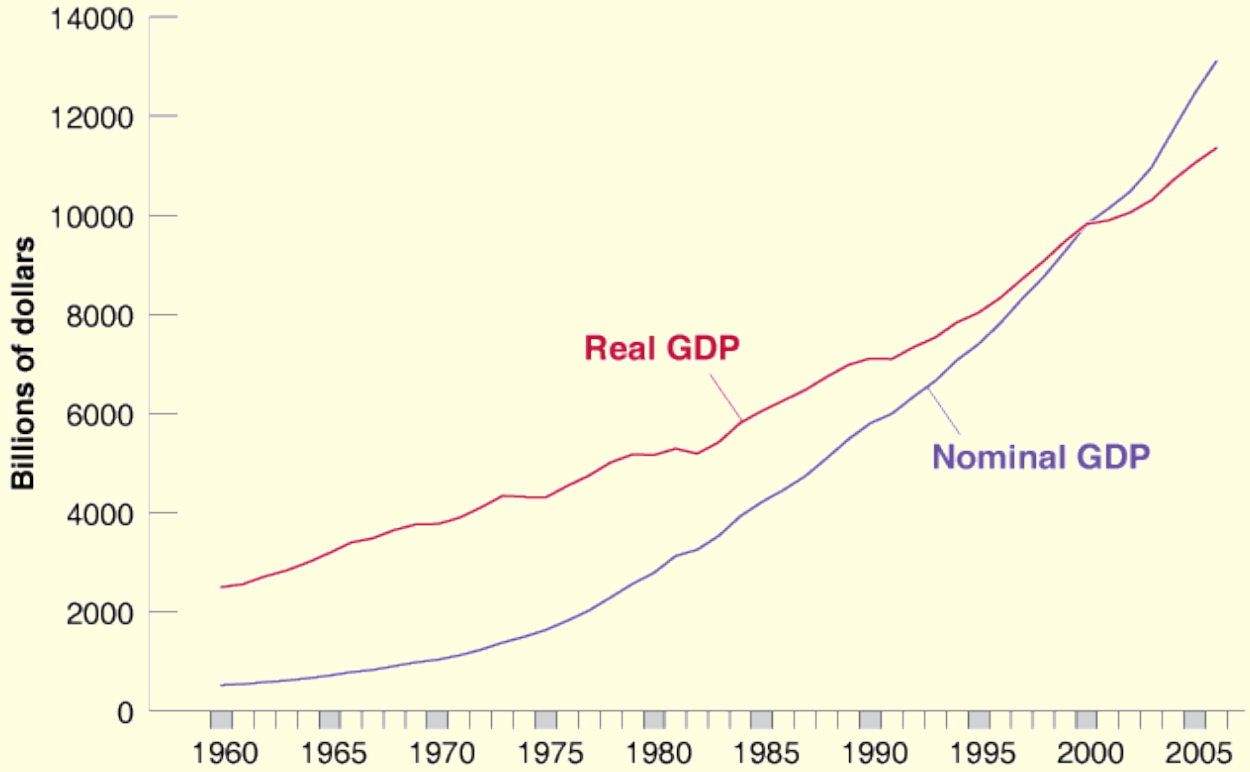
2-1 Aggregate Output

Nominal and Real GDP

Figure 2 - 1

Nominal and Real U.S. GDP, Since 1960

From 1960 to 2006, nominal GDP increased by a factor of 25. Real GDP increased by a factor of about 4.5.



2-1 Aggregate Output

Nominal and Real GDP

The terms nominal GDP and real GDP each have many synonyms:

- Nominal GDP is also called **dollar GDP or GDP in current dollars**.
- Real GDP is also called **GDP in terms of goods**, **GDP in constant dollars**, **GDP adjusted for inflation**, or **GDP in 2000 dollars**.
- GDP will refer to *real GDP,* and Y_t will denote *real GDP in year t.*
- Nominal GDP and variables measured in current dollars will be denoted by a dollar sign in front of them—for example, $\$Y_t$ for nominal GDP in year *t*.

2-1 Aggregate Output

GDP: Level Versus Growth Rate

•Real GDP per capita is the ratio of real GDP to the population of the country.

•GDP growth equals: $$\frac{(Y_t - Y_{t-1})}{Y_{t-1}}$$

- Periods of positive GDP growth are called expansions.
- Periods of negative GDP growth are called recessions.

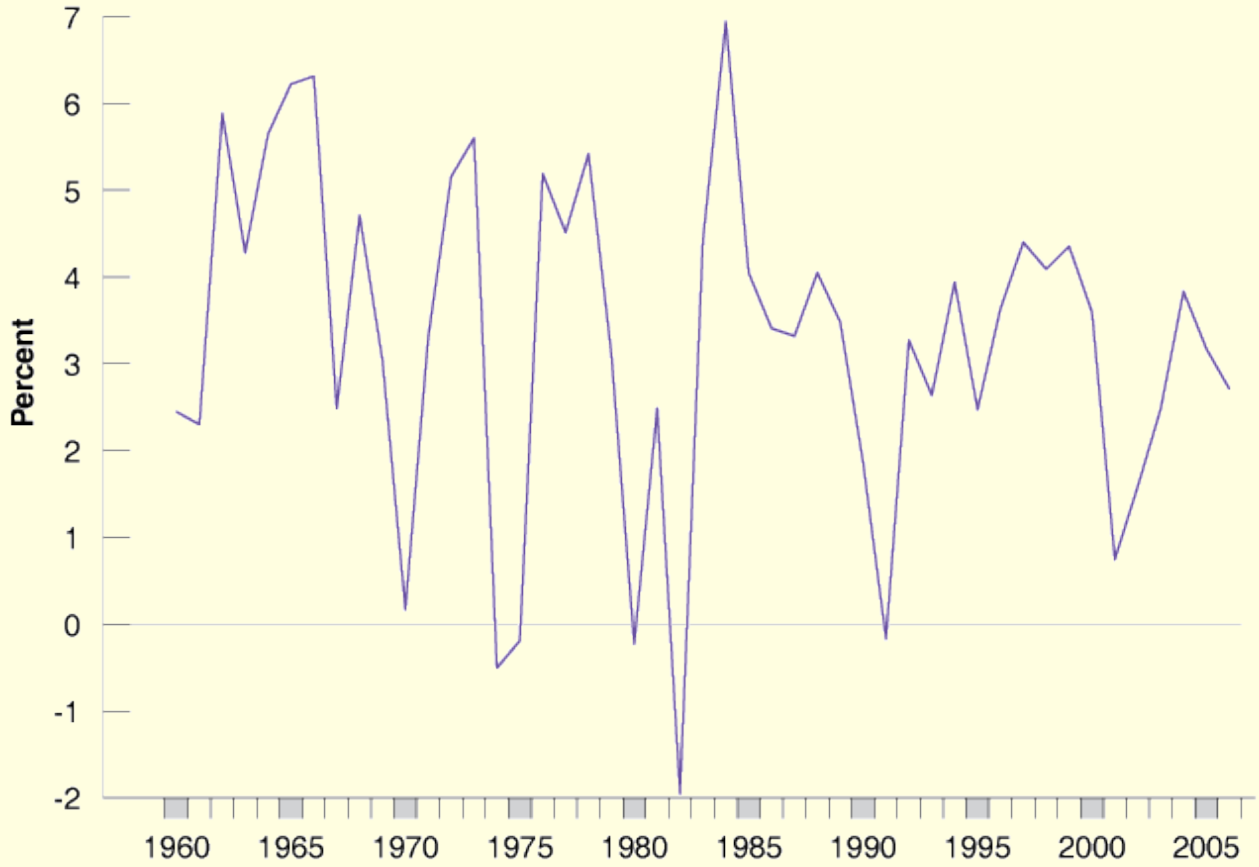
2-1 Aggregate Output

GDP: Level Versus Growth Rate

Figure 2 - 2

Growth Rate of U.S. GDP Since 1960

Since 1960, the U.S. economy has gone through a series of expansions, interrupted by short recessions.



Measurement of GDP

- Aim is to measure total economic activity in a country
- GDP is the output of goods and services produced within a country
- There are lots of measurement problems

Measurement problems of GDP

- Can’t just add up number of apples and the number of houses produced
- If the number of apples increases from 10 to 12 and the number of houses decreases from 2 to 1 has GDP increased or decreased?
- Some goods take longer to make than the time period of measurement
- If a house has not been completed, does that that mean no output at all?

Some Problems with GDP

- Only records goods and services transacted in the market. Many transactions occur outside - economic activity is not limited to what the government can measure. Households produce many unmeasured services - e.g. childrearing. Home produced vegetables.

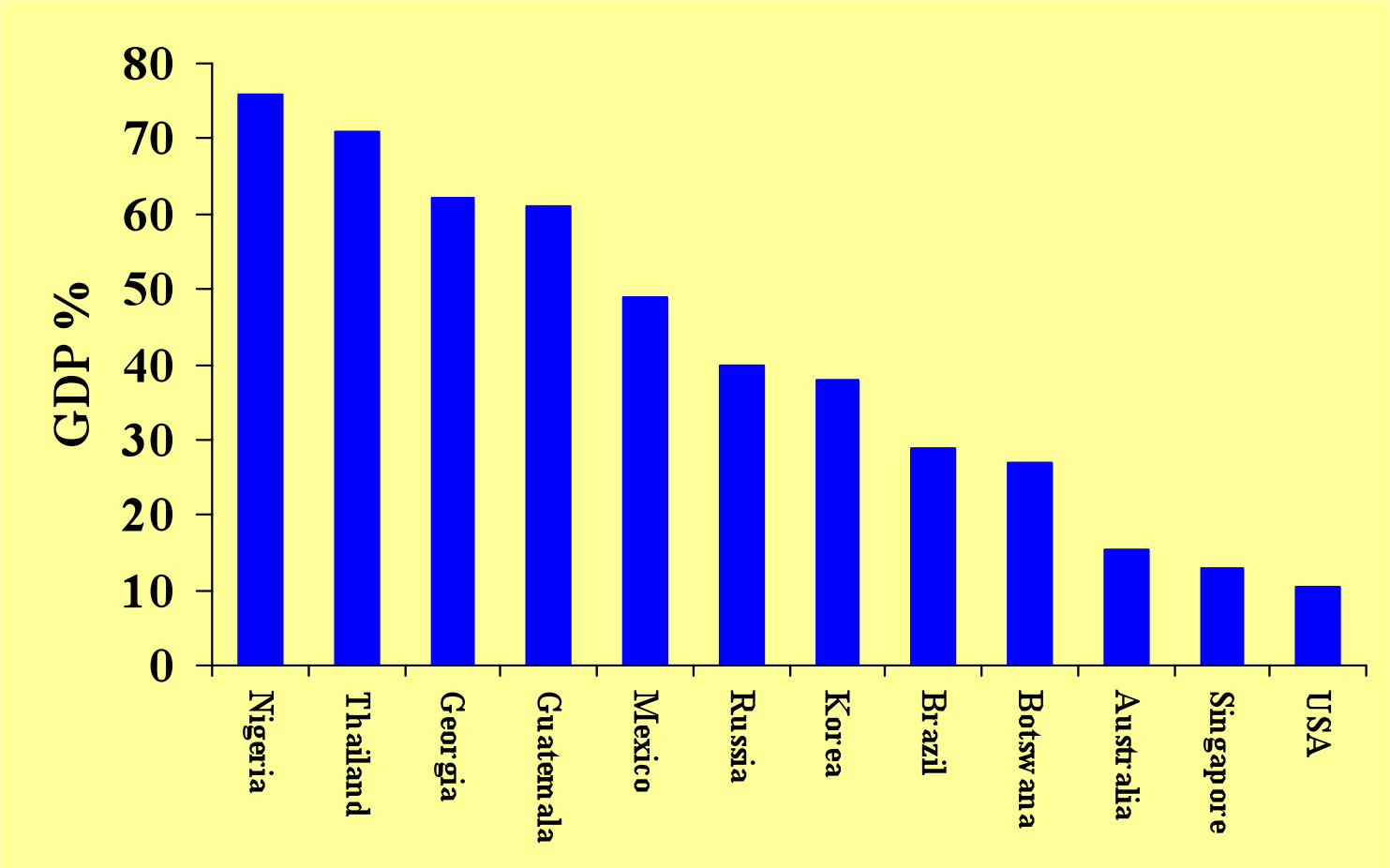
- Other markets may exist but are illegal. Drugs, prostitution, etc. See next slide for estimates.

- GDP may not link well with welfare

-more crime or illness increases expenditures on policing and health and these ADD to GDP

- attempts to clean up pollution are included in GDP as a benefit but the original pollution creation is *not included as a negative*

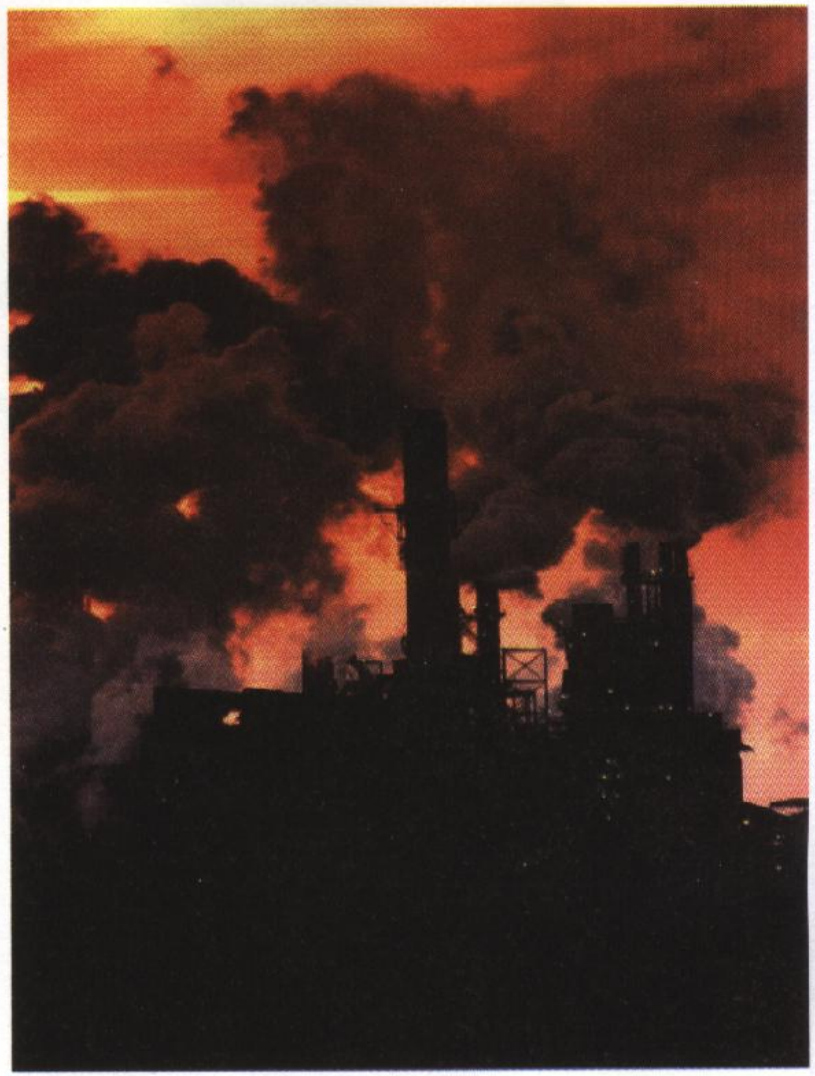
Estimates of Size of Underground Economy (%GDP)



GDP and Economic Well-Being

[GDP] does not allow for the health of our children, the quality of their education, or the joy of their play. It does not include the beauty of our poetry or the strength of our marriages, the intelligence of our public debate or the integrity of our public officials. It measures neither our courage, nor our wisdom, nor our devotion to our country. It measures everything, in short, except that which makes life worthwhile, and it can tell us everything about America except why we are proud that we are Americans.

____Robert Kennedy, 1968



GDP reflects the factory's production, but not the harm that it inflicts on the environment.

Real GDP, Technological Progress, and the Price of Computers

FOCUS

- A tough problem in computing real GDP is how to deal with changes in quality of existing goods. One of the most difficult cases is computers.
- The approach used by economists to adjust for improvements is to look at the market for computers and how it values computers with different characteristics in a given year.
- This approach, which treats goods as providing a collection of characteristics— here speed, memory, and so on—each with an implicit price, is called hedonic pricing (*hedone* means "pleasure" in Greek).

2-2 The Other Major Macroeconomic Variables

The Unemployment Rate

- Because it is a measure of aggregate activity, GDP is obviously the most important macroeconomic variable. But two other variables tell us about other important aspects of how an economic is performing:
  - Unemployment
  - Inflation

2-2 The Other Major Macroeconomic Variables

The Unemployment Rate

- Employment is the number of people who have a job.

- Unemployment is the number of people who do not have a job but are looking for one.

- The labor force is the sum of employment and unemployment:

$$L = N + U$$

Labor force = Employment + Unemployment

2-2 The Other Major Macroeconomic Variables

The Unemployment Rate

•The unemployment rate is the ratio of the number of people who are unemployed to the number of people in the labor force:

$$u = \frac{U}{L}$$

Unemployment rate = Unemployment/Labor force

In the United States, estimates based on the CPS show that:

2-2 The Other Major Macroeconomic Variables

The Unemployment Rate

•The Current Population Survey (CPS) is used to compute the unemployment rate.

•Only those looking for work are counted as unemployed. Those not working and not looking for work are not in the labor force.

•People without jobs who give up looking for work are known as discouraged workers.

•Participation rate $= \dfrac{labor\ force}{population\ of\ working\ age}$

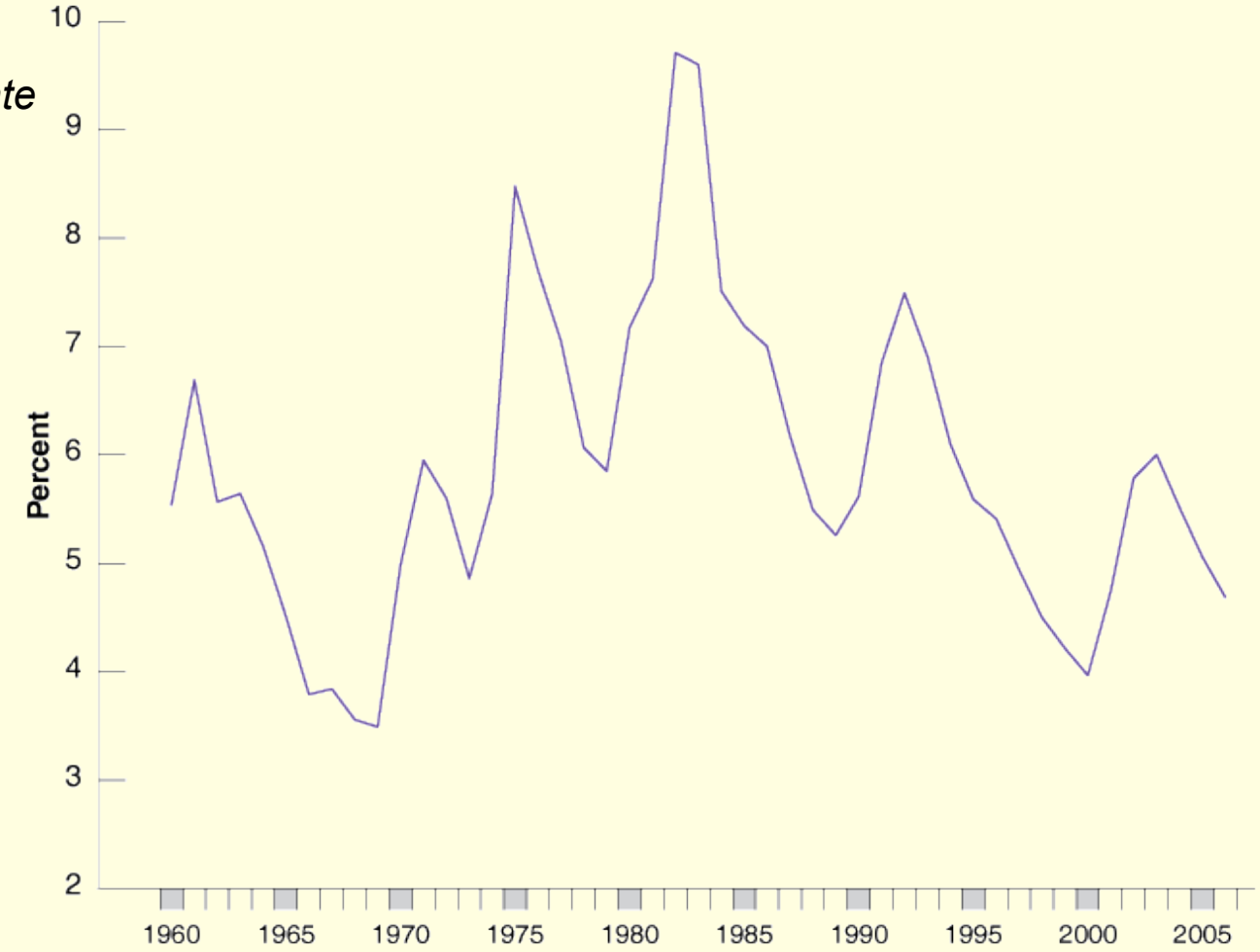
2-2 The Other Major Macroeconomic Variables

The Unemployment Rate

Figure 2 - 3

U.S. Unemployment Rate Since 1960

Since 1960, the U.S. unemployment rate has fluctuated between 3% and 10%, going down during expansions and going up during recessions.



2-2 The Other Major Macroeconomic Variables

The Unemployment Rate

Why Do Economists Care About Unemployment?

- Economists care about unemployment for two reasons:
  - Because of its direct effects on the welfare of the unemployed.
  - Because it provides a signal that the economy may not be using some of its resources efficiently.

Did Spain Really Have a 24% Unemployment Rate in 1994?

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- Spain in 1994 looked nothing like the United States in 1933: There were few homeless people, and most cities looked prosperous.
- The size of the underground economy—the part of economic activity which is not measured in official statistics, either because the activity is illegal or because firms and workers would rather not report it and thus not pay taxes—is an old issue in Spain.
- The Spanish underground economy was significant, but it just was not the case that most of the Spanish unemployed worked in the underground economy.
- A key to the answer of how the unemployed survived lies with the Spanish family structure.

2-2 The Other Major Macroeconomic Variables

The Inflation Rate

Inflation is a sustained rise in the general level of prices —the price level.

The inflation rate is the rate at which the price level increases.

Symmetrically, deflation is a sustained decline in the price level. It corresponds to a negative inflation rate.

2-2 The Other Major Macroeconomic Variables

The Inflation Rate

The GDP Deflator

The GDP deflator in year t, P_t, is defined as the ratio of nominal GDP to real GDP in year t:

The GDP deflator is what is called an index number—set equal to 100 in the base year.

2-2 The Other Major Macroeconomic Variables

The Inflation Rate

The GDP Deflator

The rate of change in the GDP deflator equals the rate of inflation:

$$\frac{(P_t - P_{t-1})}{P_{t-1}}$$

Nominal GDP is equal to the GDP deflator multiplied by real GDP:

$$\$Y_t = P_t Y_t$$

2-2 The Other Major Macroeconomic Variables

The Inflation Rate

The Consumer Price Index

- The GDP deflator measures the average price of output, while the consumer price index, or CPI, measures the average price of consumption, or equivalently, the cost of living.

- The CPI gives the cost in dollars of a specific list of goods and services over time, which attempts to represent the *consumption basket* of a typical urban consumer.

2-2 The Other Major Macroeconomic Variables

The Inflation Rate

The Consumer Price Index

The set of goods produced in the economy is not the same as the set of goods purchased by consumers, for two reasons:

- Some of the goods are sold to firms, to the government, or to foreigners.
- Some of the goods are not produced domestically but are imported from abroad.

2-2 The Other Major Macroeconomic Variables

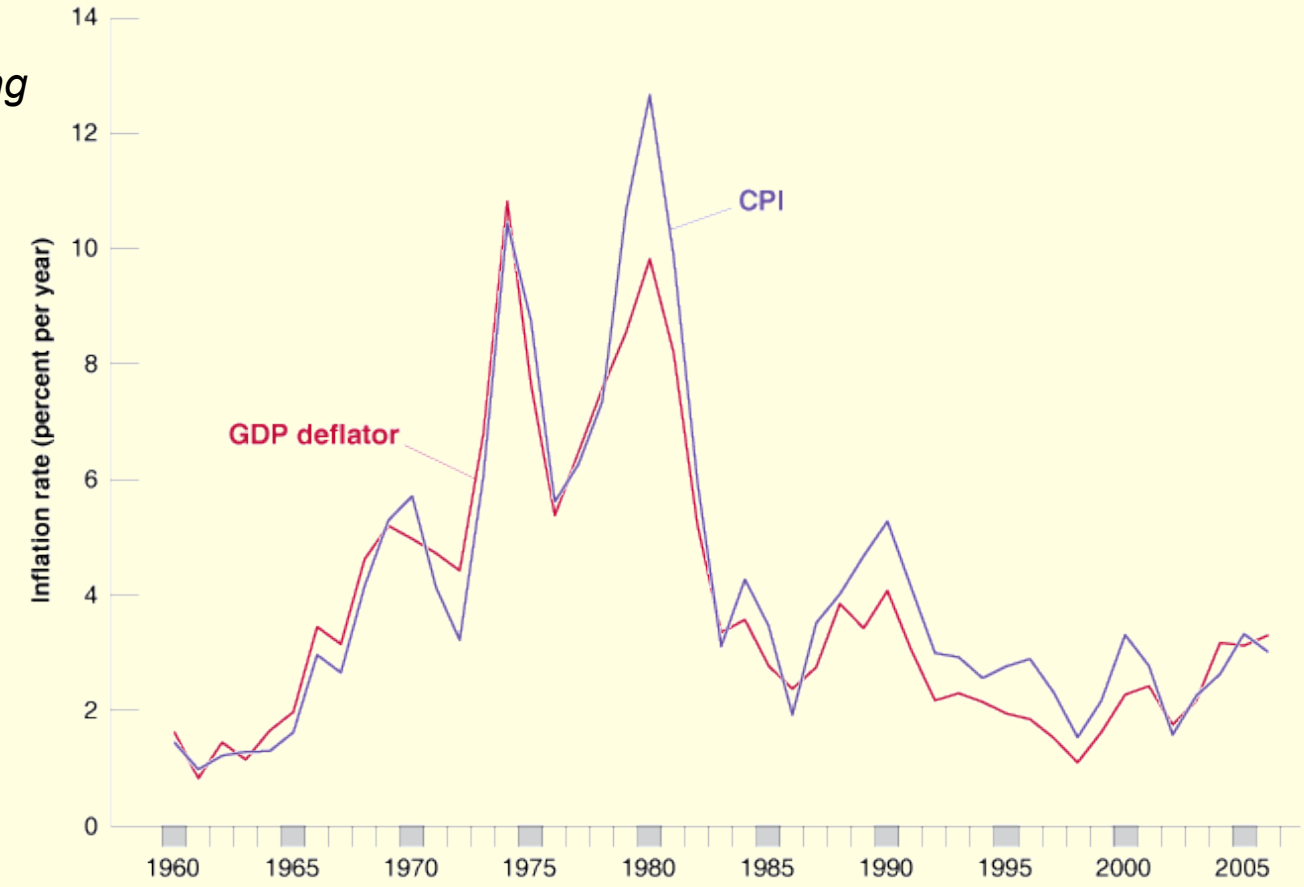
The Inflation Rate

The Consumer Price Index

Figure 2 - 4

U.S. Inflation Rate, Using the CPI and the GDP Deflator Since 1960

The inflation rates, computed using either the CPI or the GDP deflator, are largely similar.



2-2 The Other Major Macroeconomic Variables

The Inflation Rate

The Consumer Price Index

Figure 2-4 yields two conclusions:

- The CPI and the GDP deflator move together most of the time. In most years, the two inflation rates differ by less than 1%.

- There are clear exceptions, however. In 1979 and 1980, the increase in the CPI was significantly larger than the increase in the GDP deflator.

2-2 The Other Major Macroeconomic Variables

The Inflation Rate

Why Do Economists Care About Inflation?

Economists care about inflation for two reasons:

- During periods of inflation, not all prices and wages rise proportionately, inflation affects income distribution.
- Inflation leads to other distortions.

2-3 The Short Run, the Medium Run, and the Long Run

The level of aggregate output in an economy is determined by:

- demand in the short run, say, a few years,
- the level of technology, the capital stock, and the labor force in the medium run, say, a decade or so,
- factors such as education, research, saving, and the quality of government in the long run, say, a half century or more.