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THE DATA OF MACROECONOMICS

Introduction to Macroeconomics:

Nation's Income and Living Standard Dynamics

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Why to Study Economics?

"Economics is a study of mankind in the ordinary business of life." Marshal (1890)

Economic education helps…

1. In **personal life**… *to understand the world in which you live*

2. In **business**… *to be smarter participant in the economy*

3. In dealing with **government**… *to get the potential and the limits of economic policy*

Why to Study Economics?

Economic education will not…

… make your life easier

but will give you a philosophy how to make the most of living

… by itself make you rich

but it will give you some tools that may help you in that endeavor

… give universal solution to any economic problem

but makes you more responsible about your choice of state policy

Key Issues in Economics

• *How people make decisions… how much to work, what to buy, how much to save and how to invest their savings*

• *How people interact with one another… how the multitude of buyers and sellers of a good together determine the price at which the good is sold and the quantity that is sold*

• *What forces and trends affect the economy as a whole… the growth in average income, the fraction of the population that cannot find work, and the rate at which prices are rising*

Why to Study Economics?

Three directions in which economics could help us:

Personal life	Business	Government policy
Decision making	**Market interaction**	**Social/Total outcome**
1. Tradeoffs 2. Opportunity cost 3. Marginal thinking 4. Incentives	5. Benefits of trade 6. Price coordination 7. Rule enforcement	8. Productivity 9. Inflation 10. Unemployment
MICROECONOMICS		**MACROECONOMICS**

Micro- versus Macroeconomics

- Microeconomics

  - *Microeconomics* is the study of how INDIVIDUAL households and firms make decisions and how they interact with one another in markets.

- Macroeconomics

  - *Macroeconomics* is the study of the economy as a whole.

  - Its goal is to explain the economic changes that affect ALL households, firms, and markets at once.

Key Issues in Macroeconomics

Macroeconomics answers questions such as the following:

- Why is average income high in some countries and low in others?

- Why do prices rise rapidly in some time periods while they are more stable in others?

- Why do production and employment expand in some years and contract in others?

NATION'S INCOME AND LIVING STANDARD DYNAMICS

- As when judging a person whether she is doing well or poorly, a nation's overall economy is judged also based on its total income.

- Similarly, the dynamics of living standard in an economy is measured through monitoring of the changes in the cost of living of everyone in the economy over time.

# NATION'S INCOME AND LIVING STANDARD DYNAMICS

The main questions concerning nation's income and living standard are as follows:

- How Gross Domestic Product (GDP) is defined and calculated? Is GDP a good measure of economic well-being?

- How Consumer Price Index (CPI) is constructed? Why the CPI is an imperfect measure of the cost of living?

- What are the differences between CPI and GDP deflator as measures of the overall price level?

- What distinguishes real GDP from nominal GDP?

- What is the distinction between real and nominal interest rates?

The Measurement of Gross Domestic Product

- *Gross domestic product (GDP)* is a measure of the income and expenditures of an economy.

- It is the total market value of all final goods and services produced within a country in a given period of time.

- For an economy as a whole, <u>*income must equal expenditure*</u> because:

  - Every transaction has a buyer and a seller.

  - Every dollar of spending by some buyer is a dollar of income for some seller.

- The equality of income and expenditure can be illustrated with the circular-flow diagram.

Figure 1 The Circular-Flow Diagram
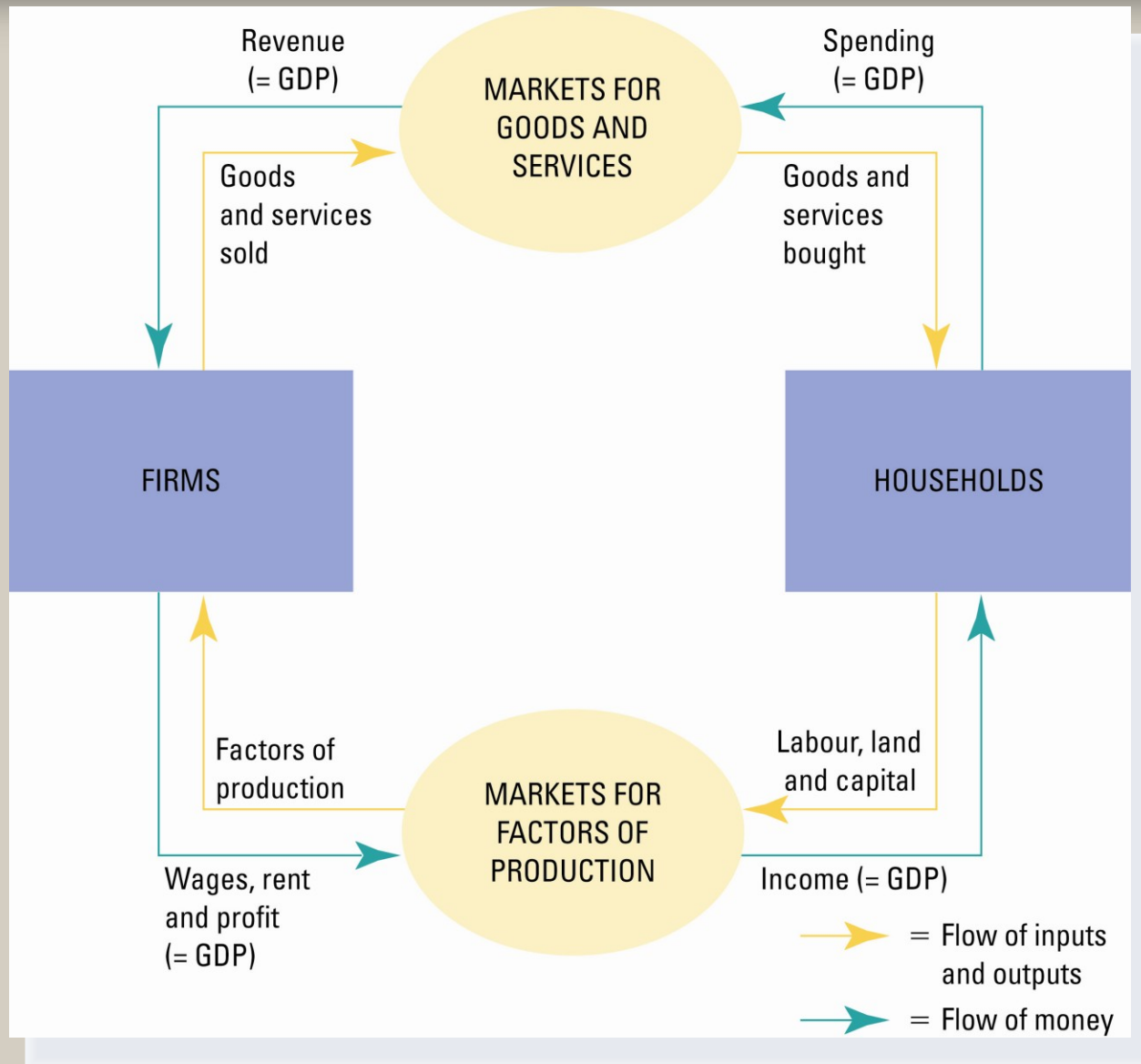
The Measurement of Gross Domestic Product

- "GDP is the Market Value . . ."
  - Output is valued at market prices.
- ". . . Of All Final . . ."
  - It records only the value of final goods, not intermediate goods (the value is counted only once).
- ". . . Goods and Services . . . "
  - It includes both tangible goods (food, clothing, cars) and intangible services (haircuts, house cleaning, doctor visits).
- ". . . Produced . . ."
  - It includes goods and services currently produced, not transactions involving goods produced in the past.
- " . . . Within a Country . . ."
  - It measures the value of production within the geographic confines of a country.
- ". . . In a Given Period of Time."
  - It measures the value of production that takes place within a specific interval of time, usually a year or a quarter (three months).

The Components of GDP

- GDP includes all items produced in the economy and sold *legally* in markets.

- What Is Not Counted in GDP?

  - GDP excludes most items that are produced and consumed at home and that never enter the marketplace.

  - It excludes items produced and sold illicitly, such as illegal drugs.

The Components of GDP

- GDP (Y) is the sum of the following:
  - Consumption *(C)*
  - Investment *(I)*
  - Government Purchases *(G)*
  - Net Exports *(NX)*

$$Y = C + I + G + NX$$

The Components of GDP

- *Consumption* (C):

  - The spending by households on goods and services, with the exception of purchases of new housing.

- *Investment* (I):

  - The spending on capital equipment, inventories, and structures, including new housing.

- *Government Purchases* (G):

  - The spending on goods and services by local and central governments.

  - Does *not* include transfer payments because they are not made in exchange for currently produced goods or services.

- *Net Exports* (NX):

  - Exports minus imports.

Table 1 GDP and Its Components

	Total (in billions of pounds)	Per person (in pounds)	Percent of total
Gross domestic product, Y	£1,165	£19,580	100%
Consumption, C	761	12,790	65
Investment, I	195	3,277	17
Government purchases, G	247	4,151	21
Net exports, NX	–38	–638	–3

Source: UK Office for National Statistics.

Other Measures of Income

Gross National Product **(GNP)**:
> The total income earned by a nation's permanent residents (called nationals).

Net National Product **(NNP)**:
> The total income of a nation's residents (GNP) minus losses from depreciation (the wear and tear on economy's stock of capital equipment and structures).

National Income **(NI)**:
> Total income earned by a nation's residents in the production of goods and services (NNP – indirect taxes + subsidies).

Personal Income **(PI):**
> Income the households and non-corporate businesses receive.
> (NI – retained earnings – income taxes and social insurance + government social and interest payments to households) .

Disposable Personal Income **(DPI):**
> (PI – personal payments to government)

GDP and Economic Well-Being

- GDP is the best single measure of the economic well-being of a society.

- GDP per person tells us the mean income and expenditure of the people in the economy.

- Higher GDP per person indicates a higher standard of living.

- GDP is not a perfect measure of the happiness or quality of life, however.

GDP and Economic Well-Being

- Some things that contribute to well-being are not included in GDP.
  - The value of leisure.
  - The value of a clean environment.
  - The value of almost all activity that takes place outside of markets, such as the value of the time parents spend with their children and the value of volunteer work.

Table 3 GDP, Life Expectancy, and Literacy

Country	Real GDP per person (2003)	Life expectancy	Adult literacy
United States	$35,992	77 years	97%
Japan	28,700	81	99
Germany	26,214	78	99
United Kingdom	25,427	78	99
Russia	9,749	68	99.5
Mexico	8,812	72	92
Brazil	7,559	71	86
China	4,654	72	86
Indonesia	3,041	69	89
India	2,538	64	60
Pakistan	1,960	62	46
Bangladesh	1,720	61	43
Nigeria	840	51	68

Source: Nationmaster.com

Figure 2 Real GDP in the United Kingdom
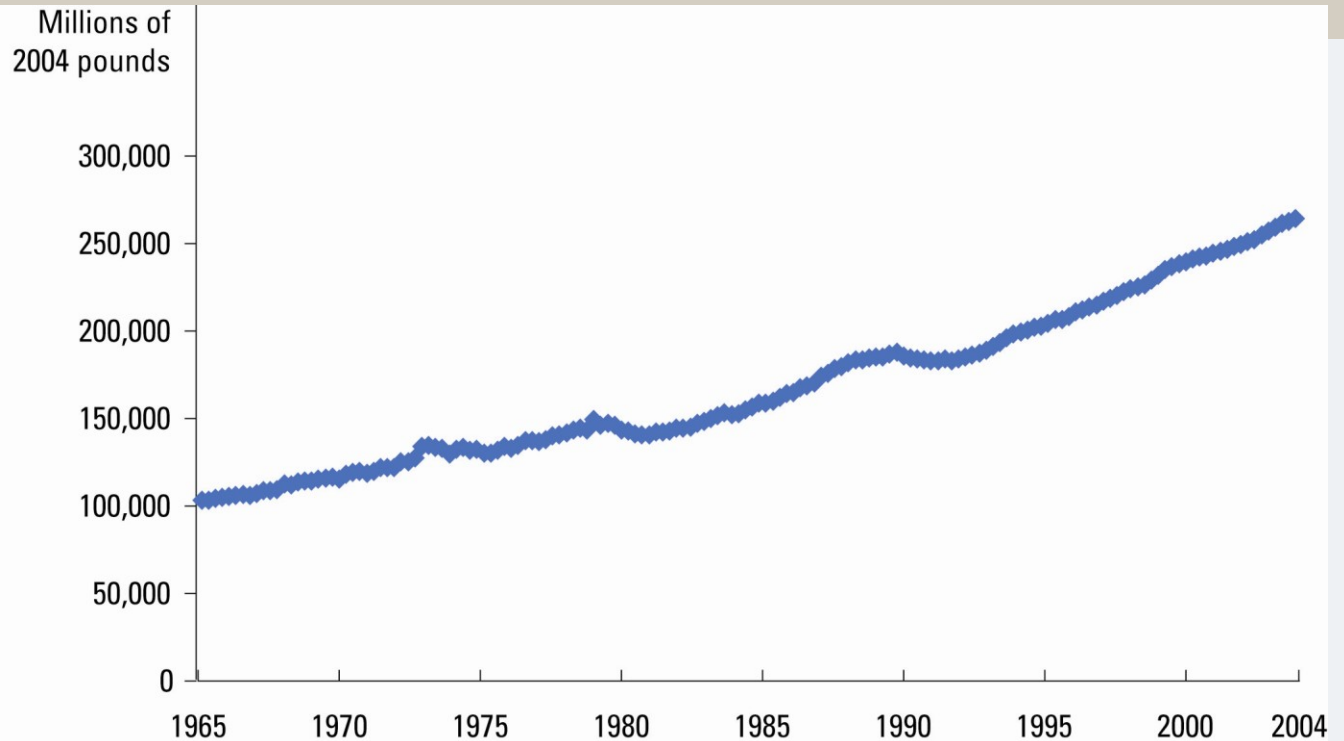
Source: UK Office of National Statistics.

Real versus Nominal GDP

- *Nominal GDP* values the production of goods and services at *current prices*.

- *Real GDP* values the production of goods and services at *constant prices*.

- An accurate view of the economy requires adjusting nominal to real GDP by using the GDP deflator.

Table 2 Real and Nominal GDP

Prices and Quantities

Year	Price of hot dogs	Quantity of hot dogs	Price of hamburgers	Quantity of hamburgers
2003	€1	100	€2	50
2004	2	150	3	100
2005	3	200	4	150

Table 2 Real and Nominal GDP

Year	Calculating nominal GDP
2003	(€1 per hot dog × 100 hot dogs) + (€2 per hamburger × 50 hamburgers) = €200
2004	(€2 per hot dog × 150 hot dogs) + (€3 per hamburger × 100 hamburgers) = €600
2005	(€3 per hot dog × 200 hot dogs) + (€4 per hamburger × 150 hamburgers) = €1,200

Table 2 Real and Nominal GDP

Year	Calculating real GDP (base year 2003)
2003	(€1 per hot dog × 100 hot dogs) + (€2 per hamburger × 50 hamburgers) = €200
2004	(€1 per hot dog × 150 hot dogs) + (€2 per hamburger × 100 hamburgers) = €350
2005	(€1 per hot dog × 200 hot dogs) + (€2 per hamburger × 150 hamburgers) = €500

The GDP Deflator

- The *GDP deflator* is a measure of the price level calculated as the ratio of nominal GDP to real GDP times 100.

- It tells us the rise in nominal GDP that is attributable to a rise in prices rather than a rise in the quantities produced.

The GDP Deflator

- The GDP deflator is calculated as follows:

$$\text{GDP deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$$

The GDP Deflator

- Converting Nominal GDP to Real GDP
    - Nominal GDP is converted to real GDP as follows:

$$\text{Real GDP}_{20XX} = \frac{\text{Nominal GDP}_{20XX}}{\text{GDP deflator}_{20XX}} \times 100$$

The Consumer Price Index

- The *consumer price index (CPI)* is a measure of the overall cost of the goods and services bought by a typical consumer.

- The Office of National Statistics reports the CPI each month.

- It is used to monitor changes in the cost of living over time.

- When the CPI rises, the typical family has to spend more money to maintain the same standard of living.

How the Consumer Price Index Is Calculated

- ***Step 1 Fix the Basket:*** Determine what prices are most important to the typical consumer.

- ***Step 2 Find the Prices:*** Find the prices of each of the goods and services in the basket for each point in time.

- ***Step 3 Compute the Basket's Cost:*** Use the data on prices to calculate the cost of the basket of goods and services at different times.

- ***Step 4 Choose a Base Year and Compute the Index:*** Compute the index by dividing the price of the basket in one year by the price in the base year and multiplying by 100.

- ***Step 5 Compute the inflation rate:*** The inflation rate is the percentage change in the price index from the preceding period.

Inflation Rate

- Inflation refers to a situation in which the economy's overall price level is rising.

- The inflation rate is the percentage change in the price level from the previous period.

  - The *inflation rate* is calculated as follows:

$$\text{Inflation Rate in Year 2} = \frac{\text{CPI in Year 2} - \text{CPI in Year 1}}{\text{CPI in Year 1}} \times 100$$

Step 1: Survey Consumers to Determine a Fixed Basket of Goods

4 hot dogs, 2 hamburgers

Table 1 Calculating the Consumer Price Index and the Inflation Rate: An Example

Step 2: Find the price of each good in each year

Year	Price of hot dogs	Price of hamburgers
2004	€1	€2
2005	2	3
2006	3	4

Table 1 Calculating the Consumer Price Index and the Inflation Rate: An Example

Step 3: Compute the cost of the basket of goods in each year

Year	Calculation
2004	(€1 per hot dog × 4 hot dogs) + (€2 per hamburger × 2 hamburgers) = €8
2005	(€2 per hot dog × 4 hot dogs) + (€3 per hamburger × 2 hamburgers) = €14
2006	(€3 per hot dog × 4 hot dogs) + (€4 per hamburger × 2 hamburgers) = €20

Table 1 Calculating the Consumer Price Index and the Inflation Rate: An Example

Step 4: Choose one year as a base year (2004) and compute the consumer price index in each year

2004	(€8/€8) × 100 = 100
2005	(€14/€8) × 100 = 175
2006	(€20/€8) × 100 = 250

Table 1 Calculating the Consumer Price Index and the Inflation Rate: An Example

Step 5: Use the Consumer Price Index to Compute the Inflation Rate from Previous Year

2002	$(175 - 100)/100 \times 100 = 75\%$
2003	$(250 - 175)/175 \times 100 = 43\%$

How the Consumer Price Index Is Calculated

- Calculating the Consumer Price Index and the Inflation Rate: Real-world Example
  - Base Year is 2002.
  - Basket of goods in 2002 costs €1,200.
  - The same basket in 2004 costs €1,236.
  - CPI = (€1,236/ €1,200) × 100 = 103.
  - Prices increased 3 percent between 2002 and 2004.

Miscellaneous goods and services 11.1%

1.7% Education

2.4% Health

2.5% Communication

Alcohol and tobacco 4.6%

Clothing and footwear 6.3%

Furniture, household equipment and maintenance 6.5%

Housing, water, electricity, gas and other fuels 10.5%

Food and non-alcoholic beverages 10.6%

Restaurants and hotels 13.9%

Transport 14.8%

Recreation and culture 15.1%
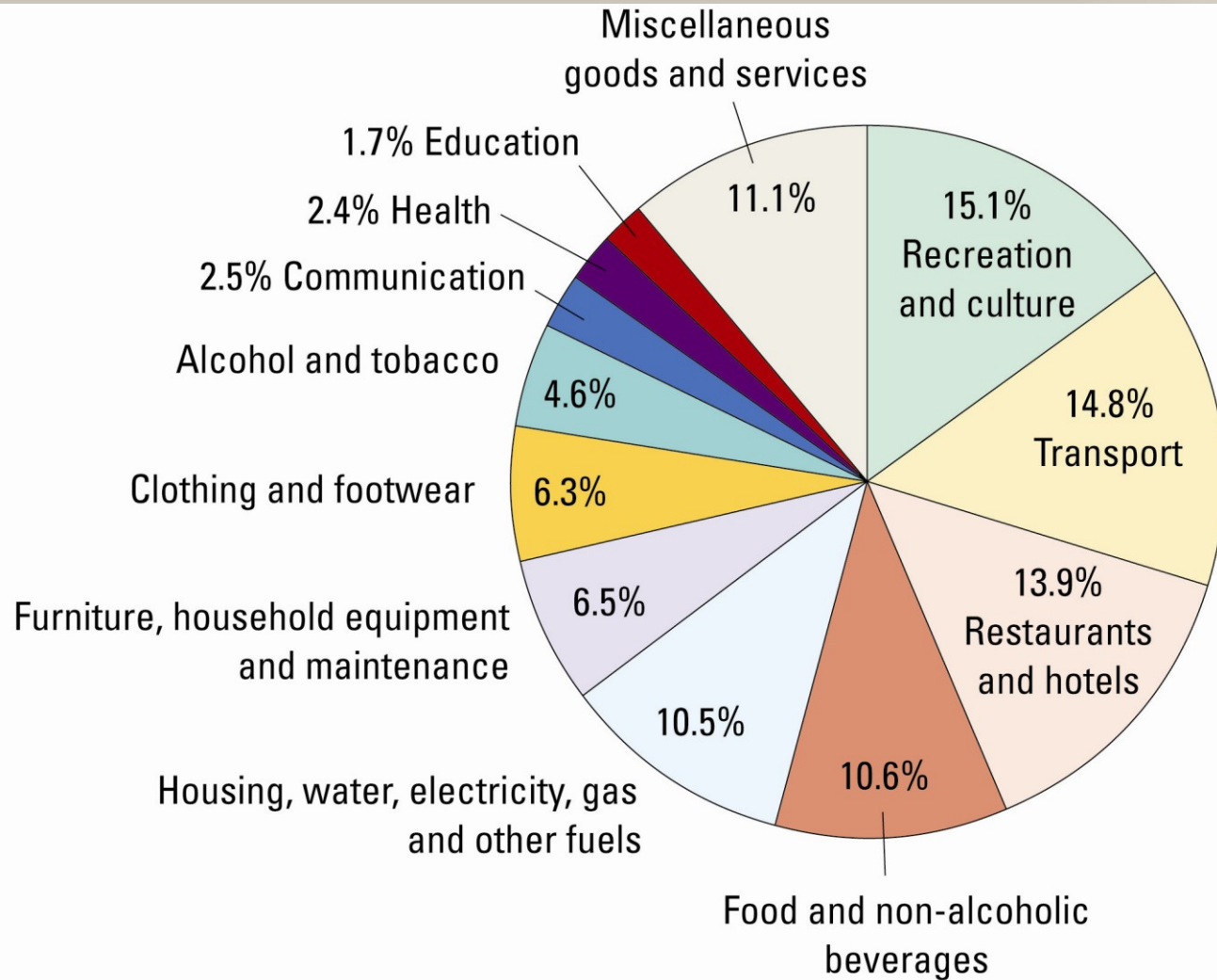
Source: UK Office for National Statistics.

Problems in Measuring the Cost of Living

- The CPI is an accurate measure of the selected goods that make up the typical bundle, but it is not a perfect measure of the cost of living.
    - Substitution bias
    - Introduction of new goods
    - Unmeasured quality changes
- The issue is important because many government programs use the CPI to adjust for changes in the overall level of prices.

Problems in Measuring the Cost of Living

- ## Substitution Bias

  - The basket does not change to reflect consumer reaction to changes in relative prices.

    - Consumers substitute toward goods that have become relatively less expensive.

    - The index overstates the increase in cost of living by not considering consumer substitution.

Problems in Measuring the Cost of Living

- Introduction of New Goods
  - The basket does not reflect the change in purchasing power brought on by the introduction of new products.
    - New products result in greater variety, which in turn makes each euro more valuable.
    - Consumers need less money to maintain any given standard of living.

Problems in Measuring the Cost of Living

- Unmeasured Quality Changes
  - If the quality of a good rises from one year to the next, the value of a euro rises, even if the price of the good stays the same.
  - If the quality of a good falls from one year to the next, the value of a euro falls, even if the price of the good stays the same.
  - The ONS tries to adjust the price for constant quality, but such differences are hard to measure.

Indexation

- When some money amount is automatically corrected for inflation by law or contract, the amount is said to be *indexed* for inflation.

- *Cost-of living allowance* (COLA) – partial or complete indexation of the wage to the consumer price index as a clause in long-term contracts between firms and unions.

- Indexation is also a feature of many laws concerning adjustment for inflation of the government social benefits.

The GDP Deflator versus the Consumer Price Index

- The ONS calculates other prices indexes:

  - The *producer price index* (PPI), which measures the cost of a basket of goods and services bought by firms rather than consumers.

  - The changes in PPI are often thought to be useful in predicting changes in CPI.

The GDP Deflator versus the Consumer Price Index

- Economists and policymakers monitor both the GDP deflator and the consumer price index to gauge how quickly prices are rising.

- There are two important differences between the indexes that can cause them to diverge:

  - The *GDP deflator* reflects the prices of all goods and services *produced domestically*, whereas the *consumer price index* reflects the prices of all goods and services *bought by consumers*.

  - The *consumer price index* compares the price of a *fixed basket* of goods and services whereas the *GDP deflator* compares the price of *currently produced* goods and services to the price of the same goods and services in the base year.

Figure 2 Two Measures of Inflation
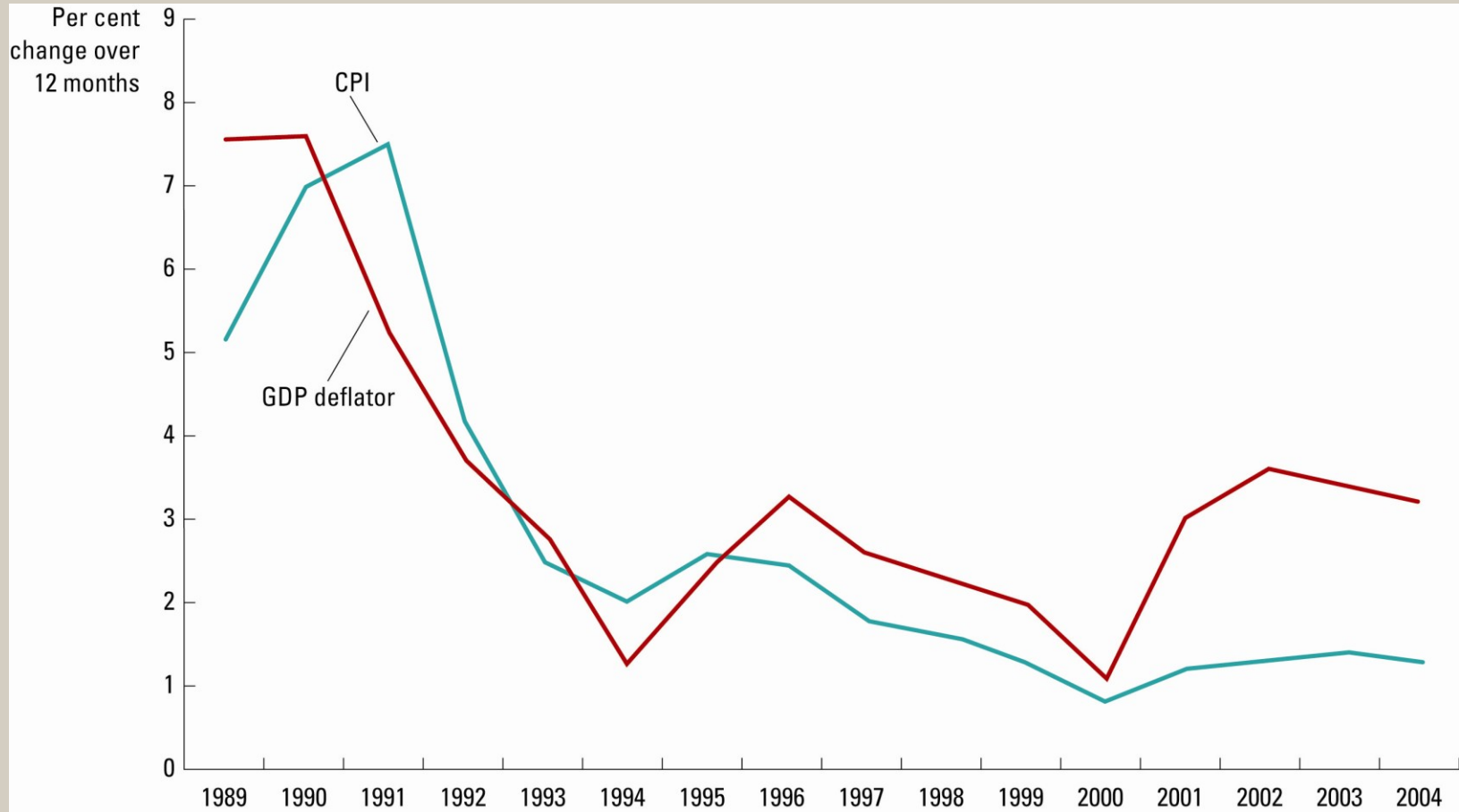
Source: UK Office for National Statistics.

Correcting Economic Variables for the Effects of Inflation

- Price indexes are used to correct for the effects of inflation when comparing money figures from different times.

- Do the following to convert (inflate) MPs' salary in 1911 to a figure in 2004 pounds:

$$\text{Salary}_{2004} = \text{Salary}_{1911} \times \frac{\text{Price level in 2004}}{\text{Price level in 1911}}$$

$$= \text{£400} \times \frac{5{,}040}{100} = \text{£20,160}$$

Money Figures from Different Times

- Do the following to convert (inflate) MPs' salary in 1911 to a figure in 2004 pounds:

$$\text{Salary}_{2004} = \text{Salary}_{1911} \times \frac{\text{Price level in 2004}}{\text{Price level in 1911}}$$

$$= \pounds 400 \times \frac{5{,}040}{100}$$

$$= \pounds 20{,}160$$

Real and Nominal Interest Rates

- Interest represents a payment in the future for a transfer of money in the past.

- The *nominal interest* rate is the interest rate usually reported and not corrected for inflation.
  - It is the interest rate that a bank pays.

- The *real interest rate* is the nominal interest rate that is corrected for the effects of inflation.
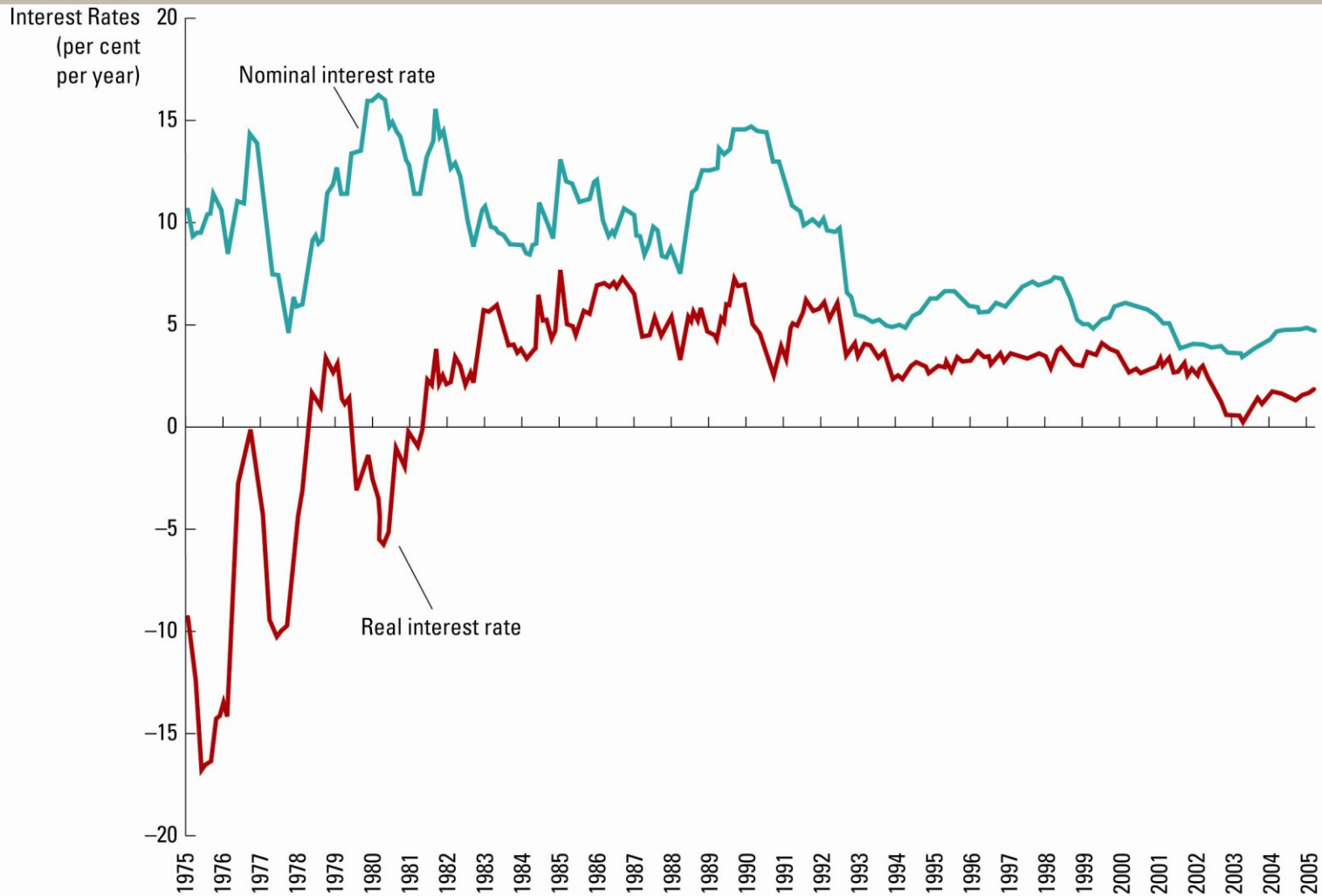
Real and Nominal Interest Rates

Example:

- You borrowed €1,000 for one year.

- Nominal interest rate was 15%.

- During the year inflation was 10%.

Real interest rate = Nominal interest rate – Inflation

= 15% - 10% = 5%

Figure 3 Real and Nominal Interest Rates

Sources: Bank of England and UK Office for National Statistics.

Summary

- Because every transaction has a buyer and a seller, the total expenditure in the economy must equal the total income in the economy.

- GDP is the market value of all final goods and services produced within a country in a given period of time.

- GDP is divided among four components of expenditure: consumption, investment, government purchases, and net exports.

- Nominal GDP uses current prices to value the economy's production. Real GDP uses constant base-year prices to value the economy's production of goods and services.

- The GDP deflator—calculated from the ratio of nominal to real GDP—measures the level of prices in the economy.

- GDP is a good measure of economic well-being because people prefer higher to lower incomes.

- It is not a perfect measure of well-being because some things, such as leisure time and a clean environment, aren't measured by GDP.

Summary

- The consumer price index shows the cost of a basket of goods and services relative to the cost of the same basket in the base year.

- The index is used to measure the overall level of prices in the economy.

- The percentage change in the CPI measures the inflation rate.

- The consumer price index is an imperfect measure of the cost of living for the following three reasons: substitution bias, the introduction of new goods, and unmeasured changes in quality.

Summary

- The GDP deflator differs from the CPI because it includes goods and services produced rather than goods and services consumed.

- In addition, the CPI uses a fixed basket of goods, while the GDP deflator automatically changes the group of goods and services over time as the composition of GDP changes.

- Money figures from different points in time do not represent a valid comparison of purchasing power.

- Various laws and private contracts use price indexes to correct for the effects of inflation.

- The real interest rate equals the nominal interest rate minus the rate of inflation.