

23

## Measuring a Nation's Income



# **In this chapter, look for the answers to these questions:**

- What is Gross Domestic Product (GDP)?
- How is GDP related to a nation's total income and spending?
- What are the components of GDP?
- How is GDP corrected for inflation?
- Does GDP measure society's well-being?

# Micro vs. Macro

- ***Microeconomics:***

The study of how individual households and firms make decisions, interact with one another in markets.

- ***Macroeconomics:***

The study of the economy as a whole.

- We begin our study of macroeconomics with the country's total income and expenditure.

# Income and Expenditure

- **Gross Domestic Product (GDP)** measures total income of everyone in the economy.
- GDP also measures total expenditure on the economy's output of g&s.

*For the economy as a whole,  
**income equals expenditure**  
because every dollar a buyer spends  
is a dollar of income for the seller.*

# The Circular-Flow Diagram

- a simple depiction of the macroeconomy
- illustrates GDP as spending, revenue, factor payments, and income
- Preliminaries:
  - **Factors of production** are inputs like labor, land, capital, and natural resources.
  - **Factor payments** are payments to the factors of production (e.g., wages, rent).

# The Circular-Flow Diagram

## Households:

- own the factors of production, sell/rent them to firms for income
- buy and consume goods & services

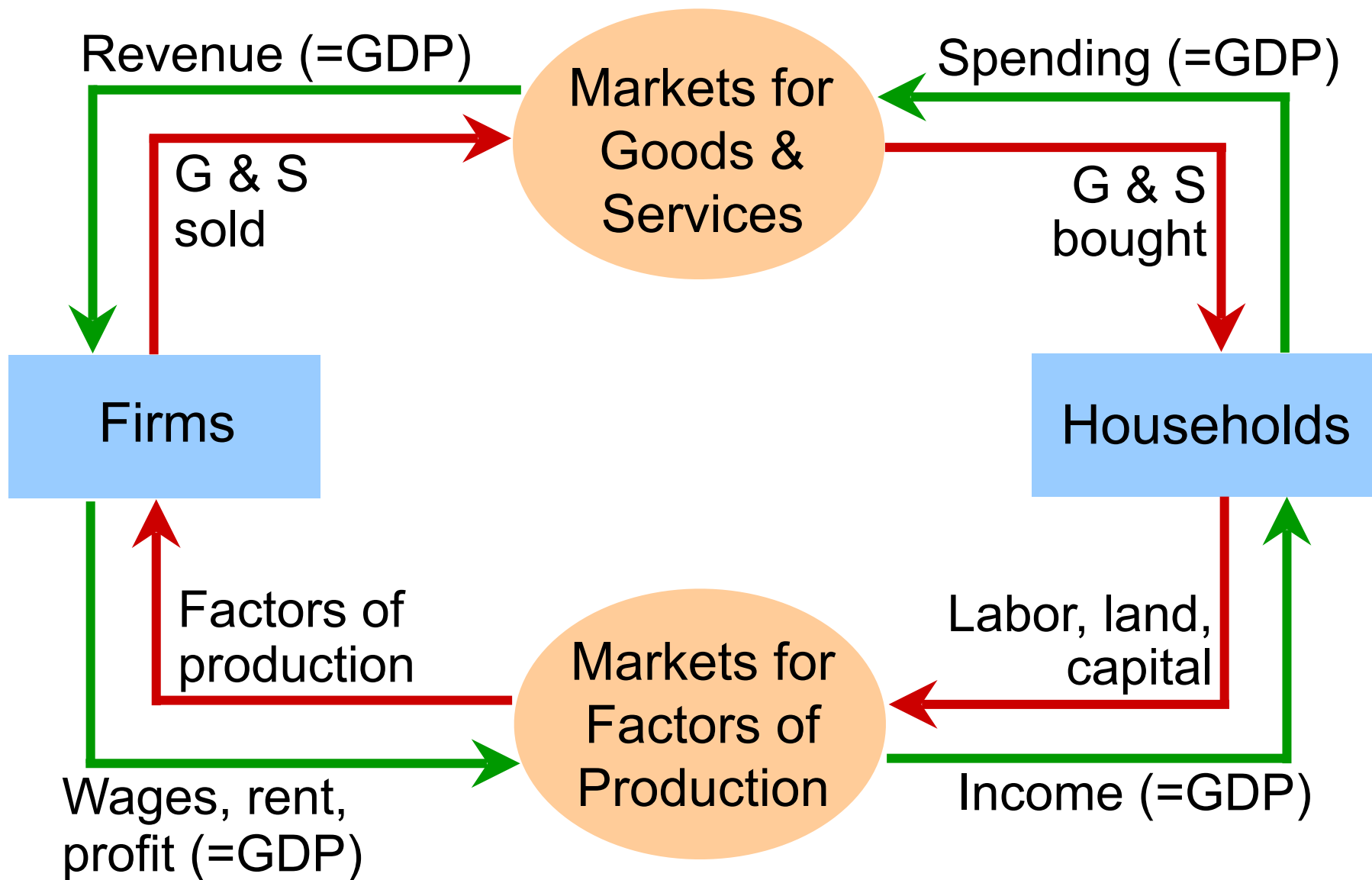
Firms

Households

## Firms:

- buy/hire factors of production, use them to produce goods and services
- sell goods & services

# The Circular-Flow Diagram



# What This Diagram Omits

- The government
  - collects taxes, buys g&s
- The financial system
  - matches savers' supply of funds with borrowers' demand for loans
- The foreign sector
  - trades g&s, financial assets, and currencies with the country's residents



# Gross Domestic Product (GDP) Is...

...the **market value** of all final goods & services produced within a country in a given period of time.

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*Goods are valued at their market prices, so:*

- *All goods measured in the same units (e.g., dollars in the U.S.)*
- *Things that don't have a market value are excluded, e.g., housework you do for yourself.*

## Gross Domestic Product (GDP) Is...

...the market value of all **final** goods & services produced within a country in a given period of time.

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***Final goods:** intended for the end user*

***Intermediate goods:** used as components or ingredients in the production of other goods*

*GDP only includes final goods – they already embody the value of the intermediate goods used in their production.*

## Gross Domestic Product (GDP) Is...

...the market value of all final goods & services produced within a country in a given period of time.

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*GDP includes tangible goods  
(like DVDs, mountain bikes, beer)*

*and intangible services  
(dry cleaning, concerts, cell phone service).*

## Gross Domestic Product (GDP) Is...

...the market value of all final goods & services produced within a country in a given period of time.

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*GDP includes currently produced goods, not goods produced in the past.*

## Gross Domestic Product (GDP) Is...

...the market value of all final goods & services produced within a country in a given period of time.

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*GDP measures the value of production that occurs within a country's borders, whether done by its own citizens or by foreigners located there.*

## Gross Domestic Product (GDP) Is...

...the market value of all final goods & services produced within a country in a given period of time.

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*Usually a year or a quarter (3 months)*

# The Components of GDP

- Recall: GDP is total spending.
- Four components:
  - Consumption (**C**)
  - Investment (**I**)
  - Government Purchases (**G**)
  - Net Exports (**NX**)
- These components add up to GDP (denoted **Y**):

$$\mathbf{Y = C + I + G + NX}$$

# Consumption (C)

- is total spending by households on g&s.
- Note on housing costs:
  - For renters, consumption includes rent payments.
  - For homeowners, consumption includes the imputed rental value of the house, but not the purchase price or mortgage payments.



# Investment (I)

- is total spending on goods that will be used in the future to produce more goods.
- includes spending on
  - capital equipment (e.g., machines, tools)
  - structures (factories, office buildings, houses)
  - inventories (goods produced but not yet sold)

*Note: “**Investment**” does not mean the purchase of financial assets like stocks and bonds.*

# Government Purchases (G)

- is all spending on the g&s purchased by govt at the federal, state, and local levels.
- **G** excludes **transfer payments**, such as Social Security or unemployment insurance benefits.  
They are not purchases of g&s.

# Net Exports (NX)

- **NX** = exports – imports
- Exports represent foreign spending on the economy's g&s.
- Imports are the portions of **C**, **I**, and **G** that are spent on g&s produced abroad.
- Adding up all the components of GDP gives:

$$\mathbf{Y = C + I + G + NX}$$

# U.S. GDP and Its Components, 2007

	<i>billions</i>	<i>% of GDP</i>	<i>per capita</i>
<b>Y</b>	\$13,841	100.0	\$45,825
<b>C</b>	9,734	70.3	32,228
<b>I</b>	2,125	15.4	7,037
<b>G</b>	2,690	19.4	8,905
<b>NX</b>	-708	-5.1	-2,344

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## ACTIVE LEARNING 1

# GDP and its components

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In each of the following cases, determine how much GDP and each of its components is affected (if at all).

- A.** Debbie spends \$200 to buy her husband dinner at the finest restaurant in Boston.
- B.** Sarah spends \$1800 on a new laptop to use in her publishing business. The laptop was built in China.
- C.** Jane spends \$1200 on a computer to use in her editing business. She got last year's model on sale for a great price from a local manufacturer.
- D.** General Motors builds \$500 million worth of cars, but consumers only buy \$470 million worth of them.

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## ACTIVE LEARNING 1

### Answers

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**A.** Debbie spends \$200 to buy her husband dinner at the finest restaurant in Boston.

*Consumption and GDP rise by \$200.*

**B.** Sarah spends \$1800 on a new laptop to use in her publishing business. The laptop was built in China.

*Investment rises by \$1800, net exports fall by \$1800, GDP is unchanged.*

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## ACTIVE LEARNING 1

### Answers

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**C.** Jane spends \$1200 on a computer to use in her editing business. She got last year's model on sale for a great price from a local manufacturer.

*Current GDP and investment do not change, because the computer was built last year.*

**D.** General Motors builds \$500 million worth of cars, but consumers only buy \$470 million of them.

*Consumption rises by \$470 million, inventory investment rises by \$30 million, and GDP rises by \$500 million.*

# Real versus Nominal GDP

- Inflation can distort economic variables like GDP, so we have two versions of GDP: One is corrected for inflation, the other is not.
- **Nominal GDP** values output using current prices. It is not corrected for inflation.
- **Real GDP** values output using the prices of a *base year*. Real GDP is corrected for inflation.



## EXAMPLE:

	Pizza		Latte	
<i>year</i>	<i>P</i>	<i>Q</i>	<i>P</i>	<i>Q</i>
2005	\$10	400	\$2.00	1000
2006	\$11	500	\$2.50	1100
2007	\$12	600	\$3.00	1200

Compute nominal GDP in each year:

$$2005: \$10 \times 400 + \$2 \times 1000 = \$6,000$$

$$2006: \$11 \times 500 + \$2.50 \times 1100 = \$8,250$$

$$2007: \$12 \times 600 + \$3 \times 1200 = \$10,800$$

Increase:

37.5%

30.9%

# EXAMPLE:

	Pizza		Latte	
<i>year</i>	<i>P</i>	<i>Q</i>	<i>P</i>	<i>Q</i>
→ 2005	\$10	400	\$2.00	1000
2006	\$11	500	\$2.50	1100
2007	\$12	600	\$3.00	1200

Compute real GDP in each year,  
using 2005 as the base year:

Increase:

$$\begin{array}{l} 2005: \quad \$10 \times 400 + \$2 \times 1000 = \$6,000 \\ 2006: \quad \$10 \times 500 + \$2 \times 1100 = \$7,200 \\ 2007: \quad \$10 \times 600 + \$2 \times 1200 = \$8,400 \end{array} \left. \begin{array}{l} \\ \\ \end{array} \right\} \begin{array}{l} 20.0\% \\ 16.7\% \end{array}$$

## EXAMPLE:

<i>year</i>	<i>Nominal GDP</i>	<i>Real GDP</i>
2005	\$6000	\$6000
2006	\$8250	\$7200
2007	\$10,800	\$8400

In each year,

- nominal GDP is measured using the (then) current prices.
- real GDP is measured using constant prices from the base year (2005 in this example).

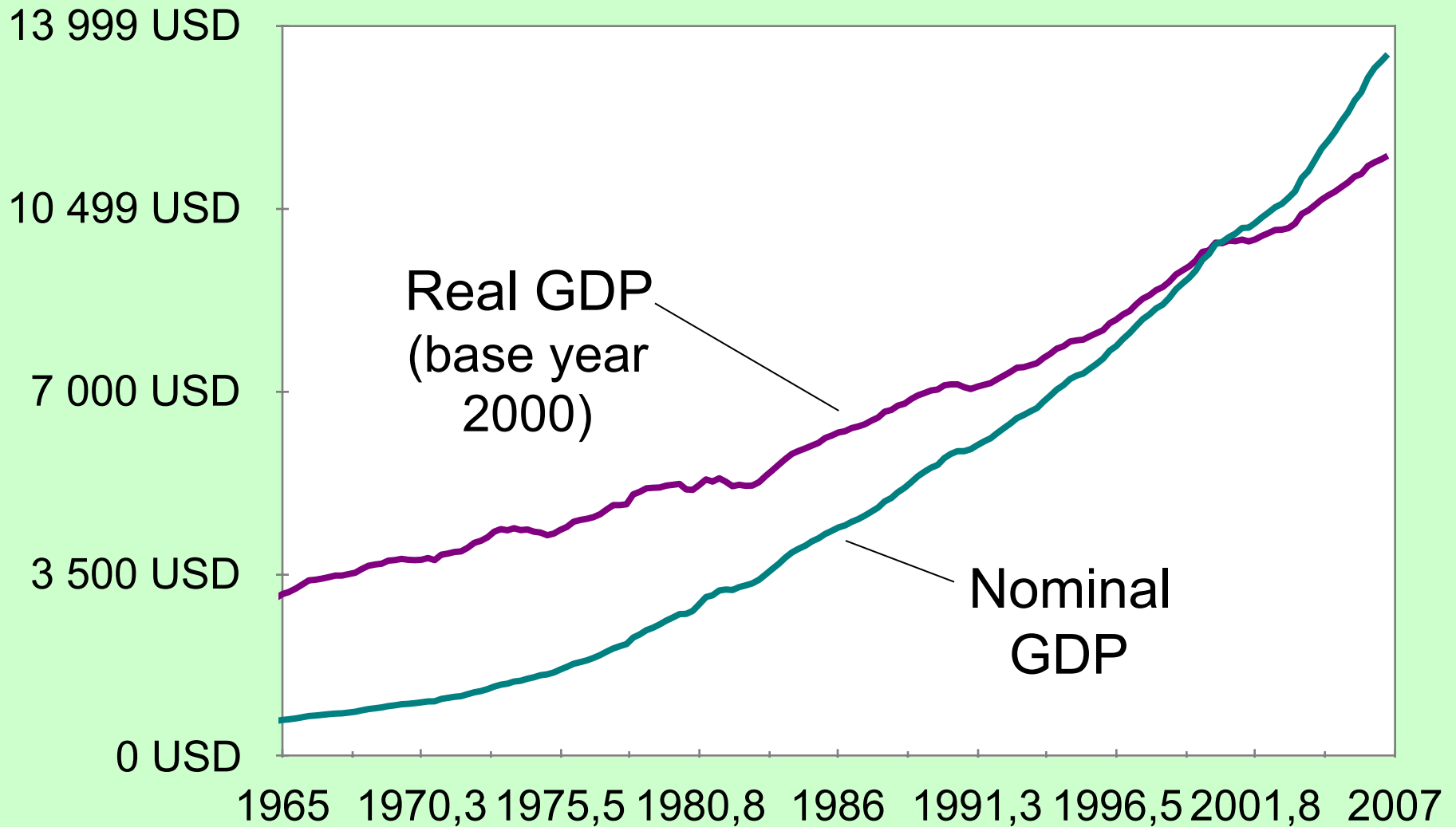
## EXAMPLE:

<i>year</i>	<i>Nominal GDP</i>		<i>Real GDP</i>	
2005	\$6000	} 37.5%	\$6000	} 20.0%
2006	\$8250		\$7200	
2007	\$10,800	} 30.9%	\$8400	} 16.7%

- The change in nominal GDP reflects both prices and quantities.
- The change in real GDP is the amount that GDP would change if prices were constant (*i.e.*, if zero inflation).

***Hence, real GDP is corrected for inflation.***

# Nominal and Real GDP in the U.S., 1965-2007



# The GDP Deflator

- The GDP deflator is a measure of the overall level of prices.
- Definition:

$$\text{GDP deflator} = 100 \times \frac{\text{nominal GDP}}{\text{real GDP}}$$

- One way to measure the economy's **inflation rate** is to compute the percentage increase in the GDP deflator from one year to the next.

## EXAMPLE:

<i>year</i>	<i>Nominal GDP</i>	<i>Real GDP</i>	<i>GDP Deflator</i>	
2005	\$6000	\$6000	100.0	} 14.6%
2006	\$8250	\$7200	114.6	
2007	\$10,800	\$8400	128.6	} 12.2%

Compute the GDP deflator in each year:

$$2005: \quad 100 \times (6000/6000) = \quad 100.0$$

$$2006: \quad 100 \times (8250/7200) = \quad 114.6$$

$$2007: \quad 100 \times (10,800/8400) = \quad 128.6$$

## ACTIVE LEARNING 2

# Computing GDP

	2007 (base yr)		2008		2009	
	<i>P</i>	<i>Q</i>	<i>P</i>	<i>Q</i>	<i>P</i>	<i>Q</i>
Good A	\$30	900	\$31	1,000	\$36	1050
Good B	\$100	192	\$102	200	\$100	205

Use the above data to solve these problems:

- A.** Compute nominal GDP in 2007.
- B.** Compute real GDP in 2008.
- C.** Compute the GDP deflator in 2009.



## ACTIVE LEARNING 2

### Answers

	2007 (base yr)		2008		2009	
	<i>P</i>	<i>Q</i>	<i>P</i>	<i>Q</i>	<i>P</i>	<i>Q</i>
Good A	\$30	900	\$31	1,000	\$36	1050
Good B	\$100	192	\$102	200	\$100	205

**A.** Compute nominal GDP in 2007.

$$\text{\$30} \times 900 + \text{\$100} \times 192 = \underline{\text{\$46,200}}$$

**B.** Compute real GDP in 2008.

$$\text{\$30} \times 1000 + \text{\$100} \times 200 = \underline{\text{\$50,000}}$$

## ACTIVE LEARNING 2

### Answers

	2007 (base yr)		2008		2009	
	<i>P</i>	<i>Q</i>	<i>P</i>	<i>Q</i>	<i>P</i>	<i>Q</i>
Good A	\$30	900	\$31	1,000	\$36	1050
Good B	\$100	192	\$102	200	\$100	205

**C.** Compute the GDP deflator in 2009.

$$\text{Nom GDP} = \$36 \times 1050 + \$100 \times 205 = \underline{\$58,300}$$

$$\text{Real GDP} = \$30 \times 1050 + \$100 \times 205 = \underline{\$52,000}$$

$$\begin{aligned} \text{GDP deflator} &= 100 \times (\text{Nom GDP})/(\text{Real GDP}) \\ &= 100 \times (\$58,300)/(\$52,000) = \underline{112.1} \end{aligned}$$

# GDP and Economic Well-Being

- *Real GDP per capita is the main indicator of the average person's standard of living.*
- But GDP is not a perfect measure of well-being.
- Robert Kennedy issued a very eloquent yet harsh criticism of GDP:

## Gross Domestic Product...

“... 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.”

- *Senator Robert Kennedy, 1968*

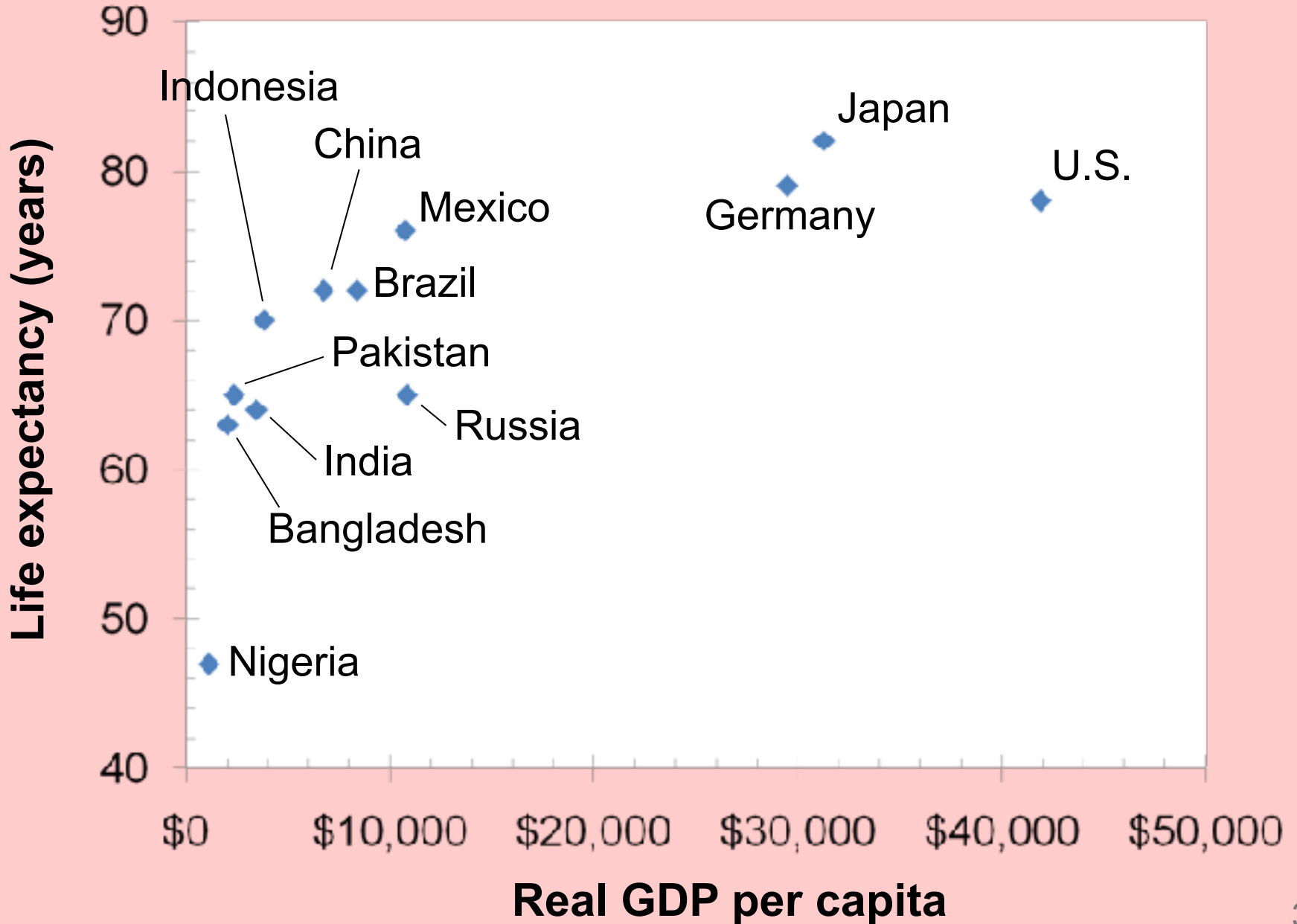
# GDP Does Not Value:

- the quality of the environment
- leisure time
- non-market activity, such as the child care a parent provides his or her child at home
- an equitable distribution of income

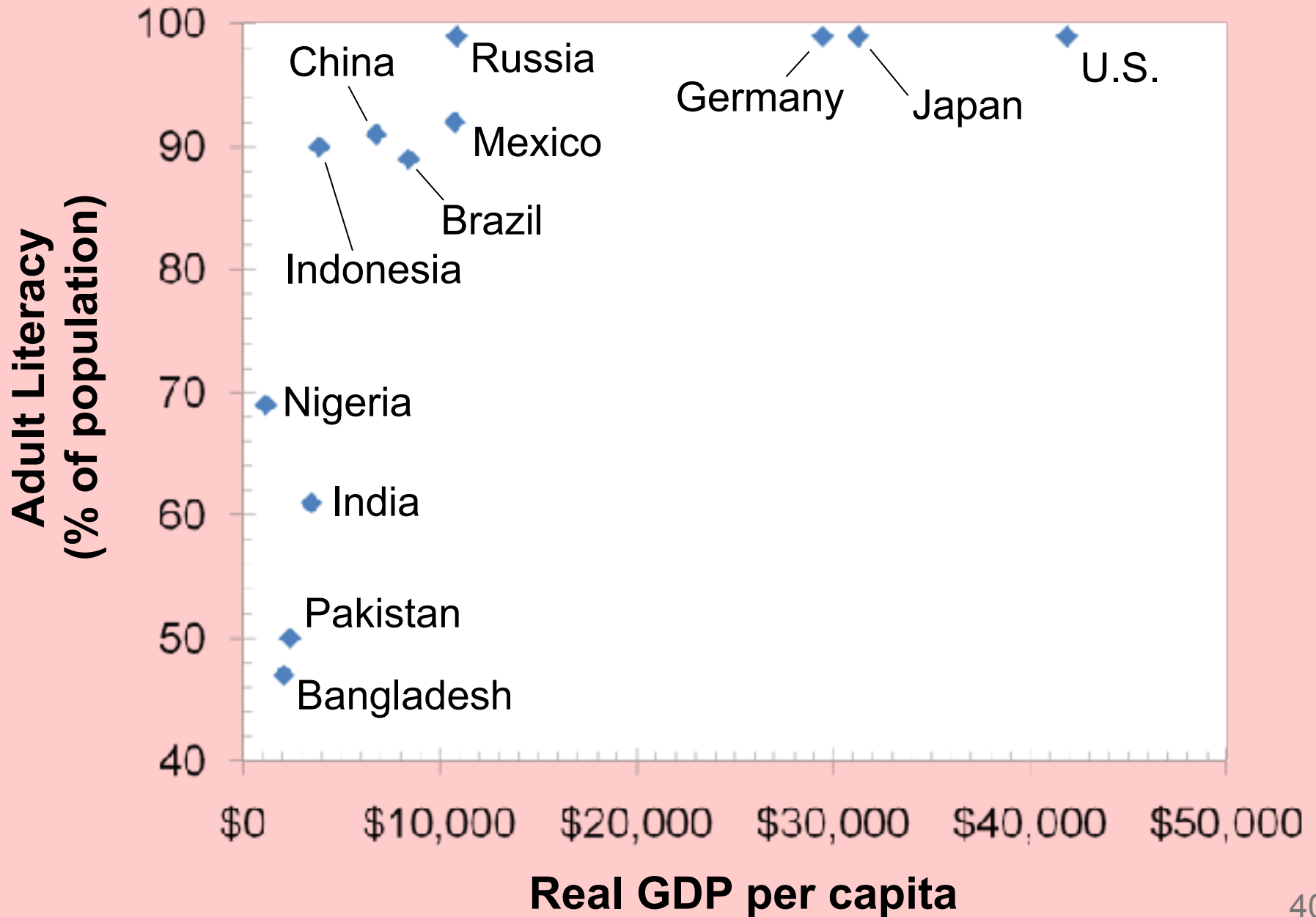
# Then Why Do We Care About GDP?

- Having a large GDP enables a country to afford better schools, a cleaner environment, health care, etc.
- Many indicators of the quality of life are positively correlated with GDP. For example...

# GDP and Life Expectancy in 12 countries

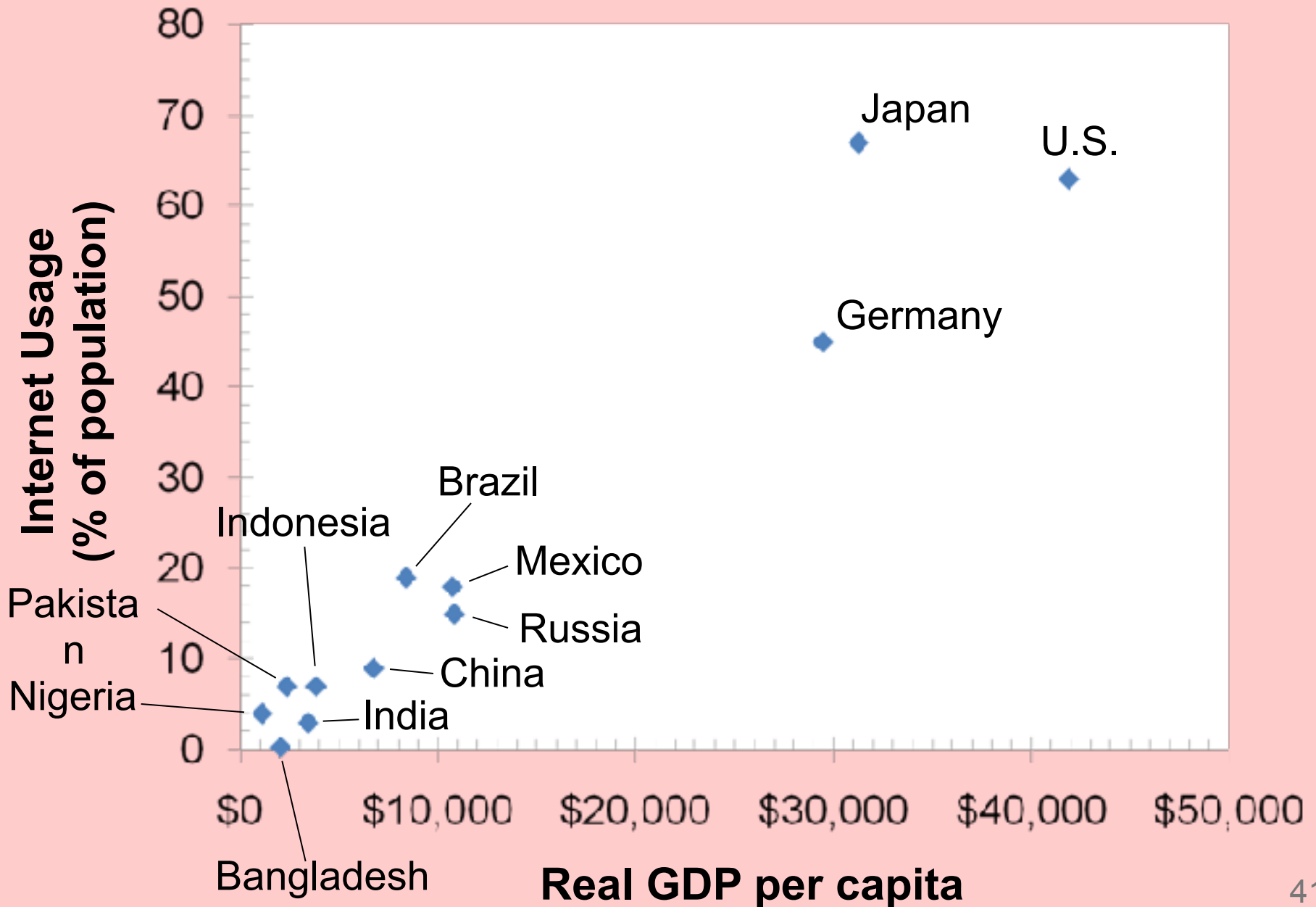


# GDP and Literacy in 12 countries

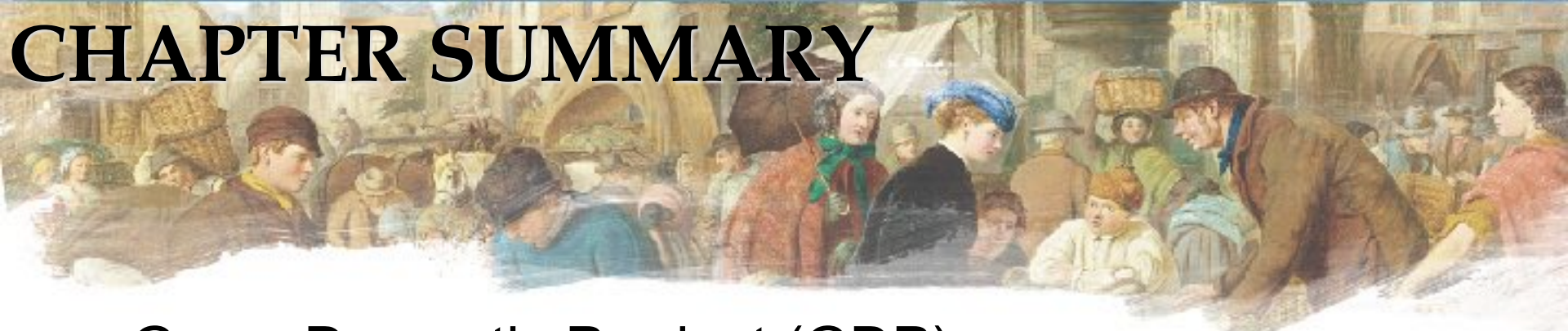




# GDP and Internet Usage in 12 countries



# CHAPTER SUMMARY



- Gross Domestic Product (GDP) measures a country's total income and expenditure.
- The four spending components of GDP include: Consumption, Investment, Government Purchases, and Net Exports.
- Nominal GDP is measured using current prices. Real GDP is measured using the prices of a constant base year and is corrected for inflation.
- GDP is the main indicator of a country's economic well-being, even though it is not perfect.