Components of macroeconomy and The measurement of National income

In this lecture, look for the answers to these questions

- **The core components of macroeconomy**
- Measurement concepts of national income
- Nominal v.s. Real GDP
- Limitations of GDP

- **Reading:** Chapter 6 in Case and Fair

The Components of the Macroeconomy

- To see the big picture of the macroeconomy, we divide the participants in the economy into four broad groups:
  1. Households (HH)
  2. Firms (F)
  3. The government (G)
  4. The rest of the world (ROTW or ROW)

- Households and firms make up the **private sector**, the government is the **public sector**, and the rest of the world is the **foreign sector**.

The Circular Flow Diagram

- **circular flow** A diagram showing the **flows in and out** of the sectors in the economy.

- **transfer payments** Cash payments made by the government to people who do not supply goods, services, or labor in exchange for these payments. They include Social Security benefits, veterans' benefits, and welfare payments.

FIGURE 1 The Circular Flow of Payments

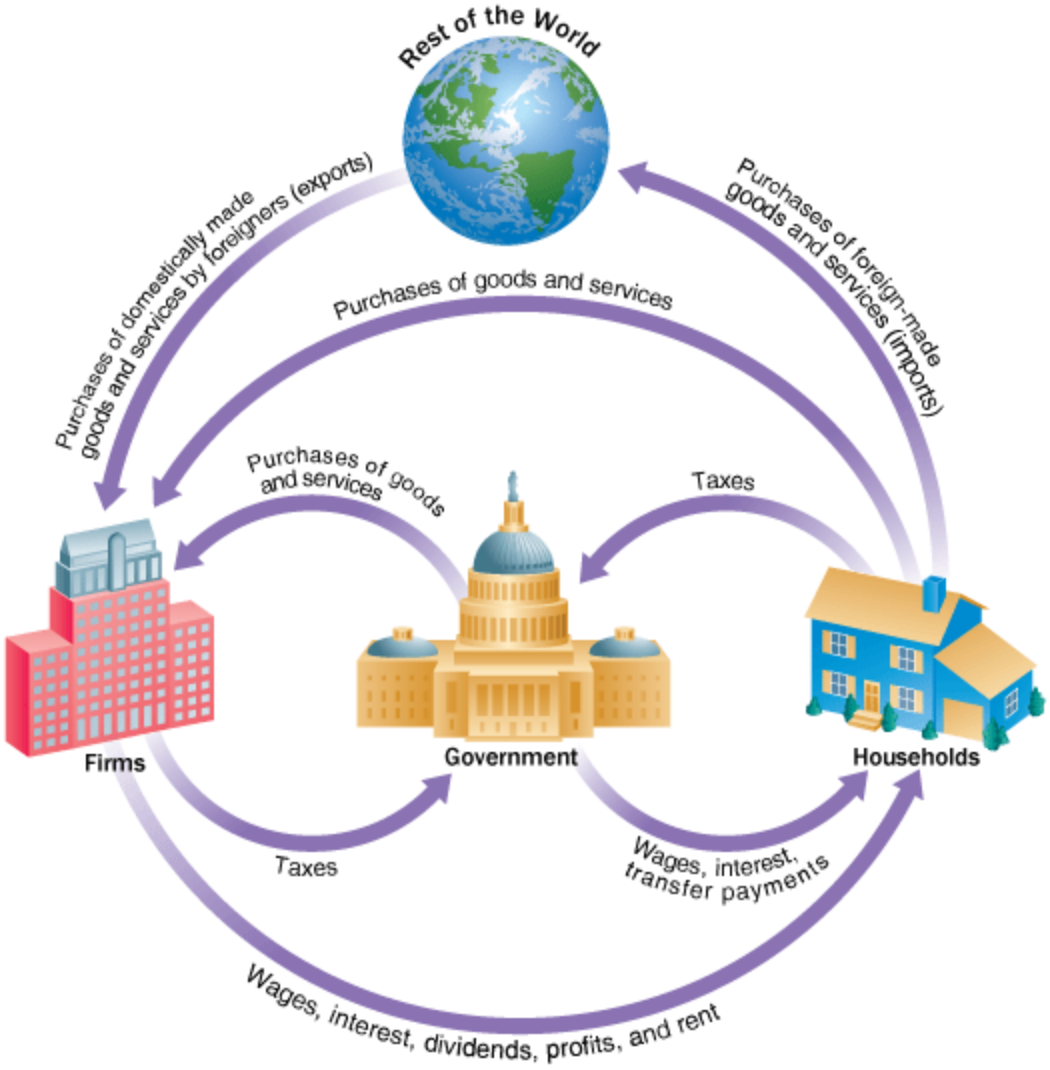
Households receive income from firms and the government, purchase goods and services from firms, and pay taxes to the government. They also purchase foreign-made goods and services (imports).

Firms receive payments from households and the government for goods and services; they pay wages, dividends, interest, and rents to households and taxes to the government.

The government receives taxes from firms and households, pays firms and households for goods and services—including wages to government workers—and pays interest and transfers to households.

Finally, people in other countries purchase goods and services produced domestically (exports).

Note: Although not shown in this diagram, firms and governments also purchase imports.



The Three Market Arenas

- Another way of looking at the ways households, firms, the government, and the rest of the world relate to one another is to consider the **markets in which they interact**.

- We divide the markets into three broad arenas:
  - The goods-and-services market
  - The labor market
  - The money (financial) market

The Three Market Arenas

Goods-and-Services Market

- Households and the government purchase goods and services from firms in the *goods-and-services market*.
- Firms purchase goods and services from each other and also *supply* to the goods-and-services market.
- Households, the government, and firms *demand* from this market.
- The rest of the world buys from and sells to the goods-and-services market.

The Three Market Arenas

Labor Market

- In the *labor market*, households *supply* labor, and firms and the government *demand* labor.
- Labor is also supplied to and demanded from the rest of the world.

The Three Market Arenas

Money Market

- Households *supply* funds to the *money market* (or *financial market*) in the expectation of earning income in the form of dividends on stocks and interest on bonds.
- Households also *demand* (borrow) funds from this market to finance various purchases.
- Firms borrow to build new facilities in the hope of earning more in the future.

The Three Market Arenas

Money Market

- The government borrows by issuing bonds.
- The rest of the world borrows from and lends to the money market.
- Much of this borrowing and lending is coordinated by financial institutions, which take deposits from one group and lend them to others.

The Three Market Arenas

Money Market

- **Treasury bonds, notes,** or **bills** Promissory notes issued by the federal government when it borrows money.
- **corporate bonds** Promissory notes issued by corporations when they borrow money.
- **shares of stock** Financial instruments that give to the holder a share in the firm's ownership and therefore the right to share in the firm's profits.
- **dividends** The portion of a firm's profits that the firm pays out each period to its shareholders.

The Role of the Government in the Macroeconomy

- **fiscal policy** Government policies concerning taxes and spending.
- **monetary policy** The tools used by the central bank to control monetary aggregates (money supply) and short-term interest rates.

In this lecture, look for the answers to these questions

- The Core components of macroeconomy
- **Measurement concepts of national income**
- Nominal v.s. Real GDP
- Limitations of GDP

- **Reading:** Chapter 6 in Case and Fair

Gross Domestic Product (GDP) Is…

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

Gross Domestic Product (GDP) Is…

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

Gross Domestic Product (GDP) Is…

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

Gross Domestic Product (GDP) Is…

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

Gross Domestic Product (GDP) Is…

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

Gross Domestic Product (GDP) Is…

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

Gross Domestic Product (GDP) tells…

Not only the Level of overall production activities

Level of **total income**

Level of **total expenditure**

Gross Domestic Product (GDP) tells…

Not only the Level of overall production activities

Level of **total income**

Level of **total expenditure**

The Circular-Flow Diagram

Households:

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

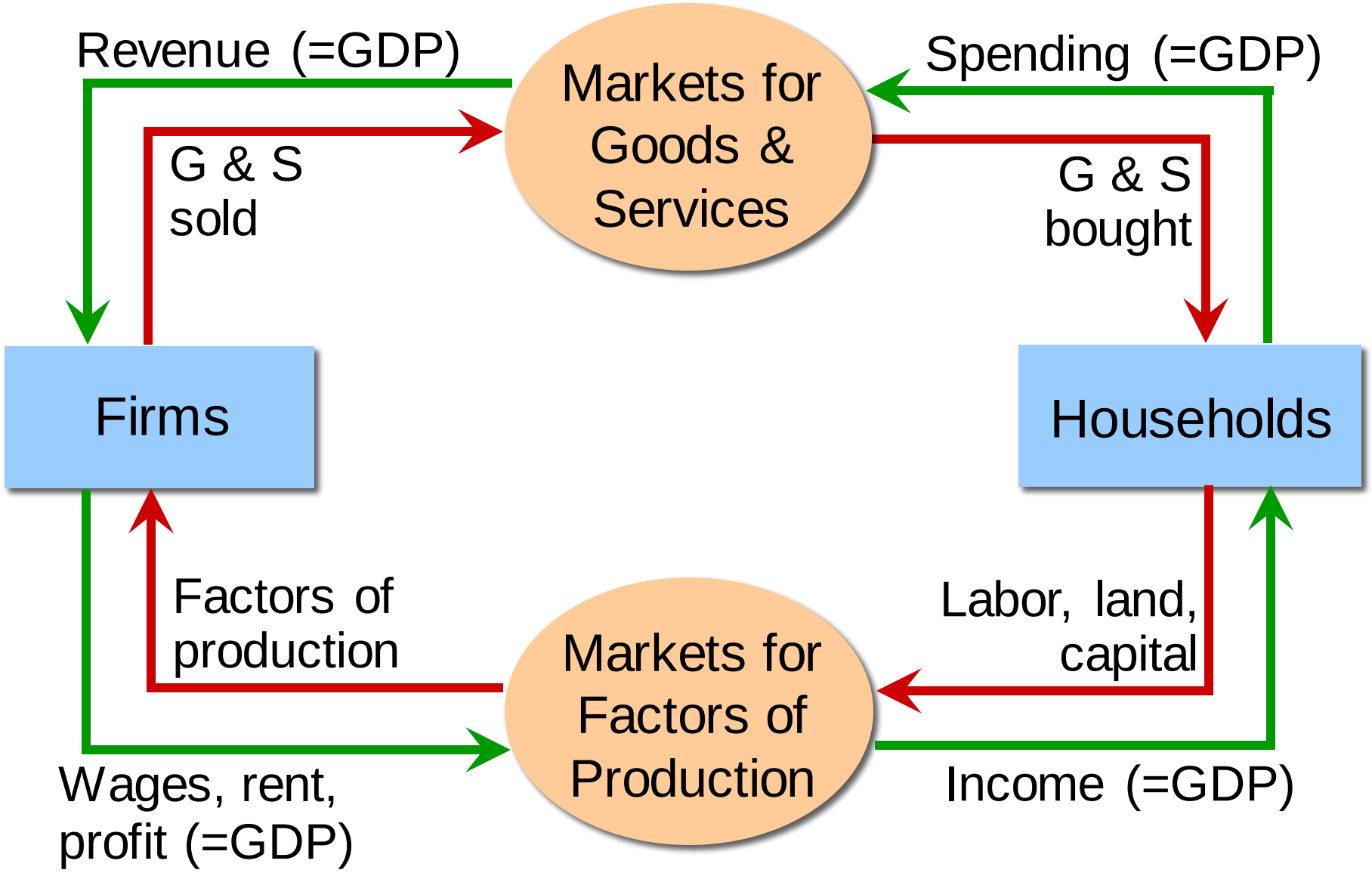
Firms

Households

Firms:

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

The Circular-Flow Diagram



In sum… GDP = value of final **output**

- **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.

Three measuring approaches

- There are three approaches;
  - **Expenditure approach**
  - **Production approach**
  - **Income approach**

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**):

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

Consumption (C)

- is total spending by households on g&s.
  - **durable goods:** Goods that last a relatively long time, such as cars and household appliances.
  - **nondurable goods:** Goods that are used up fairly quickly, such as food and clothing.
  - **Services:** The things we buy that do not involve the production of physical things, such as legal and medical services and education.

Investment (I)

- is total spending on goods that will be used in the future to produce more goods – buying investment goods to use as "**capital**"

- includes spending on
  - capital equipment (e.g., machines, tools)
  - Structures / construction (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.*

Digression: Gross investment, net investment and Capital

- **Capital:** the total outstanding value of the investment goods purchased (accumulated) over years.
- Capital is classified as a stock variable.
  - Stock variable: measured at a point of time
  - Flow variable: measured during a certain period
- Capital stock at the year end = capital stock at the beginning of the year + net investment
  - Net investment = Gross investment minus depreciation

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:

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

Thai GDP and Its Components, 2017

	Millions	% GDP
GDP	15,452,882	
Consumption (C)	**7,537,993**	**49%**
Investment (I)	**3,580,036**	**23%**
By private	2654266	17%
By government	925770	6%
Government purchase (G)	**2,531,913**	**16%**
NX	**2,092,501**	**14%**
X	10,534,540	68%
M	8,442,039	54%

ACTIVE LEARNING 1

GDP and its components

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

A. Debbie spends $300 to buy her husband dinner at the finest restaurant in Boston.

B. Sarah spends $1200 on a new laptop to use in her publishing business.The laptop was built in China.

C. Jane spends $800 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.

ACTIVE LEARNING 1

Answers

A. Debbie spends $300 to buy her husband dinner at the finest restaurant in Boston.

B. Sarah spends $1200 on a new laptop to use in her publishing business. The laptop was built in China.

ACTIVE LEARNING 1

Answers

C. Jane spends $800 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 of them.

Production-based approach

- Ask business units how much they **produce/sell** in a year.
- **Problem:** Double counting issue revisited
  - For final use v.s. For intermediate use
- Survey the **“value added”** instead.

The other two measuring approaches: Production approach

- Agency surveys the **"value added"** instead.

TABLE 6.1 Value Added in the Production of a Gallon of Gasoline (Hypothetical Numbers)

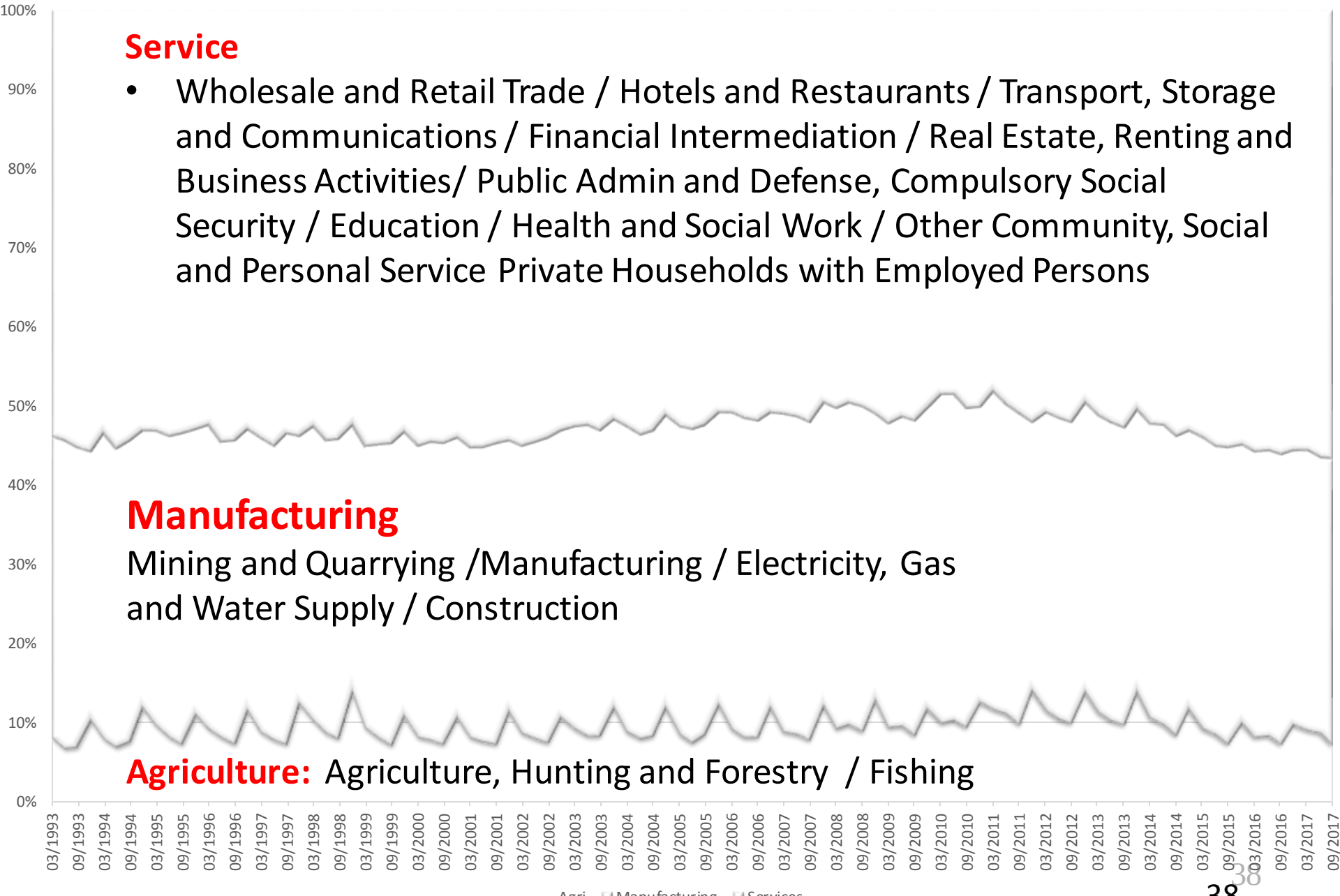
Stage of Production	Value of Sales	Value Added
(1) Oil drilling	$3.00	$3.00
(2) Refining	3.30	0.30
(3) Shipping	3.60	0.30
(4) Retail sale	4.00	0.40
Total value added		$4.00

- GDP = **sum of the value added at each stage of production.**

Production-based approach

- Production approach is then usually called the **"Value-added approach"**
- In Thailand, NESDB follows the internal standard for sectoral classification of production industries.
- NESDB reports the data of GDP from 16 industries.
- Grouping 16 industries into 3 main production sectors, e.g. **manufacturing, service and agriculture**

Sectoral share to market-value GDP (Nominal GDP)



Service

- Wholesale and Retail Trade / Hotels and Restaurants / Transport, Storage and Communications / Financial Intermediation / Real Estate, Renting and Business Activities/ Public Admin and Defense, Compulsory Social Security / Education / Health and Social Work / Other Community, Social and Personal Service Private Households with Employed Persons

Manufacturing

Mining and Quarrying /Manufacturing / Electricity, Gas and Water Supply / Construction

Agriculture: Agriculture, Hunting and Forestry / Fishing

Income-based approach

- **National income (NI)** The total income earned by the factors of production owned by **a country's citizens**.

- **1. Income to household**
  - **compensation of employees** Includes wages, salaries, and various supplements—employer contributions to social insurance and pension funds, for example—paid to households by firms and by the government.

Income-based approach

2. Income to business and government enterprise

- **proprietors' income** The income of unincorporated businesses.
- **corporate profits** The income of corporations.
- **surplus of government enterprises** Income of government enterprises.
- **net interest** The interest paid by business.

Income-based approach

3. Income to land / property owner

- **rental income** The income received by property owners in the form of rent.

4. Miscellaneous items

- **indirect taxes minus subsidies** Taxes such as sales taxes, customs duties, and license fees less subsidies that the government pays for which it receives no goods or services in return.
- **net business transfer payments** Net transfer payments by businesses to others

Income-based approach

- **National income**

TABLE 6.3 National Income, 2009

	Billions of Dollars	Percentage of National Income
National income	12,280.0	100.0
Compensation of employees	7,783.5	63.4
Proprietors' income	1,041.0	8.5
Rental income	268.1	2.2
Corporate profits	1,308.9	10.7
Net interest	788.2	6.4
Indirect taxes minus subsidies	964.3	7.9
Net business transfer payments	134.1	1.1
Surplus of government enterprises	–8.1	–0.1

Income-based approach

- **NI = GDP + net factor income from aboard – Depreciation - Statistical discrepancy**

TABLE 6.4 GDP, GNP, NNP, and National Income, 2009

	Dollars (Billions)
GDP	**14,256.3**
Plus: Receipts of factor income from the rest of the world	+589.4
Less: Payments of factor income to the rest of the world	–484.5
Equals: **GNP**	**14,361.2**
Less: Depreciation	–1,864.0
Equals: **Net national product (NNP)**	**12,497.2**
Less: Statistical discrepancy	–217.3
Equals: **National income**	**12,280.0**

Income-based approach

- **Other income-related variable**
  - **disposable personal income *or* after-tax income** Personal income minus personal income taxes. The amount that households have to spend or save.
  - **personal saving** The amount of disposable income that is left after total personal spending in a given period.
  - **personal saving rate** The percentage of disposable personal income that is saved. If the personal saving rate is low, households are spending a large amount relative to their incomes; if it is high, households are spending cautiously.

In this lecture, look for the answers to these questions

- The Core components of macroeconomy
- Measurement concepts of national income
- **Nominal v.s. Real GDP**
- Limitations of GDP

- **Reading:** Chapter 6 in Case and Fair

Real versus Nominal GDP

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

Nominal GDP v.s. Real GDP

$$NGDP_t = \sum_{i=1}^{N} P_t^i \times Q_t^i$$

$$RGDP_t = \sum_{i=1}^{N} P_{\boldsymbol{base\ year}}^i \times Q_t^i$$

$\boldsymbol{P_{base\ year}^i = price\ of\ product\ i^{th}\ during\ the\ base\ year}$

EXAMPLE:

	Pizza		Latte	
year	***P***	***Q***	***P***	***Q***
2015	$10	400	$2.00	1000
2016	$11	500	$2.50	1100
2017	$12	600	$3.00	1200

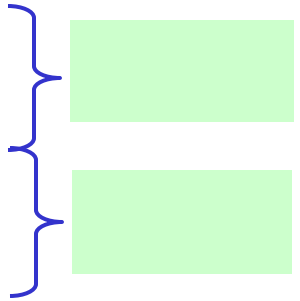
Compute nominal GDP in each year:

Increase:

2015: $10 x 400 + $2 x 1000 = $6,000

2016:

2017:



EXAMPLE:

	Pizza		Latte	
year	***P***	***Q***	***P***	***Q***
2015	$10	400	$2.00	1000
2016	$11	500	$2.50	1100
2017	$12	600	$3.00	1200

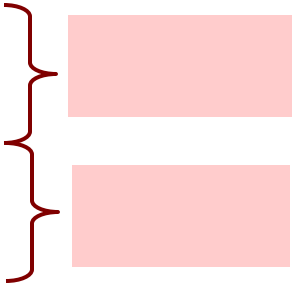
Compute real GDP in each year, using **2015 as the base year**:

2015: $10 x 400 + $2 x 1000 = $6,000

2016:

2017:

Increase:



EXAMPLE:

year	*Nominal GDP*	*Real GDP*
2015	$6000	$6000
2016	$8250	$7200
2017	$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 (2015 in this example).

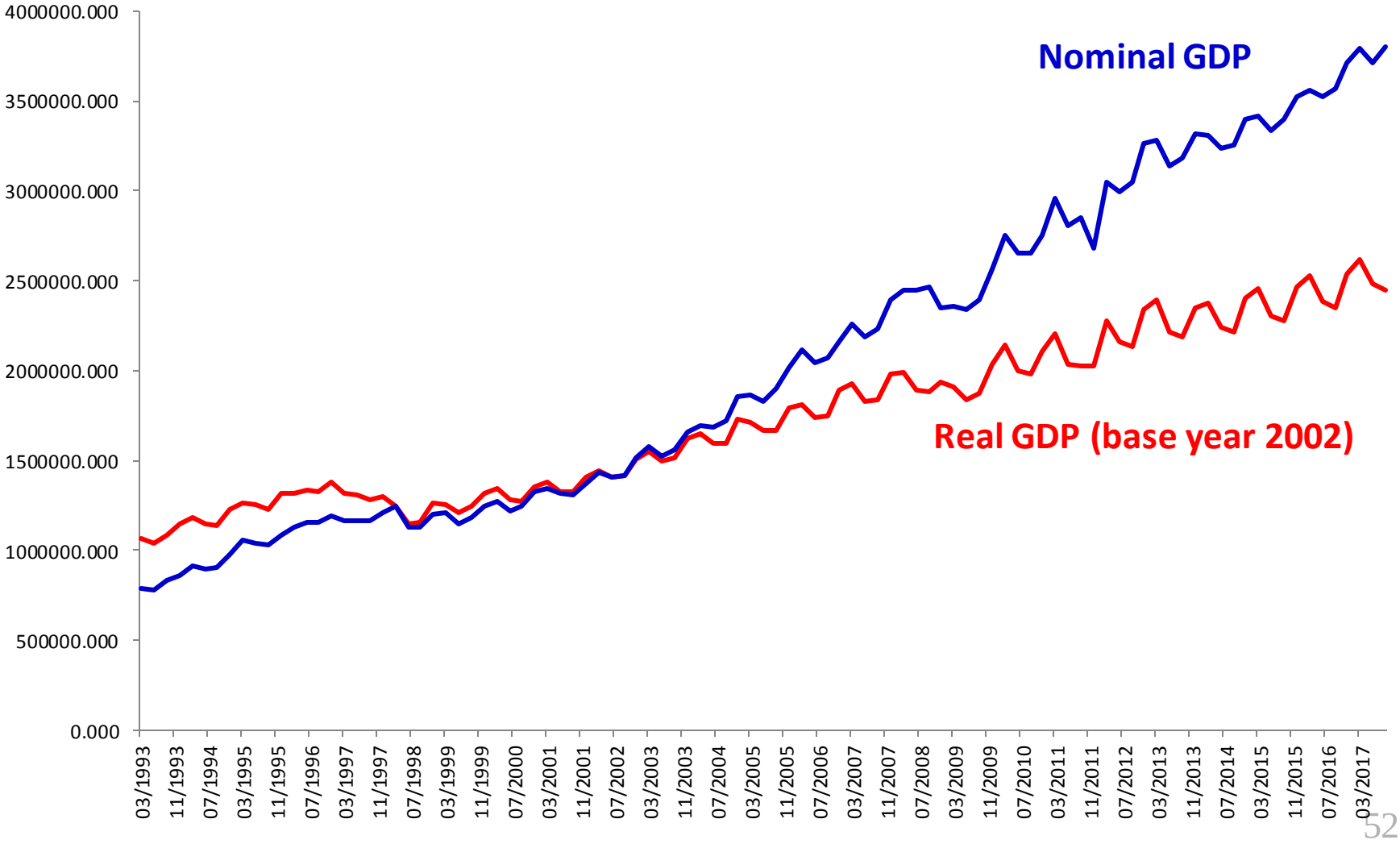
EXAMPLE:

year	*Nominal GDP*		*Real GDP*	
2015	$6000	37.5%	$6000	20.0%
2016	$8250	30.9%	$7200	16.7%
2017	$10,800		$8400	

- 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.

Real v.s. nominal GDP in Thailand (unseasonal adjusted data)



The GDP Deflator

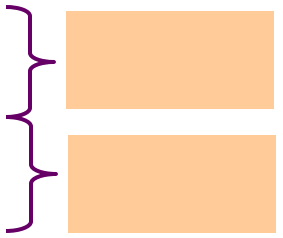
- The GDP deflator is a measure of the overall level of prices.
- Definition:

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

- 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:

year	*Nominal GDP*	*Real GDP*	*GDP Deflator*
2015	$6000	$6000	100.0
2016	$8250	$7200	
2017	$10,800	$8400	



Compute the GDP deflator in each year:

2015: 100 x (6000/6000) = 100.0

2016:

2017:

ACTIVE LEARNING 2

Computing GDP and Growth

	2015 (base yr)		2016		2017	
	P	*Q*	*P*	*Q*	*P*	*Q*
Good A	$30	900	$31	1000	$36	1050
Good B	$100	192	$102	200	$100	205

Use the above data to solve these problems:

A. Compute nominal GDP in 2015.

B. Compute real GDP in 2016.

C. Compute the GDP deflator in 2017.

In this lecture, look for the answers to these questions

- The Core components of macroeconomy
- Measurement concepts of national income
- Nominal v.s. Real GDP
- **Limitations of GDP**

- **Reading:** Chapter 6 in Case and Fair

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:

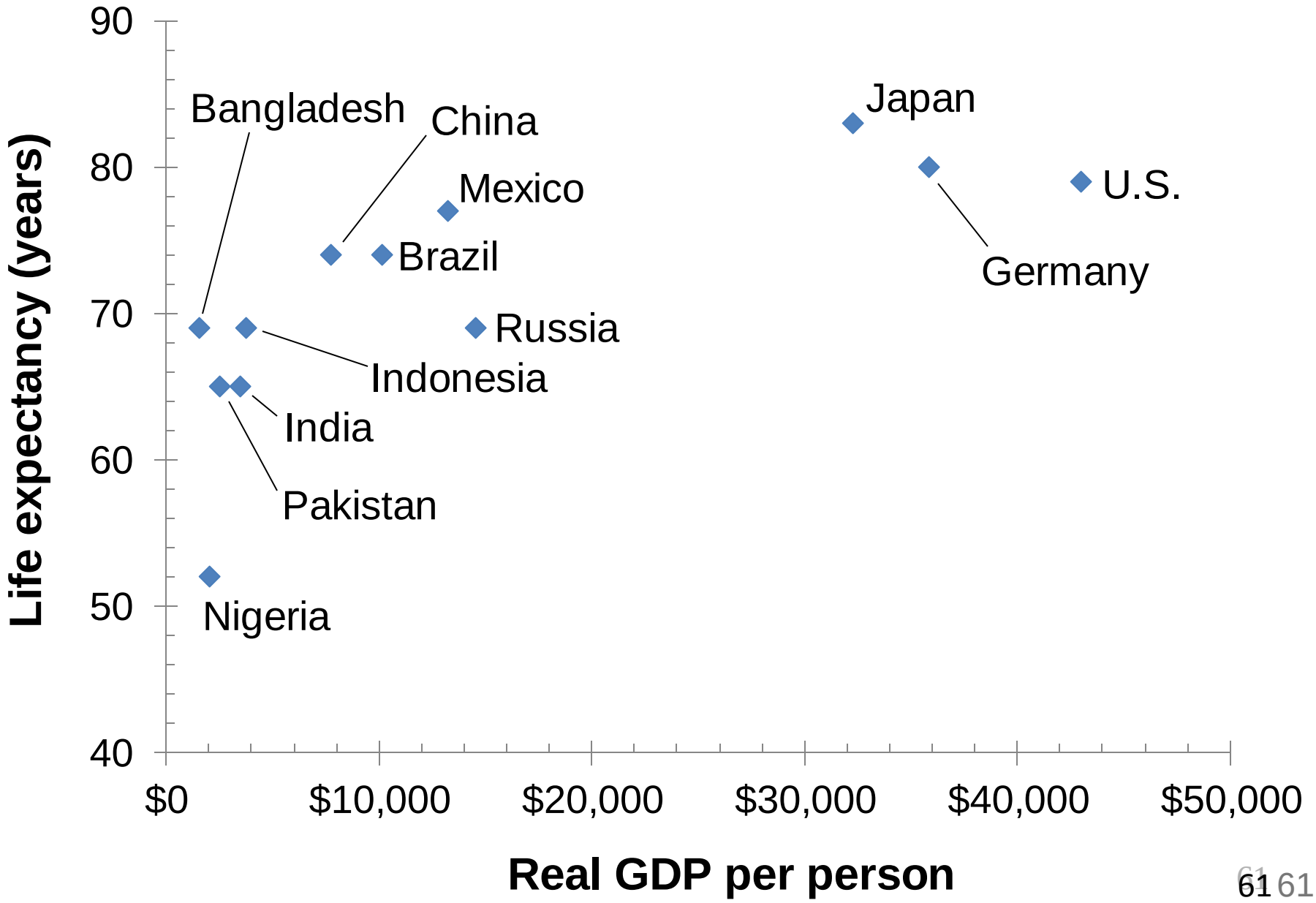
- the quality of the environment
- leisure time
- non-market activity, such as the child care a parent provides at home
- an equitable distribution of income

Then Why Do We Care About GDP?

- Having a large GDP enables a country to afford better schools, a cleaner environment, health care, etc.

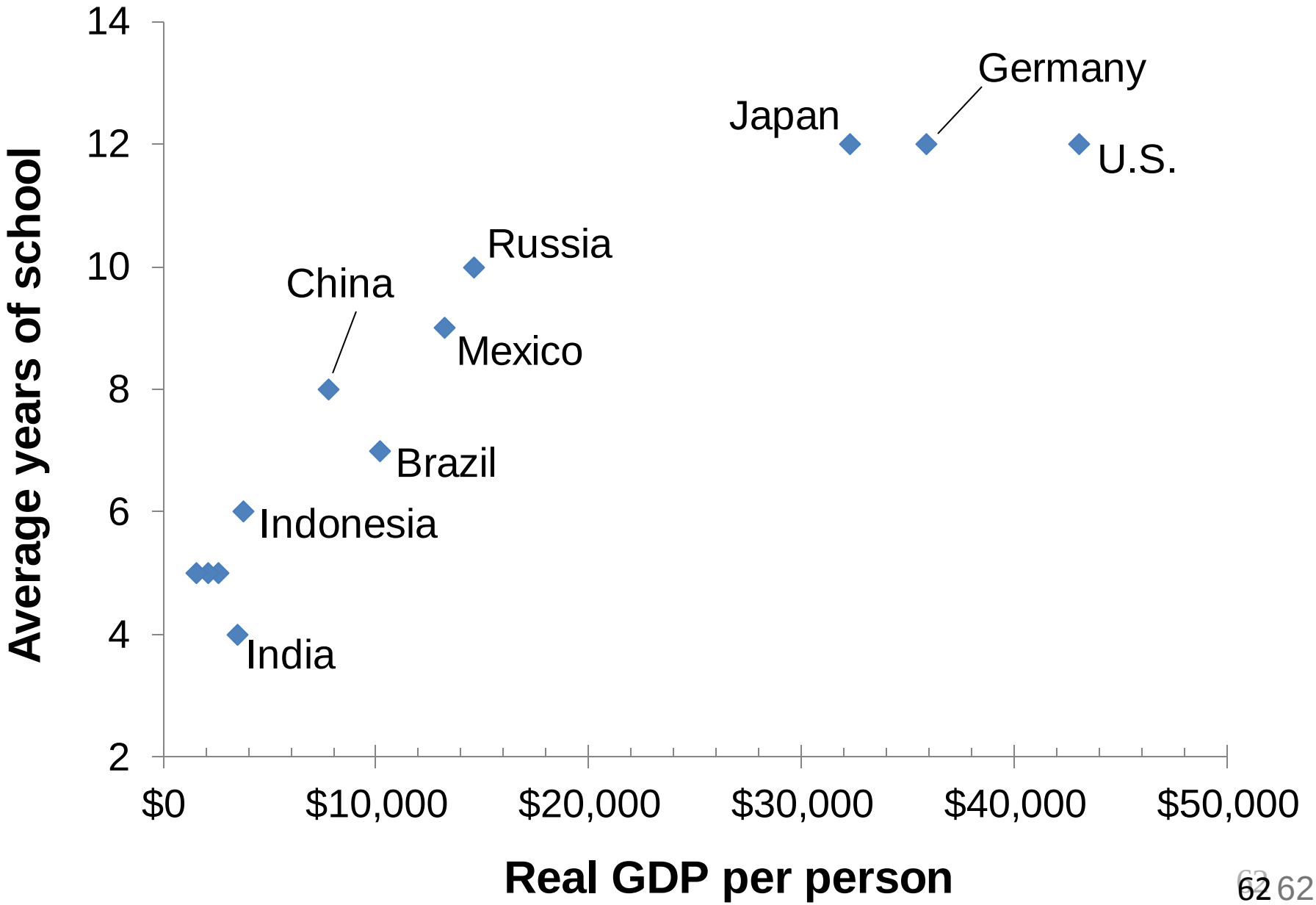
- **Many indicators of the quality of life are positively correlated with GDP.** For example…

GDP and Life Expectancy in 12 countries



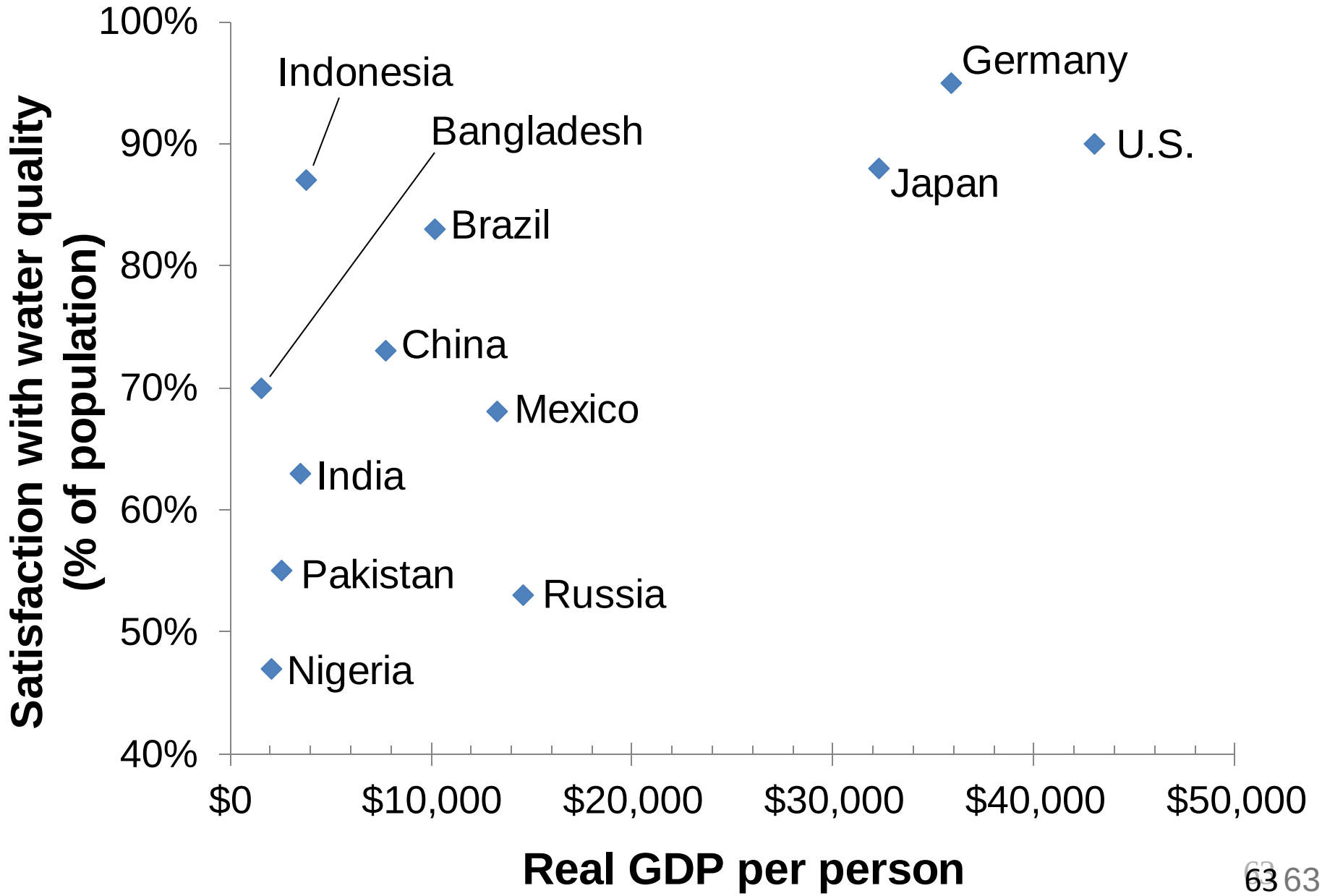
61

GDP and Average Schooling in 12 countries



62

GDP and Water Quality in 12 countries



63

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.