

*Welcome to...*  
**MACROECONOMICS**



# Description of the Course

- **Course Name:**  
Macroeconomics
- **Course Code:**  
BUS 206
- **Recommended Reading Book:**  
**Principles of Macroeconomics, by N. Gregory Mankiw**  
**Principles of Economics, by N. Gregory Mankiw**  
(Economics, by Michael Parkin)...

- **Assessment Methods:**

Method	Quantity	(%)
Participation	1	10
Assignment	1	10
Quiz	2	20
Midterm Exam	1	20
Final Exam	1	40

- **Questions:**  
essay, short answer, true-false, multiple choice, fill in the blank

## Macroeconomics

# Objective of the Course

- to develop our ability
- to understand & use the fundamental tools, concepts & principles of macroeconomic theory;
- to follow, evaluate & discuss macroeconomic issues/trends.
- ❖ ... introduces main tools, concepts & principles of macro. \_

# Learning Outcomes-1

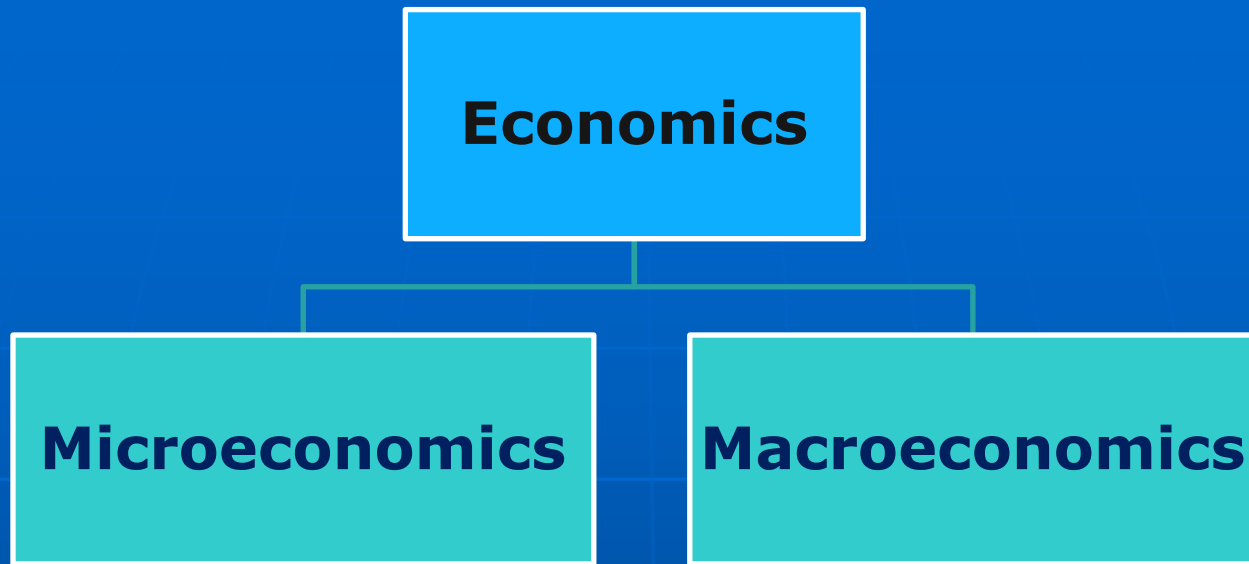
- What is Gross Domestic Product (GDP) and what does it tell us about how markets work?
- How do we compare economic well-being in one country with that in another?
- How do we calculate the economic growth rate and explain the implications of sustained growth?
- How do population growth and labor productivity growth make potential GDP grow?
- Why do we need price level stability in an economy?
- How do we count the number of people working and the number unemployed?
- What do the level of employment and the unemployment rate tell us? ➡➡

## Learning Outcomes-2

- What is the flow of funds through financial markets & institutions?
- How are investment & saving along with borrowing & lending decisions made? How do these decisions interact in the market for loanable funds?
- What is money? And what are functions of money? How does the banking system create money?
- What is the foreign exchange market and distinguish between the nominal exchange rate & the real exchange rate?
- What is fiscal policy?  
And how is fiscal policy used to stabilize the business cycle?
- What is monetary policy and what are objectives of monetary policy? \_

Macroeconomics:  
Course **CONTENTS**  
**Topics**

1. Introduction to Macroeconomics
2. Measuring a Country's Income
3. Measuring the Cost of Living
4. Pruduction and Growth
5. Saving, Investment and the Financial System & Instruments
6. Unemployment and its Natural Rate
7. Monetary System
8. Money Growth and Inflation
9. Open-Economy & Macroeconomics
10. Aggregate Demand & Aggregate Supply
11. The Influence of Monetary & Fiscal Policy on Agregate Demand \_



- complete each other:  
*Ex: apple...*
- deal with the economy from different points:  
*Ex: forest – trees →*

# Microeconomics

- is the study of decisions of individuals & businesses in specific markets, and the influence of governments...
- examines behaviour of industry, firm or household;
  - ex-1: firms: price-quantity supplied*
  - ex-2: consumers: price-quantity demanded\_*



# Macroeconomics

- is the study of the performance of the national & global economies...
- examines relationships at aggregate level:
  - ex: the relationship between the income & investments of a country as a whole\_

# Primary Topics of Macroeconomics

■ :

- 1) sustainable rates of economic growth
- 2) stability of prices essential to the proper functioning of a market economy
- 3) the employment of resources
- 4) the international linkages that bind individual countries into a world economy \_

# *Main Macroeconomic Goals*

- 1. Sustainable economic growth
- 2. Price-level stability
- 3. Full employment
- 4. Equitable distribution of income
- 5. Balanced trade
- 6. Financial stability ↔↔

## *Macroeconomic Goals*

# 1. Sustainable Economic Growth

- Economic growth occurs when the economy realizes greater production capabilities to produce g&s.
- For this to happen; resources must increase.
- Most countries experience economic growth because of;
  - 1) increases in capital stock and/or
  - 2) advances in technology ↔↔

For economic growth

## 1) Increases in capital goods

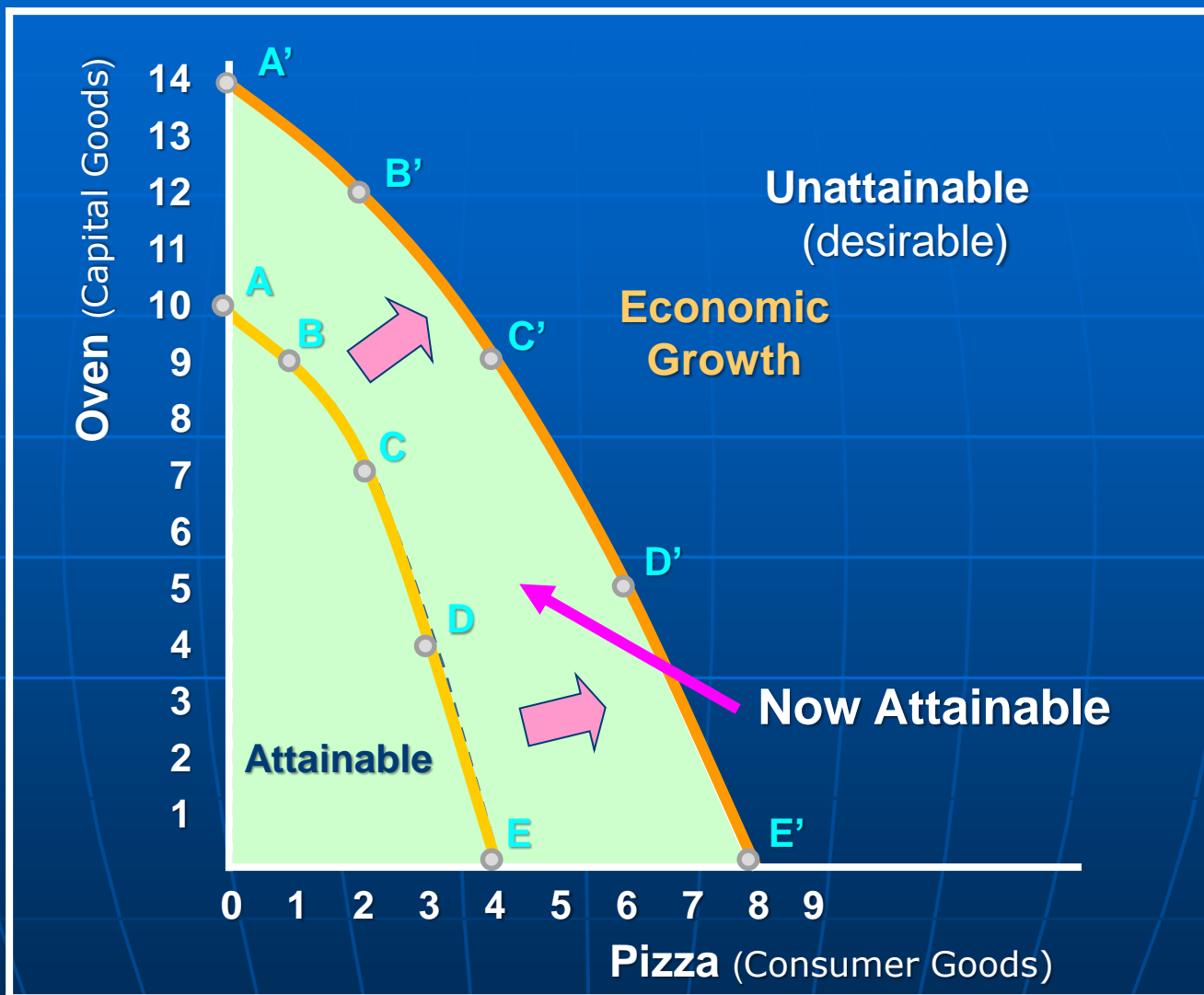
& /

## 2) Advances in technology, how ?

- **Question-1:** How does a country achieve *significant increases in capital goods*?
- **Answer-1:** At one point in time, assuming full employment, *more capital goods can be produced only at the expense of producing fewer consumption goods.*
- **Question-2:** How does a country achieve *advances in technology*?
- **Answer-2:** *Advances in technology occur because of inventions & improvements in producing g&s.*  
(Research and Development (R&D) expenditures are important) \_

Recall

# Production Possibilities Curve



Countries experience economic growth because of advances in technology and/or increases in capital stock.

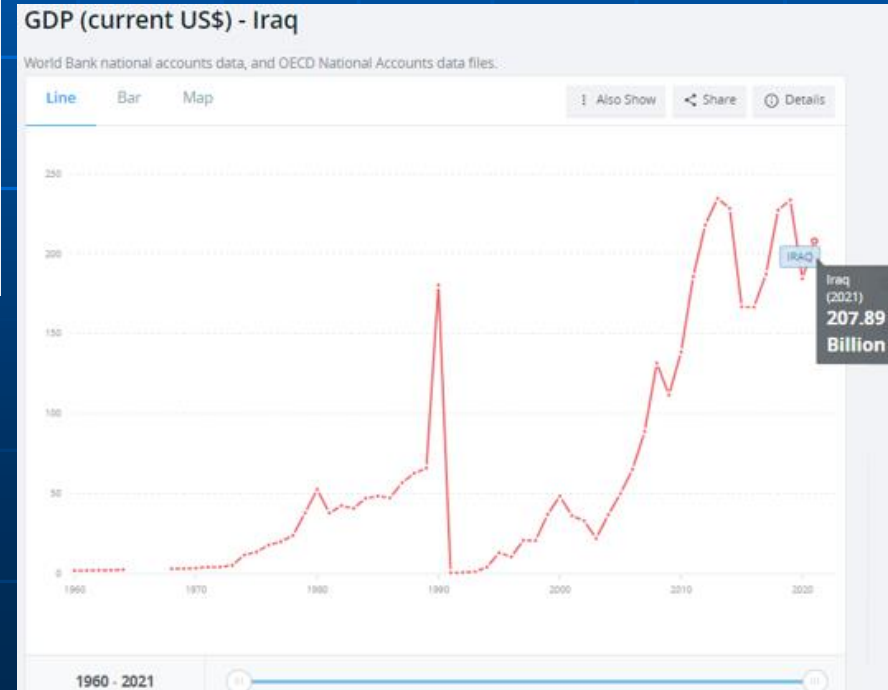
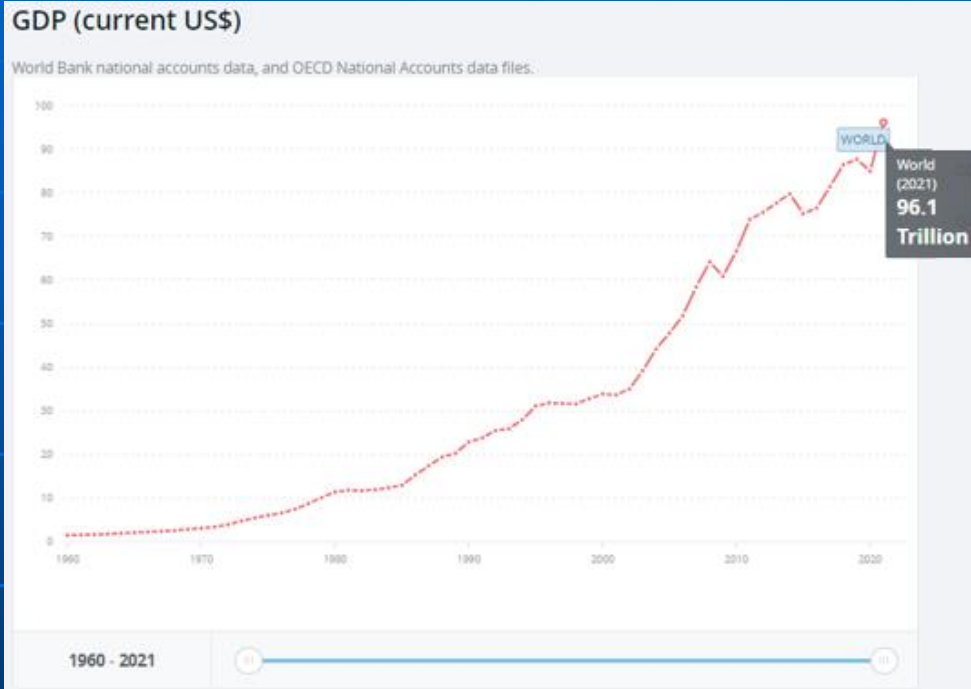
main concepts about economic growth

# Gross Domestic Product (GDP)

- Measures the total income of a country. \_

# GDP

## - World & Iraq -

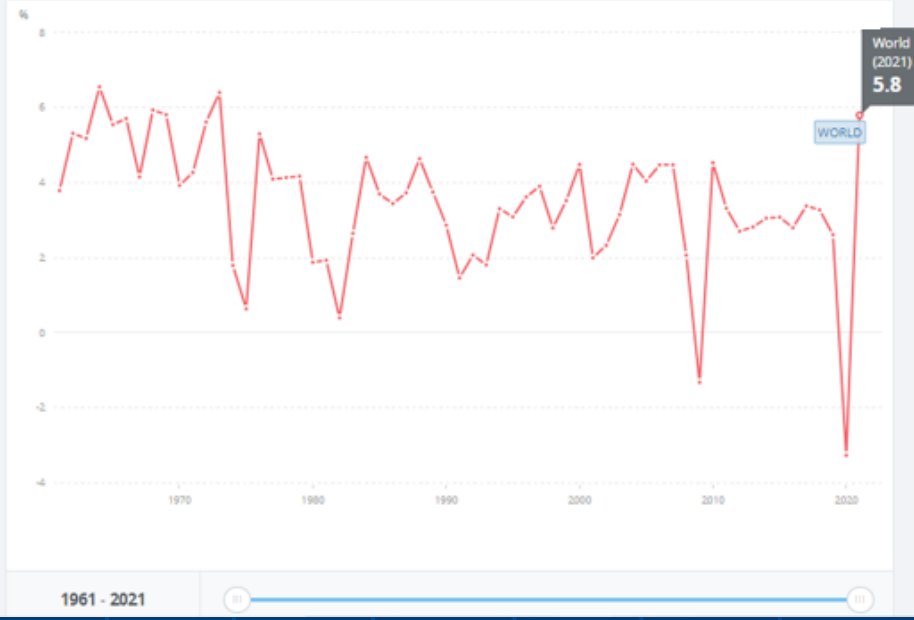




# GDP growth rate - World & Iraq -

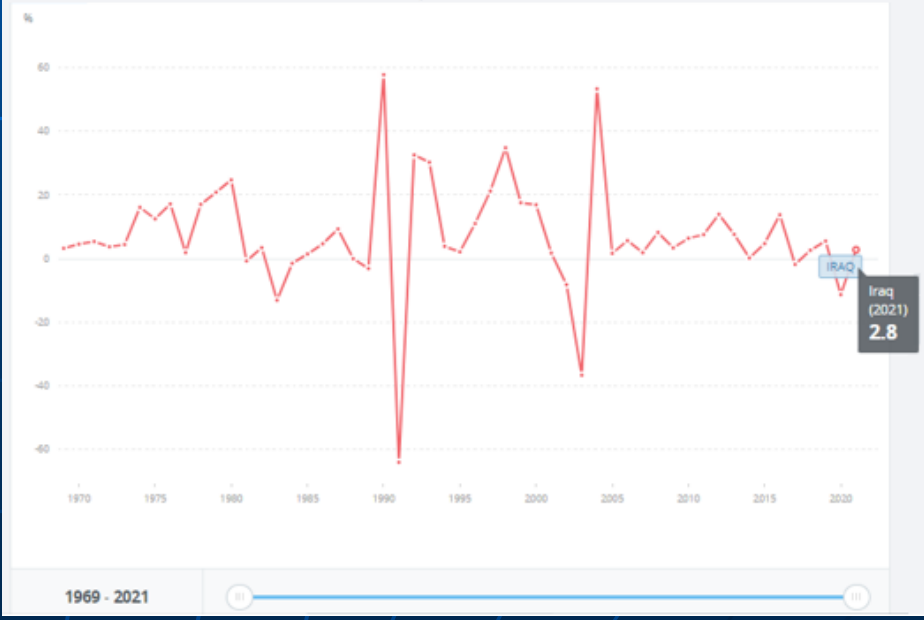
### GDP growth (annual %)

World Bank national accounts data, and OECD National Accounts data files.



### GDP growth (annual %) - Iraq

World Bank national accounts data, and OECD National Accounts data files.



## 2. Price-Level Stability

### The Aggregate Price Level (APL)

- A measure of the average level of prices of g&s in the economy.
- Tells us what is happening to prices on average.

### Inflation?

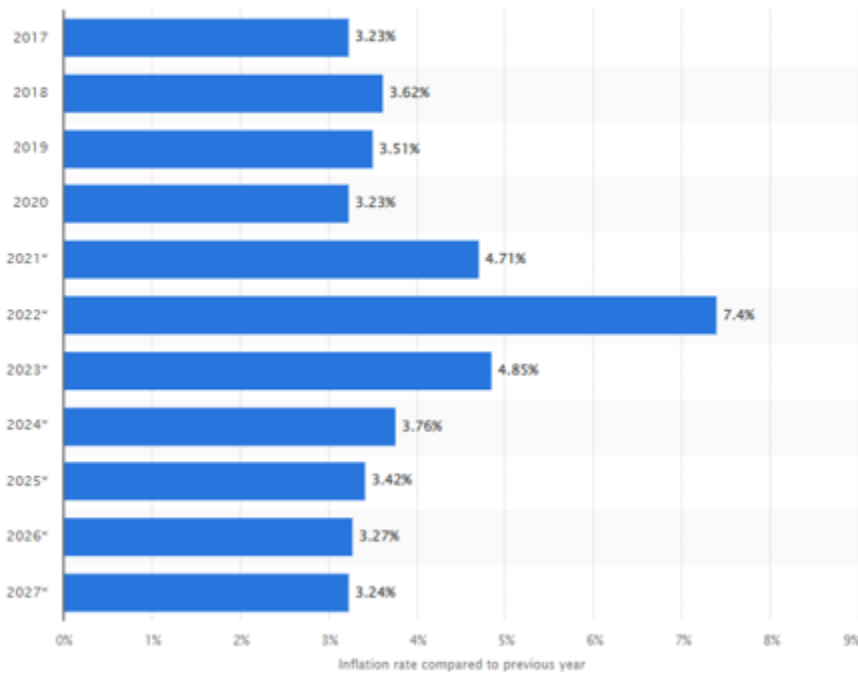
An increase in the APL over some defined time period ...

### Deflation ?...\_

# Inflation Rate

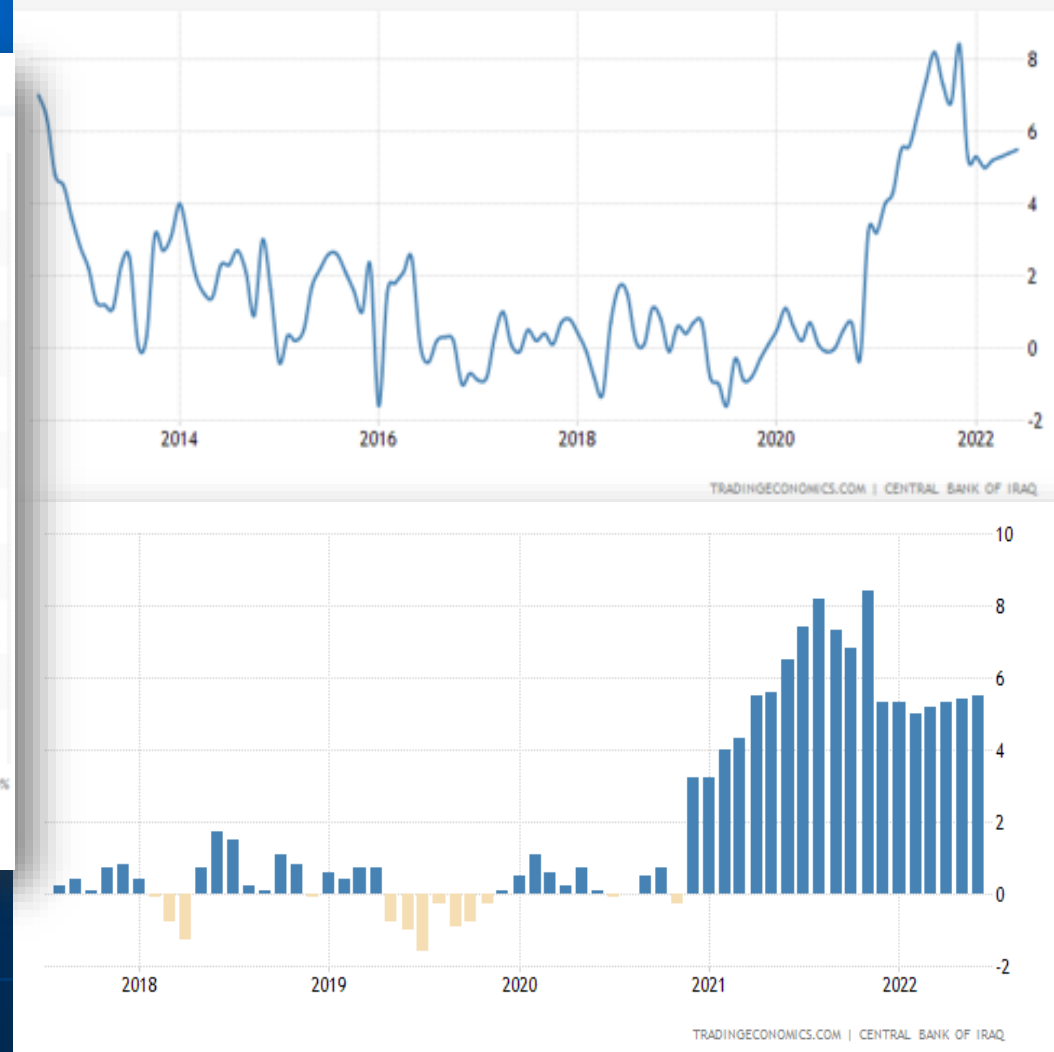
## - Global & Iraq -

### Global inflation rate from 2017 to 2027



[statista.com/statistics/256598/global-inflation-rate-compared-to-previous-year/](https://www.statista.com/statistics/256598/global-inflation-rate-compared-to-previous-year/)

### Iraq Inflation Rate



## *Macroeconomic Goals*

# ***3. Full Employment***

- All *available* resources must be used, to use resources efficiently.
- **Economic Efficiency** = Full Employment & Full Production
  - **Full Production = Productive efficiency & Allocative efficiency**
    - (a) Productive efficiency: Produce any particular mix of g&s  
*in least costly way*
    - (b) Allocative efficiency: Produce mix of g&s  
*most wanted by society.* \_

main concepts about full employment

## Unemployment, Unemployed Person & Unemployment Rate

- Unemployment: a situation that occurs when a person who is actively searching for employment is unable to find work.

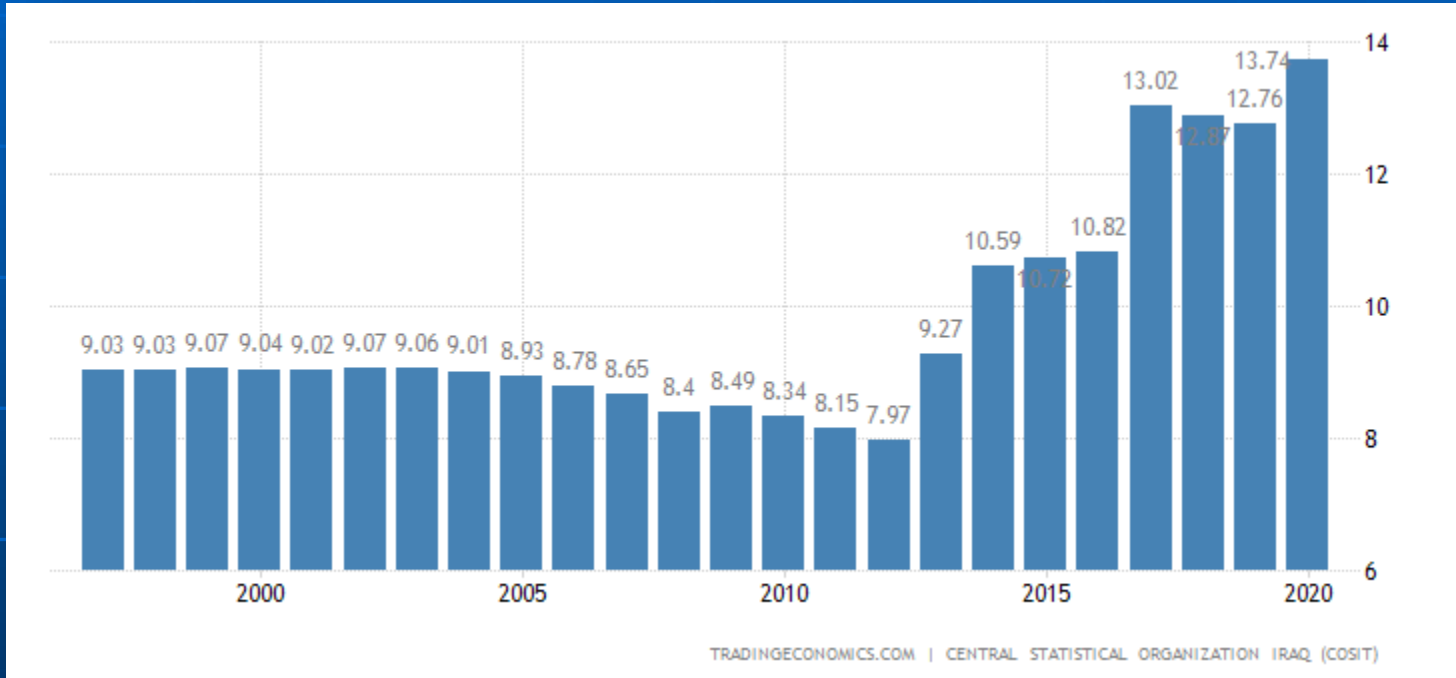
Unemployed Person; person out of work

- The Unemployment Rate: the percentage of the labor force without a job:

Unemployment Rate = Unemployed Workers / Total Labor Force

➤ *Ex:*  $40 / 400 = 0.10$  ; Unemployment Rate is %10 \_

# Unemployment Rate - Iraq -



# Underemployment

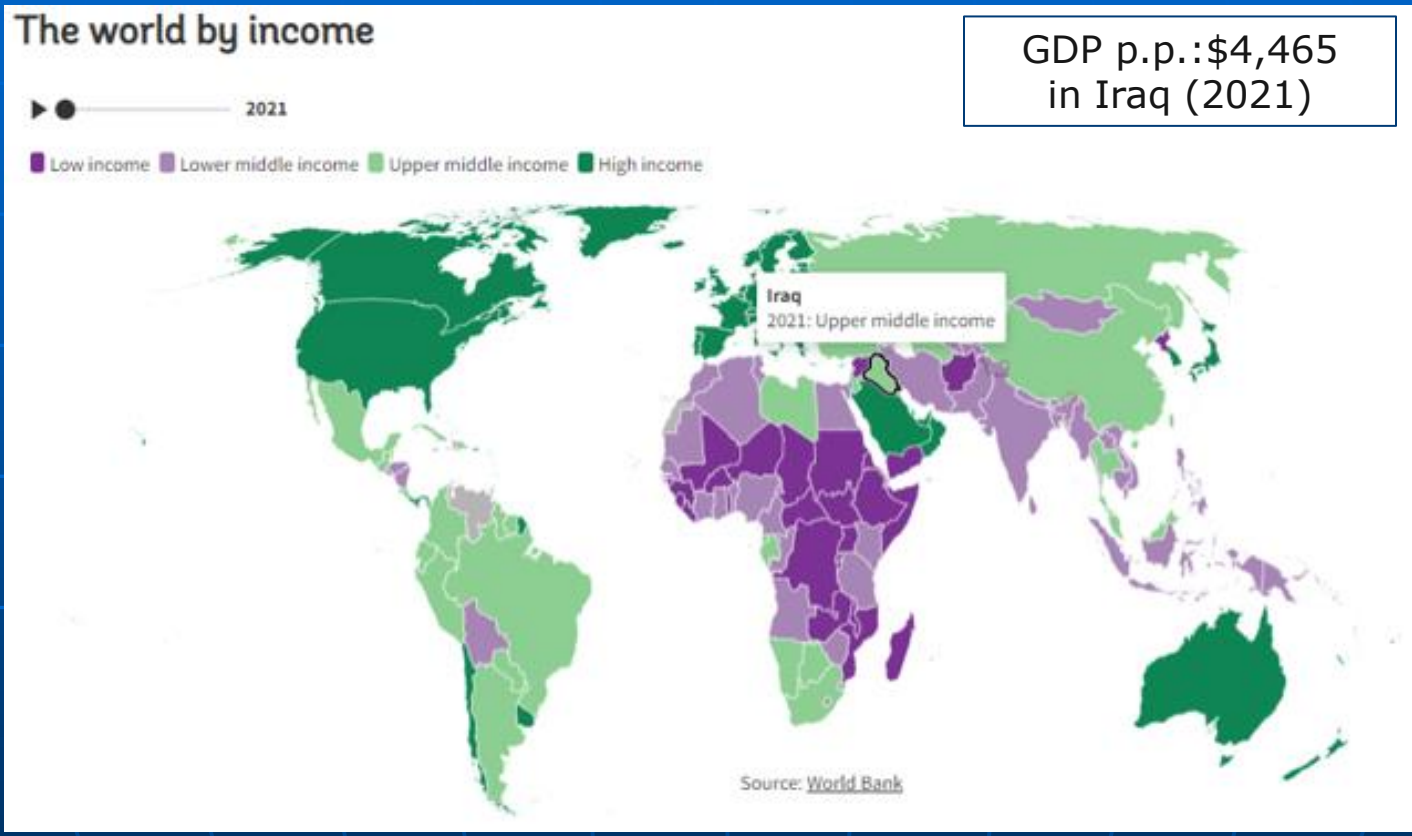
- a measure of employment and labor utilization in the economy that looks at how well the labor force is being used in terms of skills, experience, and availability to work.
- refers to a situation in which individuals are forced to work in low-paying or low-skill jobs.
- occurs when a person does not work full time or takes a job that does not reflect their actual training & financial needs. \_\_

## **4. Equitable Distribution of Income**

- The distribution of income; tells us how income is divided between different groups / individuals (in a country / in the world).

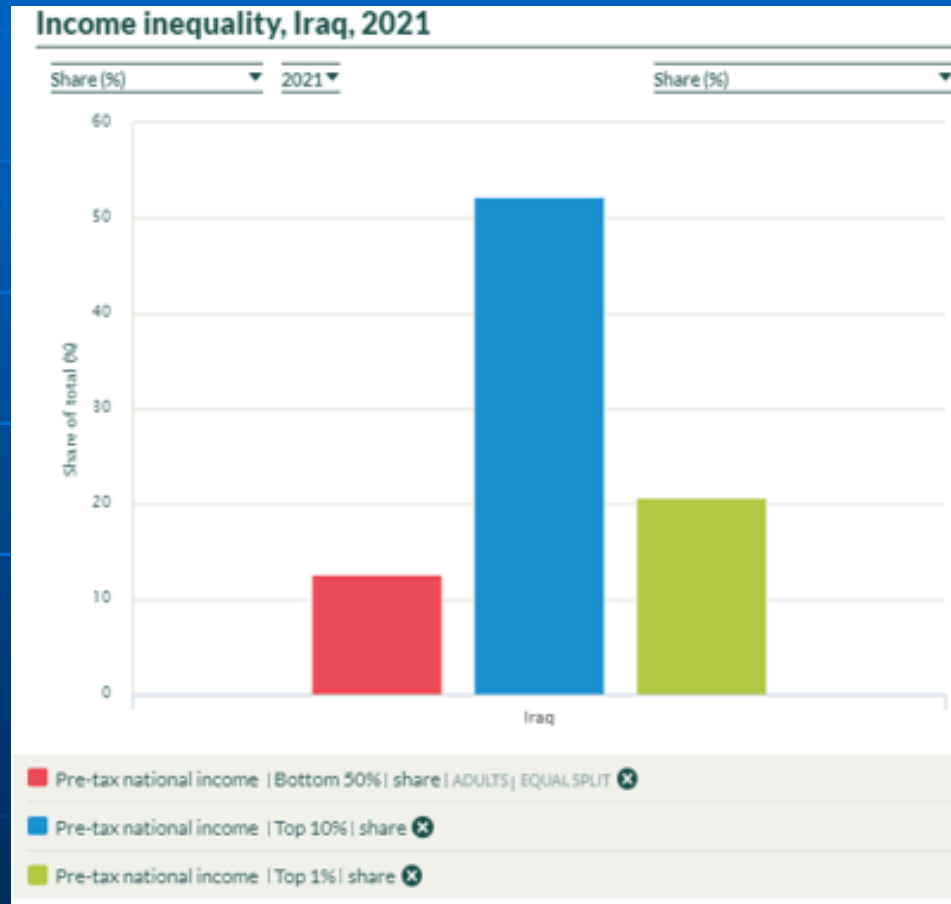


# The Distribution of Income - in the world -



Group	July 1, 2022 for FY23 (new)	July 1, 2021 for FY22 (previous)
Low income	< 1,085	< 1,045
Lower-middle income	1,086 – 4,255	1,046 – 4,095
Upper-middle income	4,256 -13,205	4,096 -12,695
High income	> 13,205	> 12,695

# The Distribution of Income - Iraq -



*Macroeconomic Goals*

# 5. Balanced Trade

- **1) Foreign Trade ; Exports(X) & Imports(M) (goods)**

**The trade balance** is the value of net exports (NX).

- **Foreign Trade Surplus** :  $X > M$
- **Foreign Trade Deficit** :  $M > X$

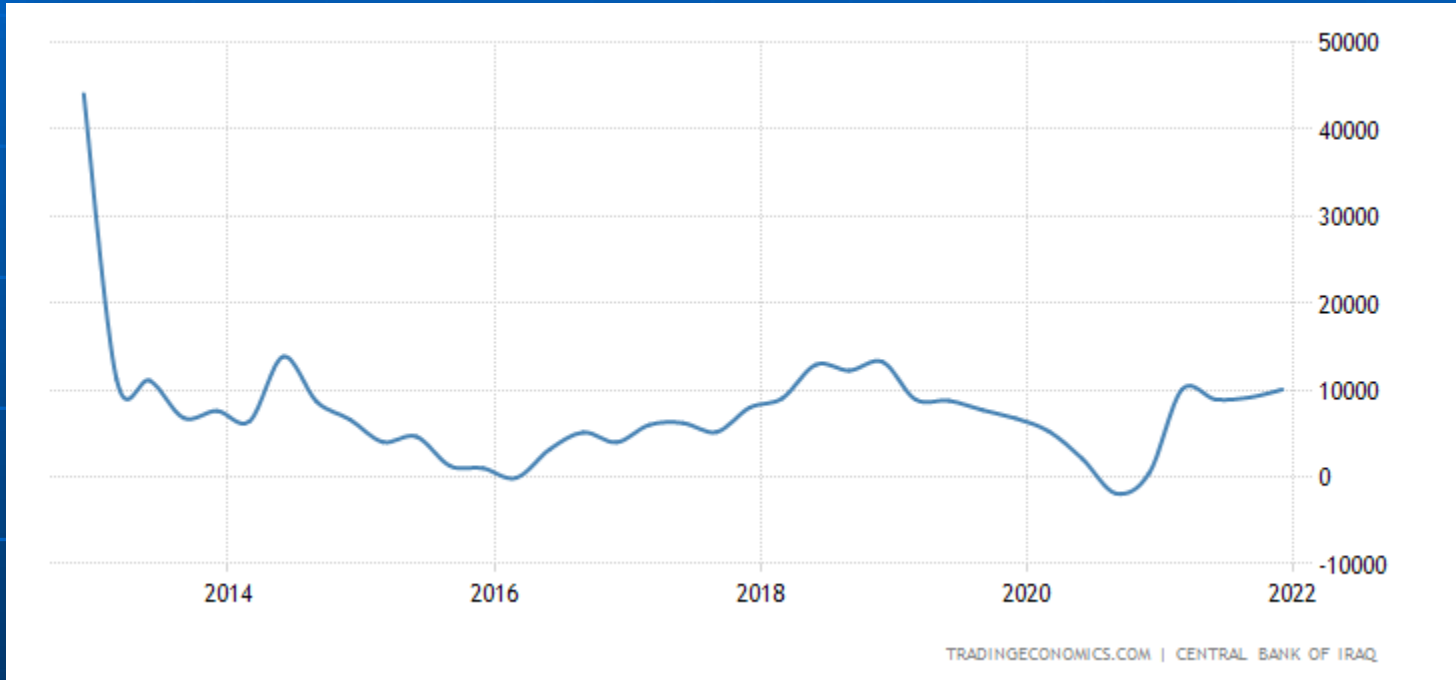
- **2) Current Account Balance (g&s)**

- **3) Balance of Payments Equilibrium**  
(g & s & capital flows)\_



# Balance of Trade

## - Iraq -

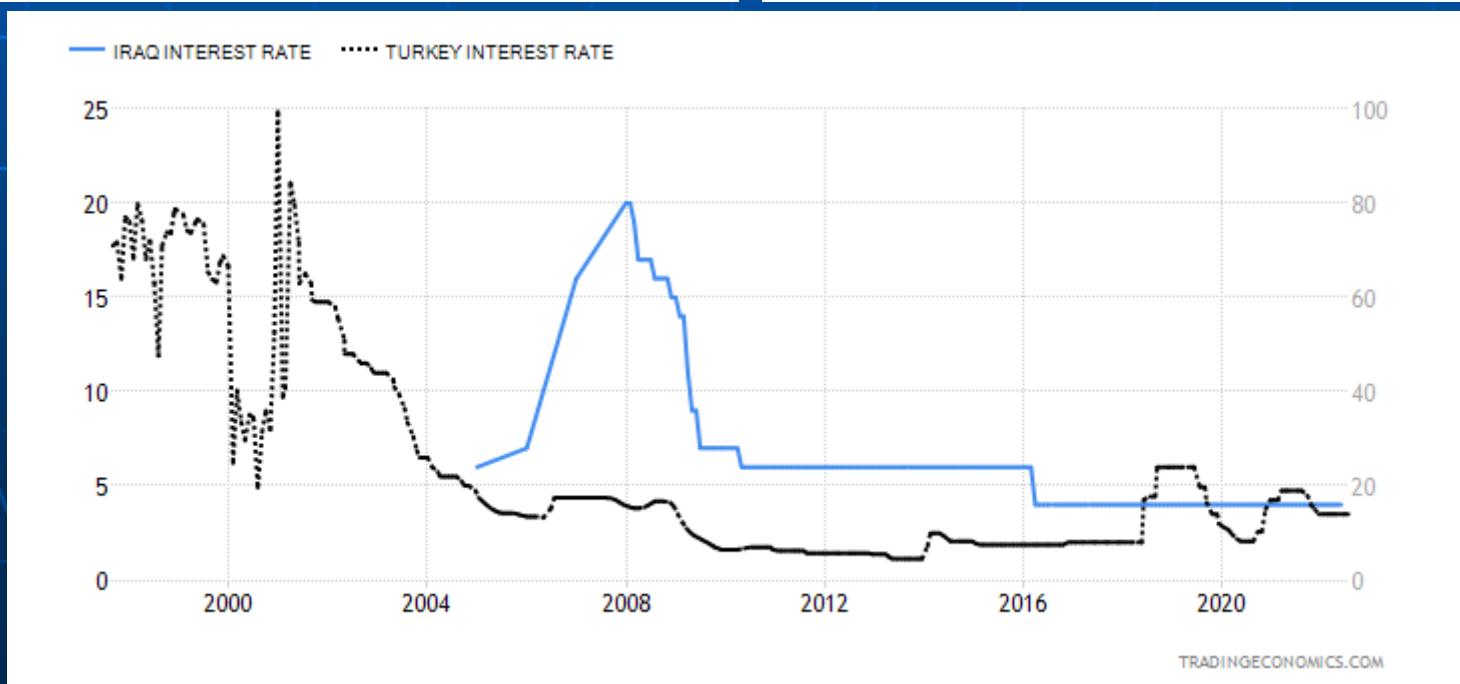
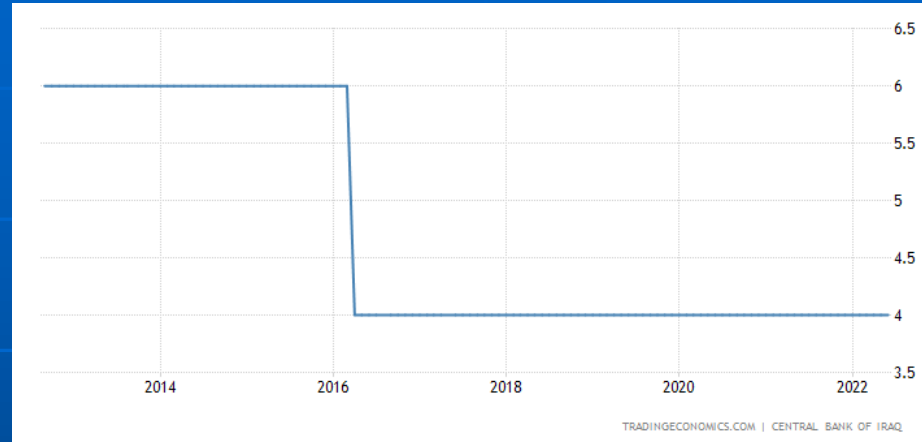


## *Macroeconomic Goals*

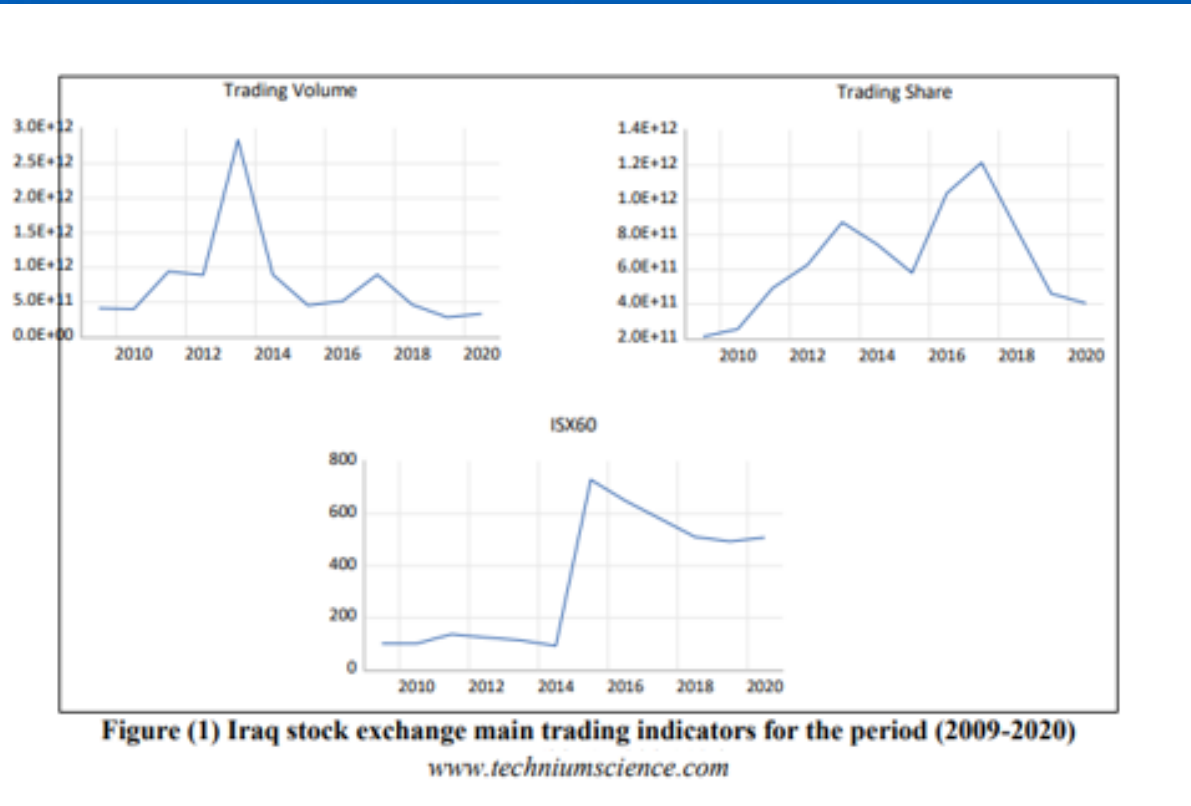
# 6. Financial Stability

- describes the condition;
  - where the financial intermediation process (fip) functions smoothly and
  - there is confidence in the operation of financial institutions & markets...
- The financial system plays a critical role in the economy:
  - enables the fip which facilitates the flow of funds between savers & borrowers
  - thus ensuring that financial resources are allocated efficiently towards promoting economic growth. \_

# Interest Rate - Turkey & Iraq -



# Iraq Stock Exchange (ISX)



# ***Economic Policies & Instruments***

## ➤ ***Main Policies***

- 1) *Monetary policy*
- 2) *Fiscal policy*

## ➤ ***Policy Instruments***

- 1) money supply, interest rate (m.p.i.)
- 2) government spending & taxes (f.p.i.)



# Measuring A Country's Income (Gross Domestic Product-GDP)



N. Gregory Mankiw, Principles of Macroeconomics, Chapter-10

N. Gregory Mankiw, Principles of Economics, Chapter-23

# Measuring A Country's Income

**At the end of this chapter we will be able to:**

- Define GDP
- Use the *circular flow model* to explain why  $GDP = \text{aggregate expenditure} \ \& \ \text{aggregate income}$
- Explain how a statistical institute of a country measures nominal and real GDP of the country
- Describe how real GDP is used measure economic growth and fluctuations
- Learn how economists compare the standart of living over time in a country & across countries by using real GDP
- Explain the limitations of real GDP as a measure of economic well-being \_

# Measuring A Country's Income (Gross Domestic Product-GDP)

- The Measurement of GDP
- The Economy's Income & Expenditure (The Circular-Flow Diagram)
- The Components of GDP
- Real & Nominal GDP
- Is GDP a good Measure of Economic Well-Being? ⇔⇔

*N. Gregory Mankiw, Principles of Macroeconomics, Chapter-10*

*N. Gregory Mankiw, Principles of Economics, Chapter-23*

- **Q:** How can we judge whether the economy is doing well or poorly?
- **A:** it is natural to look at the **total income** that everyone in the economy is earning: **GDP** ↔↔

# The Measurement of GDP

## Definition of Gross Domestic Product (GDP)

- **GDP:** the market value of all final g&s produced within a country in a given time period.
  
- This definition has seven parts:
  - 1) market value
  - 2) of all
  - 3) final
  - 4) goods & services
  - 5) produced
  - 6) within a country
  - 7) in a given time period ➡➡

# 1) Market Value

(monetary value)

- GDP is a market value : g&s are valued at their market prices.
- Ex: Which is the greater total production?
  - a) 100 apples & 50 oranges or
  - b) 50 apples & 100 oranges  
the adage: «You can't compare apples and oranges»
- To add apples, oranges, computers, popcorn,...  
we add the market values  
So, we have a total value of output in dollars.
- Assume; an apple 10 cents; an orange 20 cents. ?
  - a)  $100 \times .10 + 50 \times .20 = 10 + 10 = 20$  dollars
  - b)  $50 \times .10 + 100 \times .20 = 5 + 20 = 25$  dollars

## 2) of All

- GDP includes all items produced in the economy and sold *legally* in markets.
- What is *not counted* in GDP?
  - GDP excludes;
    - 1) most items that are produced & consumed at home and that never enter the marketplace.
    - 2) items produced and sold illicitly, such as illegal drugs. \_

### 3) Final

- GDP is the market value of the final g&s produced...
- A **final good** (or service): an item bought by its final user during a specified time period.
- A final good contrasts with an **intermediate good**, which is an item that is produced by one firm, bought by another firm, and used as a component of a final g/s:
  - Ex-1: A Ford truck & a Petlas tire
  - Ex-2: a Dell computer & an Intel Pentium chip
  - Ex-3: wheat – flour - pizza
- Excluding intermediate g&s avoids *double counting*... \_



## Q: Final Good or Intermediate Good?

- ... depends on what it is used for, not what it is:
  - **Ex-1:** a) Ford buys tires from Petlas    b) We buy tires from Petlas
  - **Ex-2:** a) A restaurant buys ice cream    b) We buy ice cream
- Some items that people buy are neither f.g. nor i.g. and they are not part of GDP :
  - **Ex:** secondhand clothes, used cars, existing home;
    - A secondhand good was part of GDP in the year in which it was produced... \_

## 4) Goods & Services

- GDP is the market value of *all final g&s produced...*
- It includes both;
  - **tangible products:** goods (food, clothing, cars...)
  - &
  - **intangible products:** services (haircuts, housecleaning, health services...)

- **Question:** existing home & real estate service?

## 5) Produced

**GDP:** the market value of all final g&s produced within a country in a given time period

- Items currently produced, not produced in the past. \_

## 6) Within a Country

- ... domestic production.
- Only g&s that are produced in a country count as part of that country's GDP:
  - **Ex-1**: Nike – U.S. – Sneakers – Vietnam
    - **Q**: The market value of thoes shoes is part of U.S. or Vietnam?
  - **Ex-2**: Toyota – Japanese – Car – Turkey
    - **Q**: The market value of this product is part of Japan or Turkey?
  - **Ex-3**: L.C. Waikiki – Turkish – T-shirt – Cambodia
    - **Q**: The market value of thoes T-shirts is part of Turkey or Cambodia?\_

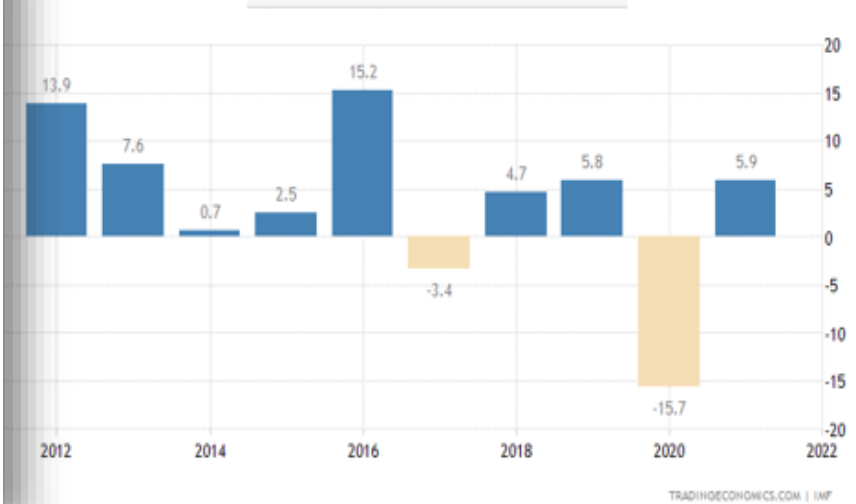
## 7) In a Given Time Period

- ... during a specific interval of time; normally a year or a quarter of a year...
  - Quarterly GDP data
  - Annual GDP data

GDP results, Quarter I: January-March, 2022 (Turkey)

Year	Quarter	GDP			
		Current prices (Million TRY)	Current prices (Million \$)	Chain-linked Volume index (2009=100)	Percentage change (%)
2020	Annual	5 046 883	716 902	179.2	1.8
	I	1 071 223	176 200	161.3	4.4
	II	1 037 692	152 585	153.0	-10.4
	III	1 413 883	196 582	198.8	6.3
	IV	1 524 085	191 535	203.8	6.2
2021	Annual	7 209 040	802 678	198.9	11.0
	I	1 390 704	188 655	173.0	7.3
	II	1 585 213	189 072	186.5	21.9
	III	1 919 314	225 983	213.8	7.5
	IV	2 313 810	198 968	222.4	9.1
2022	I	2 496 328	179 800	185.7	7.3

Iraq GDP Annual Growth Rate



# GDP

- 1) the market value
- 2) of all
- 3) final
- 4) g&s
- 5) produced
- 6) in a country
- 7) in a given time period



**GDP**  
&  
**The Economy's Income & Expenditure**  
(The Circular Flow Diagram)  
&  
**The Components of GDP**

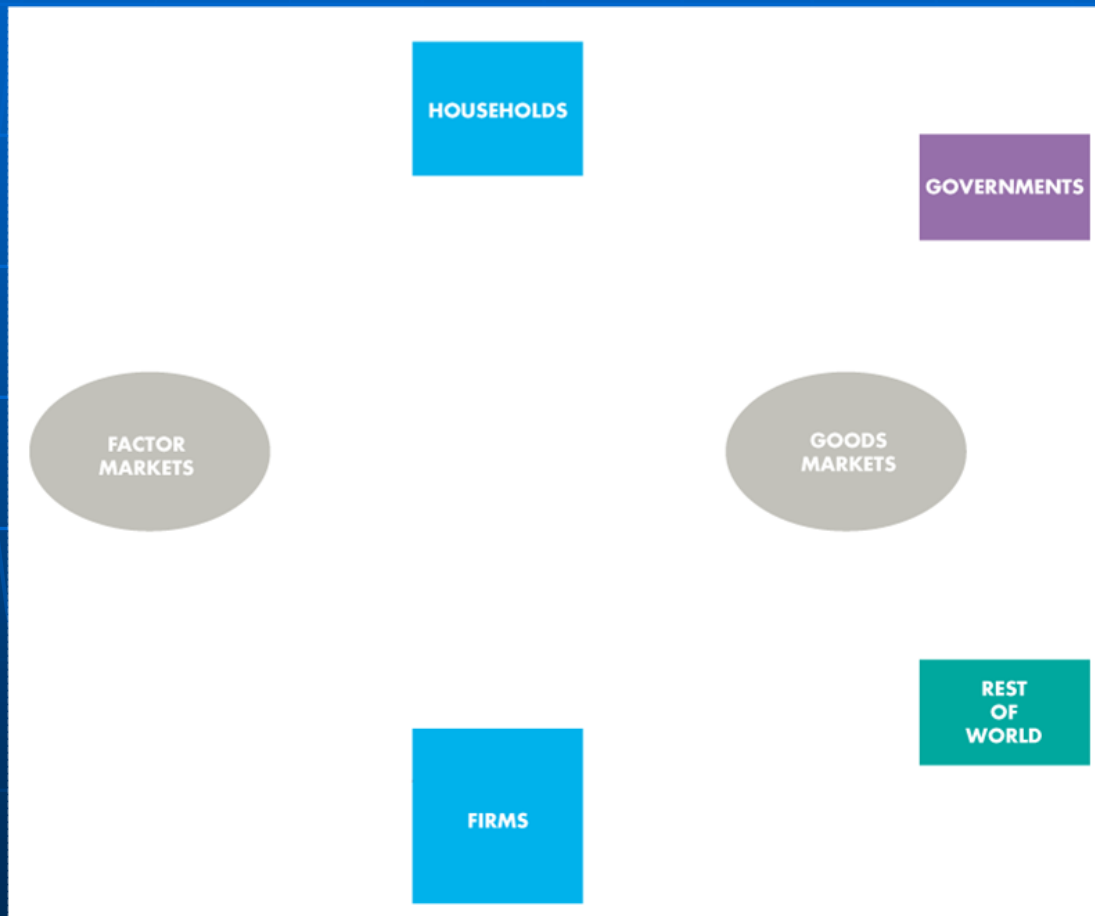


# GDP & The Circular Flow Diagram

- GDP measures the value of production, which **also** = *total expenditure* on final g&s and *total income*...
- The circular flow diagram illustrates the equality of income and expenditure ↔↔

# The Circular Flow of Expenditure & Income

- *The circular flow diagram shows the transactions among households, firms, governments, & the rest of the world:*

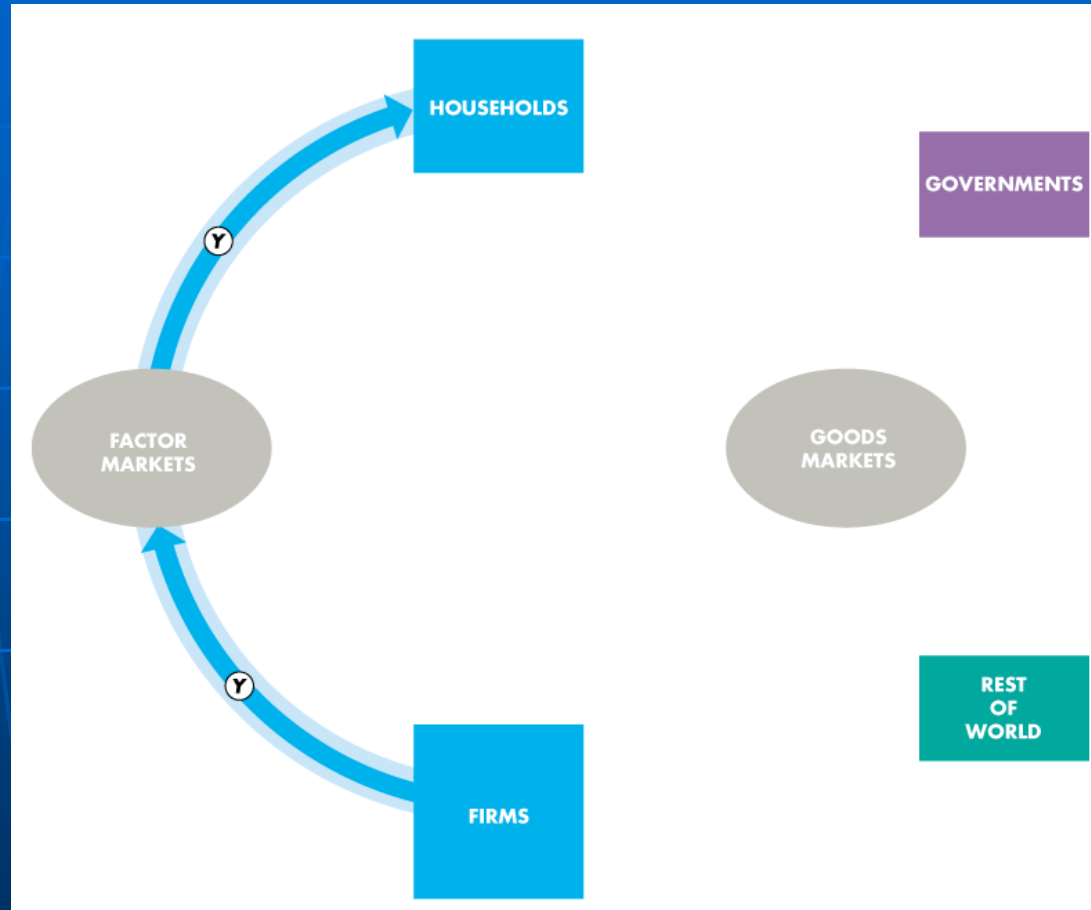


# Households & Firms and Factor Markets

- Households sell and firms buy the services of labor, capital, & land in **factor markets**.
- For these factor services, firms pay income (Y) to households:
  - wages → labor services
  - interest → the use of capital
  - rent → the use of land
  - profit → entrepreneurship

➤  $Y = \text{wages} + \text{interest} + \text{rent} + \text{profit}$

# The Circular Flow of Expenditure & Income



- ... $Y$ , shows total income paid by firms to households.
  - $Y = \text{wages} + \text{interest} + \text{rent} + \text{profit}$

# Goods Market

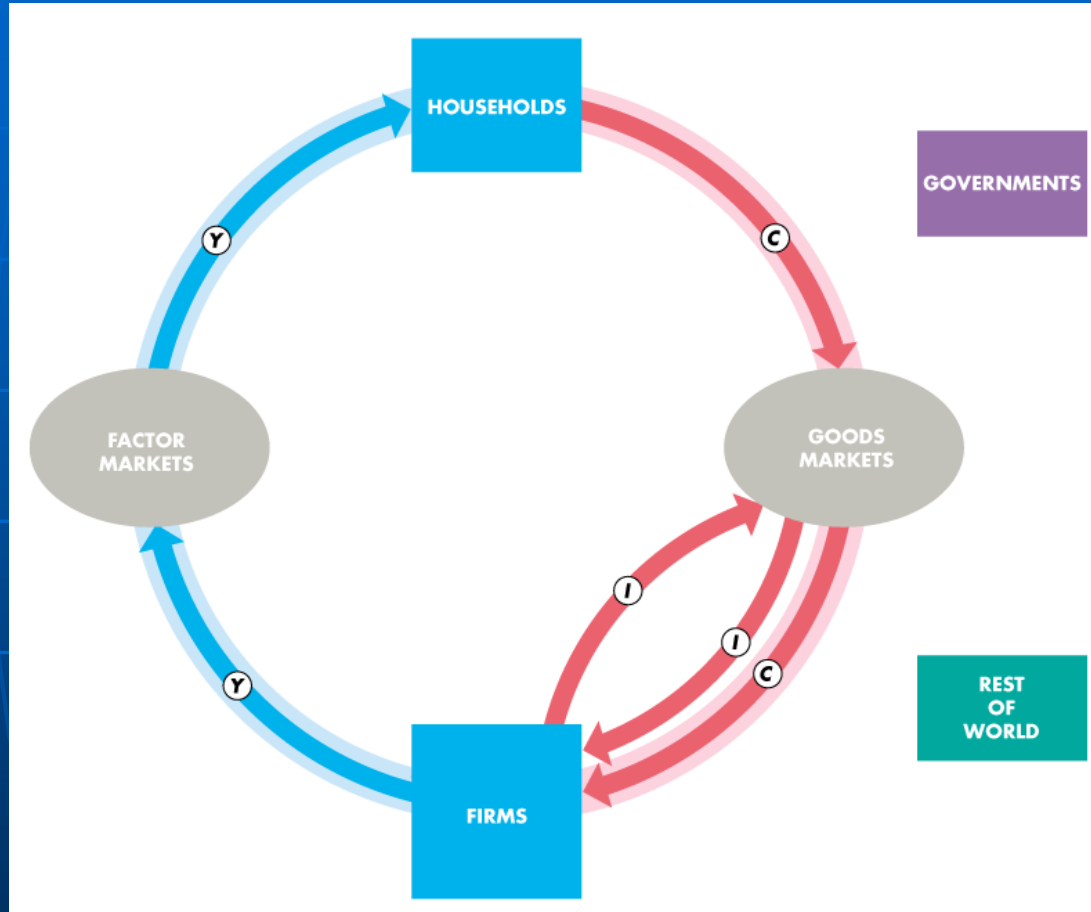
## 1) Consumption Expenditure (C)

- Firms sell and households (*consumer*) buy *g&s* in the **g. mrkt.**
- **C** is the spending by households on *g&s*, *with the exception of purchases of new housing.*

## 2) Investment Expenditure (I)

- Firms buy & sell new capital equipment in the g. mrkt. & put unsold output into inventory.
  - Ex: Toyota; total production:1000 – total sales: 950 = 50?
- **I** is the spending on capital equipment, new plant, the additions to inventories, & structures (*including new housing*).\_

# The Circular Flow of Expenditure & Income

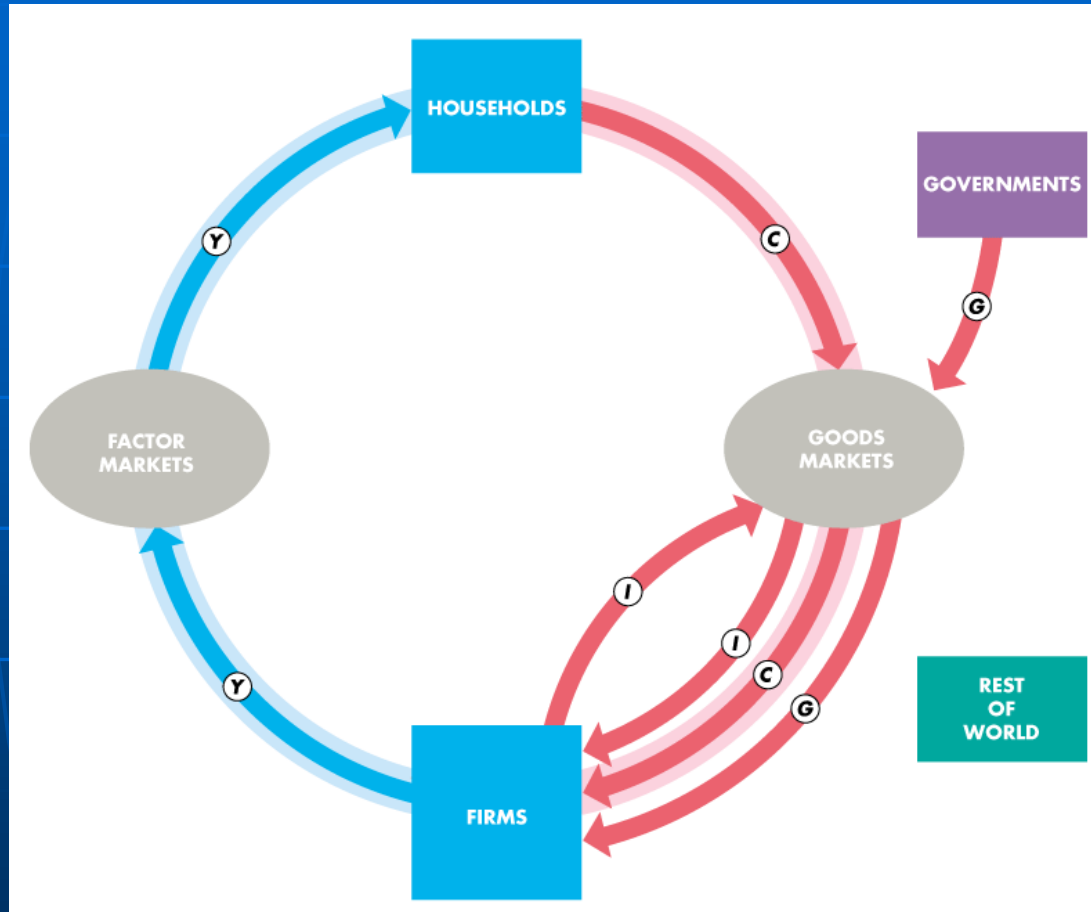


- **Consumption expenditure** is shown by the red flow, labeled *C*.
- **Investment** is shown by the red flow, *I*.

# Governments

- 1) Governments purchase g&s from firms, and their spending on g&s is called **government expenditure**.
  - includes; the salaries of government workers & expenditures on public works
  
- 2) Governments finance their expenditure with **taxes** and pay **financial transfers** to households, such as unemployment benefits, and pay subsidies to firms. (**transfer expenditure/payments**)?
  - These financial transfers are not part of the circular flow of expenditure & income (GDP). Because they are not made in exchange for currently produced g&s.\_\_

# The Circular Flow of Expenditure & Income



- Government expenditure is shown as the red flow,  $G$ .

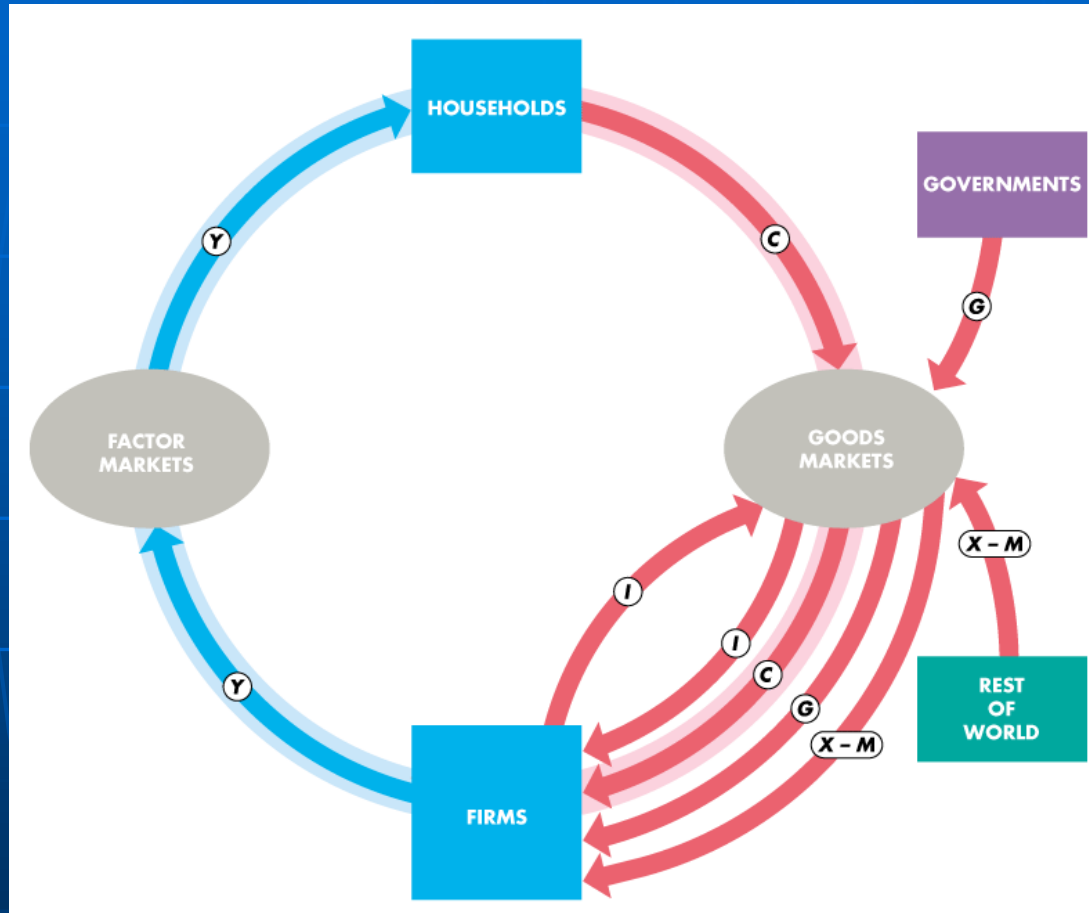


# Rest of the World

(Net Exports - NX)

- Firms in Iraq;
  - sell goods to the rest of the world - **exports (X)**
  - buy goods from the rest of the world - **imports (M)**
- **Net Exports (Trade Balance);**  $X - M = NX$
- *Q: Why net? : M are subtracted from X*
- If NX are *positive*, the net flow of goods is from Iraqi firms to the rest of the world; foreign trade surplus.
- If NX are *negative*, the net flow of goods is from the rest of the world to Iraqi firms; foreign trade deficit.
- If NX are *zero*, X & M are exactly equal; balanced trade.\_\_

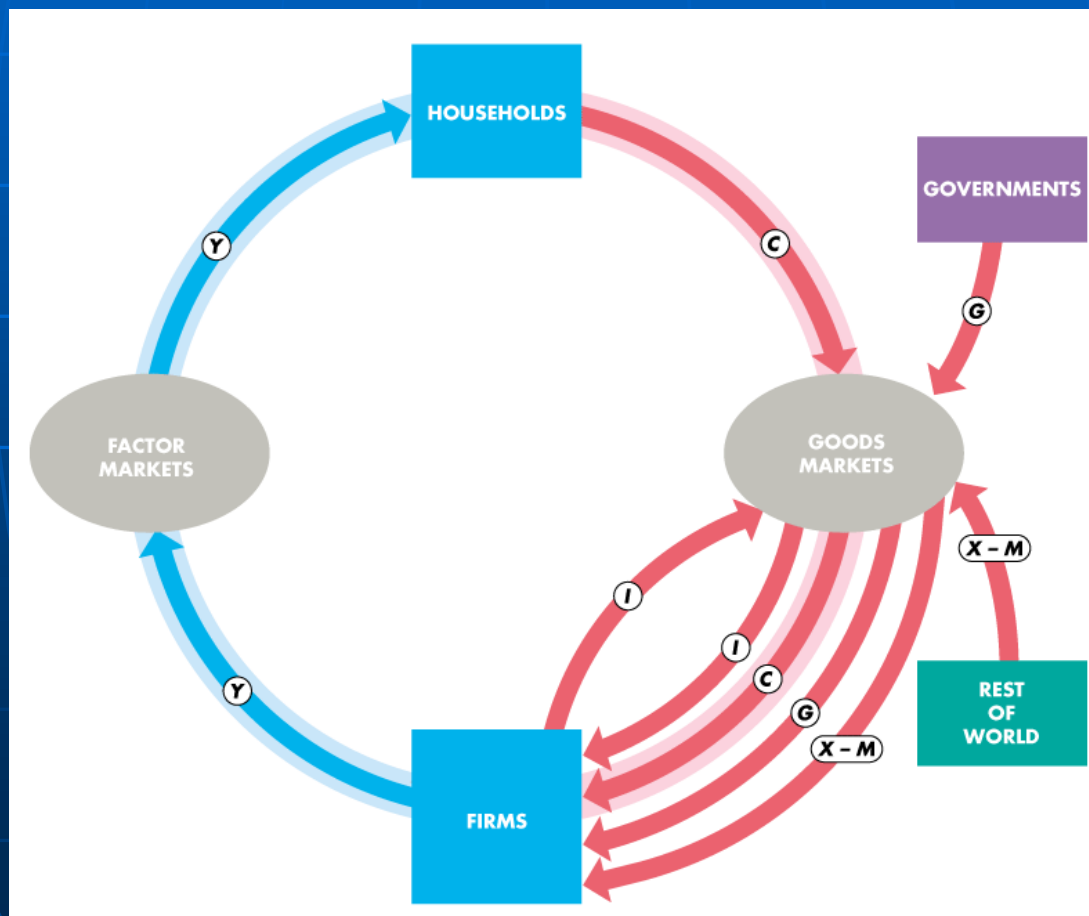
# The Circular Flow of Expenditure & Income



- **Net Exports** are shown by the red flow,  $X-M$ .

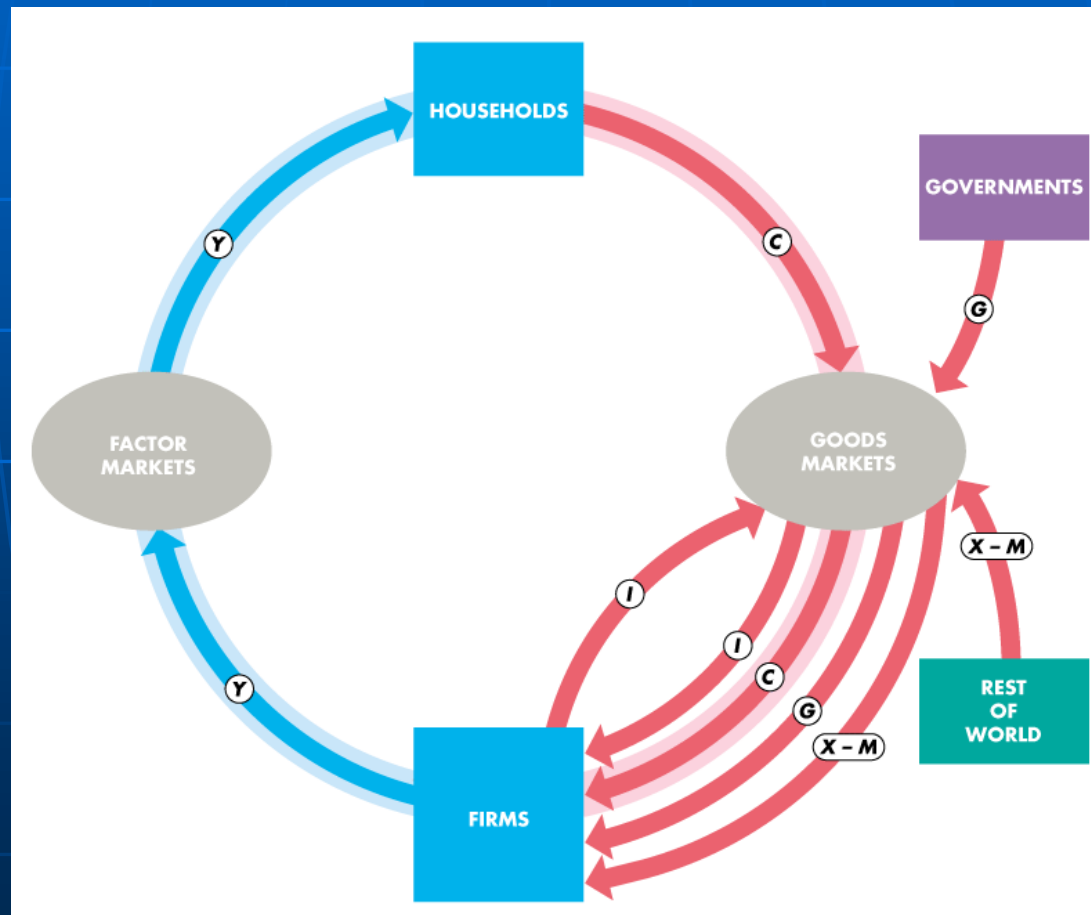
# The Circular Flow of Expenditure & Income

- The blue and red flows are the circular flow of *total income* and *total expenditure*.



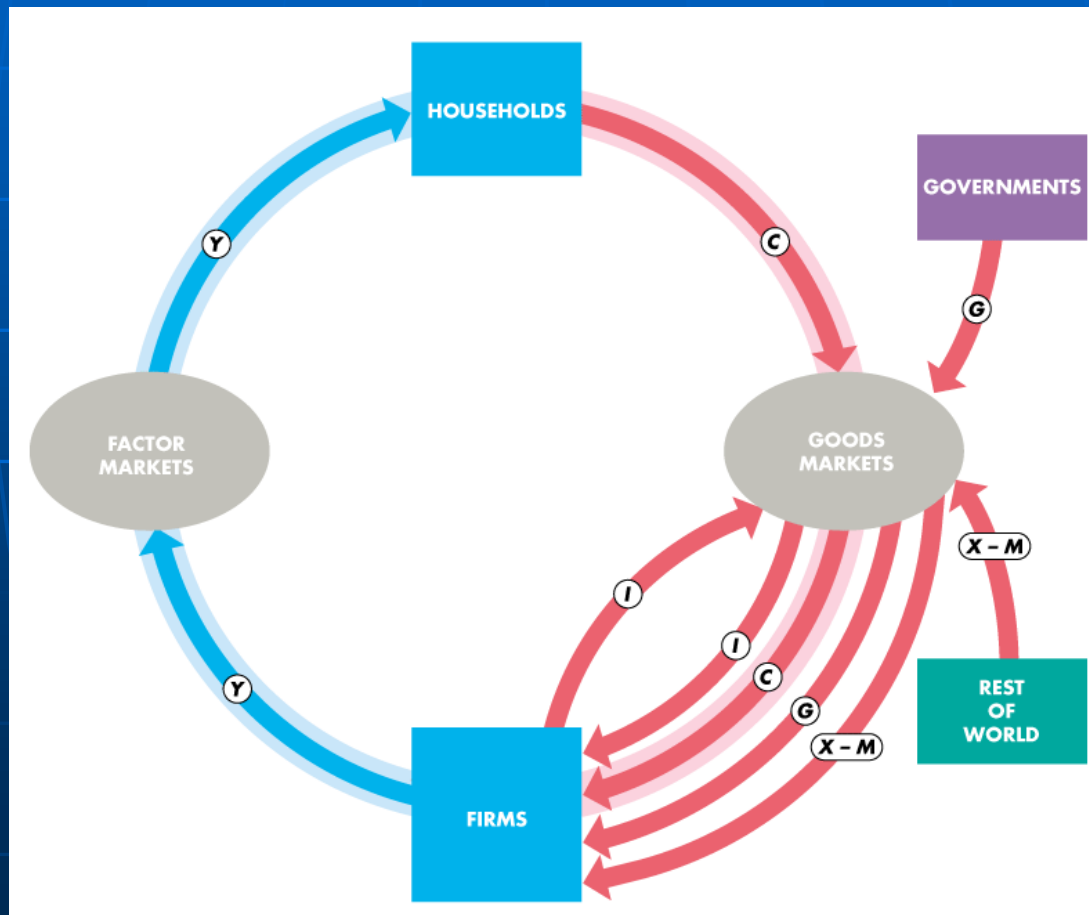
# The Circular Flow of Expenditure & Income

- The sum of *the blue flows* = *the red flow*.



# The Circular Flow of Expenditure & Income

That is:  $Y = C + I + G + X - M$



# The Economy's Income & Expenditure

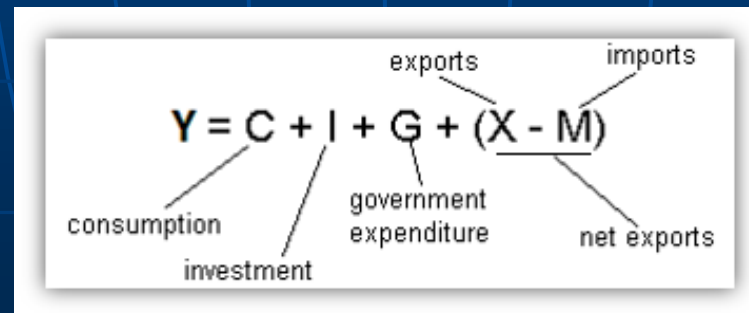
- For an economy as a whole, income must equal expenditure. Why?
- Because:
  - Every transaction has a buyer & a seller.
  - Every dollar of *spending* by some buyer is a dollar of *income* for some seller. ↔

# GDP = Income = Expenditure

- The circular flow shows two ways of measuring GDP:
- **GDP = Income = Expenditure**
- 1) Aggregate income (Y) equals the total amount paid for the use of factors of production: *wages+interest+rent+profit*
- 2) Total expenditure on final g&s equals GDP;

$$GDP = C + I + G + (X - M)$$

- Firms pay out all their receipts from the sale of final goods.  
So  
**Income = Expenditure**



# The Components of GDP

- GDP ( $Y$ ) is the sum of the following:
  - Consumption ( $C$ )
  - Investment ( $I$ )
  - Government Purchases/Expenditures ( $G$ )
  - Net Exports ( $NX=X-M$ )

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

## Case Study

in Iraq (% of GDP)

$C = 50,4\%$  (2013)

$I = 20,6\%$  (2016)

$G = 22,9\%$  (2016)

$NX = -8,4\%$  (2016)



# Gross Domestic Product

## Why “Gross”?

- Recall

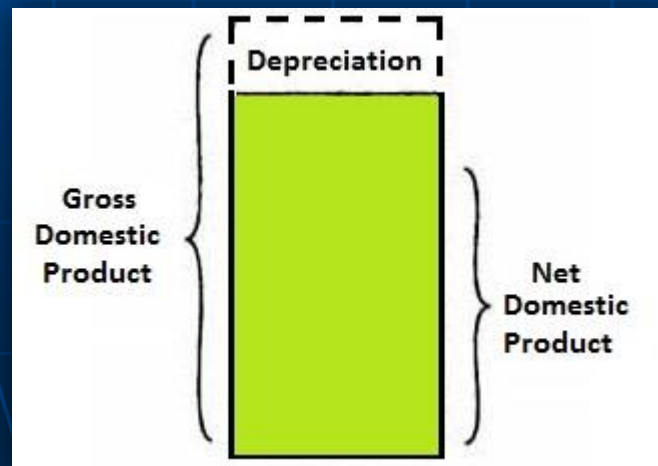
GDP : the value of all final products ...

- **Q: Why Is Domestic Product “Gross”?**

- ❖ “Gross” means *before* deducting the depreciation of capital.

- The opposite of *gross* is *net*:

- ❖ “Net” means *after* subtracting the amortization of capital. ↻↻



# Depreciation - Net investment - Gross investment

- **Depreciation:** the decrease in the value of a firm's capital that results from wear & tear, the passage of time and obsolescence.
- **Gross investment:** the total amount spent on purchases of new capital and on replacing depreciated capital.
- **Net investment:** the increase in the value of the firm's capital.

$$\text{Net investment} = \text{Gross investment} - \text{Depreciation}$$

- Ex : Iraqi Airways - buys 5 new airplanes - retires 2 old...
- **Q:** Gross Investment?, Depreciation?, Net Investment? \_

# GDP - Investment - Profit

- $\text{Gross investment} = \text{Net investment} + \text{Depreciation}$
- Gross investment is one of the expenditures included in *the expenditure approach* to measuring GDP.
  - So, total product is a “gross” measure.
- $\text{Gross profit} = \text{Net profit} + \text{Depreciation}$
- Gross profit, which is a firm’s profit before subtracting depreciation, is one of the incomes included in *the income approach* to measuring GDP.
  - So, total product is a “gross” measure. \_

# GDP - NDP

- **GDP:**  
... is calculated before deducting the depreciation of capital.
- **NDP (The Net Domestic Product):**  
...is adjusted to account for depreciation,  
calculated by subtracting depreciation from GDP.

$$\text{NDP} = \text{GDP} - \text{Depreciation}$$

# Measuring GDP

- Three approaches to measure GDP:
  - 1) The production approach
  - 2) The expenditure approach
  - 3) The income approach

# Measuring GDP-1

## The Production Approach

(Value-added Approach)

- the sum of all production activity within an economy.

$$\text{GDP} = \text{output} - \text{intermediate consumption} + \text{taxes on products} - \text{subsidies on products}$$

- *Output*: all the g&s produced
- *Intermediate consumption*: all the g&s consumed or transformed in a production process.
- *The taxes & subsidies*: included in order to put all three approaches on a consistent valuation basis.

---

**Tax**: a compulsory contribution to state revenue, levied by the gov. on worker's income and business profits or added to the cost of g&s.

**Subsidy**: a sum of money granted by gov. to assist an industry or business, (the price of g&s may remain low).

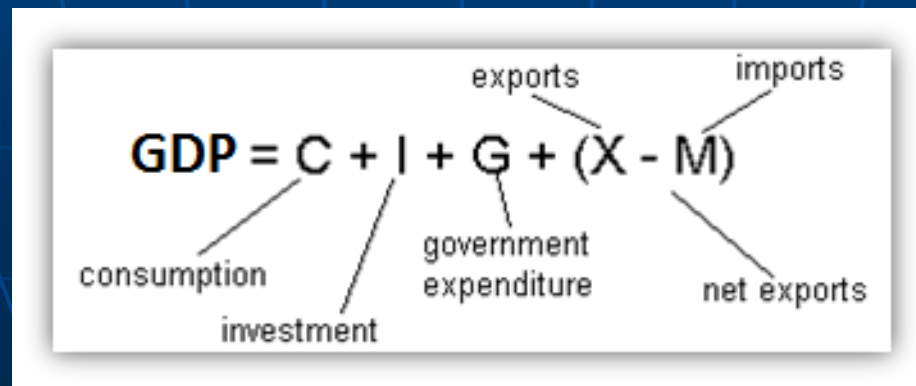
# Measuring GDP-2

## The Expenditure Approach

measures GDP as the sum of;

- consumption expenditure (C)
- gross investment expenditure (I)
- government expenditure on g&s (G)
- net exports (X-M=NX)

$$\text{GDP} = C + I + G + (X - M)$$



# Measuring GDP-3

## The Income Approach

- measures GDP by summing the incomes that firms pay households for the factors of production they hire.
- The *National Income and Product Accounts* divide incomes into 5 categories:
  - 1) Compensation of employees
  - 2) Net interest
  - 3) Rental income
  - 4) Corporate profits
  - 5) Proprietors' income
- These % income components sum to *net domestic income at factor cost*. ➡➡



# Measuring GDP-3

## The Income Approach

- Two adjustments must be made to get GDP:
  1. Indirect taxes minus subsidies are added to get from *factor costs* to *market prices*.
  2. Depreciation is added to get from *net domestic product* to *GDP*:

**GDP**

=

***Wages + Rent + Interest + Profit + Indirect Taxes – Subsidies + Depreciation***

---

*Value-added tax (VAT): a kind of indirect tax*

*Income tax: a kind of direct tax*

briefly

# Approaches to GDP

## *Expenditure Approach*

Consumption by Households  
+  
Investment by Businesses  
+  
Government Purchases  
+  
Net Exports

**G**  
**= D =**  
**P**

## *Income Approach*

Wages  
+  
Rents  
+  
Interest  
+  
Profits  
  
+ Indirect Taxes  
- Subsidies  
+ Depreciation

**G**  
**= D =**  
**P**

## *Production Approach*

Output  
-  
Intermediate Consumption  
+  
Taxes on Products  
-  
Subsidies on Products

# GDP



GDP in Iraq was worth 207.89 billion \$ in 2021, according to official data from the World Bank. The GDP value of Iraq represents 0.01% of the world economy.

**Q: Is this GDP Nominal or Real ? Why?**

# Nominal GDP *Versus* Real GDP

- **Nominal GDP**: the value of all final g&s produced during a given year *valued at the prices that prevailed in that same year.*
- **Real GDP**: the value of all final g&s produced in a given year when valued at *the prices of a reference base year.*

# Reference Base Year in Iraq

## GDP deflator (base year varies by country) - Iraq

World Bank national accounts data, and OECD National Accounts data files.



➤ Q: How can we measure Nominal GDP and Real GDP? ↔↔

# Calculating Nominal & Real GDP in 2005 (in the base year)

- This Table (a) shows the quantities produced and the prices in 2005.
- Nominal GDP in 2005 is \$100 million.
- What is real GDP, and Why?
- Because 2005 is the base year, real GDP & nominal GDP both are \$100 million.

**TABLE 21.3** Calculating Nominal GDP and Real GDP

Item	Quantity (millions)	Price (dollars)	Expenditure (millions of dollars)
<b>(a) In 2005</b>			
C T-shirts	10	5	50
I Computer chips	3	10	30
G Security services	1	20	20
Y Real and Nominal GDP in 2005			100

# Calculating Nominal GDP in 2012

- Table (b) shows the quantities produced and the prices in 2012.
- Nominal GDP in 2012 is \$300 million.
- Nominal GDP in 2012 is 3 times its value in 2005.
- *Q: But, by how much has production increased? ➡*

**TABLE 21.3** Calculating Nominal GDP and Real GDP

Item	Quantity (millions)	Price (dollars)	Expenditure (millions of dollars)
<b>(a) In 2005</b>			
C T-shirts	10	5	50
I Computer chips	3	10	30
G Security services	1	20	20
Y Real and Nominal GDP in 2005			100
<b>(b) In 2012</b>			
C T-shirts	4	5	20
I Computer chips	2	20	40
G Security services	6	40	240
Y Nominal GDP in 2012			300

# Calculating Real GDP in 2012

- In the Table (c), we calculate real GDP in 2012:
- **What Quantities?**
- The quantities are those of 2012, as in part (b).
- **What Prices?**
- The prices are those in the base year (2005) as in part (a)...
- The sum of these expenditures is real GDP in 2012, which is \$160 million...

**TABLE 21.3** Calculating Nominal GDP and Real GDP

Item	Quantity (millions)	Price (dollars)	Expenditure (millions of dollars)
<b>(a) In 2005</b>			
C T-shirts	10	5	50
I Computer chips	3	10	30
G Security services	1	20	20
Y Real and Nominal GDP in 2005			100
<b>(b) In 2012</b>			
C T-shirts	4	5	20
I Computer chips	2	20	40
G Security services	6	40	240
Y Nominal GDP in 2012			300
<b>(c) Quantities of 2012 valued at prices of 2005</b>			
C T-shirts	4	5	20
I Computer chips	2	10	20
G Security services	6	20	120
Y Real GDP in 2012			160



# Real and Nominal GDP

(Base year 2015)

## Prices and Quantities

Year	Price of Hot Dogs	Quantity of Hot Dogs	Price of Hamburgers	Quantity of Hamburgers
2015	\$1	100	\$2	50
2016	2	150	3	100
2017	3	200	4	150

## Year

## Calculating Nominal GDP

2015	$(\$1 \text{ per hot dog} \times 100 \text{ hot dogs}) + (\$2 \text{ per hamburger} \times 50 \text{ hamburgers}) = \$200$
2016	$(\$2 \text{ per hot dog} \times 150 \text{ hot dogs}) + (\$3 \text{ per hamburger} \times 100 \text{ hamburgers}) = \$600$
2017	$(\$3 \text{ per hot dog} \times 200 \text{ hot dogs}) + (\$4 \text{ per hamburger} \times 150 \text{ hamburgers}) = \$1,200$

## Year

## Calculating Real GDP (base year 2015)

2015	$(\$1 \text{ per hot dog} \times 100 \text{ hot dogs}) + (\$2 \text{ per hamburger} \times 50 \text{ hamburgers}) = \$200$
2016	$(\$1 \text{ per hot dog} \times 150 \text{ hot dogs}) + (\$2 \text{ per hamburger} \times 100 \text{ hamburgers}) = \$350$
2017	$(\$1 \text{ per hot dog} \times 200 \text{ hot dogs}) + (\$2 \text{ per hamburger} \times 150 \text{ hamburgers}) = \$500$

# Real GDP versus Nominal GDP

## Result:

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

# GDP Deflator

- ...reflects only the prices of g&s (what's happening to prices, not quantities)  
But; Nominal GDP & Real GDP?

- ...:

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

- Ex: GDP Deflator =  $300/160 \times 100 = 187.5$

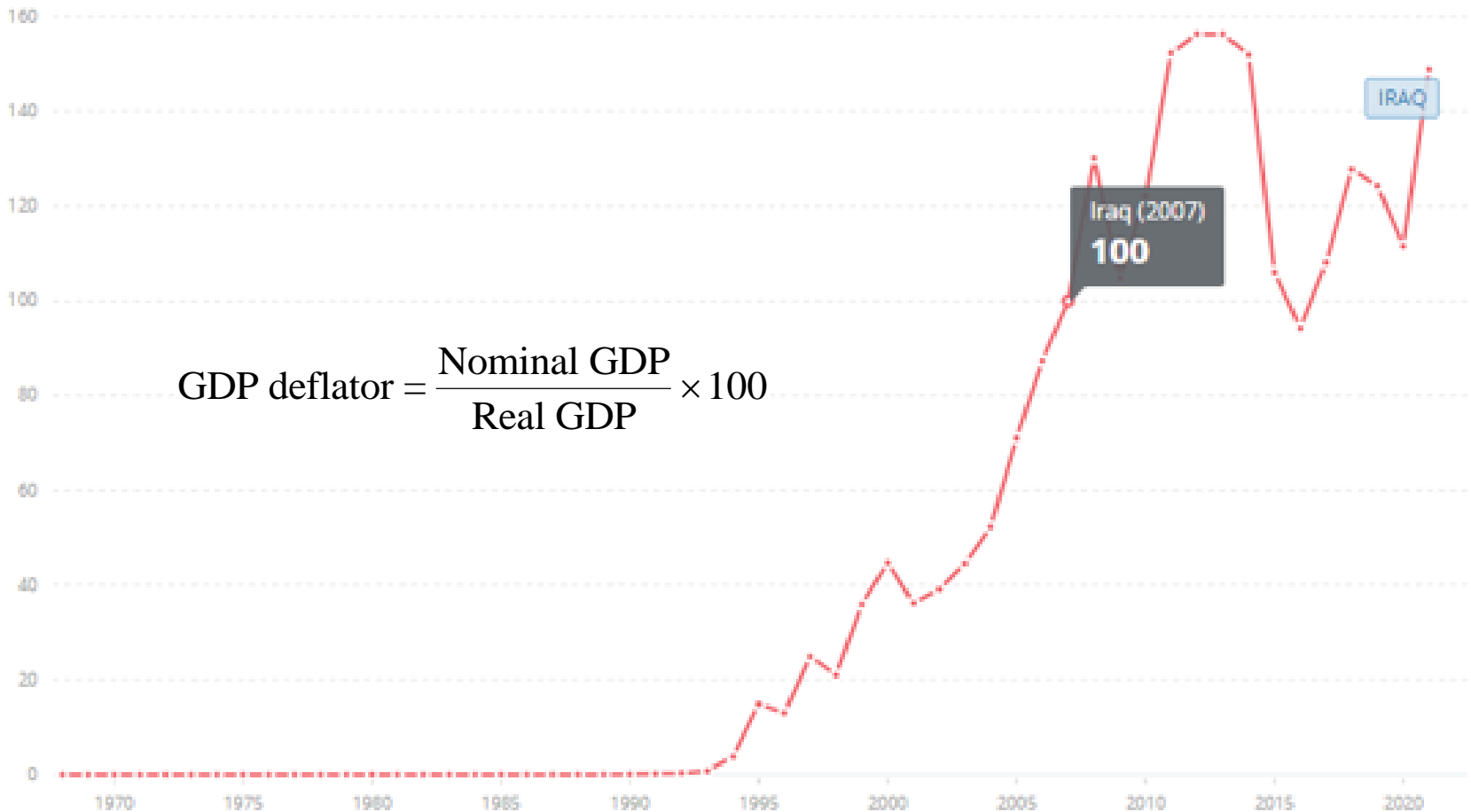
TABLE 21.3 Calculating Nominal GDP and Real GDP

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C T-shirts	4	5	20
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Y Real GDP in 2012			160

# GDP Deflator in Iraq

## GDP deflator (base year varies by country) - Iraq

World Bank national accounts data, and OECD National Accounts data files.



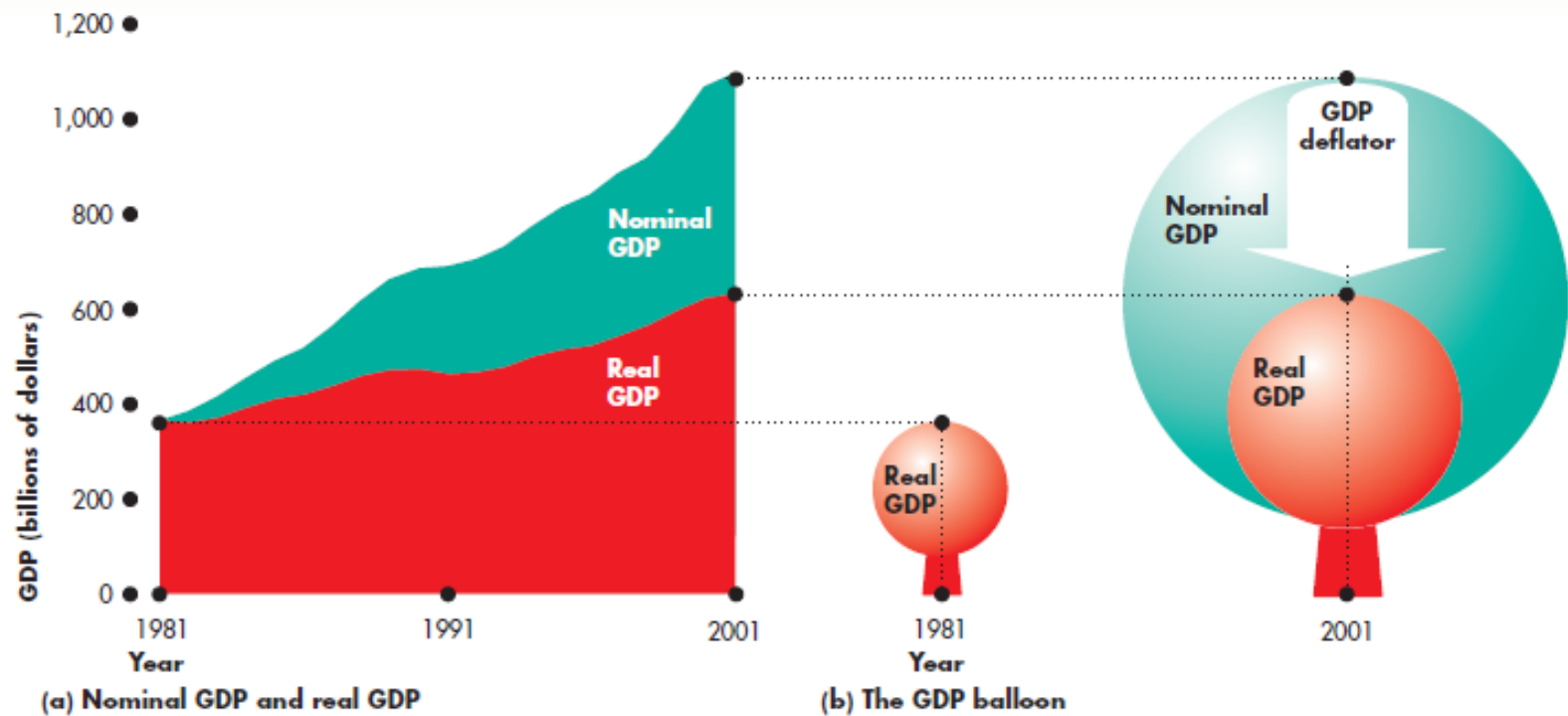
$$\text{GDP deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$$

# Deflating the GDP Balloon

NGDP as a balloon that is blown up by growing production & rising prices.

GDP deflator lets the inflation air out of the nominal GDP balloon so that we can see what happened to real GDP \_

FIGURE 20.3 The Canadian GDP Balloon



# Why do economists use real GDP?

## The Uses of Real GDP

➤ ...for two main purposes:

to compare the standard of living

- 1) over time in a country
- 2) across countries



# The Uses of Real GDP

## 1. To compare the standard of living over time in a country

- One method: **Real GDP per person (p.p.)**...

$$\text{Real GDP p.p.} = \text{Real GDP} / \text{Population}$$

- ... tells us the value of g&s that the average person can enjoy.
- Recall: By using *real* GDP, we remove any influence that rising prices might have had on our comparison. \_\_

# The Uses of Real GDP

## 1. To compare the standard of living over time in a country

- **Long-Term Trend**

...

- A handy way of comparing real GDP p.p. over time is to express it as a ratio of some reference year.

- Ex; in 1960, real GDP p.p. was \$15,000 and in 2021, it was \$45,000.

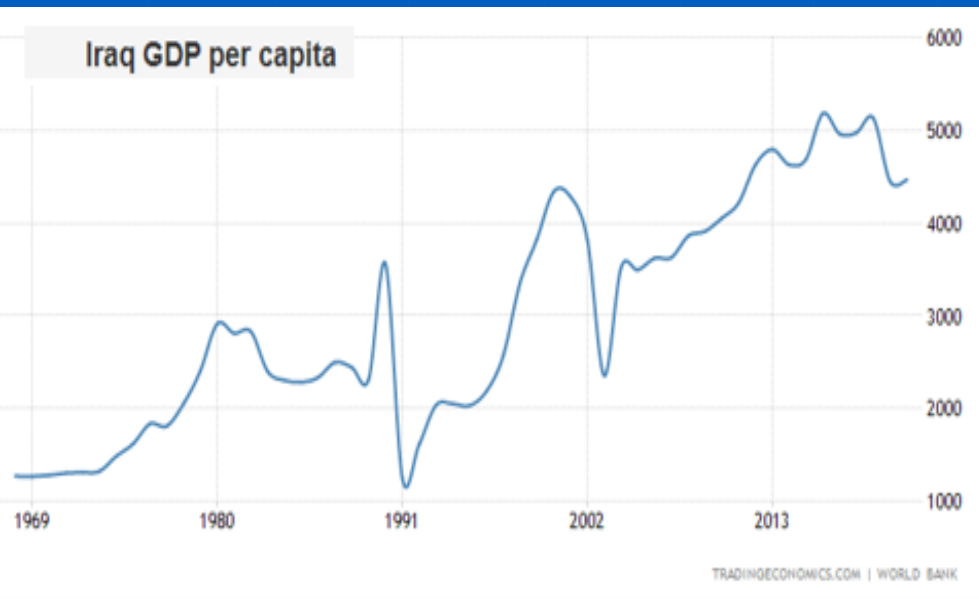
- So real GDP p.p. in 2021 was 3 times its 1960 level - that is;
  - $\$45,000 \div \$15,000 = 3$  —



# Real GDP over Recent History

## GDP Long-Term Trend

- in Iraq -



- in 1970, real GDP p.p. was \$1,275 and in 2021, it was \$4,465.

- So real GDP p.p. in 2021 was 3,50 times its 1970 level; that is:

➤  $\$4,465 \div \$1,275 = 3,50$

# The Uses of Real GDP

## 1. To compare the standard of living over time in a country

- Two features of our expanding living standard are
  - 1) The growth of potential GDP p.p.
  - 2) Fluctuations of real GDP around *potential GDP*

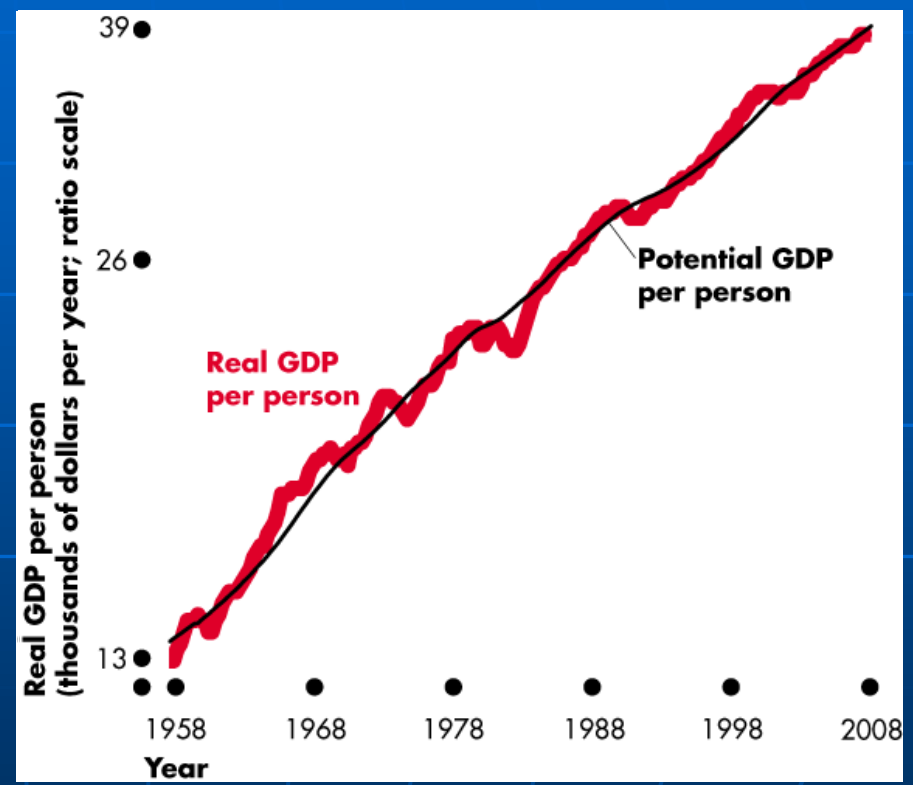
### **Potential GDP ?**

the value of real GDP

when all the economy's factors of production are fully employed. ➡

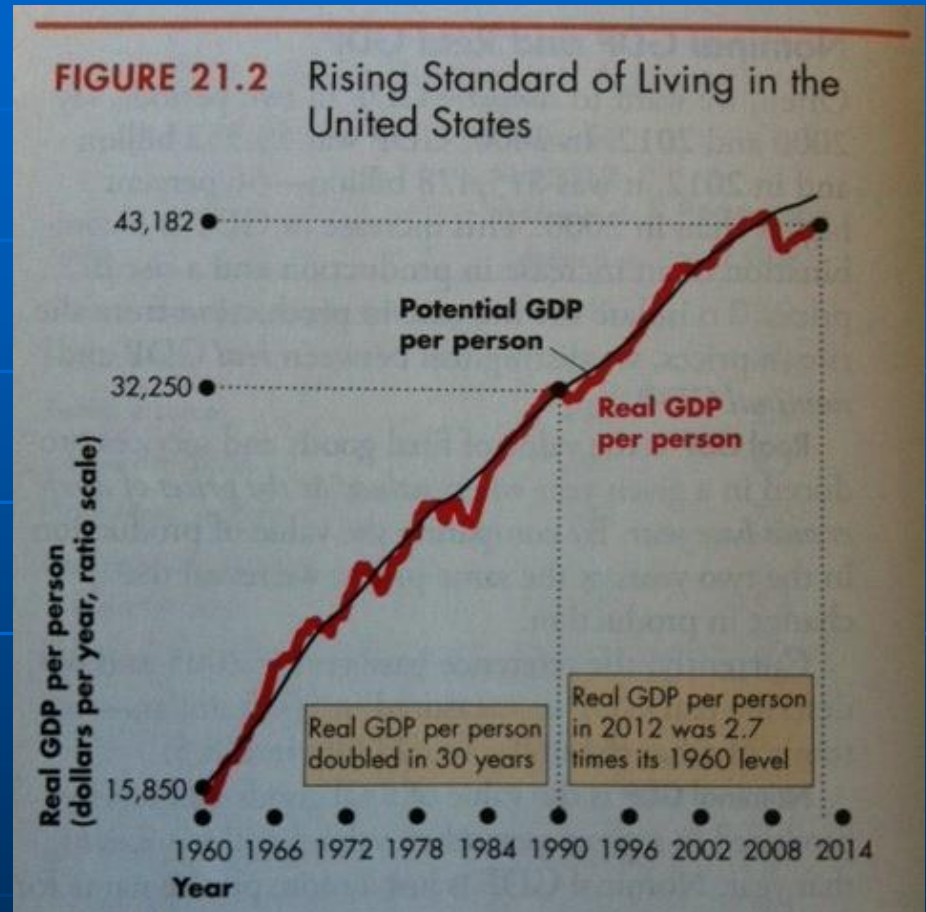
# Real & Potential GDP in the U.S.

- ...U.S. real & potential GDP p.p.
- 1) Potential GDP grows at a steady pace because the quantities of the factors of production and their productivity grow at a steady pace...
- 2) Real GDP fluctuates around potential GDP...



# Real GDP in the U.S.

- Real GDP p.p. in the U.S.:
  - Doubled in 30 years.
  - Tripled in 50 years. \_



# Real GDP Fluctuations

- **Real GDP fluctuations : business cycle**

- A **business cycle** is a periodic but irregular up-&-down movement of total production (& other measures of economic activity)...

- Every cycle has two phases:

1. *Expansion*

2. *Recession*

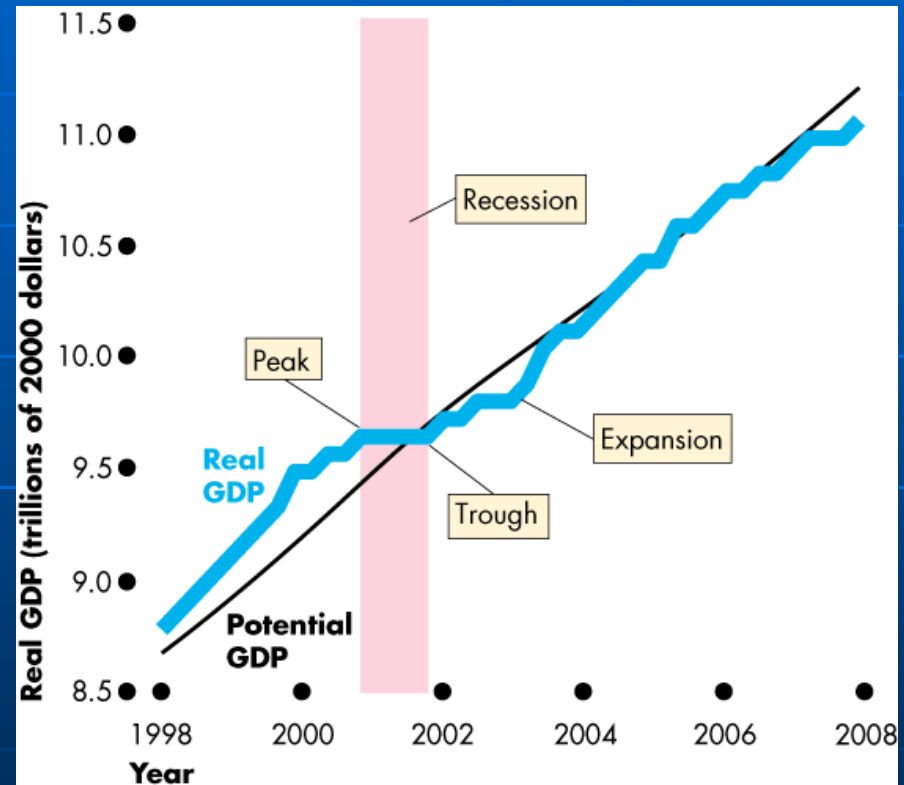
- and two turning points:

1. *Peak*

2. *Trough* ➡➡

## Real GDP Fluctuations

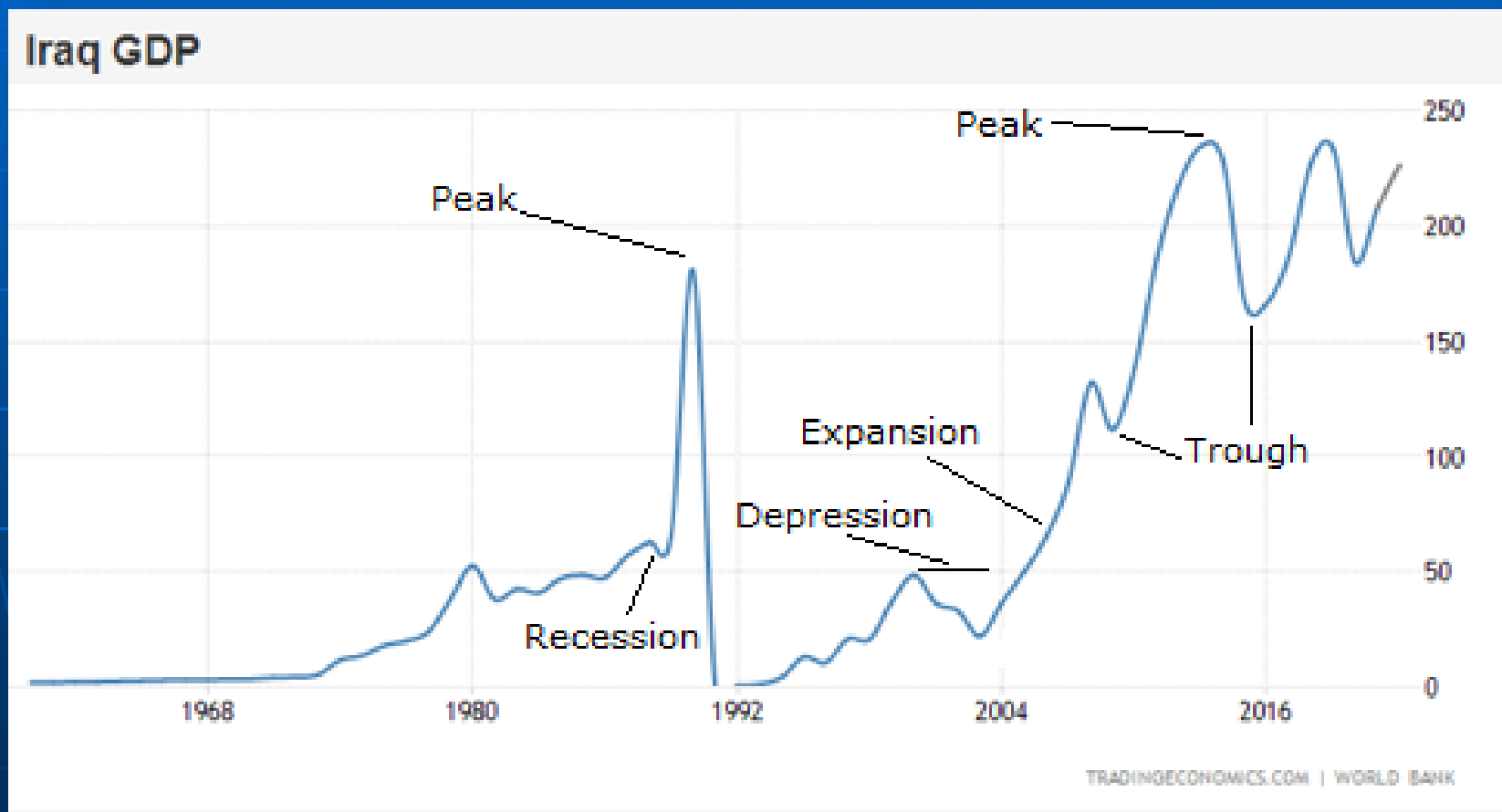
- ... features of the business cycle.
- **Expansion** is a period during which real GDP  $\uparrow$
- **Recession** is a period during which real GDP  $\downarrow$  ...  $\_$



# Recession - Depression

- **Recession**: characterised as a period of negative economic growth for two consecutive quarters.
- **Depression**: a recession but much more severe & long lasting.
  - ❖ ***Characteristics of depression:***
    - Decline in output for a prolonged period e.g. greater than 2 years.
    - A drop in output of 10% or greater.
    - Unemployment rate touching 20%.

# Real GDP Fluctuations in Iraq





# Why do economists use real GDP?

## The Uses of Real GDP

➤ ...for two main purposes:

to compare the standard of living

■ 1) over time in a country

■ 2) across countries



# The Uses of Real GDP

## 2) To compare the standard of living across countries

- Two problems arise in using real GDP to compare... :
  - 1) Each country uses different currencies.
  - 2) Prices of particular products in one country may be much less/more than in the other country.

Solutions ? ⇔⇔

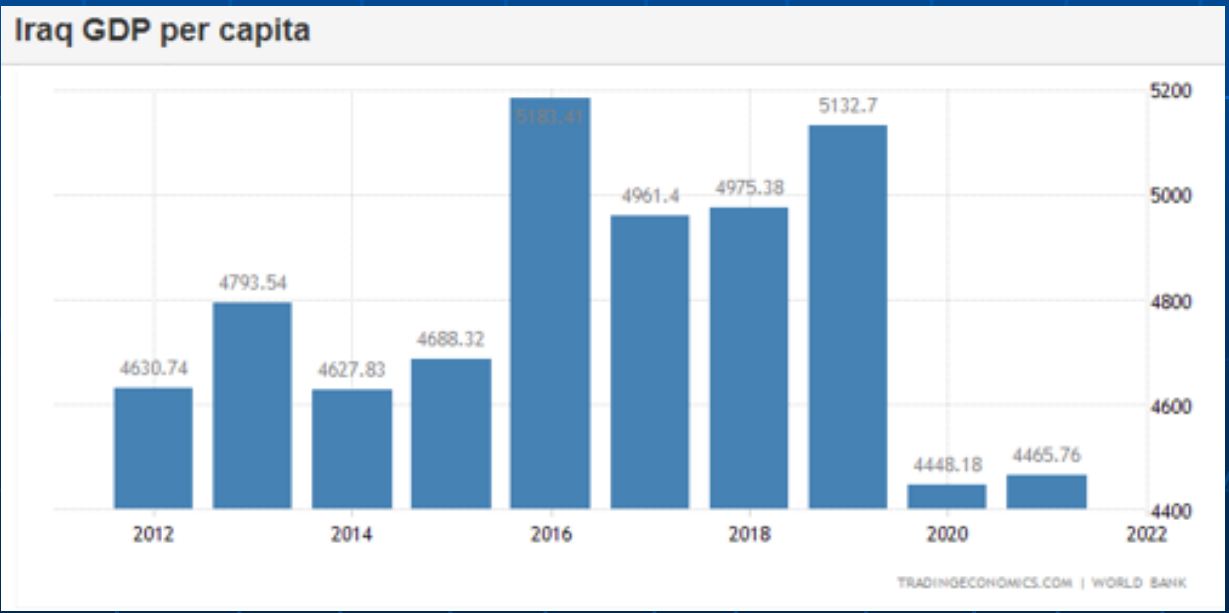
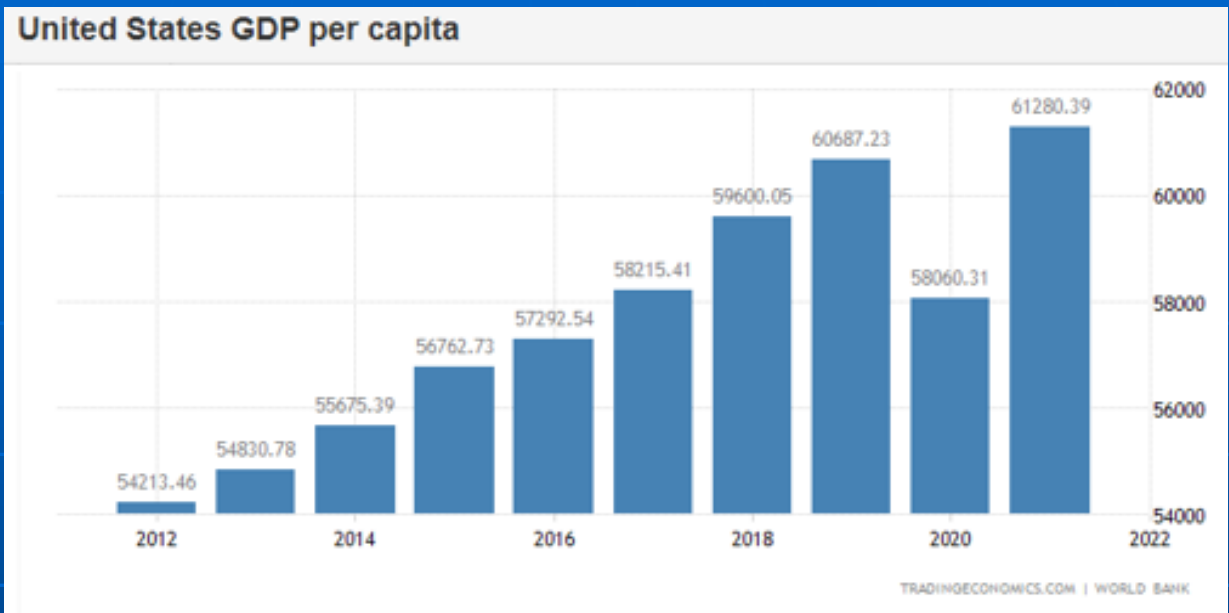
# The Uses of Real GDP

## 2) To compare the standard of living across countries

- **1) First Problem**: Different Currencies
  - **Solution**: The real GDP of one country must be converted into the same currency units as the real GDP of the other. (by using **Market Exchange Rate - MER**)\_

# Iraq and USA (MER-2021)

$61.28 / 4.46 = 13.72$



# The Uses of Real GDP

2) To compare the standard of living across countries

**2) Second Problem:** Prices of particular products in one country may be much less/more than in the other.

- So, using the MER... is problematic: ➡➡

# The Uses of Real GDP

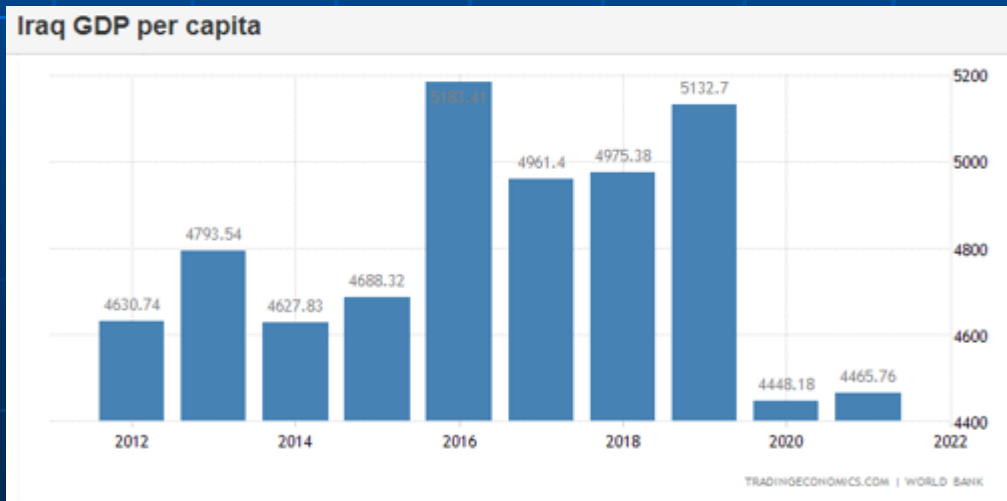
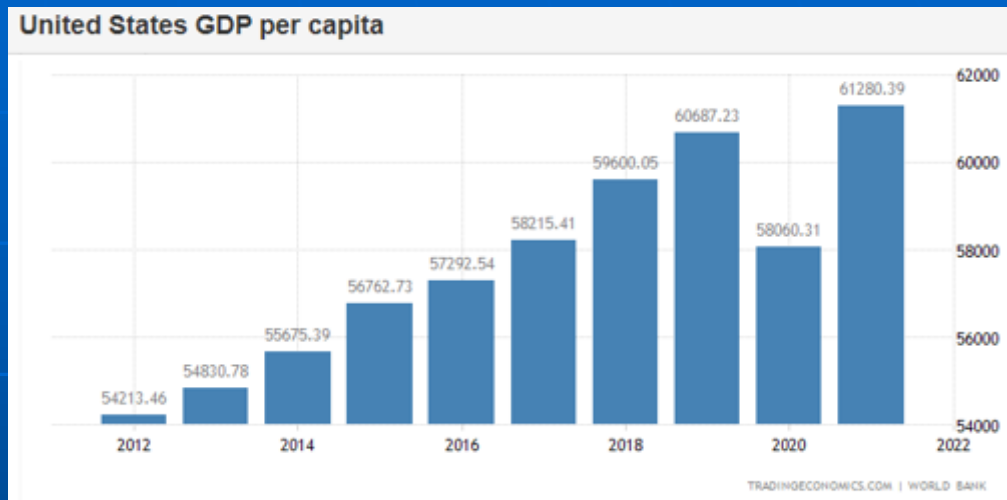
## 2) To compare the standard of living across countries

- ... the second problem:  
(different prices...)

➤ MER:  $61280/4465 = 13.72$   
times...

➤ Real GDP p.p. in Iraq is %7.3 of  
U.S. real GDP p.p.

➤ Means; Iraq is very poor. \_



# The Uses of Real GDP

2) To compare the standard of living across countries

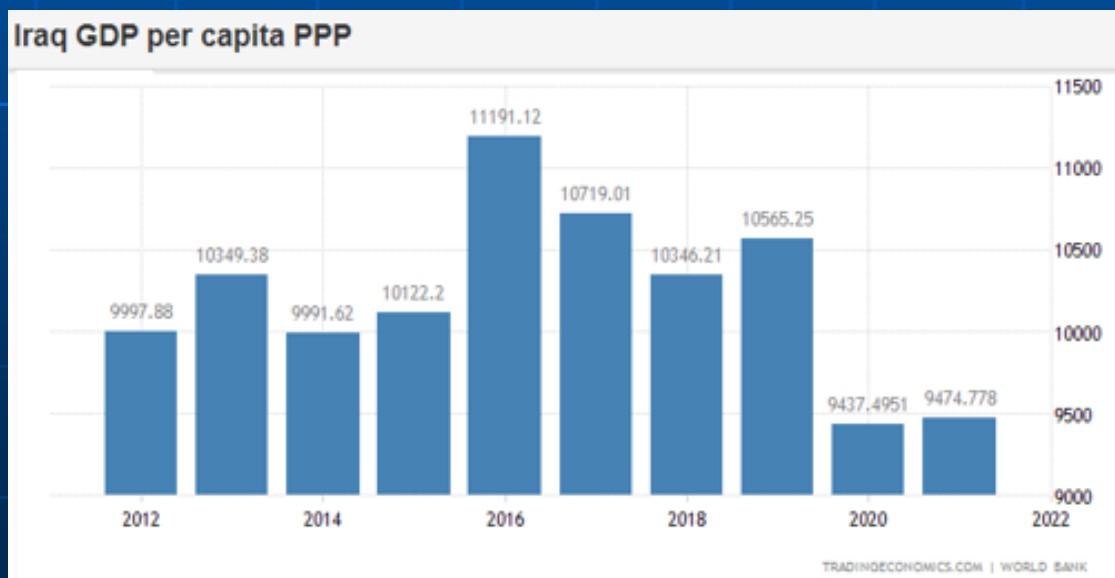
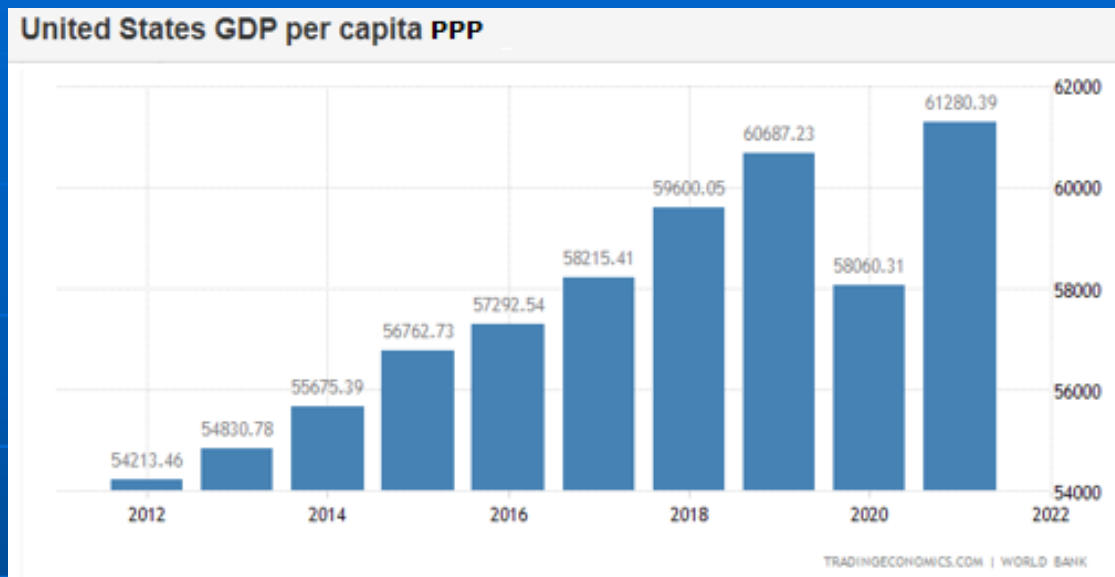
**The Solution of the Second Problem:**

**Purchasing Power Parity (PPP)**

# Case Study

## Iraq and USA (PPP)

$$61280 / 9474 = 6.46$$



- **Using PPP prices:**
- U.S. real GDP p.p. was 6.46 times Iraqi real GDP p.p.
- Iraq's real GDP p.p. is %15 of U.S. real GDP p.p.

**Recall**

- Using **MER**:
  - $61280 / 4465 = 13.72$  times...
  - Real GDP p.p. in Iraq is %7.3 of U.S. real GDP p.p.



## MER vs. PPP

- Iraq: GDP p.p. 4465 \$ ;  $4465/1 = 4465$  kg rice
- the U.S.: GDP p.p. 61280 \$ ;  $61280/2.12 = 28844$  kg rice
- 1) MER:  $61280/4465 = 13.72$  times
- 2) PPP:  $28844/4465 = 6.46$  times

**Q: More realistic approach?**

# Why do economists use real GDP?

## The Uses of Real GDP

➤ ...for two main purposes:

to compare the standard of living

- 1) over time in a country
- 2) across countries

# Is GDP a Good Measure of Economic Well-Being?

## **GDP and Economic Well-Being**

- ..is the best single measure of the economic well-being of a society:
  - GDP p.p. tells us the income & expenditure of the average person...
  - Increase in GDP p.p. indicates?
  - Higher GDP p.p.? ...
- **But**, GDP isn't a perfect measure of the happiness/quality of life.
  - **Q: Why?** ⇔⇔

Is GDP a Good Measure of Economic Well-Being?

## **The Limitations of Real GDP**

- Some of the factors that influence the standard of living & that are not part of GDP are;



- 1) Households production**
- 2) Underground economic activity**
- 3) Leisure time**
- 4) Environmental quality**

# The Limitations of Real GDP-1

## 1) Household Production

- An enormous amount of production takes place every day in our homes:
  - ❖ Ex: preparing meals, cleaning the kitchen, caring for a child...
- Because these productive activities are not trade in markets, they are not included in GDP.
- So, GDP *underestimates* total production. \_

# The Limitations of Real GDP-2

## 2) Underground Economic Activities

- ...are purposely hidden from the view of the government;
  - 1) to avoid taxes & regulations or
  - 2) because the g&s being produced are illegal...
- Ex-1: the use of illegal labor (trade/production illegal)
- Ex-2: production & distribution of illegal drugs (black mrkt)\_

# The Limitations of Real GDP-3

## 3) Leisure Time

- ...is an economic good that adds to our economic well-being:
- *Ceteris paribus*, the more leisure we have, the better off we are.
- Our working time is valued as part of GDP, but our leisure time is not.
- Over the years, leisure time has steadily increased;
  - Why?
  - Ex: - The number of vacation days has increased
    - The workweek has become shorter
    - More people take early retirement
- These improvements in economic well-being are not reflected in real GDP... —

# The Limitations of Real GDP-4

## 4) Environmental Quality

- ...is directly influenced by economic activities.
- Examples of environmental consequences of industrial production:
  - a- the production & burning of hydrocarbon fuels damages our environment*
  - b- the pollution of lakes & rivers... (air, water, soil, radioactive, noise, heat/thermal, light..)*
- Resources that are used to protect the envrnmnt are valued as part of GDP.
- ***But*** if we did not use such pieces of equipment, we would not count getting worse air, that we were breathing as a negative part of GDP.... \_



# An additional problem: GDP & The distribution of income

- **Recall:**
- GDP p.p. tells us the income & expenditure of the average person...
- **But** it says nothing about the distribution of income... —

# Measuring the Cost of Living

(Price Level)

**N.G. Mankiw, Principles of Macroeconomics, Chapter-11**

**N.G. Mankiw, Principles of Economics, Chapter-24**

# Measuring the Cost of Living

At the end of this chapter we will be able to:

- 1) Describe the price level, inflation...
- 2) Explain how we measure the price level and the inflation rate
- 3) Use Price Indexes to compare dollar figures from different times
- 4) Explain why the Consumer Price Index (CPI) measure of inflation might be biased
- 5) Explain why inflation is a problem

# Definitions ...

- The **price level**: the average level of prices & the value of money.
- **Inflation**: A persistently rising price level...  
& falling purchasing power of money
- **Deflation**: A persistently falling price level...
- **Hyperinflation** (the worst of inflation):  
money loses its value so quickly. (Ex: 50% monthly inflation rate)
- **Disinflation**: reduction in the rate of inflation.
- The **inflation/deflation rate**:  
the annual  $\% \Delta$  in the price level. \_

# Inflation or not?

- One-time increase in prices ?
- An increase in price of one g/s?  
are not inflation. \_

# Why are we interested in the price level?

- Because we want to;
  - 1) Measure the inflation (/deflation) rate
  - 2) Distinguish between real & nominal values of economic variables.\_

# The Consumer Price Index (CPI)

- The **CPI** measures the average of the prices paid by typical consumers for a “fixed” basket of consumer g&s.
- So, the price of rice/mango is included in the CPI, but the price of a forklift is not...
- kown as a cost of living index:  
to monitor changes in the cost of living over time.

# How the CPI Calculated?

## Constructing the CPI

- ...involves 4 stages:
  - 1) Selecting the CPI basket
  - 2) Conducting a monthly price survey  
(Finding the Prices)
  - 3) Choosing a Base Year
  - 4) Calculating the CPI
    - 4.1. Find the cost of the CPI basket at base-period/year prices.
    - 4.2. Find the cost of the CPI basket at current-period prices.
    - 4.3. Calculate the CPI for the current period... ➡➡



# 1. Selecting The CPI Basket

- **Fix the Basket:**  
Determine which prices are most important to the typical consumer.
- If a typical consumer buys more rice than apple, then the price of rice is more important...
- and therefore,  
should be given greater weight in measuring the cost of living.
- The CPI basket is based on a Consumer Expenditure Survey.
  - Ex: The CPI basket contains;
    - 80,000 g&s in USA
    - 1,200 g&s in Turkey
    - 333 g&s in Iraq (2018)...

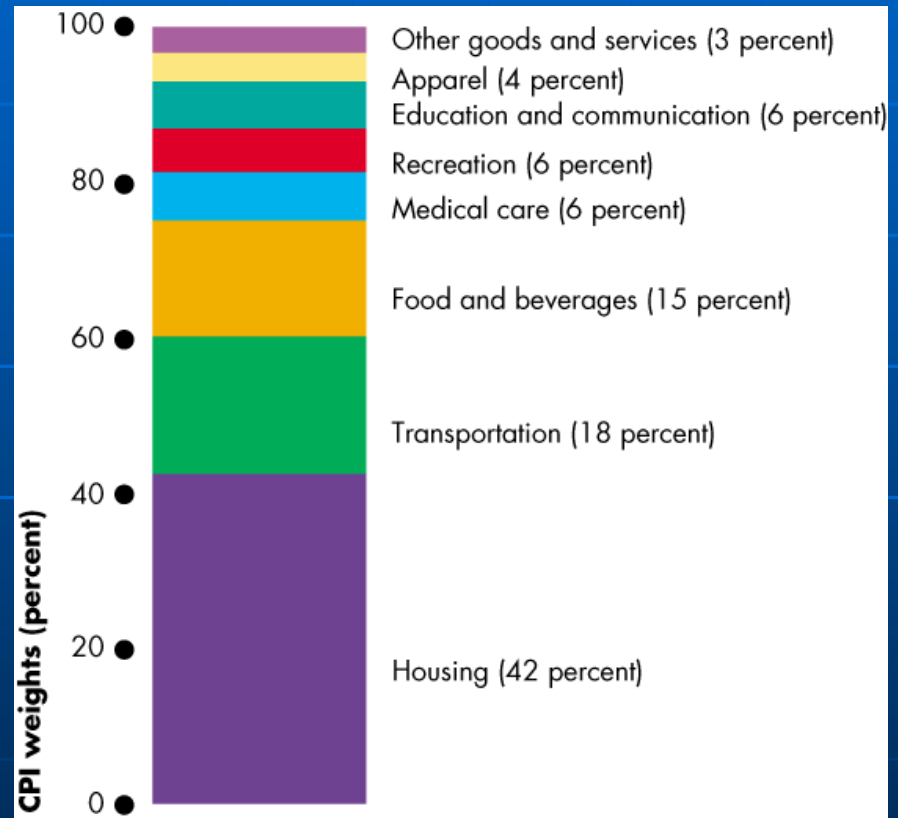
# Selecting The CPI Basket

- To select the products basket for CPI, the cut-off sampling method has been used:
- The sample included all products with monthly individual average expenditure on exceeded 25 ID on the Iraqi Household Social & Economical Survey (IHSES) on 2012.
- After selecting the sample some products which have not been included in the sample but considered important from the consumer's point of view have been added,
- At the same time some products excluded which were not considered to be important to the consumer although they appeared with expenditure exceeds 25 ID.
- Products sample included 333 products out of 803 products on (IHSES).

# CPI Weights (%)

in USA

- ....
- Housing is the largest component.
- Transportation, food & beverages are the next largest components.



# **CPI Weighs (%)** in Iraq

- As the different products differ in its relative importance,
  - this entails that the relative importance must be calculated for every commodity & service
  - by depending on the individual's monthly expenditure average
  - which is taken from Household Economical & Social Survey \_

## Constructing the CPI

# 2. Conducting the Monthly Price Survey

- Find the prices of each of the g&s in the basket for each point in time.
- How?
- **Ex-1:** Every month, Bureau of Labor Statistics employees check the prices of 80,000 g&s on 30 metropolitan areas in USA.
- **Ex-2:** Every month, Statistical Institute employees check the prices of 1,200 g&s on 27,500 workplace and 4,200 houses in Turkey. 🔄🔄

## Constructing the CPI

# 2. Conducting the Monthly Price Survey

- Find the prices of each of the g&s in the basket for each point in time.
- How?
- **Ex-3:** The Ministry of Planning\Central Statistical Organization in **Iraq**, 333 items (2018).
- Prices being collected from each governorate center and from the most important Qhada due to population size (except the center Qhada).
- CPI covers the urban area of Iraq account for 69% of total population on 2012.

# 3. Choosing a Base Year

- Designate one year as the base year, making it the benchmark against which other years are compared.
- **Iraq:** The year 2012 has been chosen to be the base year for (CPI) considering that it is the year in which Iraqi Household Social & Economical Survey (IHSES) was conducted.

# 4. Calculating the CPI

4.1. Find the cost of the CPI basket at base-period/year prices.

4.2. Find the cost of the CPI basket at current-period prices.

4.3. Calculate the CPI for the current period... ➡➡



# the CPI calculation

## 4.1. Find the cost of the CPI basket at base-period/year prices

- ...
- Let's assume:  
In a simple economy, ...
- The CPI basket...
- the prices ...
- The cost of the CPI basket ...

**TABLE 22.1** The CPI:  
A Simplified Calculation

(a) The cost of the CPI basket at base-period  
prices: 2008

CPI basket			Cost of
Item	Quantity	Price	CPI Basket
Oranges	10	\$1.00	\$10
Haircuts	5	\$8.00	\$40
Cost of CPI basket at base-period prices			<u>\$50</u>

# the CPI calculation

## 4.2. Find the cost of the CPI basket at current-period prices.

- Table 22.1(b) shows the fixed CPI basket of g&s.
- the prices ...
- The cost of the CPI basket ...

**TABLE 22.1** The CPI:  
A Simplified Calculation

(a) The cost of the CPI basket at base-period prices: 2008

CPI basket			Cost of
Item	Quantity	Price	CPI Basket
Oranges	10	\$1.00	\$10
Haircuts	5	\$8.00	<u>\$40</u>
Cost of CPI basket at base-period prices			<u><u>\$50</u></u>

(b) The cost of the CPI basket at current-period prices: 2009

CPI basket			Cost of
Item	Quantity	Price	CPI Basket
Oranges	10	\$2.00	\$20
Haircuts	5	\$10.00	<u>\$50</u>
Cost of CPI basket at current-period prices			<u><u>\$70</u></u>

# the CPI calculation

## 4.3. Calculate the CPI for the current period

- The CPI ... :

$$\text{CPI} = \frac{\text{Cost of basket at current-period prices}}{\text{Cost of basket at base-period prices}} \times 100$$

- Using the numbers for this example,
  - CPI in 2008 =  $(\$50 \div \$50) \times 100 = 100$
  - CPI in 2009 =  $(\$70 \div \$50) \times 100 = 140$
- The CPI is 40% higher ... \_

**TABLE 22.1** The CPI:  
A Simplified Calculation

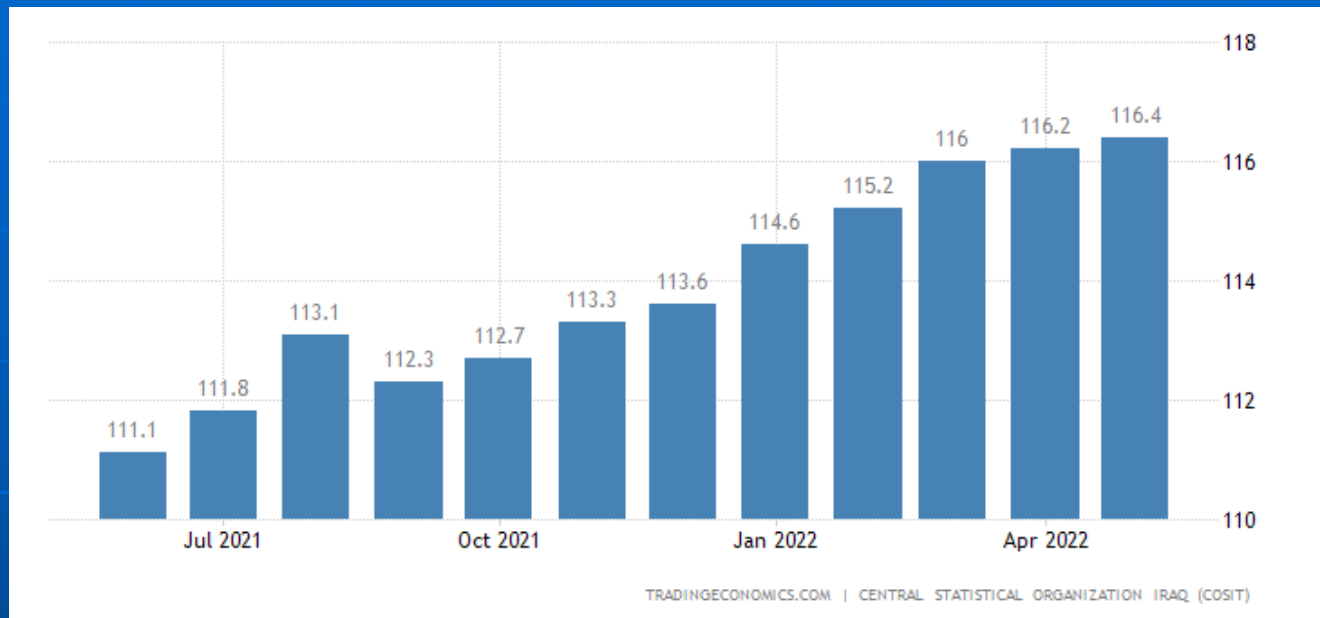
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# Reading the CPI Numbers



The base year:  
2012

# Reading the CPI Numbers

**CPI annual change in Kurdistan Region for the first six months / 2022**

#	Main Groups	Jan 2021	Jan 2022	Annual inflation rate%	Feb 2021	Feb 2022	Annual inflation rate %	Mar 2021	Mar 2022	Annual inflation rate%	April 2021	April 2022	Annual inflation rate%	May 2021	May 2022	Annual inflation rate%	Jun 2021	Jun 2022	Annual inflation rate%
01	Food and Non-Alcoholic Beverages	93.4	100.67	7.8	94.0	100.7	7.2	94.8	103.7	9.5	95.2	104.8	10.1	96.7	104.9	8.5	95.3	104.2	9.3
02	Alcoholic Beverages & Tobacco	126.4	134.90	6.7	126.4	134.9	6.7	127.3	134.1	5.3	128.5	130.5	1.6	138.0	130.5	-6.4	133.8	130.5	-2.5
03	Clothes and Footwear	95.2	102.20	7.4	94.1	101.9	8.2	95.8	102.6	7.1	98.3	102.3	4.1	99.5	102.8	3.4	99.8	103.2	3.5
04	Housing (Rent, Water, Electricity & LPG)	96.0	104.01	8.3	93.9	99.7	6.2	93.6	101.1	8.1	90.9	95.5	5.1	90.4	97.3	7.6	93.3	104.8	12.3
05	House Supplies, Appliances & Maintenance	95.9	98.49	2.7	96.2	99.4	3.3	96.2	102.3	6.3	96.9	104.2	7.5	97.2	105.5	8.5	97.5	106.4	9.1
06	Health	121.3	123.41	1.8	121.5	123.9	2.0	121.8	124.0	1.7	121.8	124.6	2.3	121.8	123.7	1.5	122.0	123.6	1.3
07	Transportation	108.6	116.99	7.7	111.1	117.6	5.9	111.3	118.3	6.3	111.8	117.1	4.7	112.3	120.1	6.9	113.4	122.3	7.8
08	Communications	115.5	126.35	9.4	114.6	127.0	10.9	114.6	129.0	12.6	114.7	128.6	12.1	114.5	123.0	7.4	114.7	123.0	7.2
09	Recreation and Culture	99.6	104.86	5.3	101.9	105.7	3.8	100.1	109.0	8.9	100.5	111.4	10.9	103.0	111.7	8.4	104.4	113.6	8.9
10	Education	104.2	118.45	13.7	104.2	118.5	13.7	104.2	118.5	13.7	104.2	112.3	7.7	104.2	112.1	7.5	104.4	112.1	7.4
11	Restaurants	84.6	87.87	3.9	85.5	89.0	4.1	85.6	93.5	9.2	85.4	96.7	13.3	85.5	99.8	16.8	86.7	100.4	15.8
12	Misc. Services and Goods	124.4	133.14	7.0	123.7	134.4	8.6	121.4	138.8	14.3	123.8	139.5	12.7	127.5	136.8	7.3	128.4	137.1	6.8
00	CPI in average	101.1	108.12	6.9	101.4	107.72	6.3	101.55	109.72	8.1	101.64	109.03	7.3	102.4	109.92	7.3	103.0	111.84	8.6

# Measuring the Inflation Rate

- The major purpose of the CPI is to measure inflation.
- The ***inflation rate*** is the %Δ in the price level from one year to the next.

$$\begin{aligned} & \text{Inflation Rate} \\ & = \\ & [(CPI \text{ this year} - CPI \text{ last year}) \div CPI \text{ last year}] \times 100 \end{aligned}$$

## Case Study

- in Iraq (CPI: 104.6 in 2019; 107.9 in 2020; 113.6 in 2021) infl?
- Ex-1: Inflation rate in 2020 =  $[(107.9 - 104.6) \div 104.6] \times 100 = \mathbf{3,2\%}$
- Ex-2: Inflation rate in 2021 =  $[(113.6 - 107.9) \div 107.9] \times 100 = \mathbf{5,3\%}$

## Calculating the CPI & the Inflation Rate

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

---

4 hot dogs, 2 hamburgers

# Calculating the CPI & the Inflation Rate

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

---

4 hot dogs, 2 hamburgers

## Step 2: Find the Price of Each Good in Each Year

---

Year	Price of Hot Dogs	Price of Hamburgers
2001	\$1	\$2
2002	2	3
2003	3	4



# Calculating the CPI & the Inflation Rate

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## Step 3: Compute the Cost of the Basket of Goods in Each Year

2001	$(\$1 \text{ per hot dog} \times 4 \text{ hot dogs}) + (\$2 \text{ per hamburger} \times 2 \text{ hamburgers}) = \$8$
2002	$(\$2 \text{ per hot dog} \times 4 \text{ hot dogs}) + (\$3 \text{ per hamburger} \times 2 \text{ hamburgers}) = \$14$
2003	$(\$3 \text{ per hot dog} \times 4 \text{ hot dogs}) + (\$4 \text{ per hamburger} \times 2 \text{ hamburgers}) = \$20$

# Example

## Calculating the CPI & the Inflation Rate

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### Step 4: Choose One Year as a Base Year (2001) and Compute the Consumer Price Index in Each Year

2001	$(\$8/\$8) \times 100 = 100$
2002	$(\$14/\$8) \times 100 = 175$
2003	$(\$20/\$8) \times 100 = 250$

# Example

## Calculating the CPI & the Inflation Rate

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

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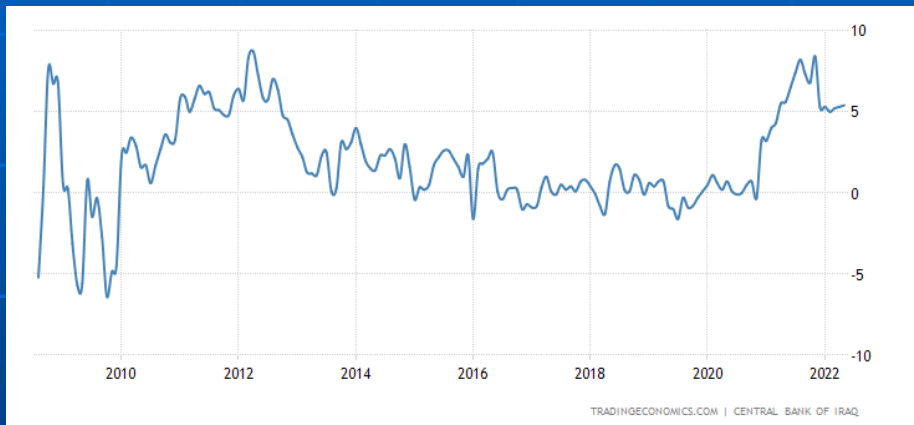
2001	$(\$8/\$8) \times 100 = 100$
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2003	$(\$20/\$8) \times 100 = 250$

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

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

## Price Level & Inflation in Iraq

- Figures show that the inflation rate is;
  - high when the price level is rising rapidly and
  - low when the price level is rising slowly. \_



# Problems in Measuring the Cost of Living

- The CPI is *an accurate measure of the selected g&s* that make up the typical bundle, but it is not a perfect measure of the cost of living.
- The Biased CPI
  - The CPI might overstate the true inflation for 4 reasons:
    - 1) Commodity substitution bias
    - 2) Outlet substitution bias
    - 3) New goods bias
    - 4) Quality change bias →→

# Why is the CPI Biased?

## **1) Commodity Substitution Bias**

- The market basket of g&s used in calculating the CPI is fixed and does not take into account consumers' substitutions away from g&s whose relative prices increase...

# Why is the CPI Biased?

## 2) Outlet Substitution Bias

- As the structure of retailing changes, people switch to buying from cheaper sources, *but* the CPI, as measured, does not consider this outlet substitution.

# Why is the CPI Biased?

## 3) New Goods Bias

- New g&s that were not available in the base year appear and, if they are more expensive than the g&s they replace, they put an upward bias into the CPI... \_



# Why is the CPI Biased?

## 4) Quality Change Bias

- Quality improvements occur every year. Part of the rise in the price is payment for improved quality and is not inflation...
- The CPI counts all the price rise as inflation... \_

# Alternative Price Indexes

- ... are;
  - 1. The Producer Price Index (PPI)
  - 2. GDP Deflator ↔↔

## Alternative Price Indexes

# 1. The Producer Price Index (PPI)

- ...measures the average change over time in the selling prices received by domestic producers for their output.
- ...is useful for investors:  
analyzing potential sales & earnings trends... \_

Recall

## Alternative Price Indexes

### 2. GDP Deflator

- ...includes the prices of all g&s...

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

# The GDP Deflator vs. the CPI

- Economists & policymakers monitor both the GDP deflator and the CPI to gauge how quickly prices are rising.
- There are two important differences between these indexes that can cause them to diverge. →→

# The GDP Deflator vs. the CPI

## *First Difference*

- The *GDP deflator* reflects the prices of all g&s *produced domestically*
- The *CPI* reflects the prices of all g&s *bought by consumers*.

## *Second Difference*

- The *CPI* compares the price of a *fixed basket* of g&s to the price of the basket in the base year.
- The *GDP deflator* compares the price of *currently produced* g&s to the price of the same g&s in the base year.

# Correcting Economic Variables for the Effects of Inflation

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

# 1. Dollar Figures from Different Times

- Do the following to convert (inflate) X's wages in 1950 to dollars in 2016:

$$\begin{aligned}\text{Salary}_{2016} &= \text{Salary}_{1950} \times \frac{\text{Price level in } \mathbf{2016}}{\text{Price level in } \mathbf{1950}} \\ &= \$80,000 \times \frac{177}{15.2} \\ &= \$931,579\end{aligned}$$



## 2. Indexation

- When some dollar amount is automatically corrected for inflation by law/contract, the amount is said to be *indexed* for inflation.
- Why?...\_

### 3. Real & Nominal Interest Rates

- Interest: represents a payment in the future for a transfer of money in the past.
- Interest: money paid regularly at a particular rate for the use of money lent, or for delaying the repayment of a debt.
- The **NIR** is the IR usually reported & not corrected for inflation.
  - It is the IR that a bank pays.
- The **RIR** is the NIR that is corrected for the effects of inflation.

## Real & Nominal Interest Rates

- You put \$1,000 in your bank deposit account for one year.
- NIR was 15%.
- During the year inflation was 10%.
- **Q:** What was the RI rate? & How much was your RI income?

*Real Interest Rate = Nominal Interest Rate - Inflation*

$$= 15\% - 10\% = 5\% \text{ (RI rate)}$$

$$= 1000 \times 5 / 100 = \$50 \text{ (RI income)}$$

# Why is Inflation a Problem?

- Low, steady, and anticipated inflation/deflation is not problem.
- But an unexpected inflation brings big problems & costs:
  - Unpredictable inflation is a problem because it;
    - 1) Redistributes income
    - 2) Redistributes wealth
    - 3) Diverts resources from production
    - 4) Lowers real GDP & employment ➡➡

Inflation is a problem because  
**1) Redistributes income**

- ...between workers & employers:
  - Workers & employers sign wage contracts that last for a year or more.
  - An unexpected inflation  $\uparrow P$ , but doesn't immediately the wages:
  - Workers are worse off, employers are better off. \_

Inflation is a problem because  
**2) Redistributes wealth**

- ...between lenders & borrowers:
- People enter into loan contracts that are fixed in money terms and that pay an interest agreed as % of money borrowed & lent.
- Unexpected inflation hurts lenders but benefits borrowers:

The real interest rate = the nominal interest rate - the inflation rate

Inflation is a problem because

### 3) Diverts resources from production

- A high inflation rate diverts resources;
  - from productive activities
    - to forecasting inflation:
- It can become more profitable to forecast the inflation correctly and managing investments than to invent a new product.
- From a social perspective, this *waste of resources* is a cost of inflation.\_

Inflation is a problem because

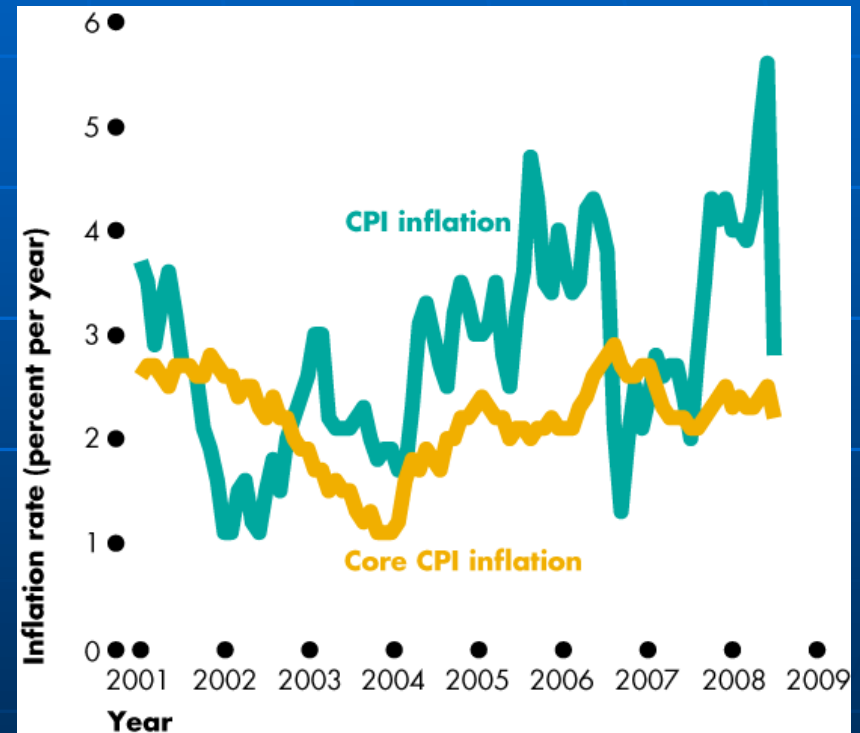
## 4) Lowers Real GDP and Employment

- Unexpected inflation that raises firms' profits brings a rise in investment, production and employment.
- But this situation is temporary:
- Finally;
  - profitable investment dries up
  - spending falls
  - real GDP falls (below potential GDP)
  - the unemployment rate rises (above the natural rate)
- So, it reduces the growth of real GDP which has negative implications for employment & standard of living for everyone. \_



# Core Inflation Rate (CIR)

- The **CIR** is the CPI inflation rate excluding the volatile elements (of food & fuel)...
- The CIR attempts to reveal the underlying inflation trend. \_



# Production & Growth

N.G. Mankiw, Principles of Economics, Chapter-25

N.G. Mankiw, Principles of Macroeconomics, Chapter-12

# Production & Growth

*At the end of this chapter we will be able to:*

- Define & calculate the economic growth rate.
- Describe the economic growth trends around the World in different countries & regions.
- Explain how labor productivity growth & population growth make potential GDP grow.
- Explain how productivity is determined
- Explain the relationship between economic growth & public policy...

# Questions

- 1) How is Potential GDP determined?
- 2) What are the two broad sources of potential GDP Growth?
- 3) What are the effects of an  $\uparrow$  in the population on
  - potential GDP,
  - the quantity of labor,
  - the real wage rate,
  - potential GDP per hour of labor?
- 4) What are the effects of an  $\uparrow$  in labor productivity on
  - potential GDP,
  - the quantity of labor,
  - the real wage rate,
  - potential GDP per hour of labor?\_

# Economic Growth & Economic Growth Rate

## Economic Growth

the sustained expansion of production possibilities  
*measured* as the increase in real GDP over a given period.

## Economic Growth Rate (EGR)

the annual %Δ of real GDP:

$$\text{Real GDP growth rate} = \frac{\text{Real GDP in current year} - \text{Real GDP in previous year}}{\text{Real GDP in previous year}} \times 100.$$

$$\text{Growth Rate} = \frac{\text{GDP}_{\text{new}} - \text{GDP}_{\text{old}}}{\text{GDP}_{\text{old}}} \cdot 100$$

## Growth Rate of Real GDP

$$\text{Real GDP growth rate} = \frac{\text{Real GDP in current year} - \text{Real GDP in previous year}}{\text{Real GDP in previous year}} \times 100.$$

Real GDP<sub>(2017)</sub> = 22.25 \$bln

Real GDP<sub>(2016)</sub> = 20.16 \$bln

Growth Rate of Real GDP ?

$$\text{Real GDP growth rate} = \frac{\$ 22.25 - \$ 20.16}{\$ 20.16} \times 100 = 10.36 \%$$

# Example

$$\text{Real GDP growth rate} = \frac{\text{Real GDP in current year} - \text{Real GDP in previous year}}{\text{Real GDP in previous year}} \times 100.$$

Year	Real GDP (millions of 2005 dollars)	Percentage change
2004	117	7.0
<b>2005</b>	<b>125</b>	5.0
2006	131	6.0
2007	139	4.0
2008	145	7.0
2009	155	8.0
2010	167	8.0
2011	178	9.7
2012	195	

# GDP Growth Rate & Inflation

$$\text{Real GDP Growth Rate} = \left[ \frac{(\text{GDP of This Year} - \text{GDP of Last Year})}{\text{GDP of Last Year}} \times 100 \right] - \text{Average Inflation Rate During This Year}$$

Nominal GDP Growth Rate

Example

$$= \left[ 10\% \right] - 10\%(\text{Inflation})$$

Real GDP Growth Rate

$$= 0\%$$

Example

$$= \left[ 10.1\% \right] - 5\%(\text{Inflation})$$

Real GDP Growth Rate

$$= 5.1\%$$



# Change in Standard of Living & Economic Growth Rate (EGR)

➤ The EGR tells us;  
how rapidly the total economy is expanding. *But...*

■ The standard of living depends on real GDP p.p. :

$$\text{Real GDP p.p.} = \text{Real GDP} / \text{Population}$$

$$\Delta \text{Real GDP p.p.} = \Delta \text{Real GDP} / \Delta \text{Population}$$

■ Real GDP p.p. grows only  
if real GDP grows faster than the population grows:

➤  $\Delta \text{Real GDP p.p.} > "0"$ ; if  $\Delta \text{Real GDP} > \Delta \text{Population}...$

## Change in Standard of Living Growth Rate of Real GDP per person

$$\text{Real GDP p.p. growth rate} = \frac{\text{Real GDP p.p. in current year} - \text{Real GDP p.p. in previous year}}{\text{Real GDP p.p. in previous year}} \times 100$$

Real GDP<sub>(2017)</sub> p.p. = 1,390 \$

Real GDP<sub>(2016)</sub> p.p. = 1,278 \$

Growth Rate of Real GDP p.p.?

$$\text{Real GDP per person growth rate} = \frac{\$1,390 - \$1,278}{\$1,278} \times 100 = 8,77\%$$

# Change in Standard of Living

## Growth Rate of Real GDP per person

$$\text{Real GDP p.p. growth rate} = \frac{\text{Real GDP p.p. in current year} - \text{Real GDP p.p. in previous year}}{\text{Real GDP p.p. in previous year}} \times 100$$

Total Real GDP(2015) = 770 billion \$  
Population(2015) = 72 million people

Total Real GDP(2014) = 700 billion \$  
Population(2014) = 70 million people

- Q-1: Growth Rate of Real GDP ?
- Q-2: Growth Rate of Real GDP p.p.? \_

# The Magic of Sustained Growth

(the rule of 70)

How many years later does a country's GDP double which has a certain GDP growth rate?

Years for the level of a variable to double  
=  
70 / The annual percentage growth rate of the variable

## RULE OF 70

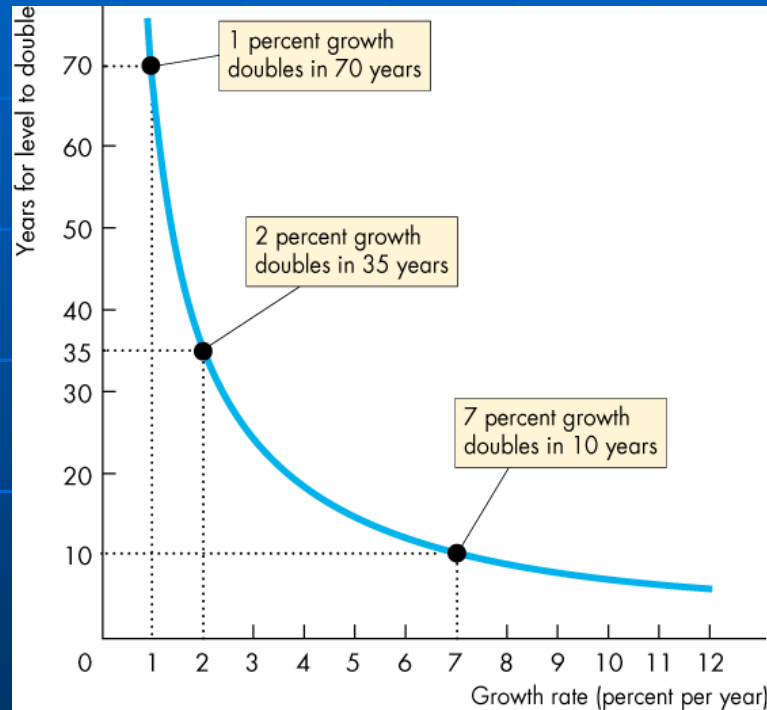
$$\begin{array}{l} \text{number} \\ \text{of years} \\ \text{to} \\ \text{double} \end{array} = \frac{70}{\text{annual} \\ \text{percentage} \\ \text{growth rate}}$$

# Example

## Applying the Rule of 70

RULE OF 70	
number of years to double	$\frac{70}{\text{annual percentage growth rate}}$

- ... the doubling time for growth rates.
- A variable that grows at ;
  - 7% a year doubles in 10 years.
  - 2% a year doubles in 35 years.
  - 1% a year doubles in 70 years...\_



Growth rate (percent per year)	Years for level to double
1	70.0
2	35.0
3	23.3
4	17.5
5	14.0
6	11.7
7	10.0
8	8.8
9	7.8
10	7.0
11	6.4
12	5.8

Example

## Applying the Rule of 70

Years	GDP (t-1)	Growth Rate %5	GDP (t)
1	100	5	105
2	105	5.25	110.25
3	110.25	5.51	115.76
4	115.76	5.79	121.55
5	121.55	6.08	127.63
6	127.63	6.38	134
7	134	6.7	140.7
8	140.7	7.04	147.74
9	147.74	7.39	155.13
10	155.13	7.76	162.89
11	162.89	8.14	171.03
12	171.03	8.55	179.58
13	179.58	8.99	188.57
14	188.57	9.43	198

# Economic Growth around the World

## The Variety of Growth Experiences

Country	Period	Real GDP per Person at Beginning of Period <sup>a</sup>	Real GDP per Person at End of Period <sup>a</sup>	Growth Rate (per year)
Japan	1890–2010	\$1,517	\$34,810	2.65%
Brazil	1900–2010	785	10,980	2.43
Mexico	1900–2010	1,169	14,350	2.31
<u>China</u>	1900–2010	723	7,520	2.15
Germany	1870–2010	2,204	38,410	2.06
Canada	1870–2010	2,397	38,370	2.00
United States	1870–2010	4,044	47,210	1.77
Argentina	1900–2010	2,314	15,470	1.74
<u>India</u>	1900–2010	681	3,330	1.45
United Kingdom	1870–2010	4,853	35,620	1.43
Indonesia	1900–2010	899	4,180	1.41
<u>Pakistan</u>	1900–2010	744	2,760	1.20
<u>Bangladesh</u>	1900–2010	629	1,800	0.96

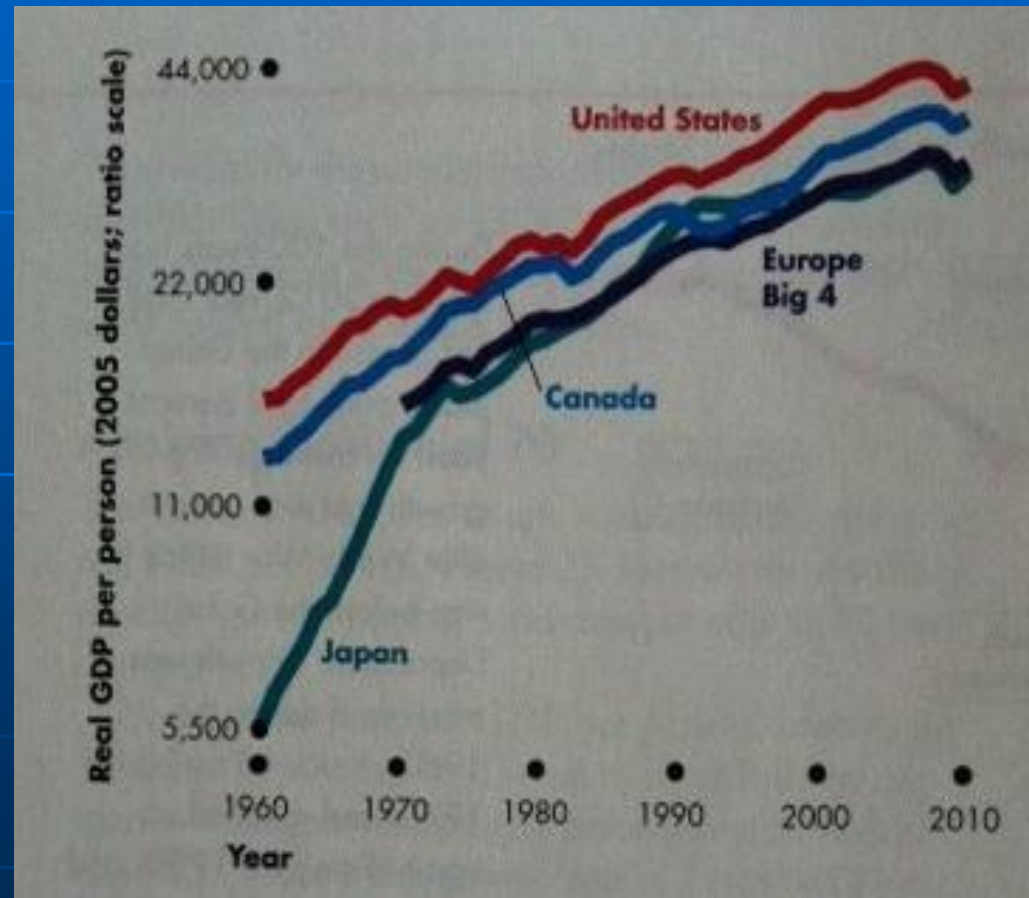
<sup>a</sup>Real GDP is measured in 2010 dollars.

Source: Robert J. Barro and Xavier Sala-i-Martin, *Economic Growth* (New York: McGraw-Hill, 1995), Tables 10.2 and 10.3; *World Development Indicators* online; and author's calculations.

# Economic Growth Trends

## ■ Real GDP Growth in the World Economy

- ... the growth in the rich countries.
- Growth in the US, Canada, & Europe Big 4 has been similar.
- Japan grew rapidly in the 1960s, slower in the 1980s, & even slower in the 1990s.

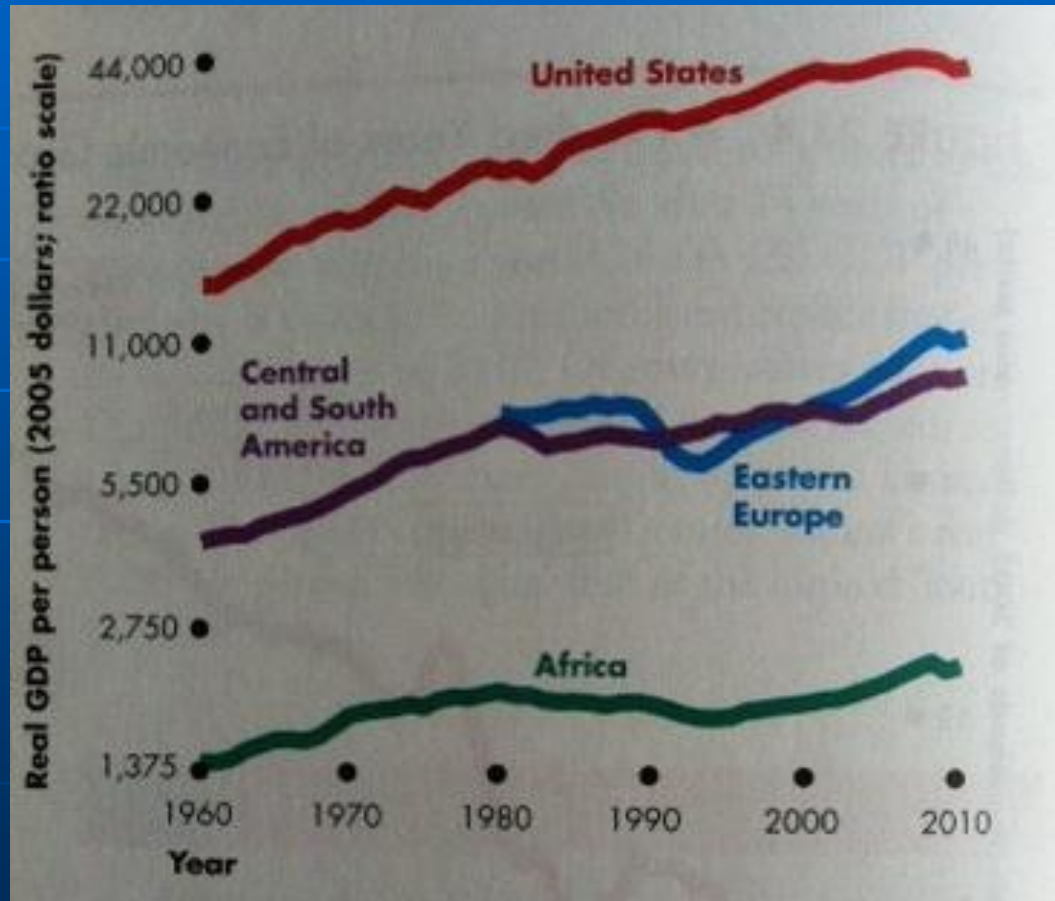




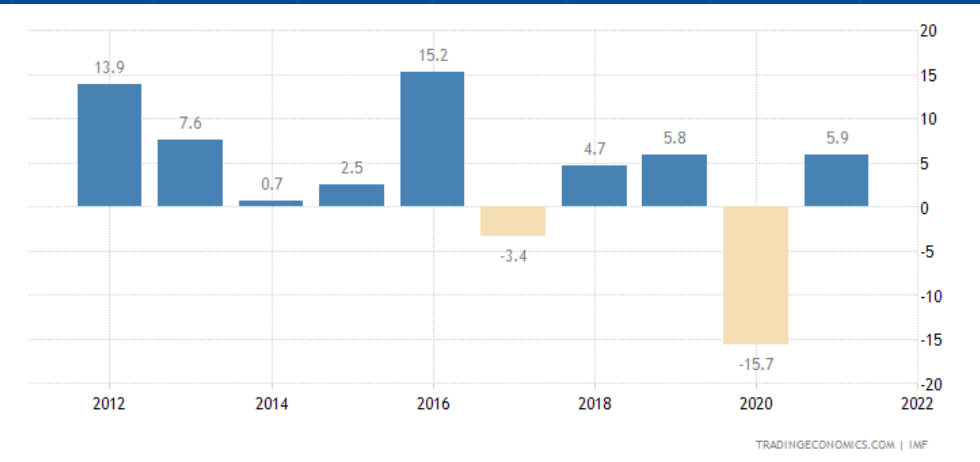
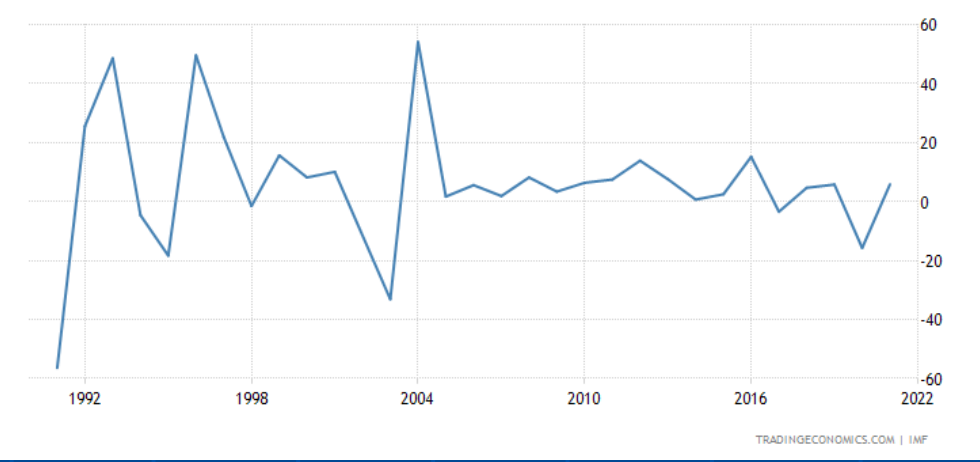
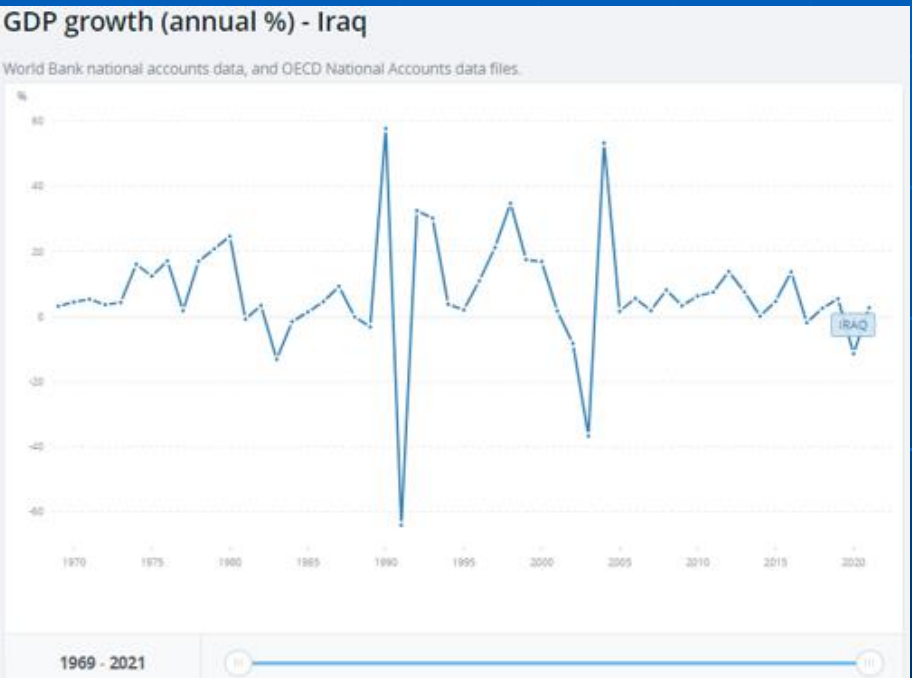
# Economic Growth Trends

## Different Groups of Countries

- The gaps between real GDP p.p. in the US & in group of poor countries have widened:
- The gap between real GDP p.p. in the US & Africa has widened by large amount.



# Economic Growth Trends in Iraq



# Productivity: Its Role & Determinants

N.G. Mankiw, Principles of Economics, Chapter-25  
N.G. Mankiw, Principles of Macroeconomics, Chapter-12

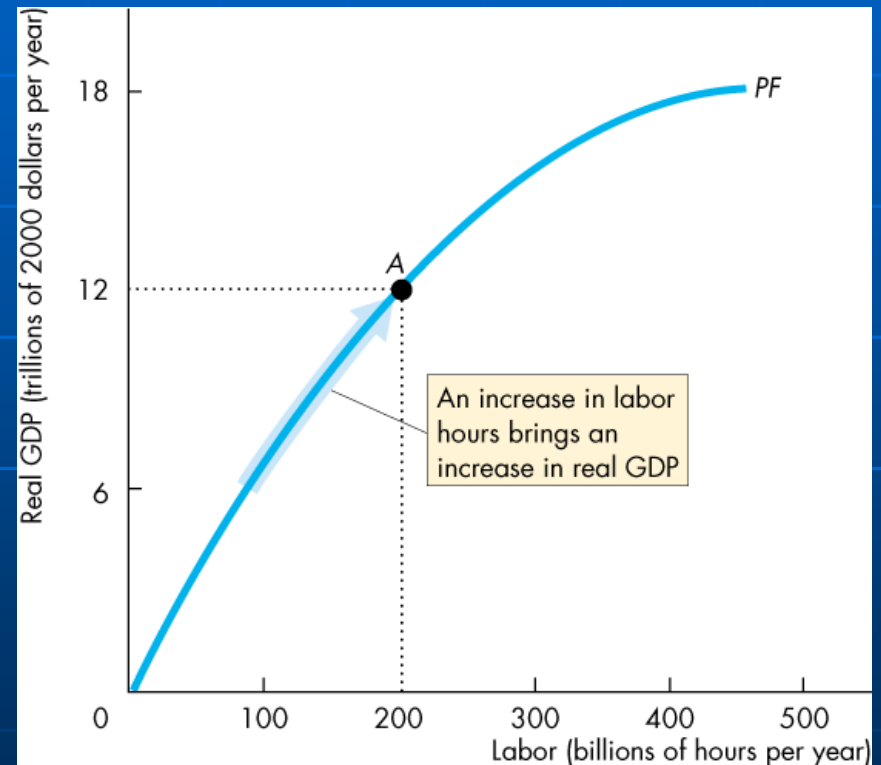
# Economic Growth - Real GDP - Potential GDP & a model

- **Economic growth** (EG) occurs when *real GDP*  $\uparrow$ .
- EG is the sustained, year-on-year  $\uparrow$  in *potential GDP*.
- **Potential GDP** is the quantity of real GDP produced when the quantity of labor employed is the full-employment quantity.
- **2 Questions:**
  - **Q-1:** How is Potential GDP determined?
  - **Q-2:** What makes Potential GDP grow?
- **A-1:** To determine potential GDP we use a model with 2 components:
  - 1- The aggregate production function
  - 2- The aggregate labor market ↔↔

# 1. How is Potential GDP Determined ?

## 1- Aggregate Production Function (APF)

- ...tells us how real GDP  $\Delta$ s as the quantity of labor  $\Delta$ s, *c.p.* ...
- An  $\uparrow$  in labor  $\uparrow$  real GDP...



# 1. How is Potential GDP Determined ?

## 2- Aggregate Labor Market

- ❑ 1) The demand for labor:  
the quantity of labor demanded (QLD) & the real wage rate (RWR)...
- ❑ 2) The supply of labor:  
the quantity of labor supplied (QLS) & the RWR...
- The labor market is in equilibrium  
at the RWR at which the QLD = the QLS.. ↔

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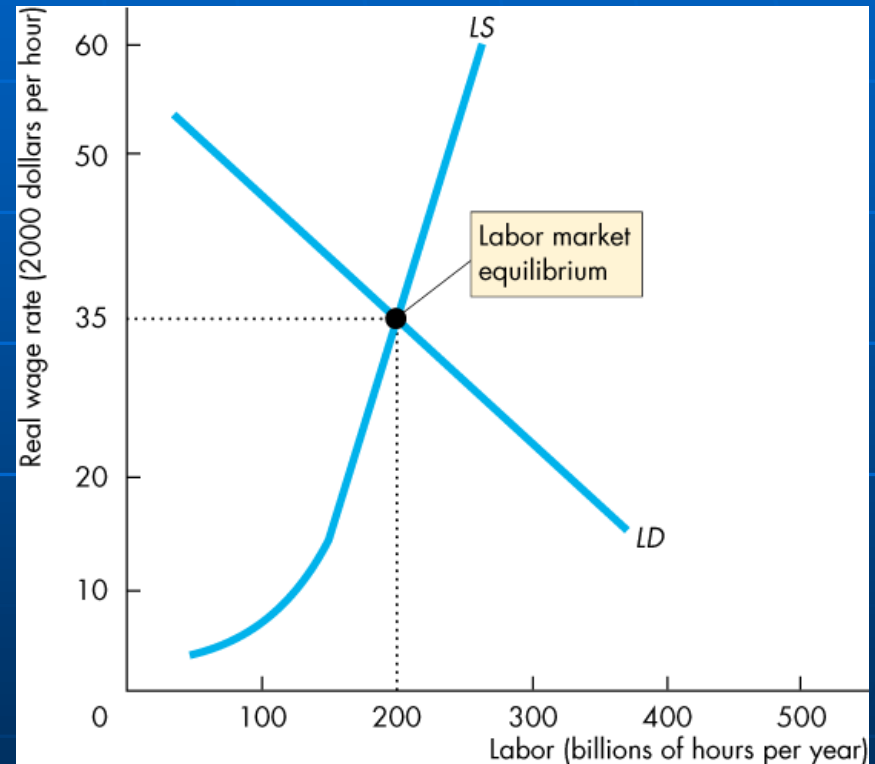
The real wage = the money wage – inflation rate

# 1. How is Potential GDP Determined ?

## Labor Market Equilibrium (LME)

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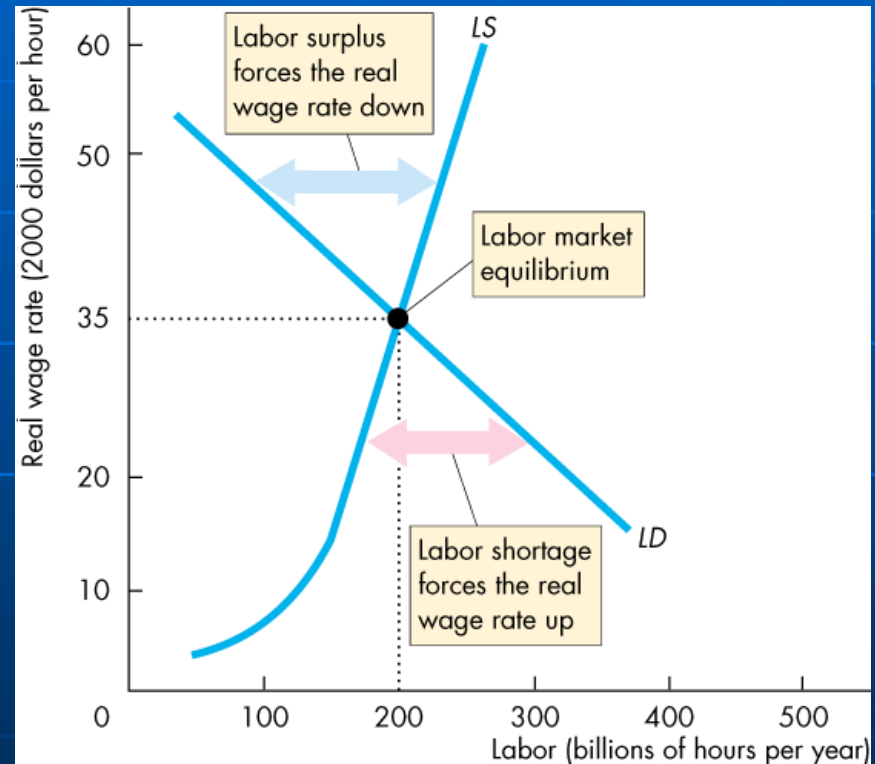
- LME occurs at a RWR of \$35 an hour & 200 billion hours employed. \_



# 1. How is Potential GDP Determined ?

## Surplus – Shortage - Equilibrium

- At a RWR above \$35 an hour, there is a surplus of labor & the RWR falls.
- At a RWR below \$35 an hour, there is a shortage of labor & the RWR rises.
- At the LME, the economy is at *full employment*... \_

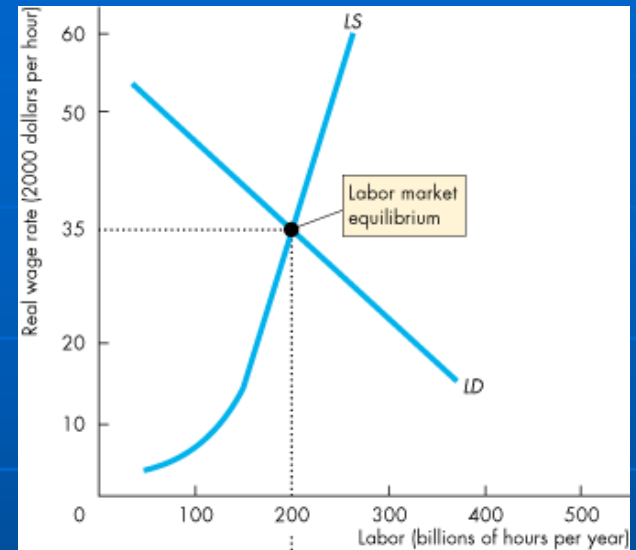




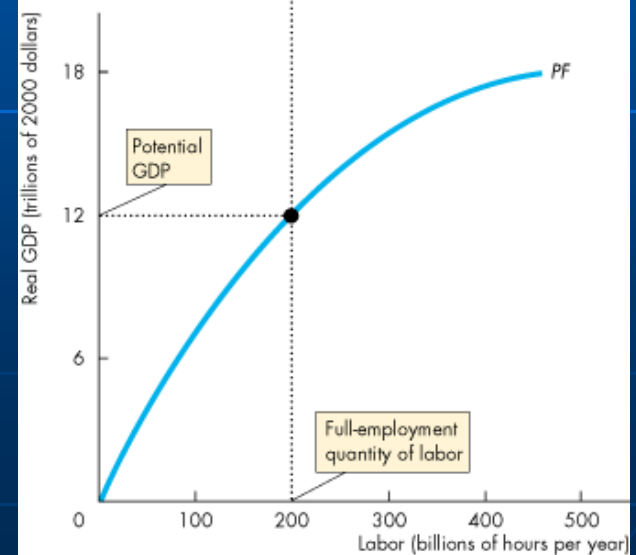
# 1. How is Potential GDP Determined ?

## Determining Potential GDP

- Recall: The quantity of real GDP produced, when the economy is at full employment, is potential GDP.
- When the full-employment quantity of labor is 200 bln, potential GDP is \$12 trillions \_.



(a) The labor market

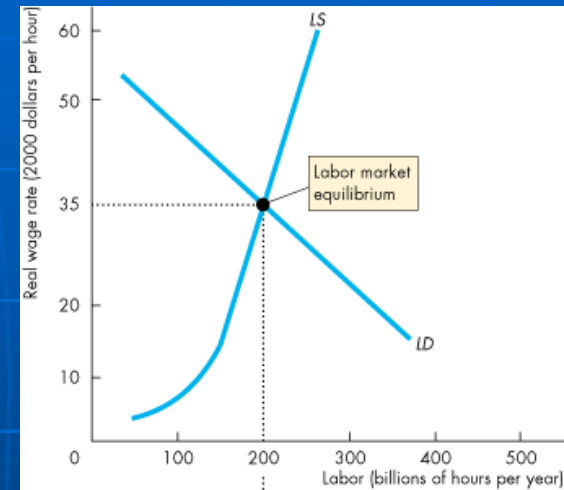


(b) Potential GDP

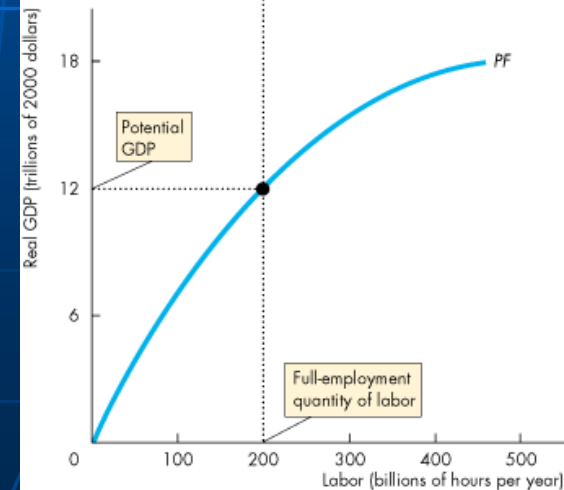
## 2. What Makes Potential GDP Grow?

What are the broad sources of potential GDP Growth?

- All the forces that make potential GDP grow are divided into 2 categories:
  - 1) Growth in the supply of labor
  - 2) Growth in labor productivity



(a) The labor market



(b) Potential GDP

## What Makes Potential GDP Grow?:

# 1) Growth in the Supply of Labor

- Aggregate labor hours: the total number of hours worked by all the people employed;

= number of workers employed x average hours per worker

- Population growth ↑ aggregate hours & real GDP, *but* to ↑ real GDP p.p., labor must become more productive...\_

# Growth in the Supply of Labor

What are the effects of an  $\uparrow$  in the population *on potential GDP, the quantity of labor, the RWR, and potential GDP per hour of labor?*

## ➤ The Effects of Population Growth

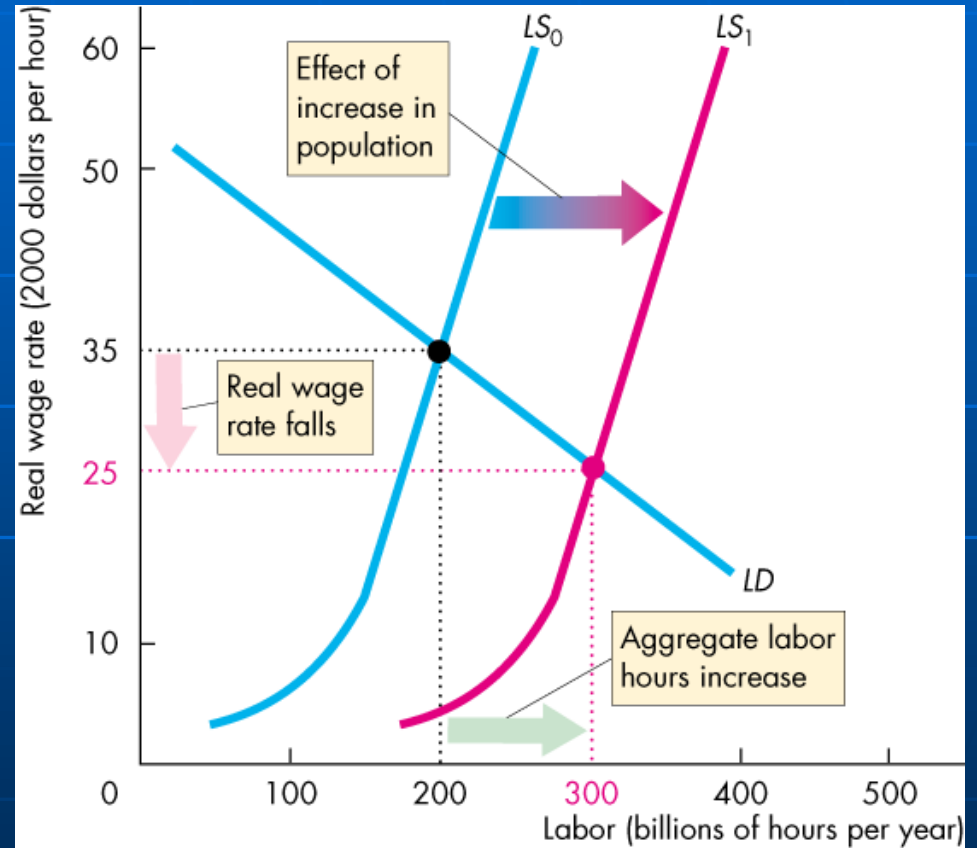
An  $\uparrow$  in population;

- 1)  $\uparrow$  the supply of labor... (demand for labor ?, Production Function ?)
- 2) With no  $\Delta$  in the demand for labor,  
the equilibrium RWR falls & the aggregate hours  $\uparrow$ .
- 3) The  $\uparrow$  in the aggregate hours  $\uparrow$  potential GDP  $\Rightarrow \Rightarrow$

# The Effects of Population Growth

...

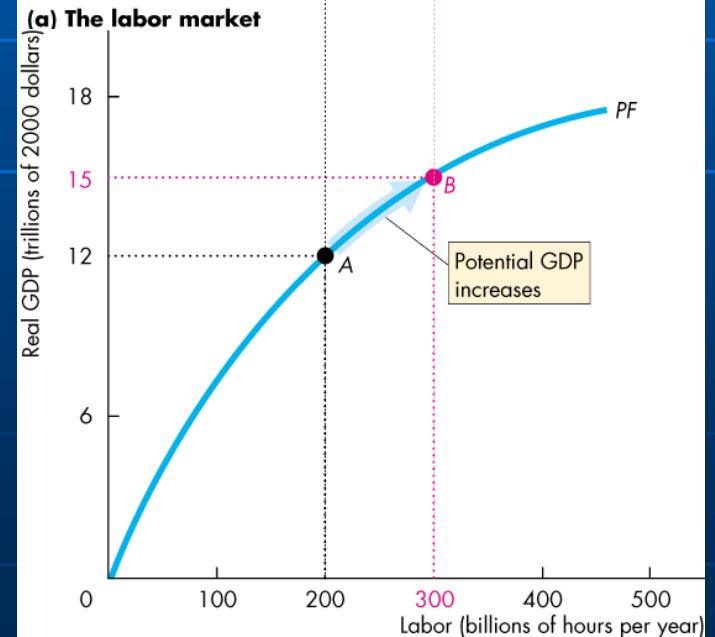
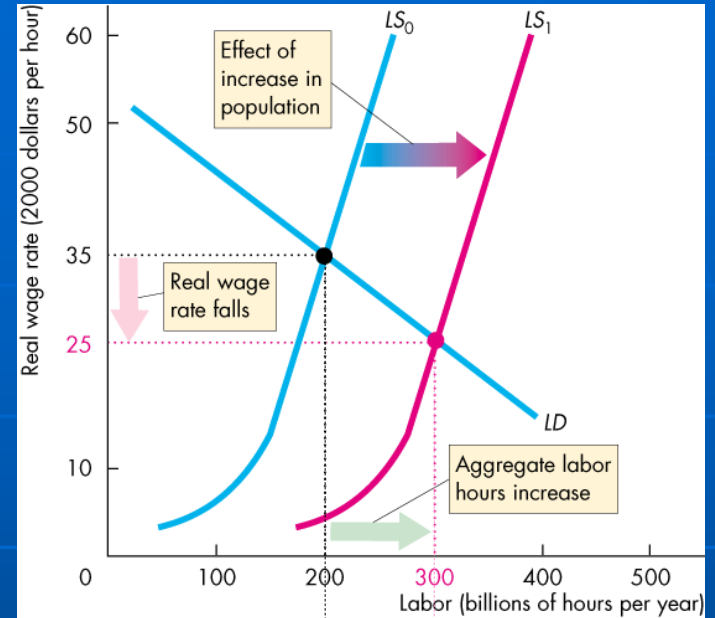
- The LS curve shifts rightward.
- The RWR falls,
- & aggregate hours  $\uparrow$   $\Rightarrow$



(a) The labor market

# The Effects of Population Growth

- The  $\uparrow$  in aggregate hours  $\uparrow$  potential GDP.
- The increased population  $\uparrow$  real GDP, BUT  $\downarrow$  real GDP per hour of labor.
- Initial real GDP per hour ?
- New real GDP per hour ?
- Why?
- The diminishing returns  $\rightleftarrows$



(b) Potential GDP

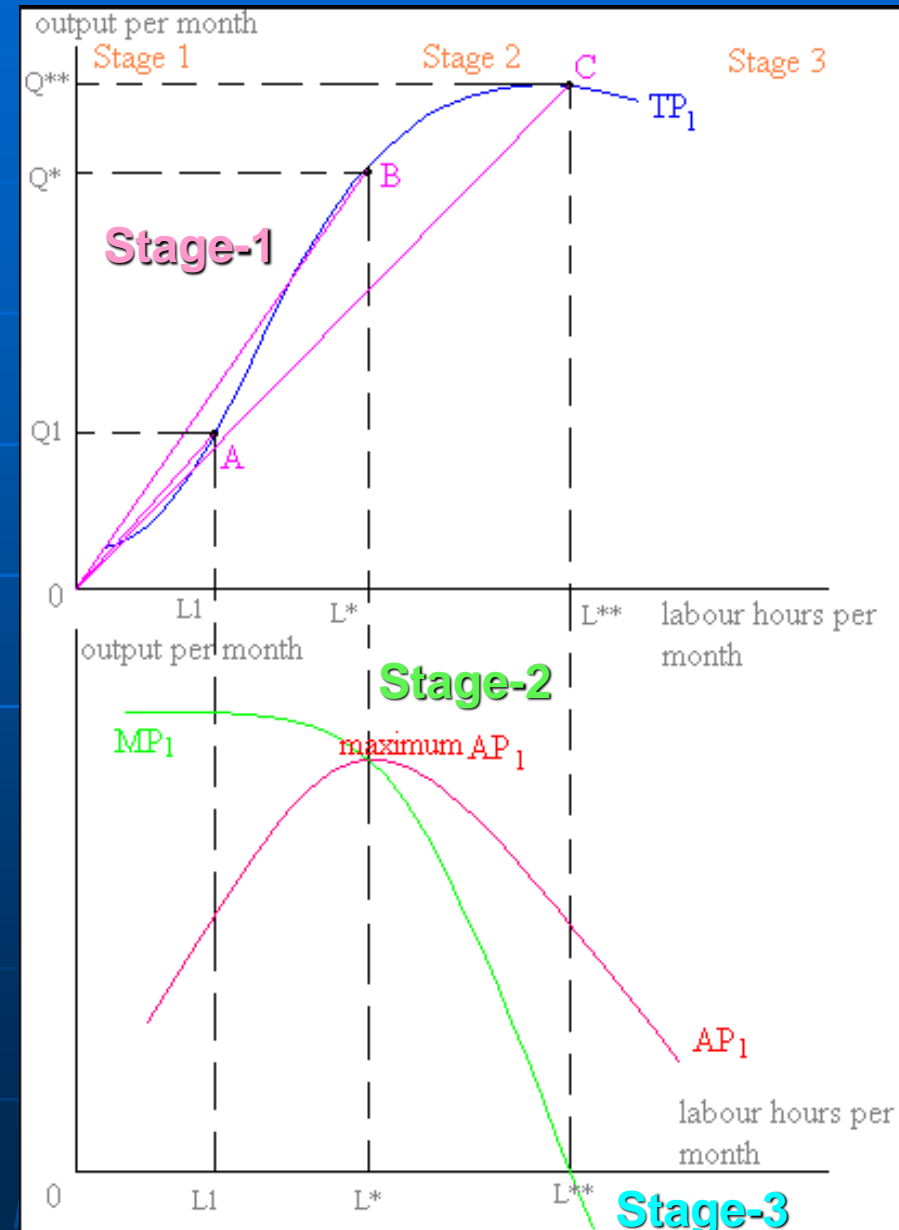
# The Law of Diminishing Returns

## (Diminishing Marginal Productivity - DMP)

### DMP;

a short run production concept where *increases* in the variable factor of production lead to *less & less* additional output.

- ...MP will decline as the proportion of the variable input to fixed input ( $L/K$ ) increases.
- ...there is a limit the amount of output that can be produced in a productive facility of a given size.




# What Makes Potential GDP Grow?

## 2) Growth in Labor Productivity

What are the effects of an  $\uparrow$  in labor productivity on potential GDP, the quantity of labor, the RWR, and potential GDP per hour of labor?

- **Productivity** is the quantity of g&s produced from each unit of labor input.
- **(Labor) Productivity** is the quantity of real GDP produced by an hour of labor:

$$\text{(Labor) Productivity} = \text{Real GDP} / \text{Aggregate Labor Hours}$$

- If labor become more productive, firms are willing to pay more for a given number of hours, so the demand for labor  $\uparrow$ . 

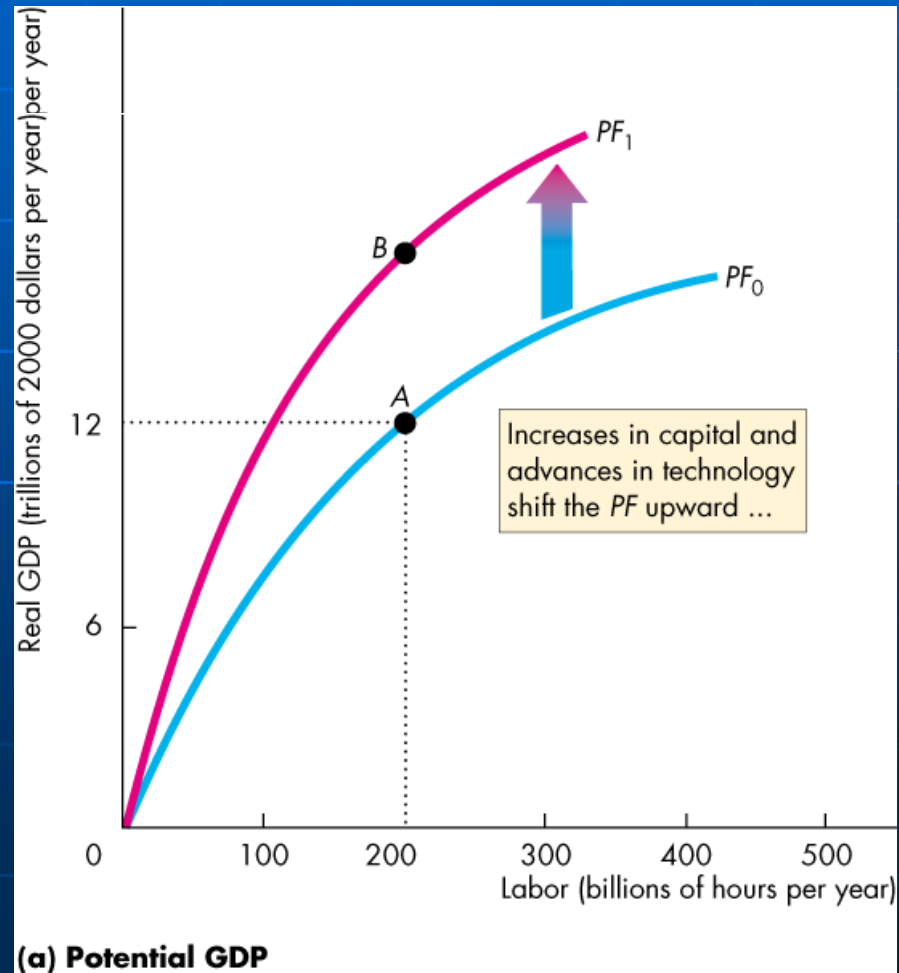


# Why Productivity is So Important?

## The effect of an increase in labor productivity-1

.....

- The  $\uparrow$  in labor productivity shifts the production function upward...  $\Rightarrow \Rightarrow$

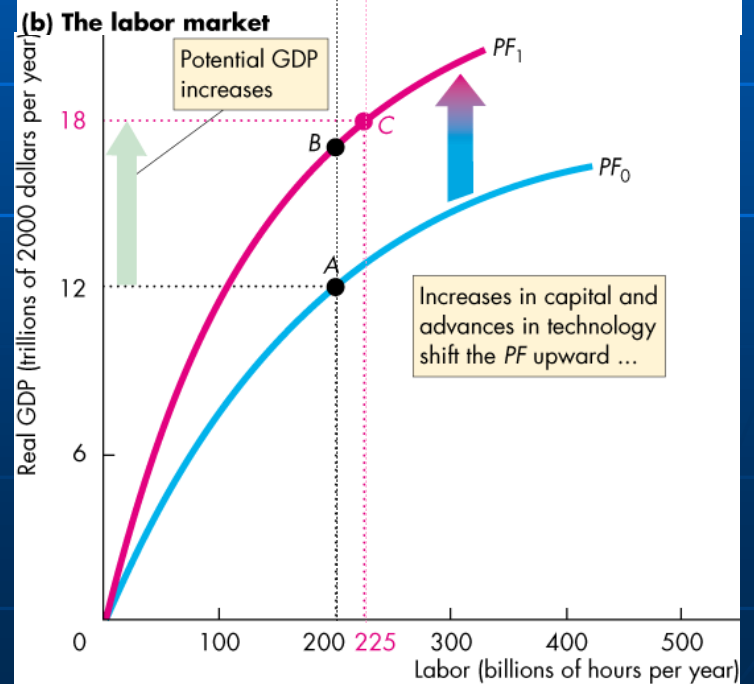
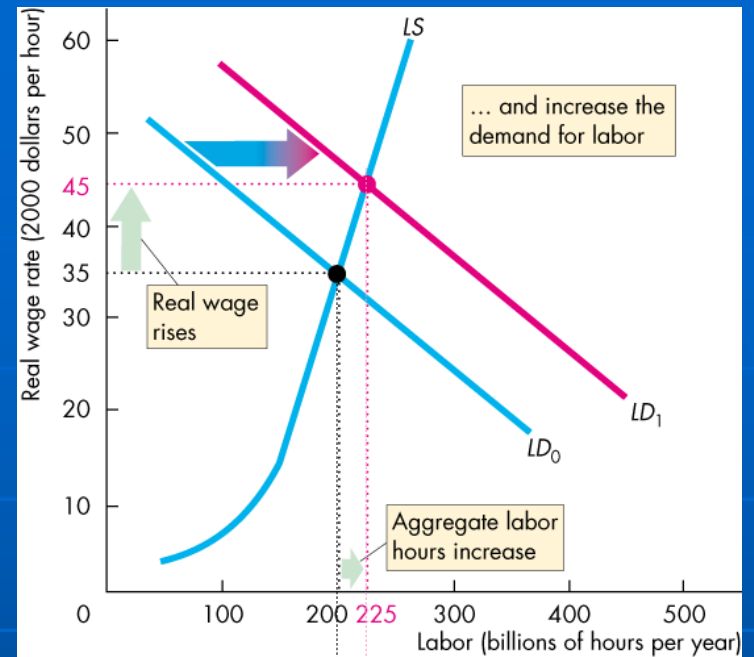


# Why Productivity is So Important?

## The effect of an increase in labor productivity-2

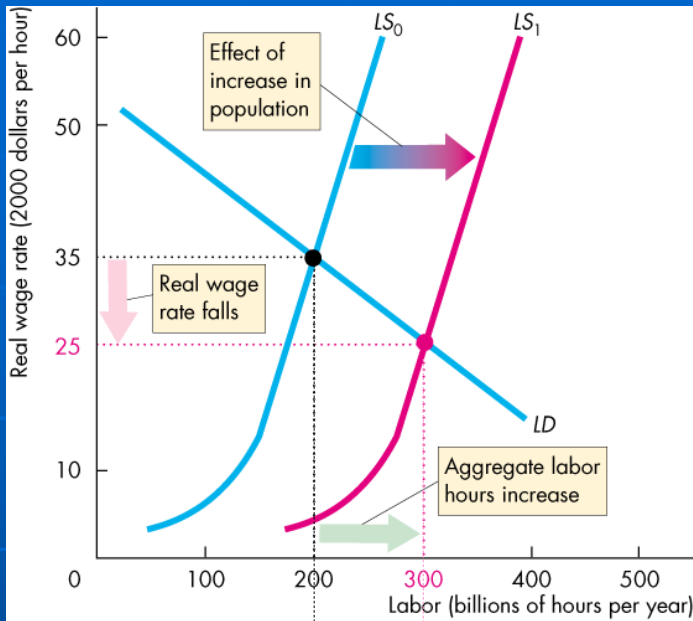
➤ In the labor market:

- An  $\uparrow$  in labor productivity  $\uparrow$  the demand for labor.
- With no  $\Delta$  in the supply of labor; the RWR rises,
- & aggregate hours  $\uparrow$ .
- So, potential GDP  $\uparrow$ . \_

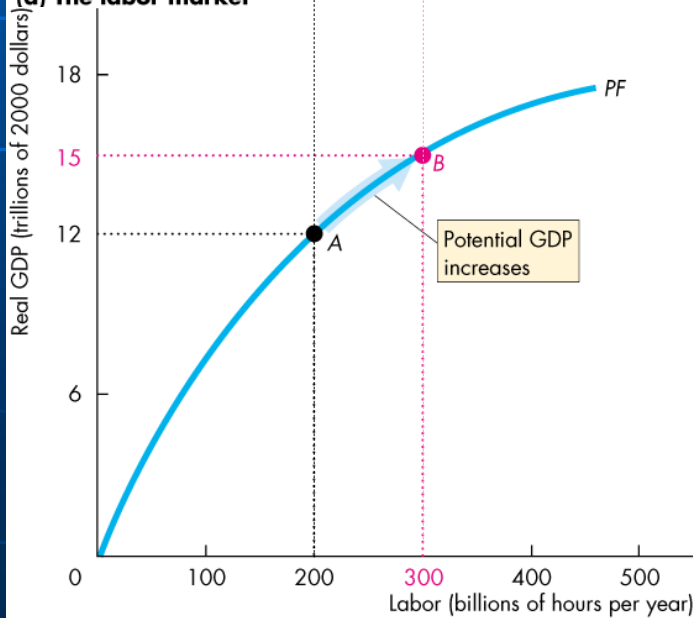


(a) Potential GDP

# The Effects of Population Growth - The Effect of an Increase in Labor Productivity

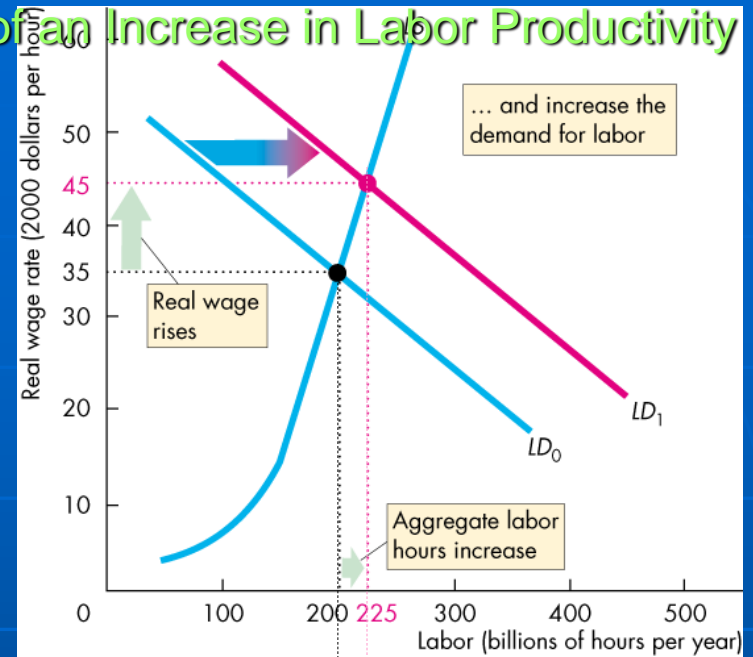


(a) The labor market

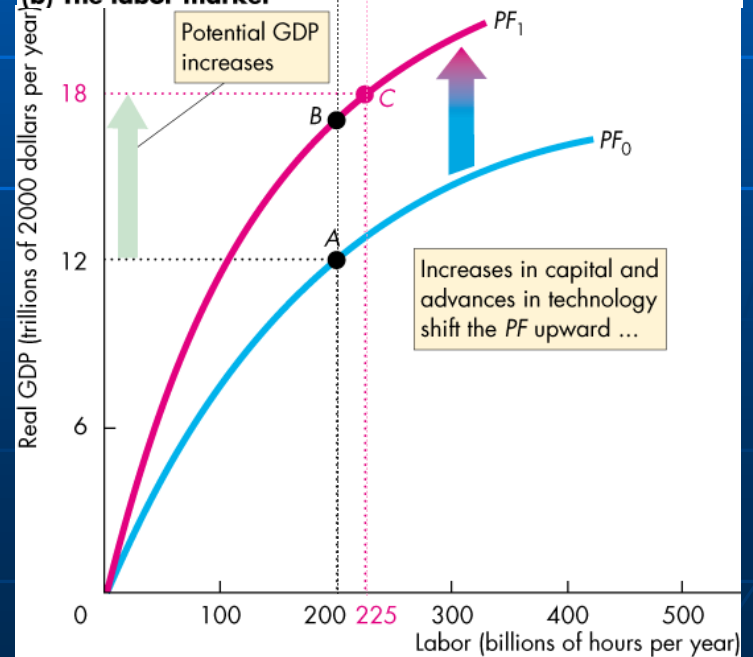


(b) Potential GDP

**Recall**



(b) The labor market



(a) Potential GDP

# How Productivity is Determined ?

## Preconditions for Labor Productivity Growth

### 6 Determinants of Productivity:

- The growth of labor productivity depends on;
  - 1) Physical capital growth
  - 2) Human capital growth
  - 3) Natural capital (Natural resources) growth
  - 4) Technological advances/growth
  - 5) Social capital growth
  - 6) Intellectual capital growth ↔↔

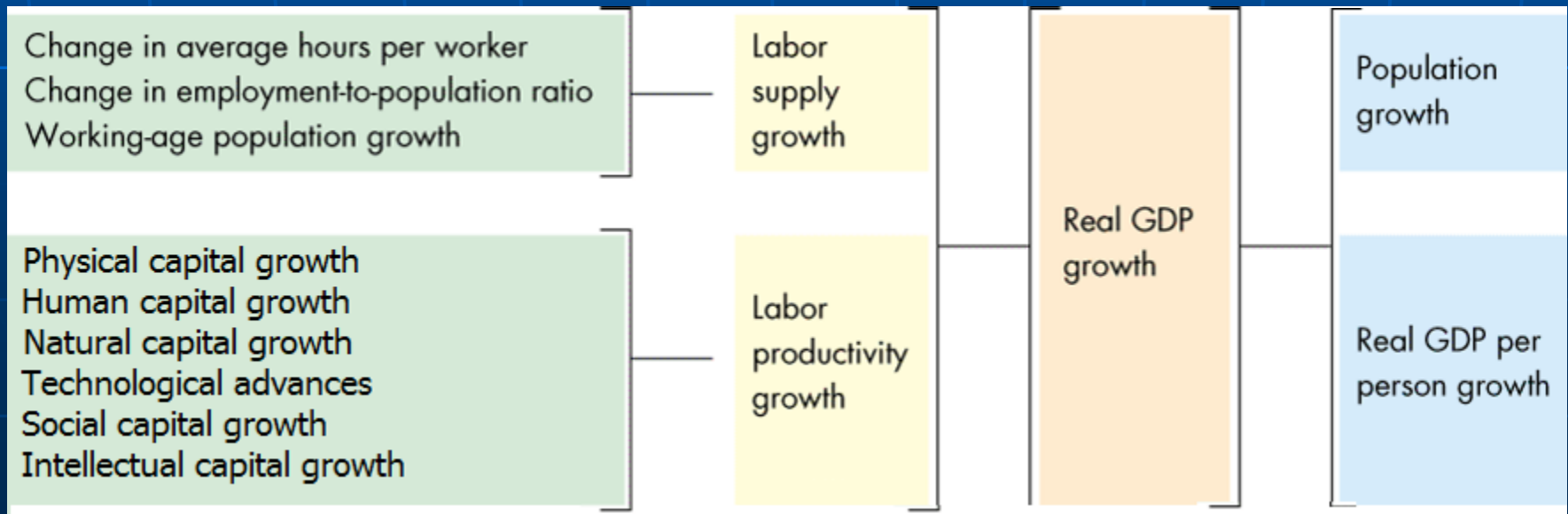
# 6 Determinants of Productivity

Why does Labor Productivity Grow?

- **1) Physical Capital Growth**
  - The accumulation of new capital  $\uparrow$  capital per worker &  $\uparrow$ ...
- **2) Human Capital Growth**
  - Human capital acquired through; education, on-the-job training, and learning-by-doing ...
- **3) Natural Capital Growth**
  - Renewable (forest) and nonrenewable (oil).
- **4) Technological Advances/Growth**
  - Technological change; the discovery & the application of new technologies & new goods.
- **5) Social Capital Growth**
  - The nature of relationship among people.
- **6) Intellectual Capital Growth**
  - The level of knowledge. —

# The Sources of Economic Growth

- This Figure;
  - summarizes the process of growth:
  - shows that the growth of real GDP p.p. depends on real GDP growth & the population growth rate. \_



# Economic Growth & Public Policy

- Government Policies That Raise Productivity & Living Standards:
  - 1) Encourage saving & investment
  - 2) Encourage investment from abroad
  - 3) Encourage education & training
  - 4) Establish secure property rights & maintain political stability
  - 5) Promote free trade
  - 6) Promote research & development
  - 7) Promote health & nutrition →→

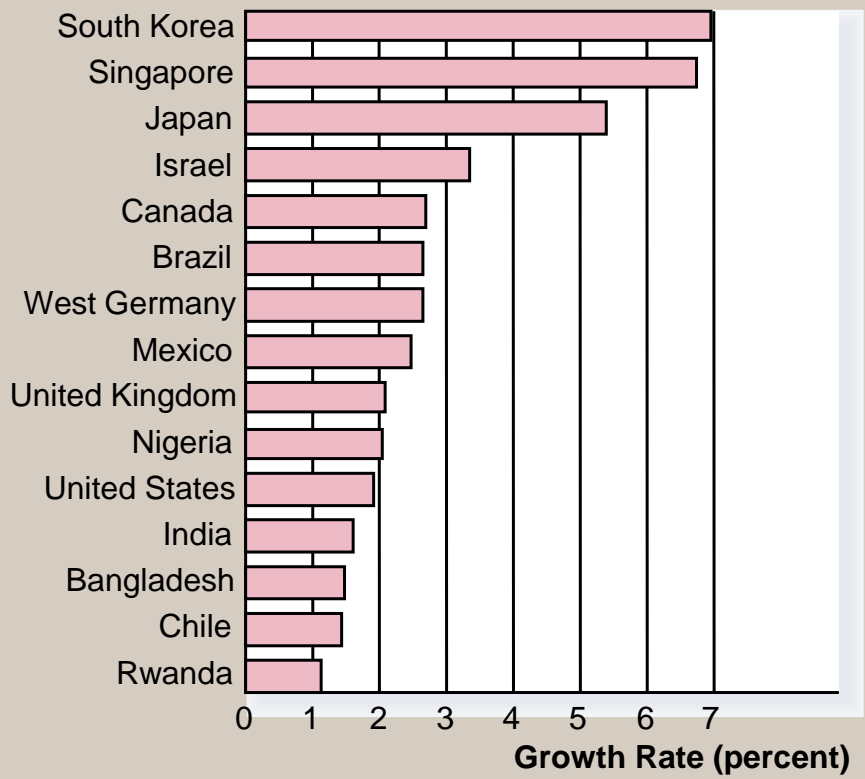
## Economic Growth & Public Policy

# 1) The Importance of Saving & Investment

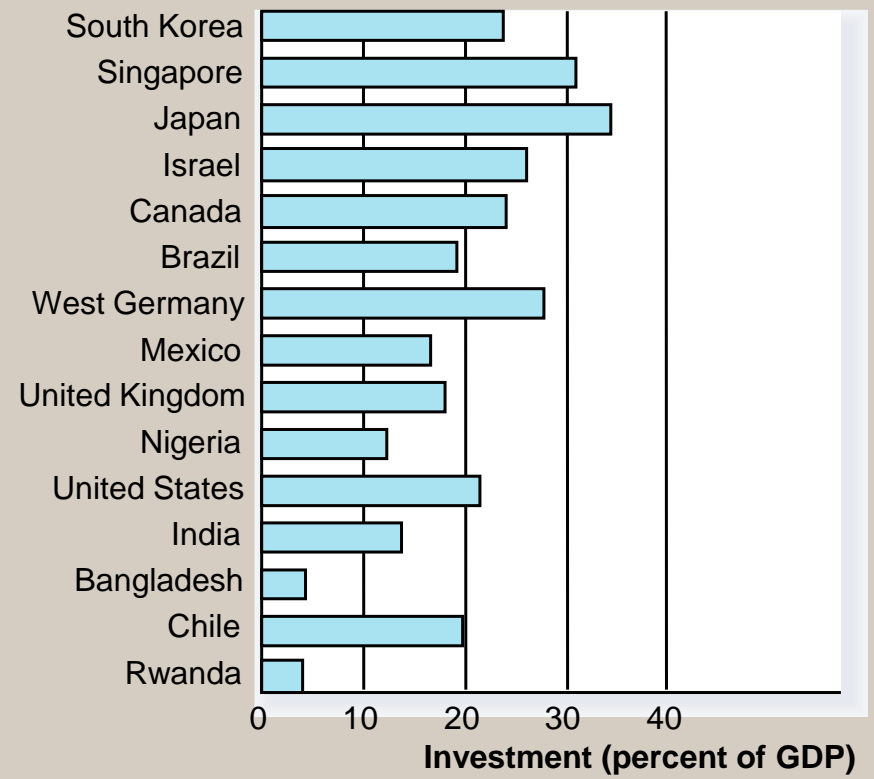
- ...to invest more current resources in the production of capital.



**(a) Growth Rate 1960–1991**



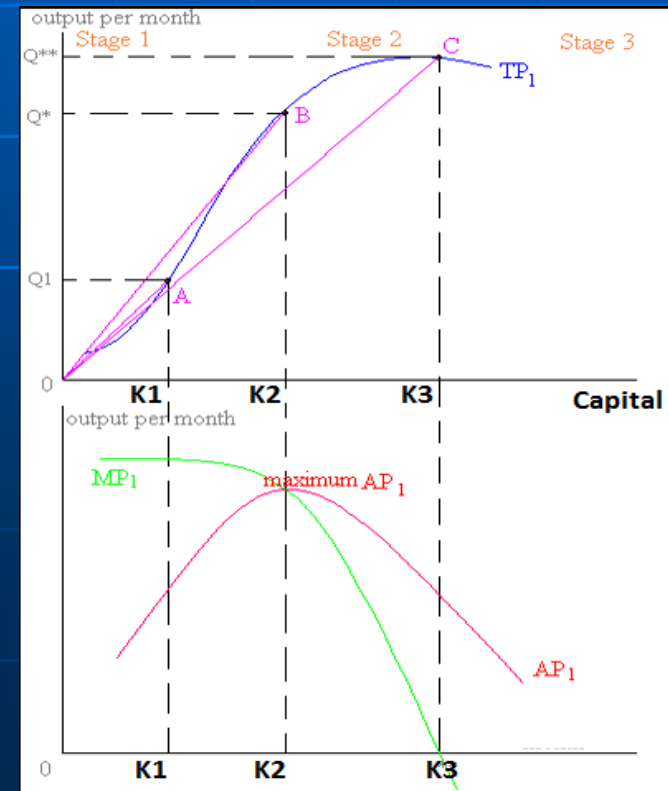
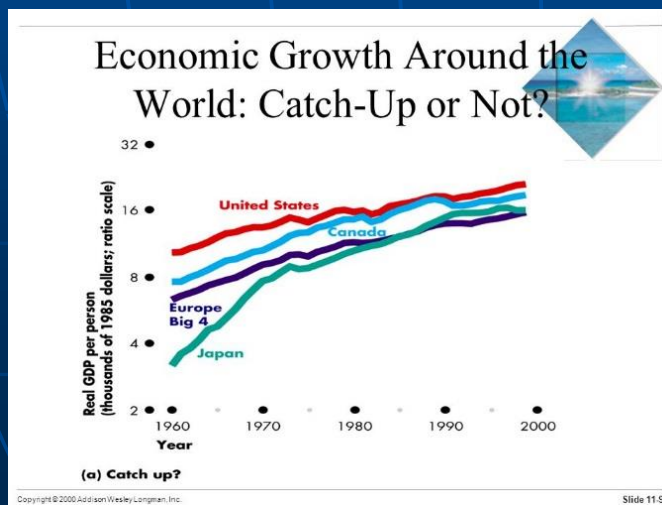
**(b) Investment 1960–1991**



# Diminishing Returns & the Catch-Up Effect

- Recall: D.R., As the stock of capital  $\uparrow$ ; the extra output produced from an additional unit of capital  $\downarrow$ .
- Because of diminishing returns, an  $\uparrow$  in the saving rate leads to higher growth *only for a while*.
- In the long run, the higher saving rate leads to a higher level of productivity & income, but *not* to higher growth in these areas.

□ The Catch-up Effect refers to the property whereby countries that start off poor tend to grow more rapidly than countries that start off rich. —



# Economic Growth & Public Policy

## 2) Investment from Abroad

- Governments can ↑ capital accumulation & long-term economic growth by encouraging investment from f.m.
- Investment from abroad takes several forms:
  - Foreign Direct Investment (FDI)
    - Capital investment owned & operated by a foreign entity.
  - Foreign Portfolio Investment (FPI)
    - Investments financed with foreign money *but* operated by domestic residents.

# Economic Growth & Public Policy

## 3) Education

- ... is at least as important as investment in physical capital.
  - Ex: In the U.S., each year of schooling raises a person's wage, on average, by about 10%.
  - Thus, one way the government can enhance the standard of living is to provide schools & encourage the population to take advantage of them.
  - An educated person might generate new ideas about how best to produce g&s which in turn, might enter society's pool of knowledge & provide an external benefit to others. \_

# Education **Brain Drain**

- ...the emigration of many of the most highly educated workers to rich countries.

## Economic Growth & Public Policy

# 4) Property Rights & Political Stability

- ...refer to the ability of people to exercise authority over the resources they own.
  - An economy-wide respect for property rights is an important prerequisite for the price system to work.
  - It is necessary for investors to feel that their investments are secure. (secure investment climate)

## Economic Growth & Public Policy

### 5) Free Trade

- Some countries engage in . . .
  - . . . *inward-orientated* trade policies; avoiding interaction with other countries.
  - . . . *outward-orientated* trade policies; encouraging interaction with other countries.\_
- A country that eliminates trade restrictions will experience the same kind of economic growth that would occur after a major technological advance.
- So, FT is, in some ways, a type of technology.\_

## Economic Growth & Public Policy

# 6) Research & Development (R&D)

- The advance of technological knowledge has led to higher standards of living:
  - Most technological advances come from private research by firms & individual inventors.
  - Governments can encourage the development of new tech. through research grants, tax breaks, and the patent system.



## Economic Growth & Public Policy

### 6) Health & Nutrition

- Improved health from better nutrition is a significant factor in the long run growth.
- Vicious Circle; wealth-health:
  - Poor countries are poor because their populations are not healthy, and their populations are not healthy because they are poor...
- Virtuous Circle: To support health facilities with policies. \_

Next  
Chapter

# Saving, Investment & the Financial System

*N. G. Mankiw, Principles of Economics, Chapter 26 (31&32)*  
*N. G. Mankiw, Principles of Macroeconomics, Chapter 13*