

Chapter

# 4

review for  
the exam

This is Macroeconomics  
Measuring the Spending of Nations  
and Employment :- ) and  
Unemployment :- (

1. this chapter is about how economists measure our nation's real GDP, employment, and unemployment
2. every three months the real GDP (Y) report is released, but then there are two revisions to the initial report
  - A. because of the multiple reports, it is very difficult to decide fiscal policy (government taxing and spending by Congress) and monetary policy (the size of the money supply and controlling inflation by the Federal Reserve); in other words...should the economy be expanded or contracted?

## **Intermediate Goods vs. Final Goods and Value Added**

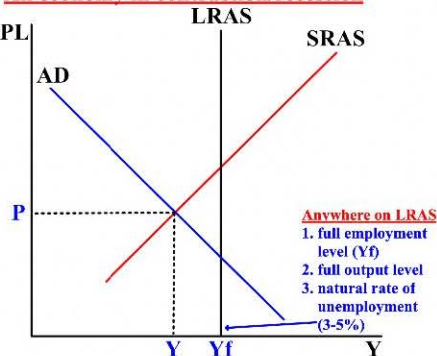
1. when measuring GDP, it is important to not count the same item more than once, which is called **double counting**
  - A. if you buy a bicycle, the bike is a **final good** (goods that undergo no further processing)
  - B. the tires are part of the bike (the tires are an **intermediate goods**)
  - C. only final goods are part of GDP, so you wouldn't add the cost of the tires *and* the bike to measure GDP because that would count the tires twice
2. only the **value added** is used to calculate GDP
  - A. value added only counts what each firm adds to the other intermediate goods to get the final product

## Sticky Wages

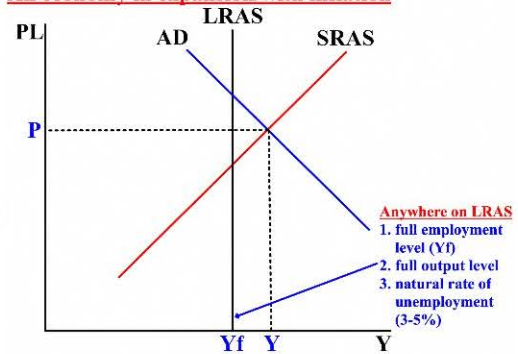
1. sticky wages occur when workers' earnings don't adjust quickly to changes in labor market conditions

- if workers' wages remain higher for longer than they should when an economy is in contraction/recession, the economy's recovery from a recession might take longer
- if workers' wages remain lower for longer than they should when an economy is in expansion/has inflation, the economy's recovery from an expansion might take longer
- when sticky wages occur, the best way to raise GDP is to increase government spending (G)

An economy in contraction/recession



An economy in expansion/with inflation



## **The Spending Approach**

1. America uses the spending approach as our main way to measure GDP
  - A. the **spending approach** determines how GDP is allocated among the four major components of spending: consumption by consumers (C), business investment (I), government purchases (G), and net exports (X) (exports - imports)
2. because of scarce resources, all four parts of spending must compete for the for what they need

$$Y = C + I + G + X$$

Y = real GDP/AD

C = consumption

I = business investment

G = government purchases

X = net exports (exports - imports)

## **The Spending Approach (cont.)**

1. the **interest rate** (the part of a loan that is charged as interest to the borrower; either fixed or flexible) is a key factor that both influences and is influenced by C, I, G, and X spending and borrowing
  - A. this applies more to the long-run (4-5 years out) than to the short-run (up to one year out) because it takes time for consumers (C), businesses (I), and net exports (X) to completely respond to changes in interest rates
  - B. interest rates only affect the three shares of spending by the private sector: C, I, and X
    - i. C, I, and X are interest-sensitive (sensitive to interest rates)
    - ii. higher interest rates decrease borrowing and spending by C, I, and X while lower rates increase borrowing and spending
  - C. government (G) spending/expenditures are part of the public sector and are not impacted by interest rates

## **The Spending Approach (cont.)**

1. government surpluses and deficits have to be considered when it comes to spending and borrowing by C, I, and X
  - A. if there is a government surplus, interest rates would decrease because the government would decrease its quantity demanded (Qd) of loanable funds (the amount of money in a country that is available to be loaned to C, I, and X) from where C, I, and X get their loans from
    - i. there would be a surplus of money (the more money there is the less value the money has separately) and interest rates would decrease leading to spending or borrowing by C, I, and X to increase
  - B. if there is a government deficit, interest rates would increase because the government would increase its quantity demanded (Qd) of loanable funds from where C, I, and X get loans from
    - i. there would be a decrease in the money supply (the less money there is the more value the money has separately) and interest rates would increase leading to spending or borrowing by C, I, and X to decrease

## **The Spending Approach- Business Investment and Depreciation**

1. business **investment (I)** consists of new purchases of final goods by businesses/firms
  - A. it's also called **business fixed investment** or **private domestic investment**
  - B. this includes
    - i. money spent on human capital (which also increases workers' output, productivity, and wages)
    - ii. workers' stock (value)
    - iii. capital goods (anything used to produce goods and services and to change their inventories)
  - C. if companies from anywhere produce their goods in America then sell it in America, it increases America's GDP/AD
2. **depreciation** is the amount by which anything needed for production decreases in worth each year and needs to be replaced

## The Spending Approach- Net Exports

1. **net exports (X)** is the difference between exports and imports
  - A. three other terms for net exports are **trade balance**, **balance of payments**, and **current account**
  - B. net exports can be either favorable/positive (if exports increase) or unfavorable/negative (if exports decrease)
  - C. if net exports are positive (more exports than imports), that country has a **trade surplus**
  - D. if net exports are negative (less exports than imports), that has a **trade deficit**
  - E. the more a country exports the higher its GDP; the more it imports the lower the GDP

trade  
balance →



what is the  
formula for the  
GDP deflator?

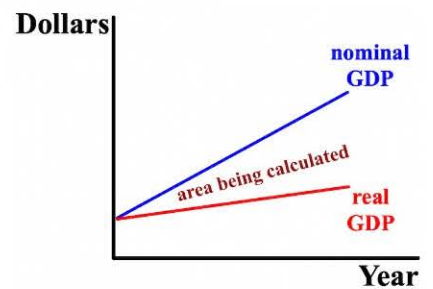


## Real GDP vs. Nominal GDP- Measuring Inflation

1. nominal GDP gives a very misleading picture of the U.S. economy because nominal GDP grows faster than real GDP (Y) because the changes in the price level (inflation and deflation) aren't taken into account
2. if we divide nominal GDP by real GDP then multiply it by 100, we get the **GDP deflator**, which measures inflation in an economy
  - A. the reason for the term deflator is that to get real GDP, we can deflate nominal GDP by dividing it by the GDP deflator

macro  
formula  
#7

$$\frac{\text{\$20 nominal GDP}}{\text{\$10 real GDP}} = \underline{2} \times 100 = \text{200 GDP deflator}$$



## An Alternative Measure of Inflation

1. there are other measures of inflation besides the GDP deflator

A. the **consumer price index (CPI)** is the price of a fixed collection: a “market basket” of 80,000 consumer goods and services in some future year divided by the price of the same collection in a base year

i. if the market basket consists solely of one CD and two tapes, than the CPI for 2019 (on top) compared with the base year 2018 (on the bottom) would be

$$\frac{\begin{array}{c} \text{Tapes} \\ P \quad Q \end{array}}{2019} = \frac{\begin{array}{c} \text{CDs} \\ P \quad Q \end{array}}{2018} = \text{CPI of 2}$$

$$\frac{\$30 \times 3 + \$10 \times 2}{\$15 \times 3 + \$5 \times 2} = \frac{110}{55} = \text{CPI of 2}$$

ii. because the quantity demanded (Qd) doesn't change from year to year, CPI is referred to as the quantity-constant model

### An Alternative Measure of Inflation (cont.)

1. when the price of goods rises, the quantity demanded (Qd) should decline
  2. the CPI doesn't allow the quantity demanded to change when the price (P) changes
  3. the CPI doesn't allow substitutes to be purchased when the price changes (the items in the basket of 80,000 goods and services are fixed and don't change
- A. because quantity demanded and the basket's items don't change, the result is an overstatement of inflation

$$\begin{array}{r} \text{2019} = \frac{\begin{array}{c} \text{Tapes} \\ P \quad Q \\ \$30 \times 3 \end{array} + \begin{array}{c} \text{CDs} \\ P \quad Q \\ \$10 \times 2 \end{array}}{\begin{array}{c} \text{2018} = \$15 \times 3 + \$5 \times 2 \end{array}} = \frac{110}{55} = \text{CPI of 2} \end{array}$$

## **Foreign Exchange (FOREX)**

1. the **foreign exchange market**, or **FOREX** is the global market for the trading of currencies from different countries
2. when countries buy goods from other countries, or when people travel to other countries, each country is usually paid in their own currency
  - A. the buyer must exchange their currency for that of the seller
3. changes in preferences/tastes, relative incomes, relative price levels, and relative interest rates between countries can impact foreign exchange

## **Foreign Exchange (FOREX) (cont.)**

1. a **higher dollar exchange rate** (stronger value/purchasing power of U.S. currency compared to another country's currency) brought about by a higher interest rate would tend to make goods imported into the U.S. more attractive because it makes foreign goods cheaper with the stronger U.S. dollar
2. if the Federal Reserve (monetary policy) sells government bonds/securities (loans) to banks and thus the nominal interest rate rises while other countries' central banks maintain or even lowers their interest rates, then the return on savings will be more attractive in the U.S. than in other countries
  - A. given this higher rate in the U.S., international capital (money) will flow from other countries into the U.S. to earn higher interest rates
    - i. this will lead to the dollar's appreciation (increase in value) and an increase in imports, but aggregate demand and GDP (AD/GDP/Y) will decrease because price levels will be higher
    - ii. a loss of funds from a country, like when interest rates decrease, depreciates (decreases) a country's currency value and increases exports, and increases its AD/GDP/Y because price levels will be lower

## **Foreign Exchange (FOREX) (cont.)**

1. the higher the **exchange rate** (either fixed/pegged or flexible/floating, the value of one currency for the purpose of conversion to another) the more the quantity demanded (Qd) of imported goods will be
  - A. this is because in the country where there are higher exchange rates, their money is valued more and the people in that country will buy less of their own country's goods and will then buy more imports
2. a **fixed or pegged rate** is a country's exchange rate fixed completely by its own country
3. a **flexible or floating exchange rate** is an exchange rate between countries that changes depending on the supply (S) and demand (D) in the international community

## **Foreign Exchange (FOREX) (cont.)**

1. in the foreign exchange market we only look at two countries/currencies at a time and examine the price of one currency relative to that of the other currency
2. if you need more dollars to buy one euro, the price for the euro **appreciates** (the increase in value of a country's currency with respect to a foreign currency) and the U.S. dollar **depreciates** (the loss in value of a country's currency with respect to a foreign currency)
  - A. more dollars are then needed to buy the other currency and the dollar is said to be “weaker,” and the American price level (PL) will decrease
3. if you need fewer dollars to buy one euro, the U.S. dollar appreciates relative to the euro
  - A. fewer dollars are needed to buy a single unit of the other currency and the dollar is then said to be “stronger,” and the American price level will increase

### **Foreign Exchange (FOREX) (cont.)**

1. if the GDP for a country is strong, the exchange rate of its currency will tend to rise, its price level (PL) will increase, the chance of inflation will increase, and the chance of recession will decrease
2. if the GDP for a country is weak, the exchange rate of its currency will tend to decline, its price level will decrease, the chance of inflation will decrease, and the chance of recession will increase
3. higher exchange rates make U.S. exports less attractive because it makes American goods more expensive for foreigners to buy
  - A. leads to more imports and fewer exports while a lower exchange rate means less imports and more exports



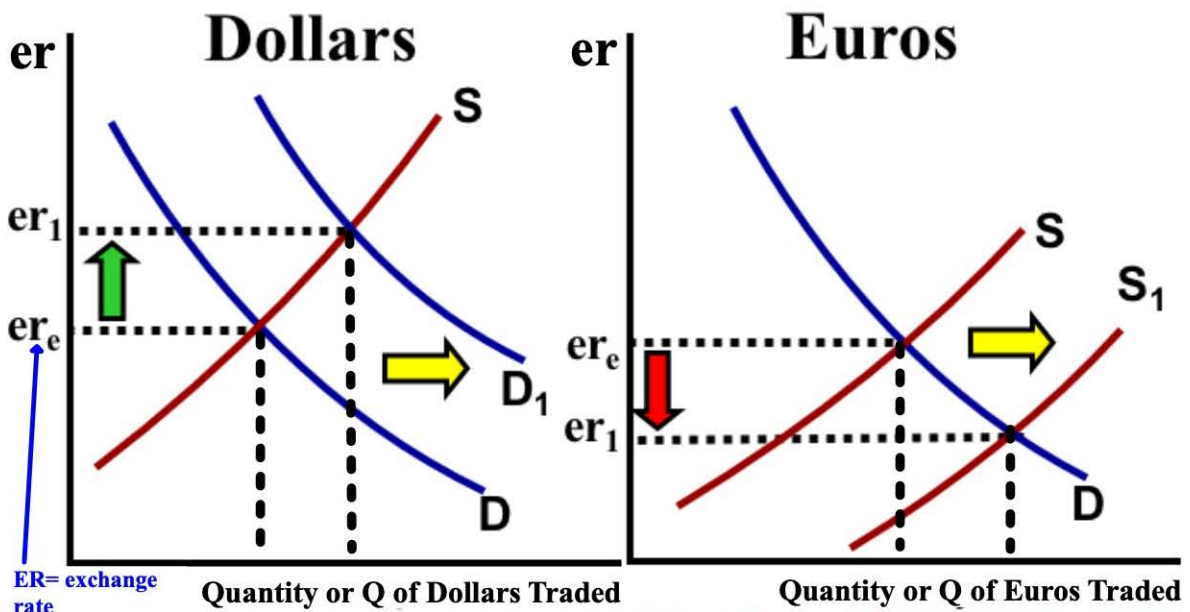
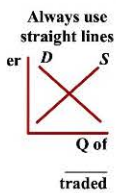
## **Foreign Exchange (FOREX) (cont.)**

1. when thinking about FOREX and which country's currency is appreciating and which is depreciating; think of the currency that is wanted or demanded more relative to the other
  - A. if America's currency is desired by foreigners either
    - i. the inflation in America is decreasing relative to another country making it cheaper to buy American goods because America's price level is decreasing
    - ii. America's interest rate is increasing relative to another country (making it more profitable for foreigners to put their money in American banks because of the higher rate of return from their investment)

**draw two graphs of the foreign exchange market showing what happens when Europeans come to Disney World in Orlando or America's interest rate is high compared to other countries**

## Foreign Exchange (FOREX) (cont.)

What happens if Europeans prefer vacationing in the United States?



**The Dollar APPRECIATES**

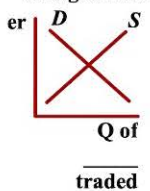
**The Euro DEPRECIATES**

## Foreign Exchange (FOREX) (cont.)

What will happen to the value of the Mexican Peso if either high inflation or low interest rates in Mexico decrease how much of it people want?

### Foreign exchange market for the Pesos

Always use straight lines

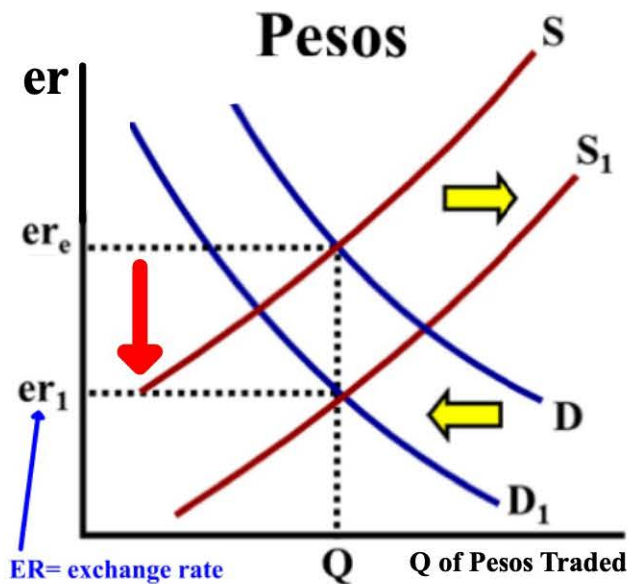


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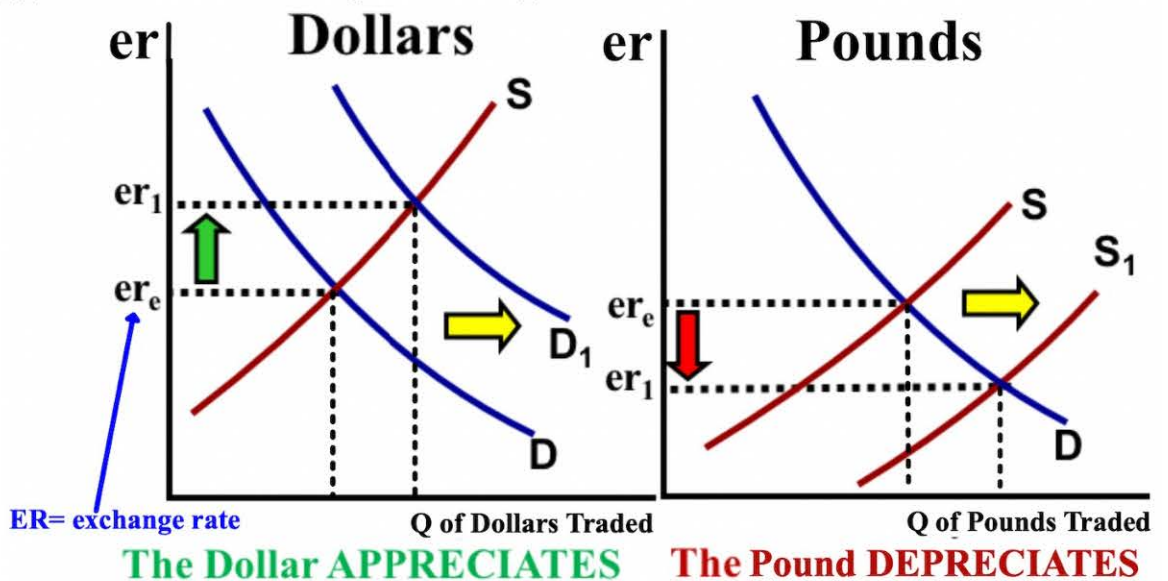
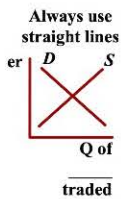
The demand for Pesos will decrease since Mexico's trading partners will not want to purchase higher priced Mexican products or lose money investing in Mexico. The supply of Pesos will increase as Mexicans look to buy lower priced imports.

**The peso DEPRECIATES**

## Foreign Exchange (FOREX) (cont.)

Reasons for a change in FOREX (foreign exchange):

1. Changes in tastes- British tourists flock to the U.S.....
  - a. the demand for U.S. dollars increases (shifts right)
  - b. the supply of British pounds increases (shifts right)
  - c. the dollar appreciates and the pound depreciates

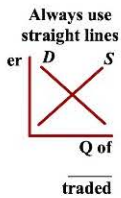


## Foreign Exchange (FOREX) (cont.)

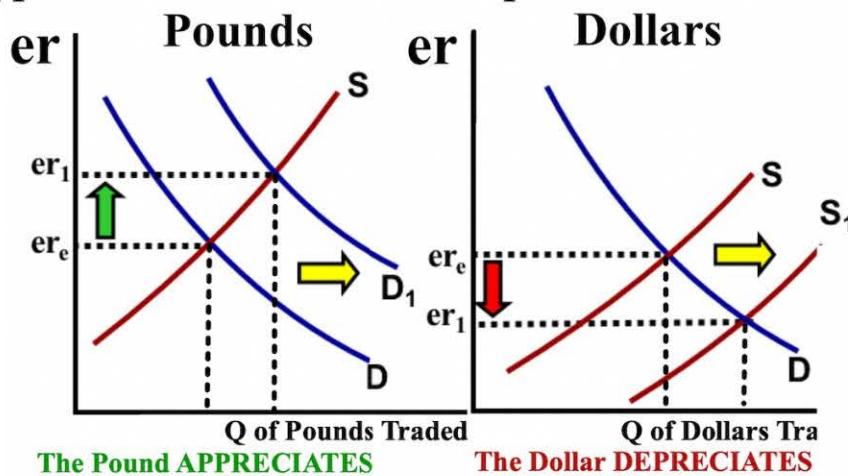
Reasons for a change in FOREX (foreign exchange):

2. Changes in relative incomes- U.S. growth increases U.S. incomes resulting in more imports....
  - a. the U.S. buys more British imports
  - b. the demand for pounds increases (shifts right)
  - c. the supply of U.S. dollars increases (shifts right)
  - d. the pound appreciates and the dollar depreciates

Always use straight lines



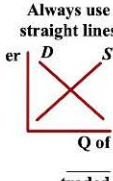
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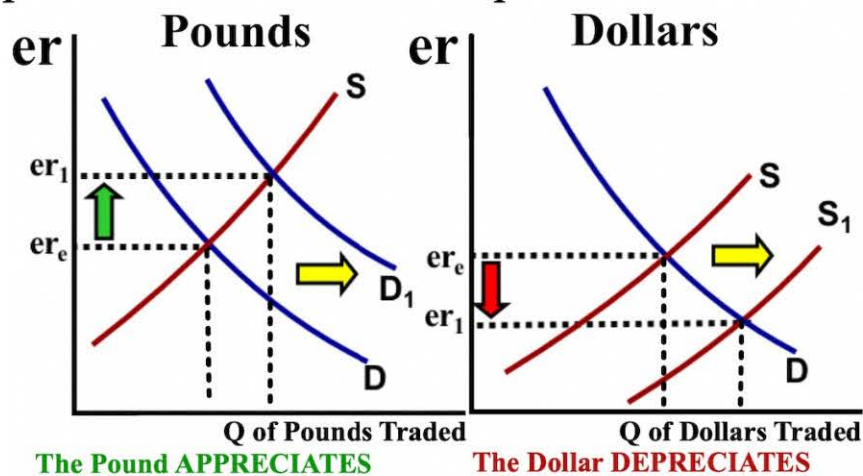


## Foreign Exchange (FOREX) (cont.)

Reasons for a change in FOREX:

3. Changes in relative price level- U.S. prices increase relative to Britain resulting in more imports....
  - a. the U.S. demand for cheaper imports increases
  - b. the U.S. demand for the pound increases (shifts right)
  - c. the supply of U.S. dollars increases (shifts right)
  - d. the pound appreciates and the dollar depreciates

Always use straight lines  
  
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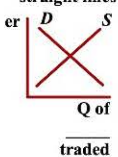
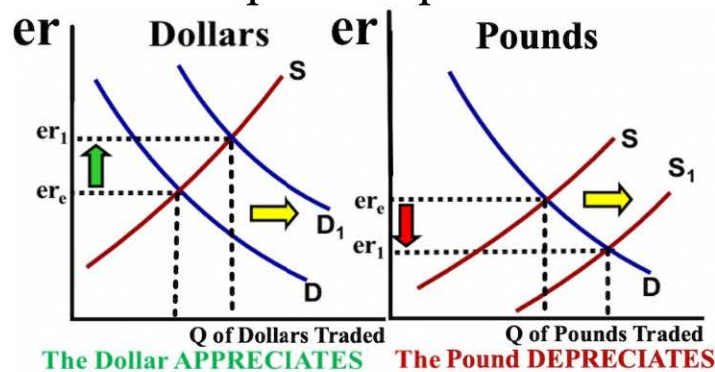


## Foreign Exchange (FOREX) (cont.)

Reasons for a change in FOREX:

4. Changes in relative interest rates- Ex: U.S. has a higher interest rate than Britain....
  - a. British people want to put money in U.S. banks
  - b. capital flow (money) increases from other countries to the U.S. (shifts right)
  - c. British demand for U.S. dollars increases (shifts right)
  - d. British supply of pounds increase (shifts right)
  - e. the dollar appreciates and the pound depreciates

Always use straight lines

## **Foreign Exchange (FOREX) (cont.)**

For each of the following examples, identify what will happen to the value of U.S. Dollars vs. Japanese Yen.

1. American tourists increase visits to Japan

**U.S. \$ depreciates and Yen appreciates**

Americans spend more in Japan

2. The U.S. government decreases personal income tax

**U.S. \$ depreciates and Yen appreciates**

American money supply increases which leads to a higher dollar value and increased imports from Japan

3. Inflation in Japan rises faster than in the U.S.

**U.S. \$ appreciates and Yen depreciates**

Japan will invest capital (money) in America and buy American goods because of the higher cost of Japanese goods

4. Japan has a budget deficit and increases interest rates

**U.S. \$ depreciates and Yen appreciates**

Americans will invest capital (money) in Japan because of the higher interest rate in order to earn more money



## **Foreign Exchange (FOREX) (cont.)**

For each of the following examples, identify what will happen to the value of U.S. Dollars vs. Japanese Yen.

5. Japan places high tariffs (taxes) on all U.S. imports

**U.S. \$ depreciates (demand decreases)  
and Yen appreciates (supply decreases)**

American goods increase in price to pay for the Japanese tariff and more Japanese goods are purchased

6. The U.S. suffers a larger recession than Japan

**U.S. \$ appreciates (supply decreases)  
and Yen depreciates (demand decreases)**

Japan will invest capital (money) in America because of their lower price level due to the recession

7. The U.S. Federal Reserve sells bonds at high interest rates.

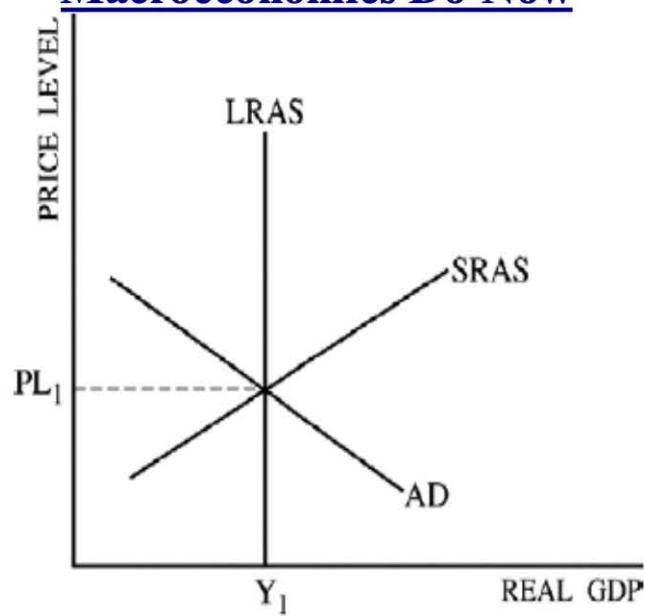
**U.S. \$ appreciates and Yen depreciates**

Japan will invest capital (money) in America because of the higher interest rate in order to earn more interest

## Macroeconomics Do-Now

1. Assume that the United States economy is operating at full employment.
  - (a) Using a correctly labeled graph of the long-run aggregate supply, short-run aggregate supply, and aggregate demand, show each of the following.
    - (i) Current price level, labeled  $PL_1$
    - (ii) Current output level, labeled  $Y_1$
  - (b) Assume that a recession starts in the United States. Think about its impact on interest rates.
  - (c) Based on the real interest rate change identified in part (b),
    - (i) will interest-sensitive expenditures increase, decrease, or remain unchanged?
    - (ii) what will happen to the rate of economic growth **based on the information in (C) and (i)? Explain.**
  - (d) Assume that the real interest rate of the euro zone increases relative to the real interest rate of the United States. Draw a correctly labeled graph of the foreign exchange market for the euro and show the impact of the change in the real interest rate in the euro zone on each of the following.
    - (i) Demand for the euro. Explain.
    - (ii) Value of the euro relative to the United States dollar

## Macroeconomics Do-Now



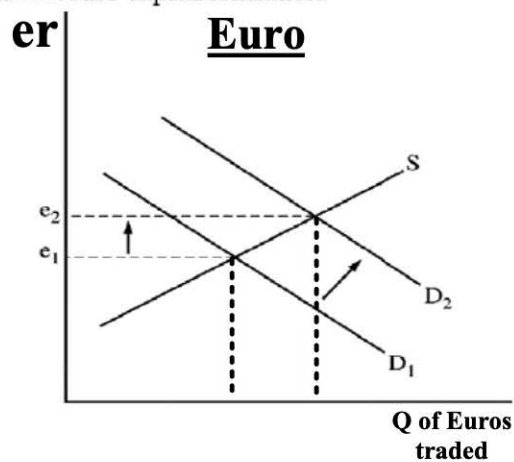
(a) 2 points:

- One point is earned for drawing a correctly labeled graph, showing AD, SRAS, and  $PL_1$ .
- One point is earned for drawing a vertical LRAS curve at  $Y_1$  that is at the intersection of AD and SRAS.

## Macroeconomics Do-Now

(c) 2 points:

- One point is earned for stating that interest-sensitive expenditures will increase.
- One point is earned for stating that the economic growth rate will increase because higher investment will increase capital formation.



(d) 3 points:

- One point is earned for drawing a correctly labeled graph of the foreign exchange market for the euro.
- One point is earned for shifting the demand curve to the right and showing an increase in the value of the euro.
- One point is earned for explaining that the demand for the euro increases because the higher real interest rate in the euro zone leads to higher returns for financial investments in the euro zone, attracting funds from the United States to the euro zone.

### **Macroeconomics Do-Now**

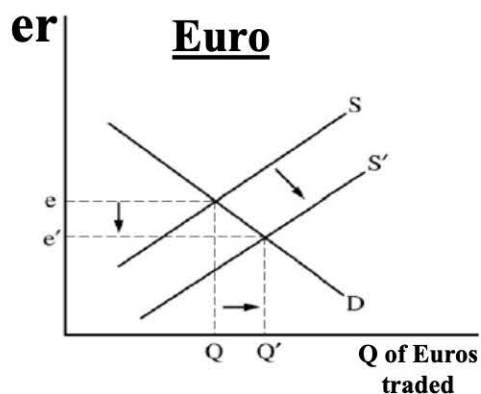
3. Exchange rates and interest rates are important for macroeconomic decision making.
  - (a) How does an increase in Japan's government budget deficit affect each of the following?
    - (i) The real interest rate in the short run in Japan. Explain.
    - (ii) Private domestic investment in plant and equipment in Japan
  - (b) Draw a correctly labeled graph of the foreign exchange market for the euro, and show the effect of the change in the real interest rate in Japan from part (a)(i) on each of the following.
    - (i) Supply of euros. Explain.
    - (ii) Yen price of the euro
  - (c) To reverse the change in the yen price of the euro identified in part (b)(ii), should the European Central Bank buy or sell euros in the foreign exchange market?

## Macroeconomics Do-Now

6 points (2+3+1)

(a) 2 points:

- One point is earned for stating that the real interest rate in Japan will increase in the short run because the supply of loanable funds will decrease or the demand for loanable funds will increase.
- One point is earned for stating that private domestic investment in plant and equipment in Japan will decrease.



(b) 3 points:

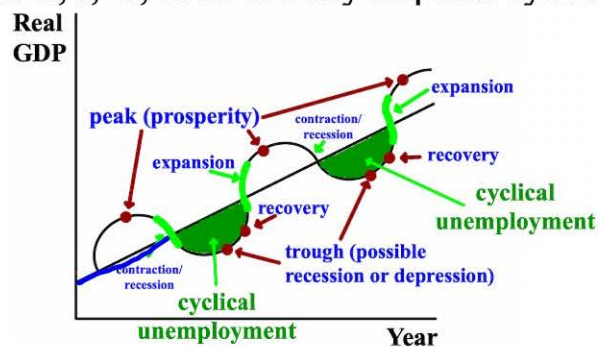
- One point is earned for drawing a correctly labeled graph of the foreign exchange market for the euro.
- One point is earned for showing that the supply curve for euros shifts to the right and for concluding that the yen price of the euro decreases.
- One point is earned for explaining that the European purchases of Japanese financial assets will increase due to the relatively higher rate of return in Japan.

(c) 1 point:

- One point is earned for stating that European Central Bank should buy euros.

## Cyclical, Frictional, and Structural Unemployment

1. now we'll talk about about employment and unemployment
  2. the **natural unemployment rate** ( $Y_f$ ) is the unemployment rate (about 3-5% in America) that exists when the economy is not in a recession or in an expansion and when real GDP is equal to potential GDP
  3. an economy in long-run equilibrium leads potential GDP to be same as the real unemployment rate
  4. an increase in aggregate demand (AD) does not impact the natural unemployment rate
  5. the increase in unemployment above the natural rate during recessions is called **cyclical unemployment** (shaded green below) because it is related to the short-term cyclical functions in the economy
- A. increases or decreases in C, I, G, or X directly impacts cyclical unemployment

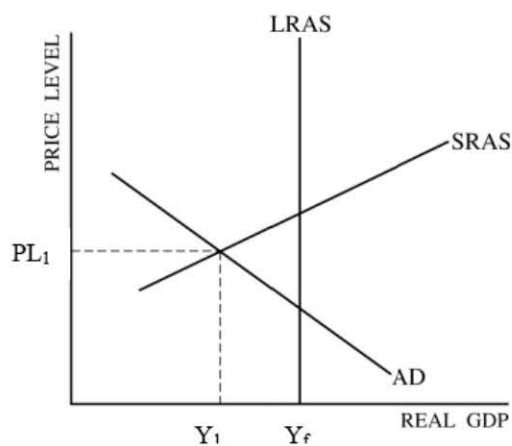


## Macroeconomics Do-Now

1. Assume that the United States economy is currently operating below the full-employment level of real gross domestic product with a balanced budget.
  - (a) Draw a correctly labeled graph of aggregate demand, short-run aggregate supply, and long-run aggregate supply, and show each of the following in the United States.
    - (i) Current output and price level, labeled as  $Y_1$  and  $PL_1$ , respectively
    - (ii) Full-employment output, labeled as  $Y_f$
  - (b) The United States government increases spending on goods and services by \$100 billion, which is financed by borrowing. How will the increase in government spending affect each of the following?
    - (i) Cyclical unemployment
    - (ii) The natural rate of unemployment
  - ~~(c) If the marginal propensity to consume is equal to 0.75, calculate the maximum possible change in real gross domestic product that could result from the \$100 billion increase in government spending.~~
  - ~~(d) Assume that the government increases spending by \$100 billion. Show the impact of the spending on the real interest rate and loanable funds. No numbers are needed.~~
  - (e) Based on the real interest rate change in part (b), what is the effect on the long-run economic growth rate? Explain.
  - (f) Now assume that instead of financing the \$100 billion increase in government spending by borrowing, the United States government increases taxes by \$100 billion. With this equal increase in government spending and taxes, will the real gross domestic product increase, decrease, or remain the same? Explain.



## Macroeconomics Do-Now



(a) 2 points:

- One point is earned for drawing a correctly labeled graph showing an equilibrium with AD, SRAS,  $Y_1$ , and  $PL_1$  labeled.
- One point is earned for drawing a vertical LRAS curve at  $Y_f$  to the right of the intersection of AD and SRAS.

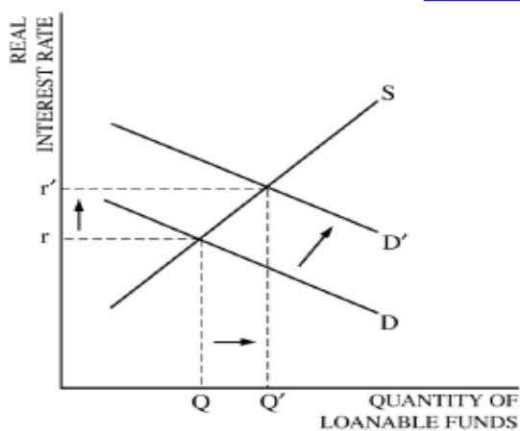
(b) 2 points:

- One point is earned for stating that cyclical unemployment will decrease.
- One point is earned for stating that the natural rate of unemployment will not change.

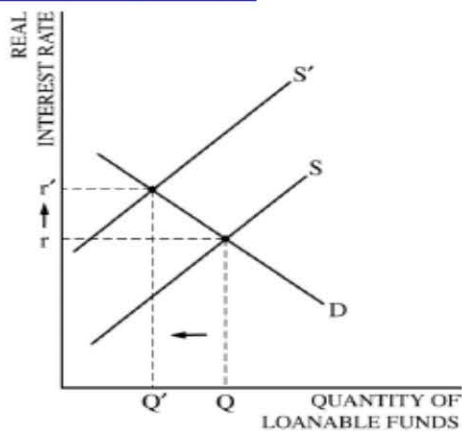
~~(c) 1 point:~~

- ~~• One point is earned for calculating the maximum change in real GDP:  
 ~~$\text{Change in GDP} = (1/0.25) \times \$100 \text{ billion} = \$400 \text{ billion}$~~~~

## Macroeconomics Do-Now



OR



(d) 2 points:

- One point is earned for drawing a correctly labeled loanable funds market graph.
- One point is earned for shifting the demand curve to the right (or shifting the supply curve to the left) and showing an increase in the real interest rate.

(e) 2 points:

- One point is earned for stating that the economic growth rate will fall.
- One point is earned for explaining that the higher real interest rate will slow down capital formation.

(f) 2 points:

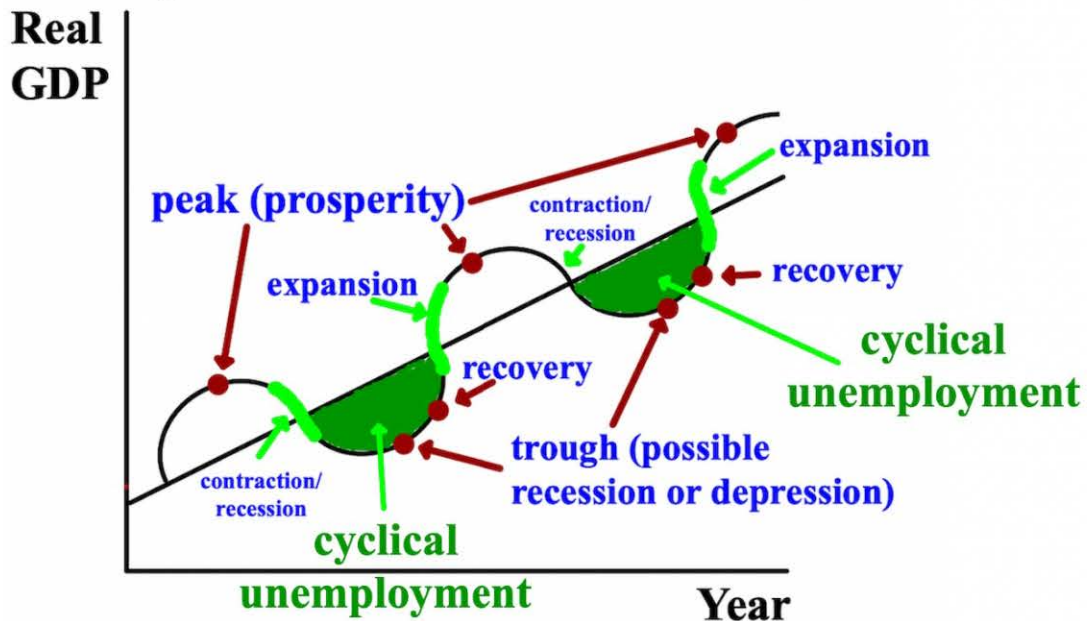
- One point is earned for stating that real gross domestic product will increase.
- One point is earned for explaining that the expansionary effect of the increase in government spending outweighs the contractionary effect of the increase in taxes of the same size. (Or students may explain by calculating the net increase in GDP, \$100 billion, or stating the tax multiplier is smaller than the spending multiplier.)

## **Cyclical, Frictional, and Structural Unemployment (cont.)**

1. the natural unemployment rate ( $Y_f$ ) is caused by a combination of **frictional unemployment** and **structural unemployment**
  - A. frictional unemployment occurs when new workers enter the labor force and must look for work, or when workers change jobs for one reason or another, like quitting a job to get another one
    1. most frictional unemployment is short-lived
  - B structural unemployment occurs if workers find that they have insufficient skills or find that their skills are no longer in demand as a result of technological change or a shift in people's tastes toward new products
2. frictional unemployment and structural unemployment are not constant and change over time

## Cyclical, Frictional, and Structural Unemployment (cont.)

1. at full employment ( $Y_f$ ), frictional unemployment exists but not cyclical
2. economists feel that natural unemployment occurs whenever the operation of the overall economy is as close to normal in the sense that real GDP is near potential GDP



## **How is Unemployment Measured?**

1. each month, the U.S. Census Bureau surveys households in the United States
2. the Census Bureau determines whether each person 16 years of age or over is employed or unemployed
3. **discouraged workers** are workers who have left the labor force after not being able to find a job
4. **part-time workers** are counted as employed
  - A. the official definition of a part-time worker is one who works between one and 34 hours per week
5. the most comprehensive measure of labor input to the production of real GDP (Y) is the total number of hours worked by all workers, or aggregate hours

*what is the formula for the unemployment rate?*

## Comparing Two Key Indicators

1. there are two key indicators of conditions in the economy

A. one is the **unemployment rate** (the percentage of the labor force that is unemployed), which = the number of citizens unemployed / the number of citizens in the labor force x 100

i. the **labor force** consists of those who are at least 16 and either working or looking for work

ii. to be counted as unemployed, a person must be looking for work, but not have a job

macro  
formula  
#8

$$\frac{\overset{10}{\text{the number of unemployed people}}}{\underset{100}{\text{the number of people in the labor force}}} = \frac{.1}{1} \times 100 = \overset{10\%}{\text{unemployment rate}}$$

what is the  
formula for  
the labor force  
participation  
rate?

Date	Labor Force	Employed	Unem.	Working Age Pop.	Unempl. Rate?
11/2017	160,529,000	153,918,000	6,610,000	205,000,000	<b>4.1%</b>
	$\frac{6,610,000}{160,529,000}$	= 0.041	$0.041 \times 100 = 4.1\%$		
			unemployment		

## Comparing Two Key Indicators (cont.)

- the second key indicator of conditions in the labor market is the **labor force participation rate** (the ratio of people in the labor force to the working-age population), which = the number of citizens in the labor force / the number of the working-age population x 100.

macro  
formula  
#9

$$\frac{\overset{10}{\text{the number of citizens in the labor force}}}{\underset{100}{\text{the number of the working-age population}}} = \underline{.1} \times 100 = \overset{10\%}{\text{labor force participation rate}}$$

Date	Labor Force	Employed	Unem.	Age Pop.	Rate
11/2017-	160,529,000	153,918,000	6,610,000	205,000,000	4.1%
	$\frac{160,529,000}{205,000,000} = 0.783$				$0.783 \times 100 = 78.3\%$ labor force participation rate