

# **Unit 3**

## **National Income and Price Determination**

(17%–27%)

OpenStax Chapters: 11-13

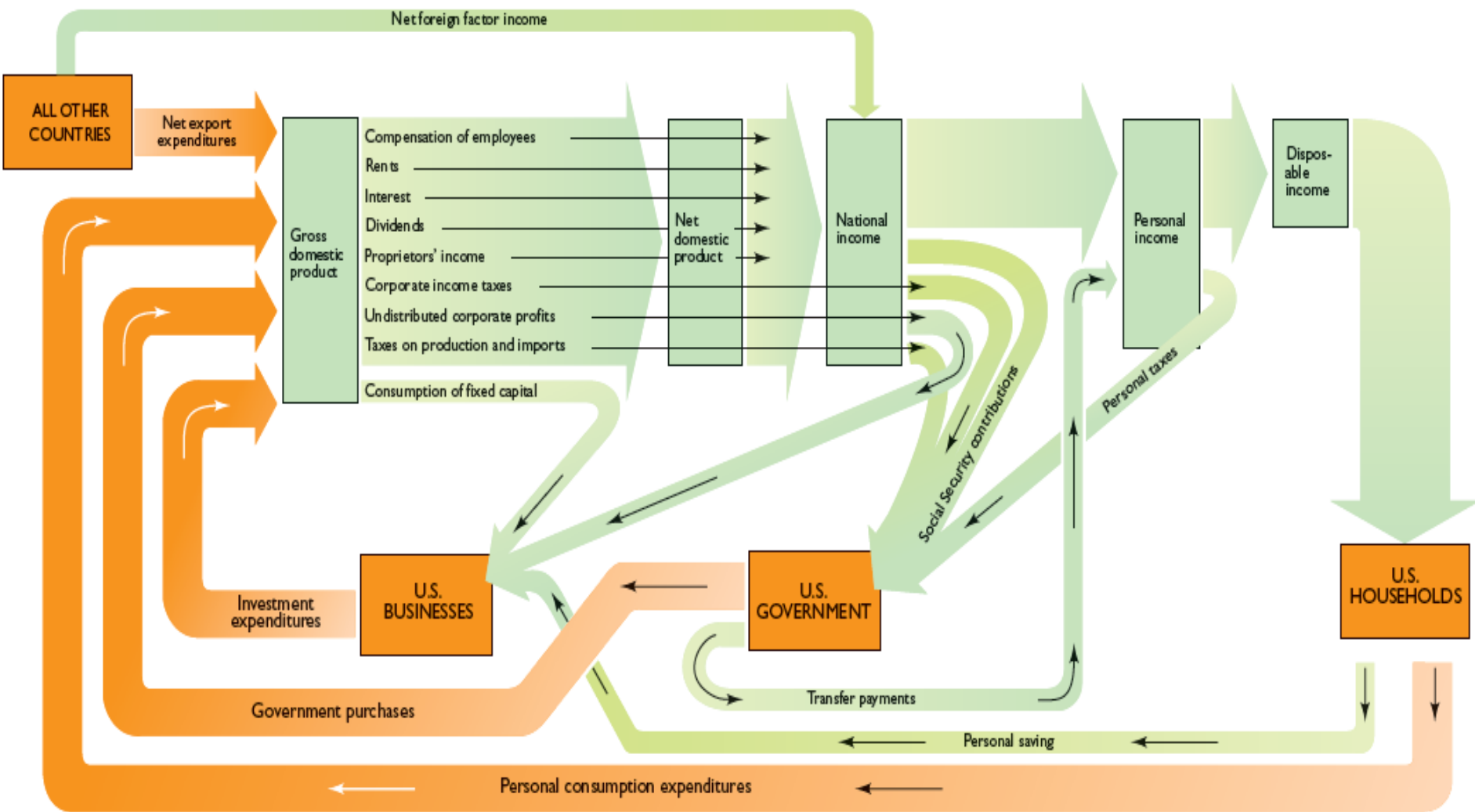
5 Steps Chapters: 8, 9

# National Income and Price Determination

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- ▶ This section introduces the aggregate supply and aggregate demand model to explain the determination of equilibrium national output and the general price level, as well as to analyze and evaluate the effects of public policy. It is important to discuss the aggregate demand and aggregate supply concepts individually to provide students a firm understanding of the mechanics of the aggregate demand and aggregate supply model.
- ▶ The aggregate demand and aggregate supply analysis often begins with a general discussion of the nature and shape of the aggregate demand and aggregate supply curves and the factors that affect them. A detailed study of aggregate demand may begin by defining the four components of aggregate demand: consumption, investment, government spending, and net exports. It also examines why the aggregate demand curve slopes downward and how changes in the determinants affect the aggregate demand curve. The spending-multiplier concept and its impact on aggregate demand, and how crowding out lessens this impact, should be demonstrated as well. The course can then present the definition and determinants of aggregate supply, the different views about the shape of the aggregate supply curve in the short run and in the long run, and highlight the importance of the shape in determining the effect of changes in aggregate demand on the economy. It is also important to understand the notion of sticky-price and sticky-wage models and their implication for the aggregate supply curve in comparison to flexible prices and wages.
- ▶ Students should be able to use the aggregate demand and aggregate supply model to determine equilibrium income and price level and to analyze the impact of economic fluctuations on the economy's output and price level, both in the short run and in the long run.



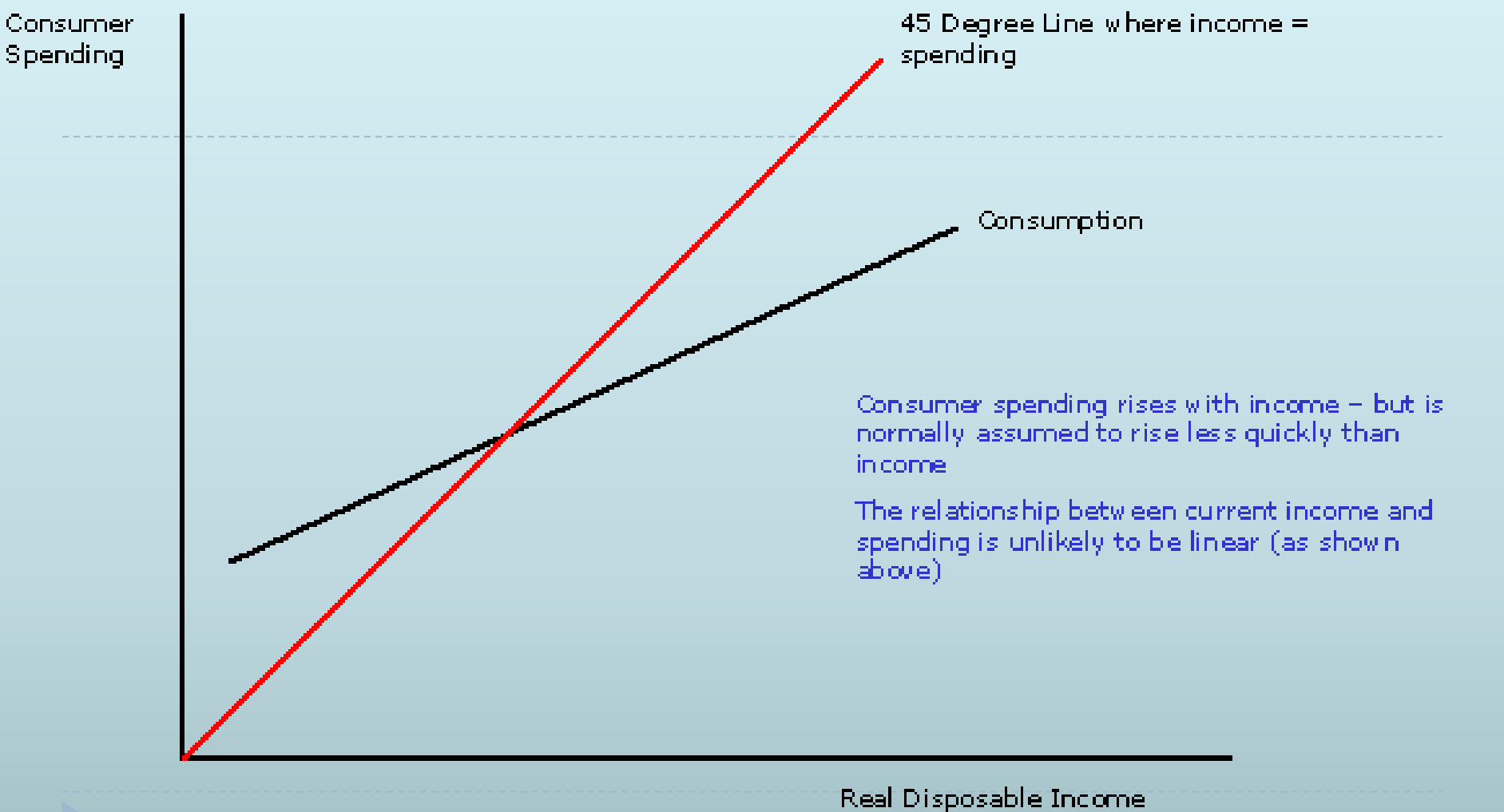


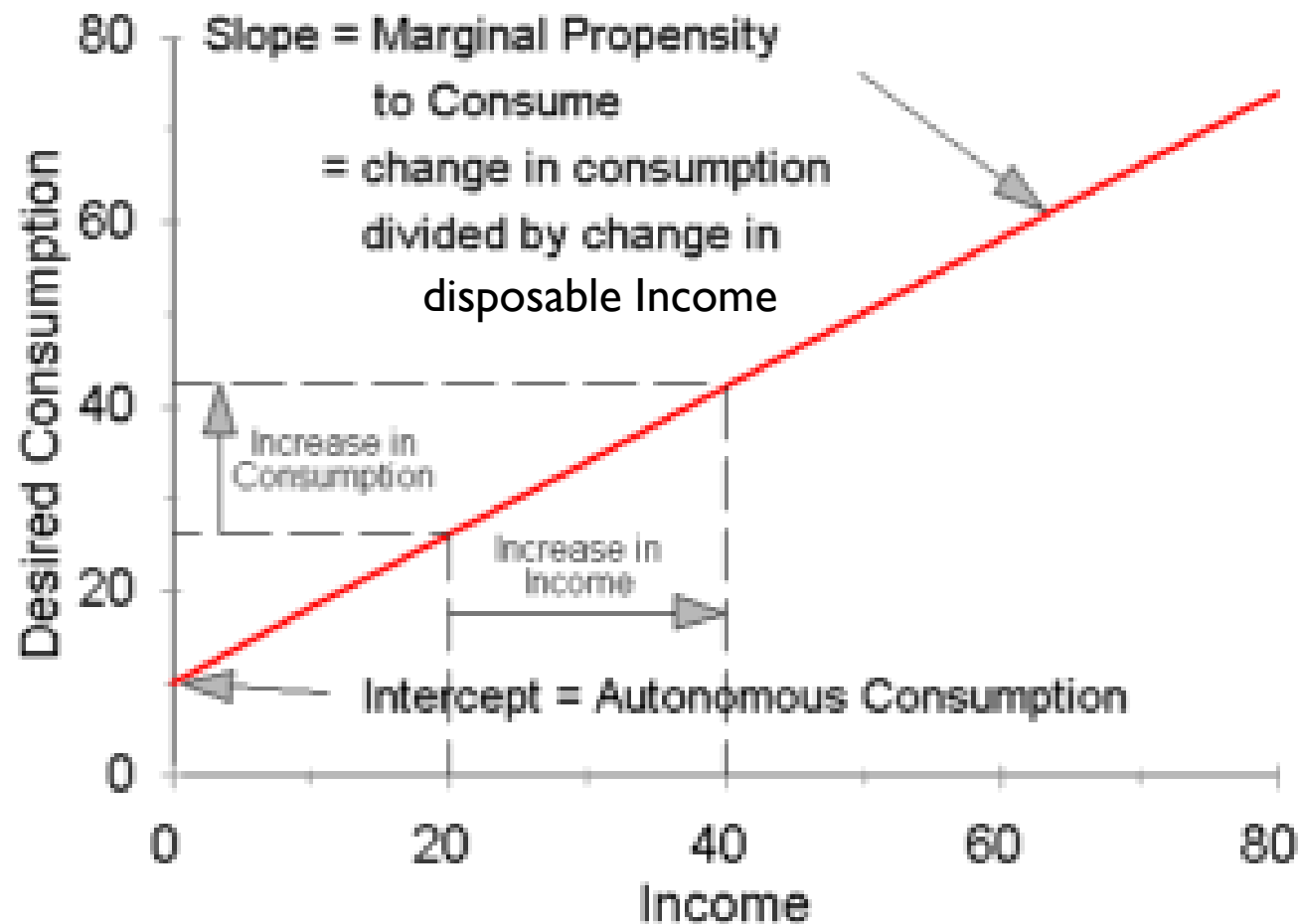
# Disposable Income

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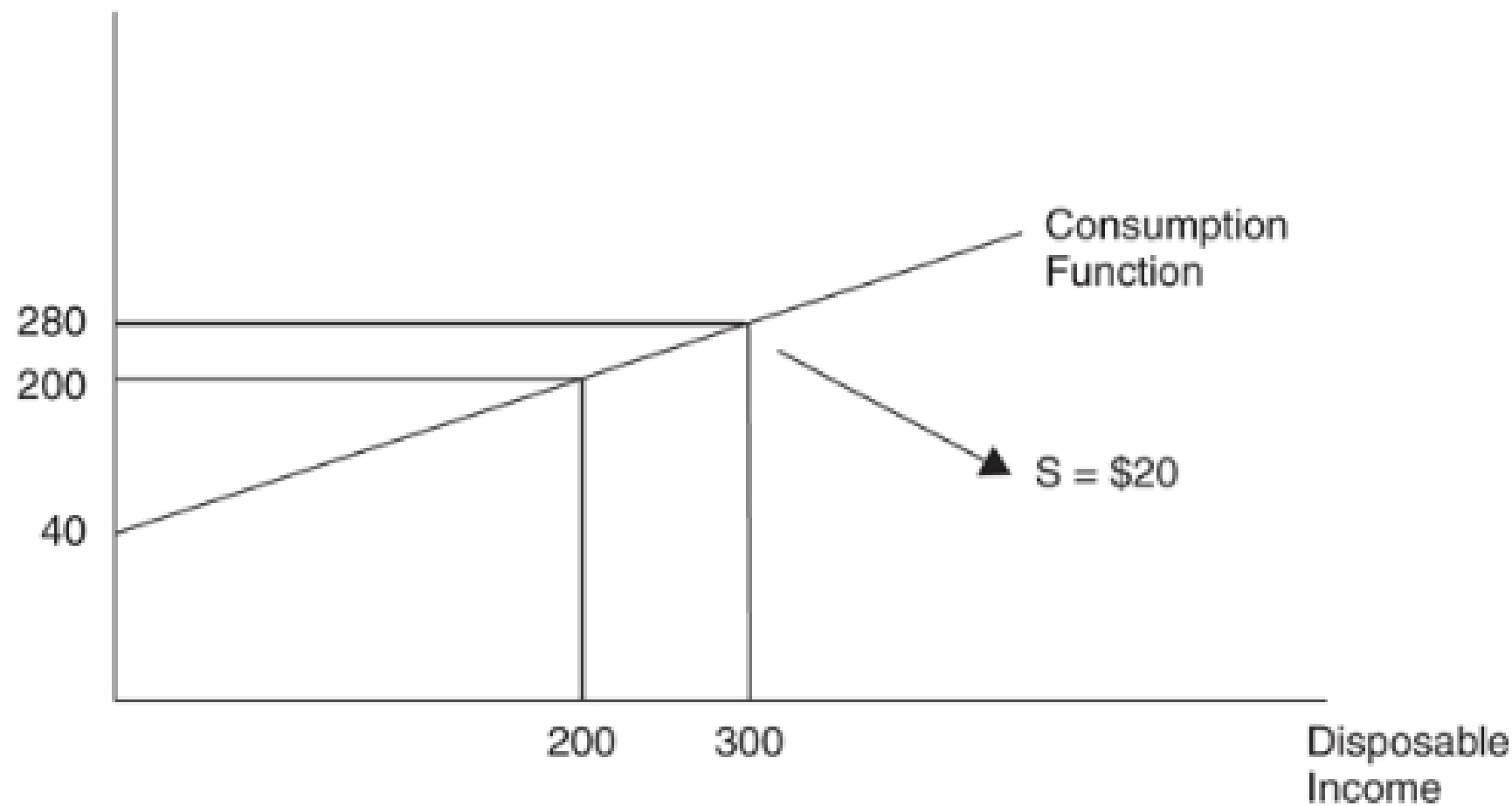
- ▶  $\text{Gross Income} - \text{Income Taxes} = \text{Disposable Income}$
- ▶ Even with zero disposable income, households still consume as they liquidate wealth (sell assets), spend some savings, or borrow (dissavings).



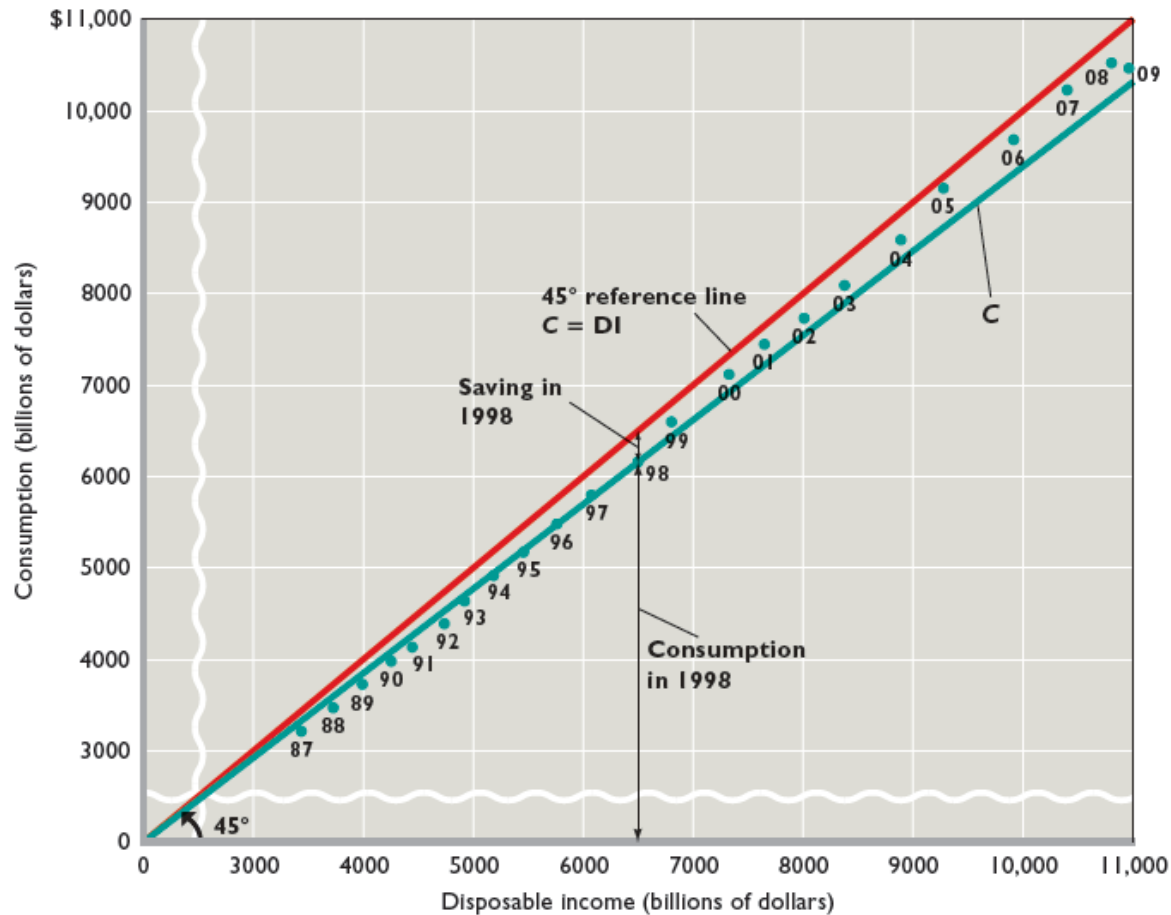




Consumption

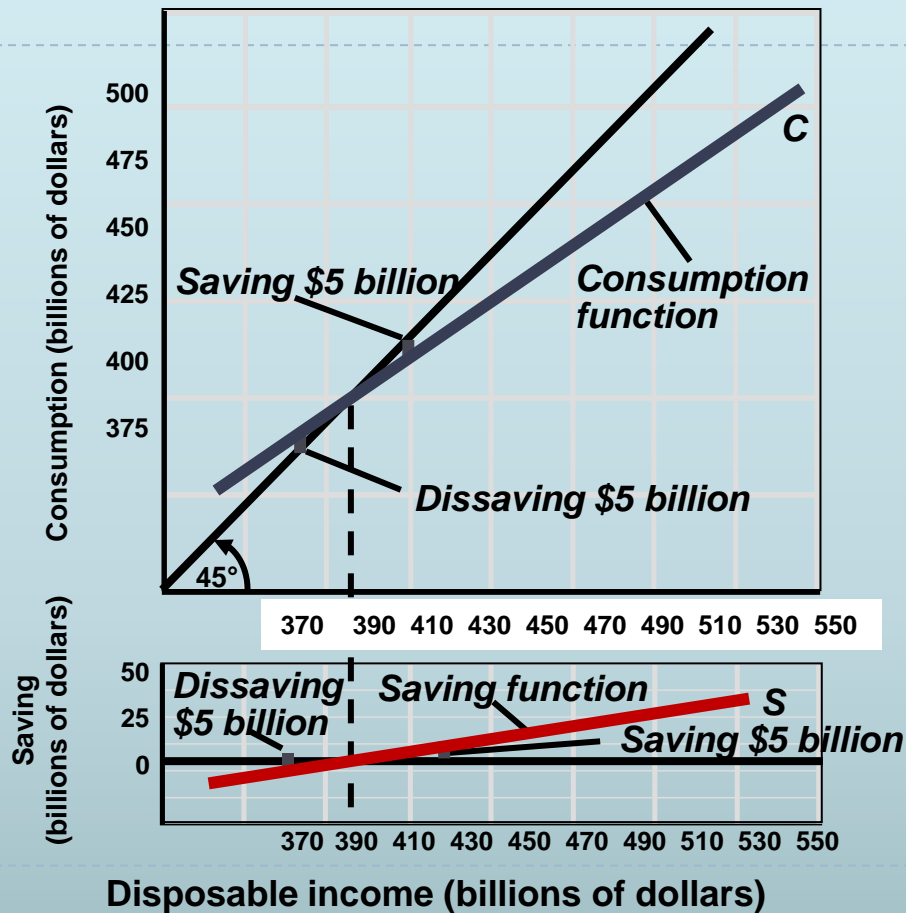


# Income, Consumption, and Saving



Source: Bureau of Economic Analysis. [www.bea.gov](http://www.bea.gov).

# Consumption and Saving Schedules



# Determinants of Consumption and Saving

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- ▶ Financial Wealth: Causes  $C$  to shift upwards and  $S$  to shift down.
  - ▶ Can sell stock or other sources of wealth (and savings) to consume more.
- ▶ Debt: Can increase  $C$  with by borrowing.
  - ▶ Eventually, with increased debt,  $DI$  decreases as does consumption because they have to pay off debt.
- ▶ Expectations: Uncertainty about the future can cause  $S$  to increase but  $C$  to decrease. Expectations of higher prices can cause  $C$  to increase and  $S$  to decrease.
- ▶ Real Interest Rates: Lower real interest rates can cause  $C$  to increase but  $S$  to decrease.
  - ▶ Higher Real Interest Rates: Increase Savings but decrease Consumption.
- ▶ Taxes and Transfer Payments: With these,  $C$  and  $S$  always change in the same direction. Increases in taxes cause both  $C$  and  $S$  to decrease.
  - ▶ Transfer Payments: Like Social Security cause  $C$  and  $S$  to increase.

○ Consumption (C) and Saving (S)

Consumer Wealth $\uparrow \rightarrow C\uparrow, S\downarrow$

Consumer Wealth $\downarrow \rightarrow C\downarrow, S\uparrow$

Consumer Expectations $\uparrow \rightarrow C\uparrow, S\downarrow$

Consumer Expectations $\downarrow \rightarrow C\downarrow, S\uparrow$

Consumer Debt $\uparrow \rightarrow C\downarrow, S\uparrow$

Consumer Debt $\downarrow \rightarrow C\uparrow, S\downarrow$

Income Taxes $\uparrow \rightarrow C\downarrow, S\downarrow$

Income Taxes $\downarrow \rightarrow C\uparrow, S\uparrow$

Transfer Payments $\uparrow \rightarrow C\uparrow, S\uparrow$

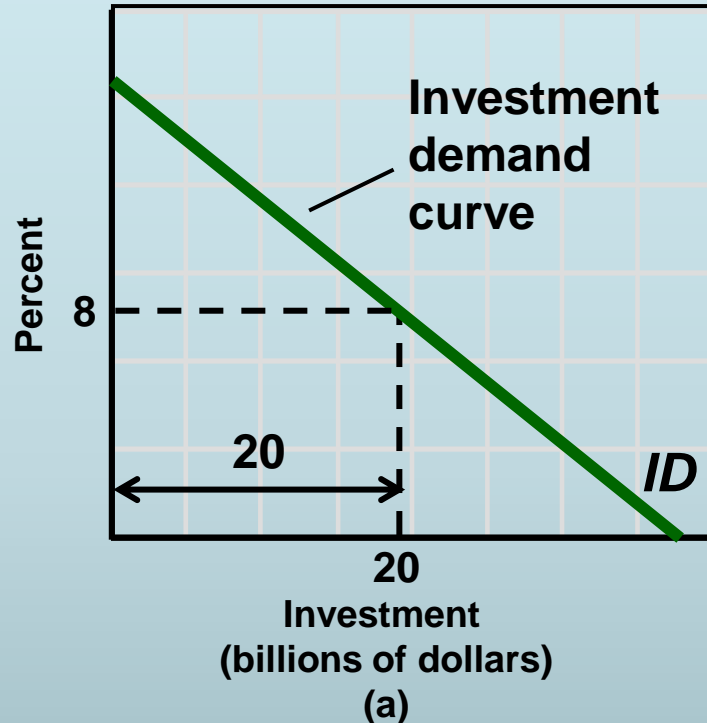
Transfer Payments $\downarrow \rightarrow C\downarrow, S\downarrow$

# Investment

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- ▶ How do you decide if an investment is worth while?
  - ▶ If the real rate of return ( $r\%$ ) is  $\geq$  the real interest ( $i\%$ ) then make the investment.
  - ▶ If  $r\% < i\%$ , do not make the investment.
- ▶ If Sara buys a new stove for \$1000 for her restaurant, she expects that extra stove to help produce more food.
  - ▶ The expected profits for one year of the stove are \$200.
  - ▶ The expected ( $r$ ) is  $200/1000$  or .20 (20%)
  - ▶ The bank offers her a loan for the \$1000 at 10% nominal interest and includes 3% for expected inflation and 7% as the real rate of borrowing. So ( $i$ ) is .07 or 7%.
- ▶ Should Sara invest? How much is Sara paying in interest for that year? How much is her total profits?

# Investment Demand Curve



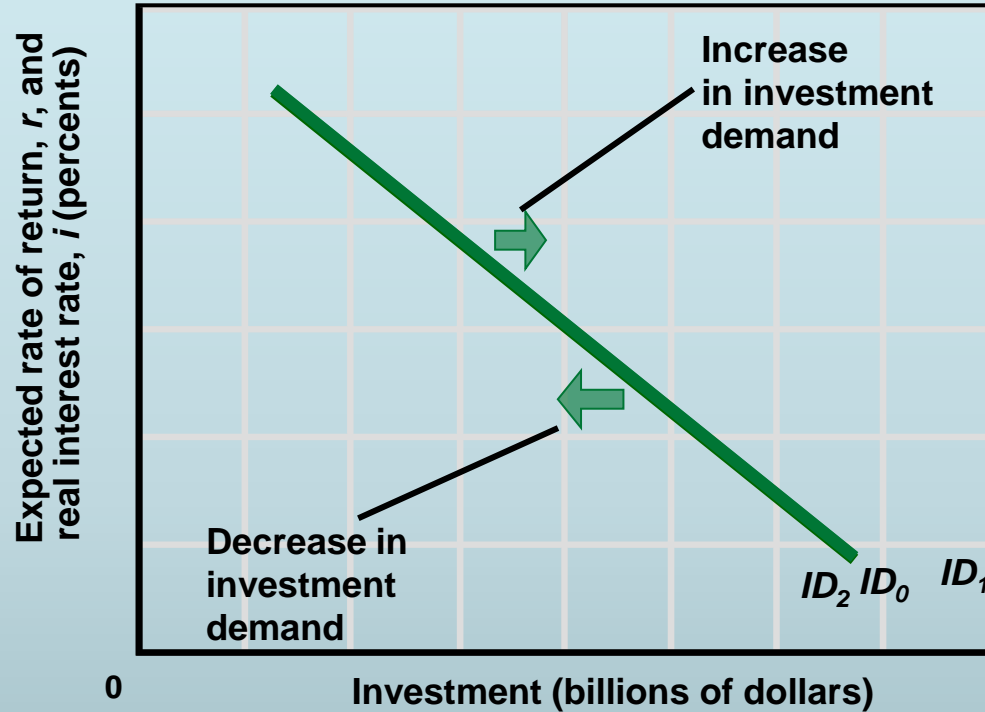
Investment demand curve

- A rational firm will invest until  $i = r$ .
- Once you get passed  $i$ , the firm sees the investment as too great a risk.
  - Or that it may take too long to see a return on the investment.

# Shifts of Investment Demand

- ▶ Acquisition, maintenance, and operating costs
- ▶ Business taxes
- ▶ Technological change
- ▶ Stock of capital goods on hand
- ▶ Planned inventory changes
- ▶ Expectations

# Shifts of Investment Demand



## Investment

### Spending/Demand (I)

Acquisition/Maintenance/Operating Costs  $\uparrow \rightarrow I \downarrow$

Acquisition/Maintenance/Operating Costs  $\downarrow \rightarrow I \uparrow$

Business Taxes  $\uparrow \rightarrow I \downarrow$

Business Taxes  $\downarrow \rightarrow I \uparrow$

Technology  $\uparrow \rightarrow I \uparrow$

Technology  $\downarrow \rightarrow I \downarrow$

Inventory  $\uparrow \rightarrow I \downarrow$

Inventory  $\downarrow \rightarrow I \uparrow$

Market Expectations  $\uparrow \rightarrow I \uparrow$

Market Expectations  $\downarrow \rightarrow I \downarrow$

# Consumption and Investment Spending

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1. Firms invest money
  2. Income increases for employees
  3. This causes aggregate output to increase
  4. Leads to more disposable income (DI) for employees (profits and wages)
  5. Employees spend more (consumer spending)
  6. Influences firms to increase output again and generating another increase in disposable income.
  7. Rinse and Repeat
- How do we measure the overall effect of this process?



# Income, Expenditures and the Multiplier

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## ▶ Assumptions:

- ▶ Producers are willing to supply additional output at a fixed price (in the short run).
- ▶ Changes in spending translate to changes in aggregate output.
- ▶ Interest Rates are as given
- ▶ No government spending and no taxes
- ▶ Exports and Imports = 0.



# Marginal Propensity to Consume (MPC)

- ▶ The increase in consumer spending when DI rises by \$1.

- ▶  $DI = \text{Gross Income} - \text{Net Taxes}$
- ▶  $DI = \text{Consumption} + \text{Saving } (C + S)$

$$MPC = \frac{\Delta \text{Consumer spending}}{\Delta \text{Disposable income}}$$

- ▶ For example, consumer income goes from \$8 billion to \$12 billion, consumer spending goes from \$4 billion to \$6 billion.
  - ▶  $2/4 = 0.5$ ,  $MPC = 0.5$ , so for every dollar earned, consumer spending increased by 50 cents. This will show up on a graph, so that for every 100 dollars earned, consumption (C) increased by 50 dollars.
- ▶ The MPC will always be between 0 and 1, because some new income will always be saved.
- ▶ This is called Marginal Propensity to Save (MPS).

$$MPC + MPS = 1$$

$$MPS = 1 - MPC$$

# Consumption Schedule

Income	Consumption	MPC
\$0	\$1.00	
1	1.75	
2	2.50	
3	3.25	
4	4.00	
5	4.75	
6	5.50	
7	6.25	
8	7.00	
9	7.75	
10	8.50	

- ▶ Autonomous Consumption is the amount one would spend even if DI is at 0.
- ▶ Autonomous Saving is opposite, the amount that needs to be borrowed.
- ▶ This is constant and unchanging.
- ▶ How much is Autonomous Saving and Autonomous Consumption in this example?
- ▶ What is the MPC in this example?
- ▶ What is the consumption function? The amount we save for every increment?
  - ▶ **This will also be the slope of the curve when plotted.**

Consumption and Savings Schedule (Problem # 1, find the MPC and MPS of the following)						
(1) Level of Output and Income GDP=DI	(2) Consumption (C)	(3) Saving (S), (1) – (2)	Marginal Propensity to Consume (MPC), $\Delta(2)/\Delta(1)^*$	Marginal Propensity to Save (MPS), $\Delta(3)/\Delta(1)^*$		
(1) \$370	\$375	\$-5				
(2) 390	390	0				
(3) 410	405	5				
(4) 430	420	10				
(5) 450	435	15				
(6) 470	450	20				
(7) 490	465	25				
(8) 510	480	30				
(9) 530	495	35				
(10) 550	510	40				

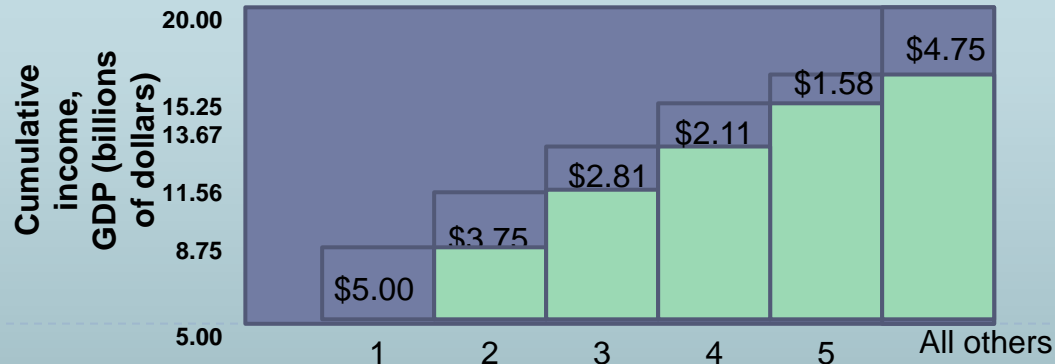
# The Spending Multiplier

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- ▶ A change in spending changes real GDP more than the initial change in spending.

# The Spending Multiplier Effect

	(1) Change in Income	(2) Change in Consumption (MPC = .75)	(3) Change in Saving (MPS = .25)
Increase in investment of <b>\$5.00</b>	\$5.00	\$3.75	\$1.25
Second round	3.75	2.81	.94
Third round	2.81	2.11	.70
Fourth round	2.11	1.58	.53
Fifth round	1.58	1.19	.39
All other rounds	4.75	3.56	1.19
Total	<b>\$20.00</b>	\$15.00	\$5.00



# Multiplier and Marginal Propensities

- ▶ Multiplier and MPC directly related
  - Large MPC results in larger increases in spending
- ▶ Multiplier and MPS inversely related
  - Large MPS results in smaller increases in spending

$$\text{Multiplier} = \frac{1}{1 - \text{MPC}}$$

$$\text{Multiplier} = \frac{1}{\text{MPS}}$$

$$\text{Multiplier} = (\Delta \text{GDP}) / (\Delta \text{Spending})$$

# Common Multiplier and Marginal Propensities

MPC	Multiplier
.9	10
.8	5
.75	4
.67	3
.5	2

**MEMORIZE THIS** so  
you won't have to do  
the math by hand.

$$.90 = 10$$

$$.80 = 5$$

$$.75 = 4$$

$$.67 = 3$$

$$.50 = 2$$

# Government and Foreign Sectors

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- ▶ When you find the MPC and then follow up with the multiplier, you can apply these numbers to  $G$  and  $X_n$  to find how much the amounts of Government and Foreign spending affect GDP.

- ▶ **Practice Problems 2:**

- $G = \$30$  and  $MPC = 0.75$ , how much will that multiply into the countries GDP?
- $MPC = 0.75$ , if  $X = \$400$  and  $M = \$600$ , how much will that multiply into GDP?



# The Tax Multiplier

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- ▶ When taxes are decreased, we see an increase in DI, this increases consumption by a factor of MPC and MPS.
  - ▶ Most households will save a proportion of the decrease.
- ▶ In 2008, to stimulate the economy, George W. Bush created a stimulus package to help the economy where every citizen received a \$300 check from the government.
  - ▶ This was to spur economic activity.

# The Tax Multiplier

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$.90 = 10$	$.67 = 3$
$.80 = 5$	$.50 = 2$
$.75 = 4$	

- ▶ For the \$300 rebate, if  $MPC = .80$ , then \$240 is consumed and \$60 is saved.
- ▶ The multiplier then kicks in, but not on the whole \$300, just on the \$240 which is spent.
  - ▶ For an  $MPC$  of  $.80$ , the spending multiplier is 5, so the overall impact on the economy is \$1200 in real GDP.
  - ▶ However, we have another measure called the Tax Multiplier, usually seen as  $T_m$ .
    - ▶  $T_m = MPC \times \text{Spending Multiplier}$
    - ▶ So  $T_m = 0.80 \times (1/.20)$  or  $.80 \times 5 = 4$  (an easy way to remember this is what is 80% of 5?)
    - ▶  $T_m$  for this scenario is 4. Now, if you multiply the original \$300  $\times 4$ , how much of an increase in Real GDP do you get?



# Why?

$$.90 = 10$$

$$.67 = 3$$

$$.80 = 5$$

$$.50 = 2$$

$$.75 = 4$$

- ▶ The  $T_m$  has to go through a person's consumption function as  $DI$ , not as government spending. (you have to be able to explain this on an FRQ)
- ▶ If the government wants to increase overall GDP, are they better off spending the \$300 or giving it to citizens as a tax rebate?
- ▶ **Practice Problem # 3:**
- ▶  $MPC = .75$ , government wants to use \$100 to increase Real GDP.
  - a) Find the total increase in Real GDP if the government spent the money.
  - b) Find the total increase in Real GDP if the money was transferred in a lump sum to citizens.



# Tm Formulas

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$$.90 = 10$$

$$.67 = 3$$

$$.80 = 5$$

$$.50 = 2$$

$$.75 = 4$$

- ▶  $T_m = MPC \times \text{Multiplier}$
- ▶  $T_m = (\Delta GDP)/(\Delta \text{Taxes})$

## ▶ Practice Problem # 4

- ▶ What if the government wants to impose a \$400 lump sum increase in taxes in order to increase government spending and the spending multiplier is .67.
  - A. What is the  $T_m$ ?
  - B. How will that tax increase affect Real GDP? (Keep in mind, the government is SPENDING that money).
  - C. By How much?



# Balanced Budget Multiplier is always 1.

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- ▶ A balanced budget means dollars collected = dollars spent.
- ▶ With an MPC of .90, the spending multiplier of 10 means that for an extra \$100 dollars of spending, you'll get a \$1,000 increase in Real GDP.
- ▶ But to get that extra \$100 dollars you had to tax people, that increase in taxing, with the same MPC means a multiplier of 9. In this case, you get a \$900 reduction in GDP because people couldn't consume that money for themselves.
- ▶ So what was the total change in real GDP based on Government Spending?



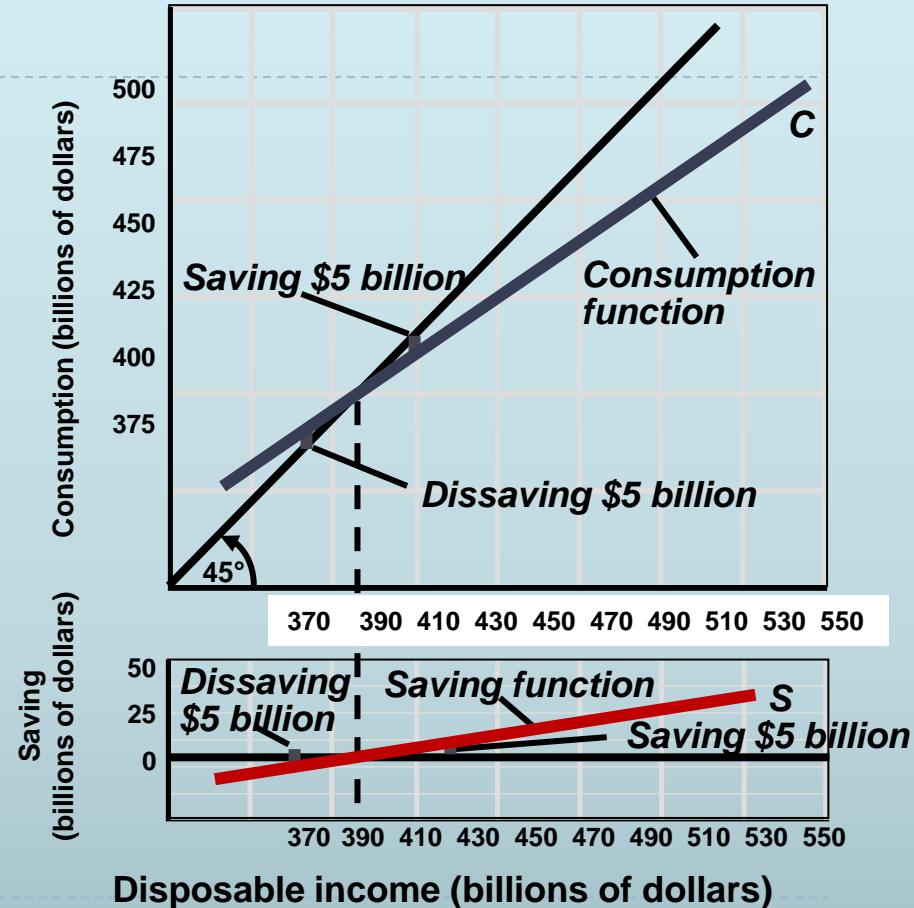
# Practice Problem # 5

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- ▶ Assume the  $MPC$  in an economy is 0.75 and the government increases government purchases of goods and services by \$150 million. Also assume the absence of taxes, international trade, and changes in the aggregate price level.
  - a) What is the value of the multiplier?
  - b) By how much will real GDP change as a result of the increase in government purchases?
  - c) What would happen to the size of the effect on real GDP if the  $MPC$  fell? Explain.
  - d) Now, what if that money was taxed as a lump sum from citizens? What would be the overall impact on real GDP?

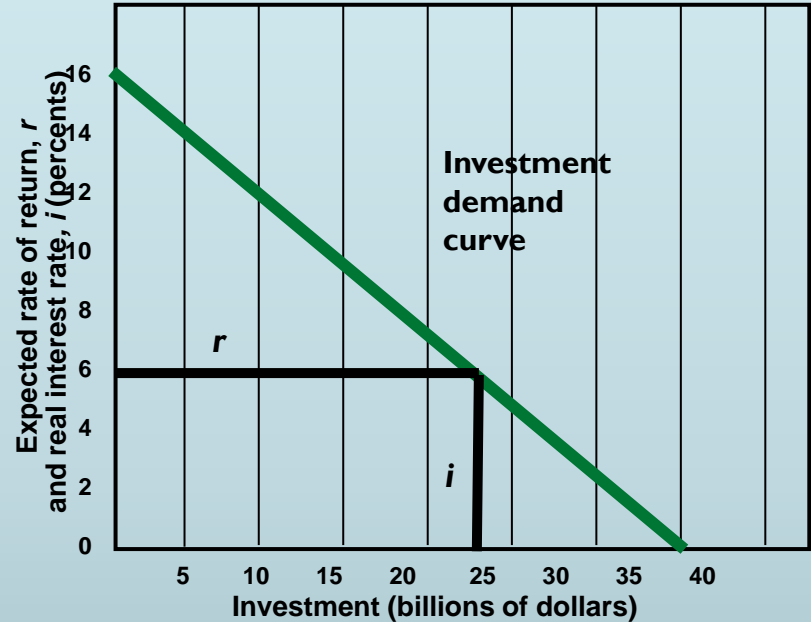
# Loanable Funds

- ▶ All this discussion about consumption, what about all that saved money?
- ▶ Does it just sit there?

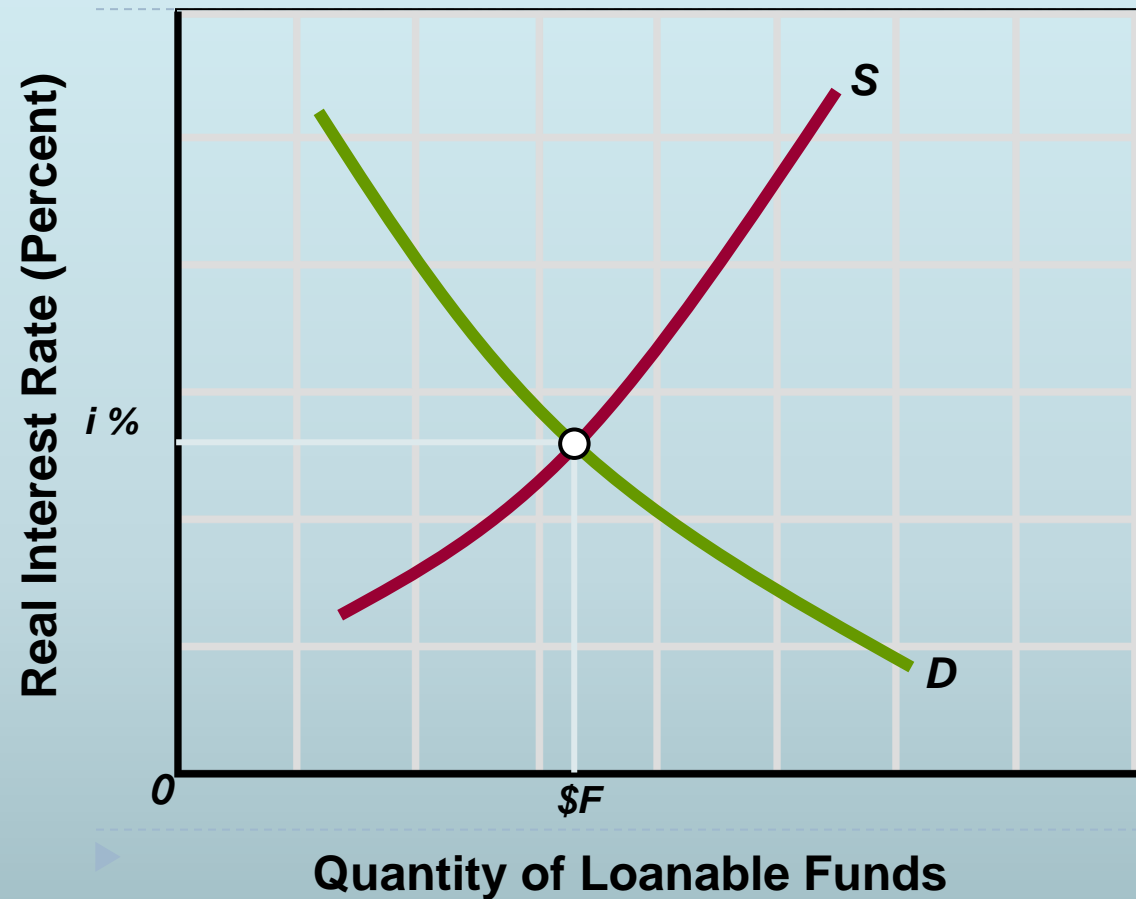


# Loanable Funds

- ▶ When funds are saved, that money is now available for investment by firms.
  - ▶ Savings accounts and Bonds.
- ▶ The demand for loanable funds is correlated between the real interest rate and costs.
  - ▶ As real interest rates fall, large monetary investments become more attractive to firms.



# Supply of Loanable Funds



- ▶ Savings of DI of Households contributes to the supply of loanable funds.
  - ▶ As long as  $DI > C$ , private savings exists.
- ▶ Also, if government is at a surplus (they collect more taxes than they spend), public saving is also positive and contributes to the amount of loanable funds.
- ▶ Supply in the graph comes from saving and lending.
- ▶ Demand in the graph comes from investment and borrowing.
- ▶ Equilibrium is the real interest rate where dollars saved = dollars invested.

# Aggregate Demand/Aggregate Supply (AD/AS)

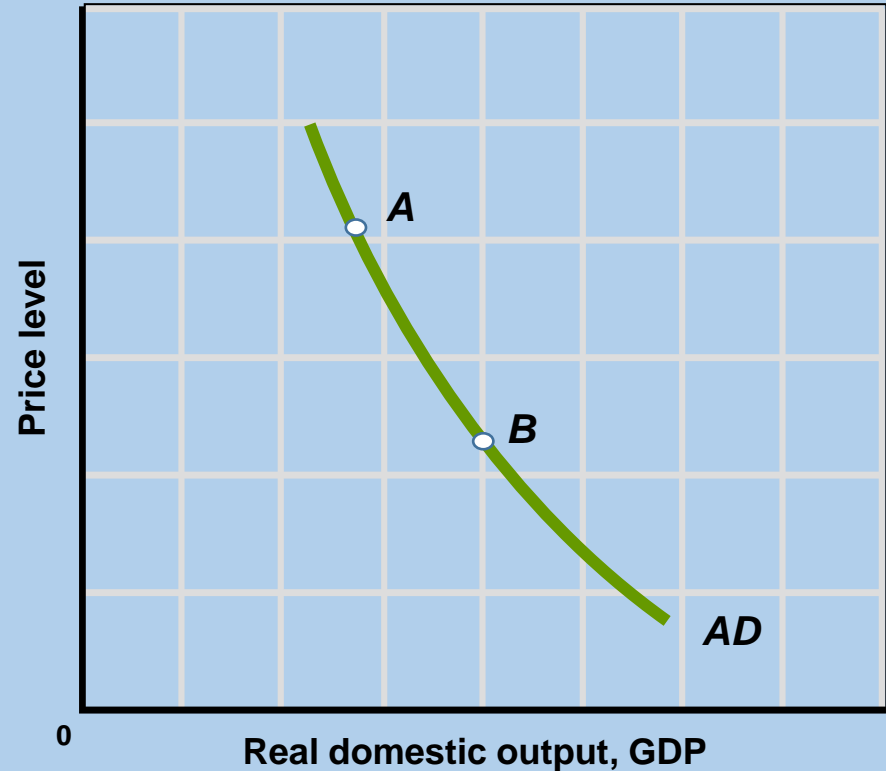
- The most important economic model in macroeconomics.
- Will be used as a basis for many of the topics going forward.
- **What is AD?**
- AD is the relationship between all spending on domestic output and their price levels.
  - It is not a summation of the demand curves for all microeconomic goods and services.
- Comes from the four sources of GDP ( $C+I+G+X_n$ )
  - AD measures for any price level, the sum of consumption spending by all four sources.

# Substitutes for AD

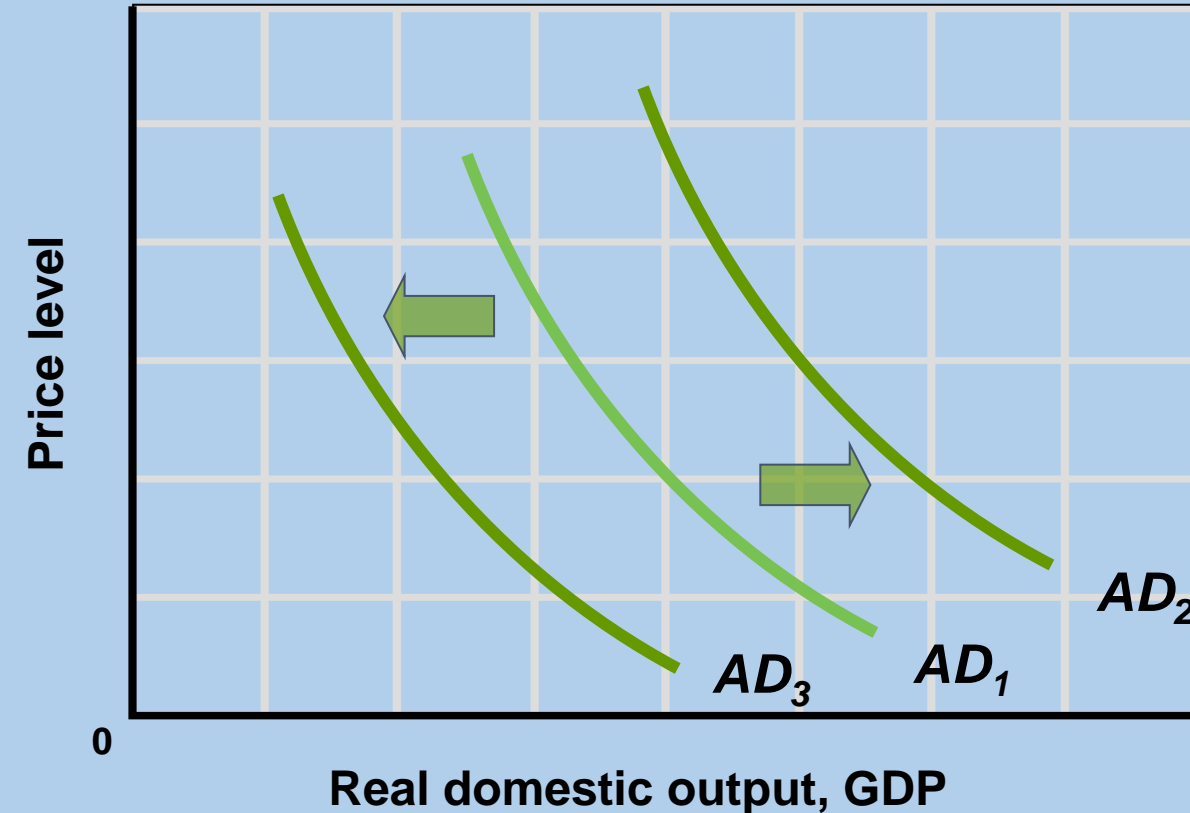
- Demand is strongly influenced by the amount of substitutes, but how do you find substitutes when you are measuring the demand of everything domestically produced?
- AD has three main substitutes:
  - Foreign Sector Substitutes: Goods produced in other countries
    - When CPI increases, consumers look to foreign goods to substitute for domestic (cars, fruits, wine, etc)
  - Interest Rate Effect: Buying in the future
    - A high interest rate will cause a reduction in current real GDP because consumers will wait to make those high value purchases.
  - Wealth Effect: Money and Finances
    - Higher prices reduce the quantity of domestic goods and services that are consumed.
    - But an increase in the overall level of the stock market may give consumers additional DI to consume with.

# The Aggregate Demand Curve

- The three types of substitutes cause movement along the AD curve, such as from point A to point B.



# Changes in Aggregate Demand



- Since AD is related to the four components of GDP [ $C+I+G+(X-M)$ ], any increase or decrease in them will cause a shift of the AD curve at all price levels.

# Determinants of AD

- **Consumer Spending Determinants:**

- Consumer wealth
- Household borrowing
- Consumer expectations
- Personal taxes

- **Investment Spending Determinants:**

- Real interest rates
- Expected returns
  - Expectations about future business conditions
  - Technology
  - Degree of excess capacity
  - Business taxes

- **Government spending determinants:**

- Increase in Government Spending
  - Aggregate demand increases (as long as interest rates and tax rates do not change)
  - More transportation projects

- **Government spending decreases**

- Aggregate demand decreases
- Less military spending

- **Net Export (X-M) Determinants:**

- Consumer Tastes
  - Popularity of imported or exported goods (French Wine, American Cars)
- National income abroad
  - Good economies in other parts of the world means more DI for those people and more money they can spend on US made goods.
- Exchange rates
  - Dollar depreciation
  - Dollar appreciation

## Factors That Shift the Aggregate Demand Curve

### Changes in expectations

- |   |                                   |
|---|-----------------------------------|
| If consumers and firms become more optimistic, . . .  | . . . aggregate demand increases. |
| If consumers and firms become more pessimistic, . . . | . . . aggregate demand decreases. |

### Changes in wealth

- |  |                                   |
|--|-----------------------------------|
| If the real value of household assets rises, . . . | . . . aggregate demand increases. |
| If the real value of household assets falls, . . . | . . . aggregate demand decreases. |

### Size of the existing stock of physical capital

- |  |                                   |
|--|-----------------------------------|
| If the existing stock of physical capital is relatively small, . . . | . . . aggregate demand increases. |
| If the existing stock of physical capital is relatively large, . . . | . . . aggregate demand decreases. |

### Fiscal policy

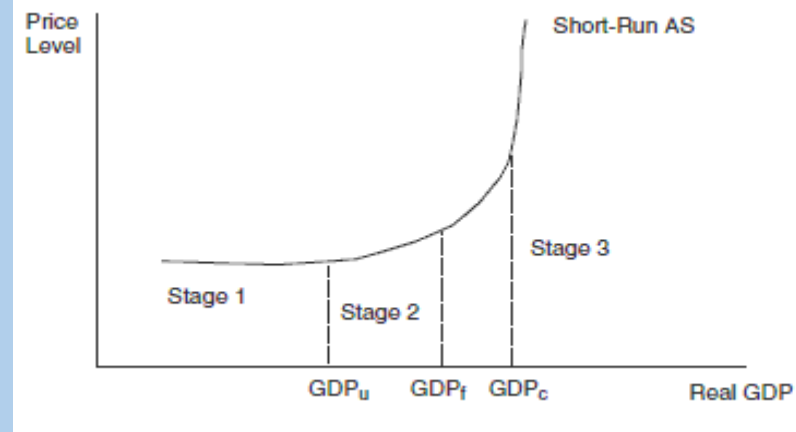
- |   |                                   |
|---|-----------------------------------|
| If the government increases spending or cuts taxes, . . . | . . . aggregate demand increases. |
| If the government reduces spending or raises taxes, . . . | . . . aggregate demand decreases. |

### Monetary policy

- |  |                                   |
|--|-----------------------------------|
| If the central bank increases the quantity of money, . . . | . . . aggregate demand increases. |
| If the central bank reduces the quantity of money, . . .   | . . . aggregate demand decreases. |

# Aggregate Supply (AS)

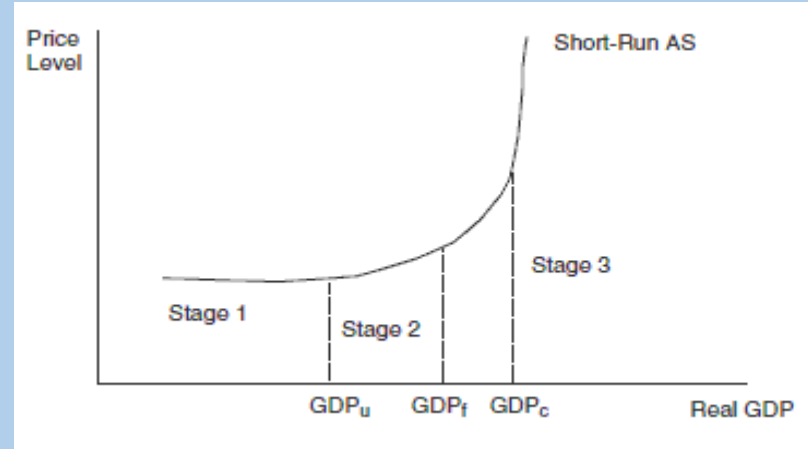
- Total real output produced at each price level
- Relationship depends on time
  - **Macroeconomic Short run AS**
    - Prices of goods and services are changing, but **input** prices have not yet adjusted to those changes.
  - The three stages of Short Run AS are:
  - Stage 1,  $GDP_u$ : Many unemployed resources when the economy is in a recession.
    - Always drawn as almost horizontal because trying to increase output from this level has minimal increases on the price level.
  - Sticky wages exist: wages that take long to react to the rise and fall of the economy.



- Stage 2,  $GDP_f$ : Real GDP starts increasing in as the economy gets close to Full employment.
  - Resources start becoming more difficult to find, driving up input costs.
  - If the price level outpaces the input costs, producers still have an incentive to produce.
  - This is where the economy spends most of its time so you usually see AS with that positive, upward slope.

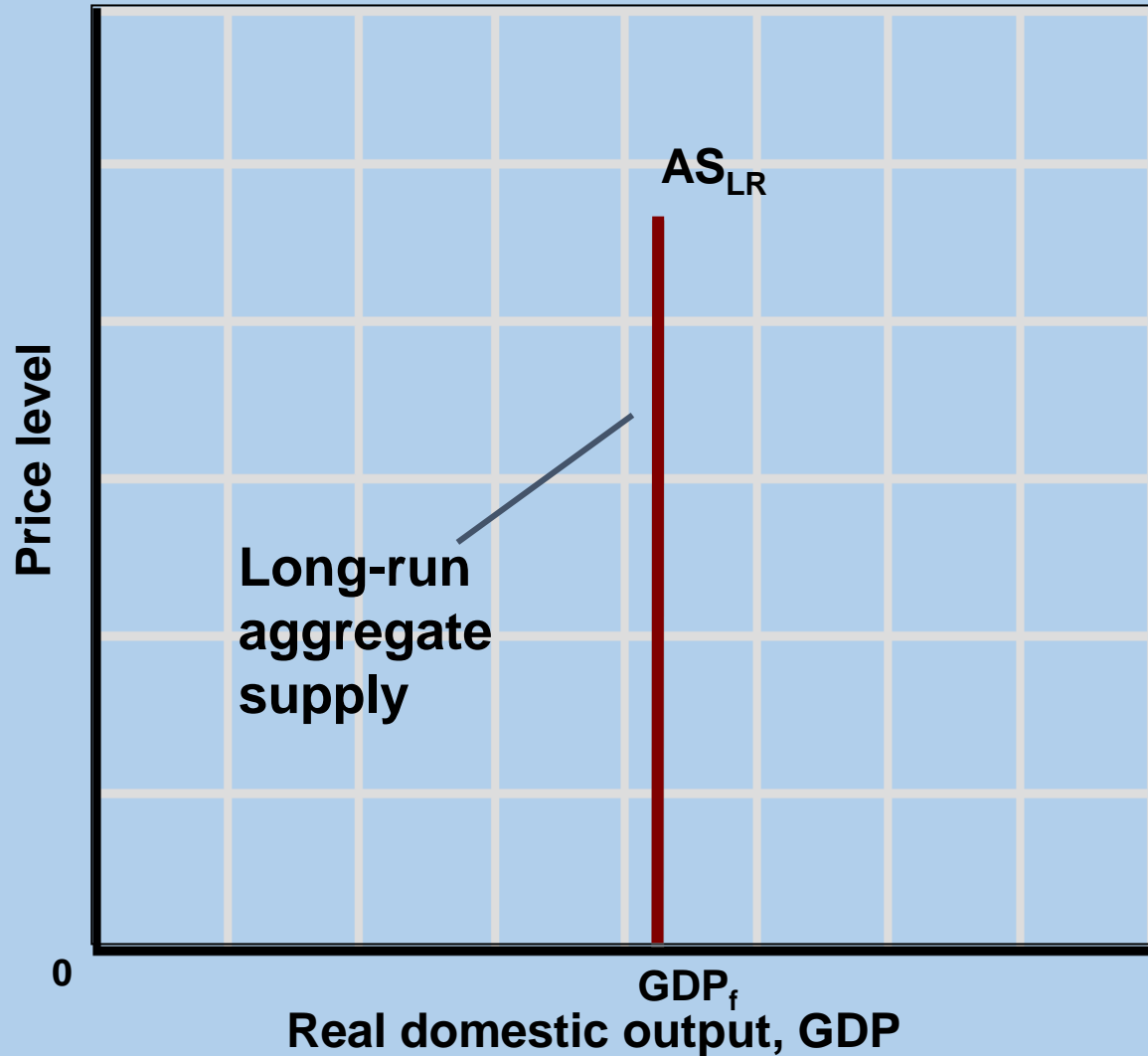
# Stage 3, GDP<sub>c</sub> of AS

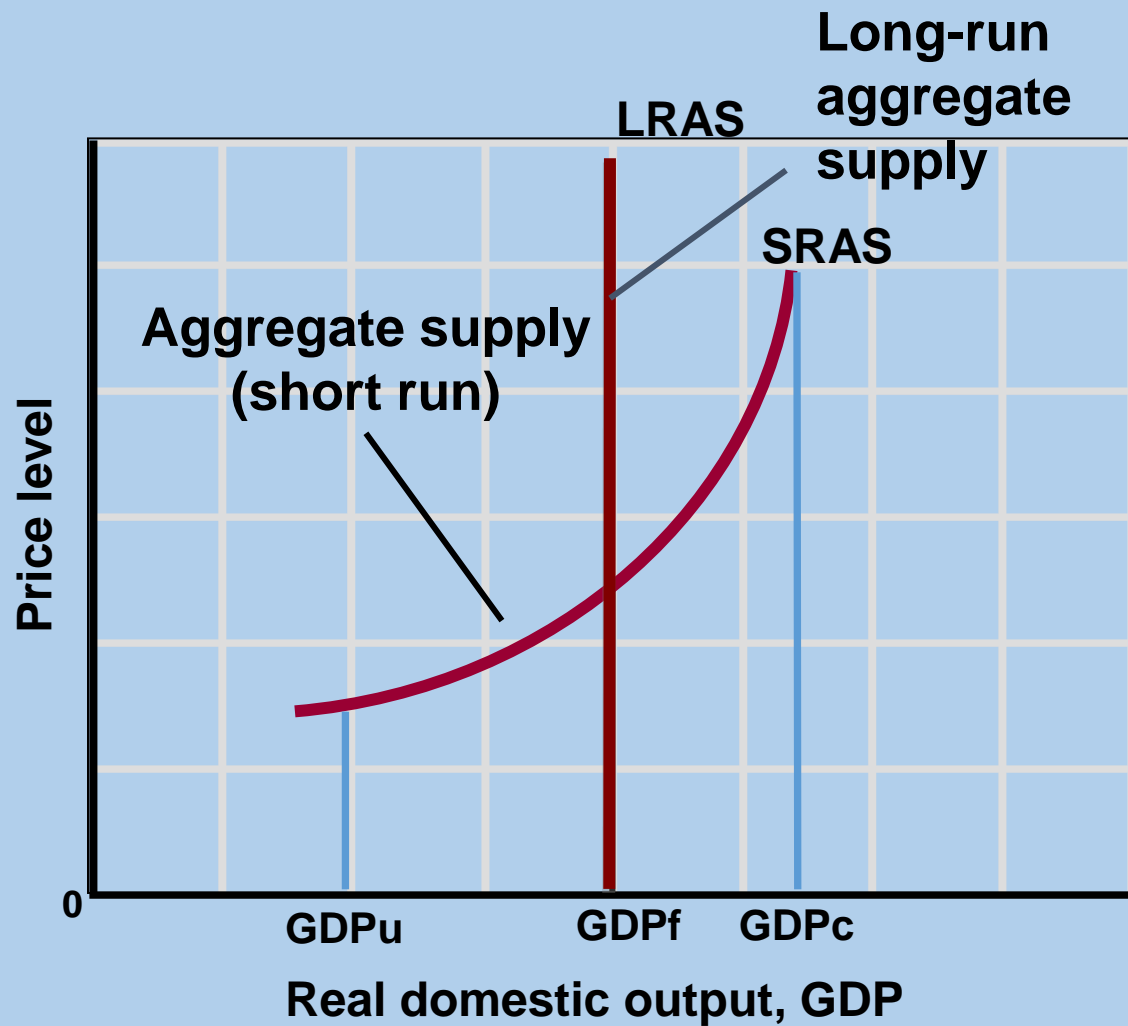
- The economy grows and is now reaching Capacity.
- The curve is almost vertical because producers cannot find unemployed inputs (think of being at the frontier of the PPC curve).
- Input costs and price levels start rising much more sharply.
- If everyone has a job, do workers demand higher wages?



# Macroeconomic Long Run AS

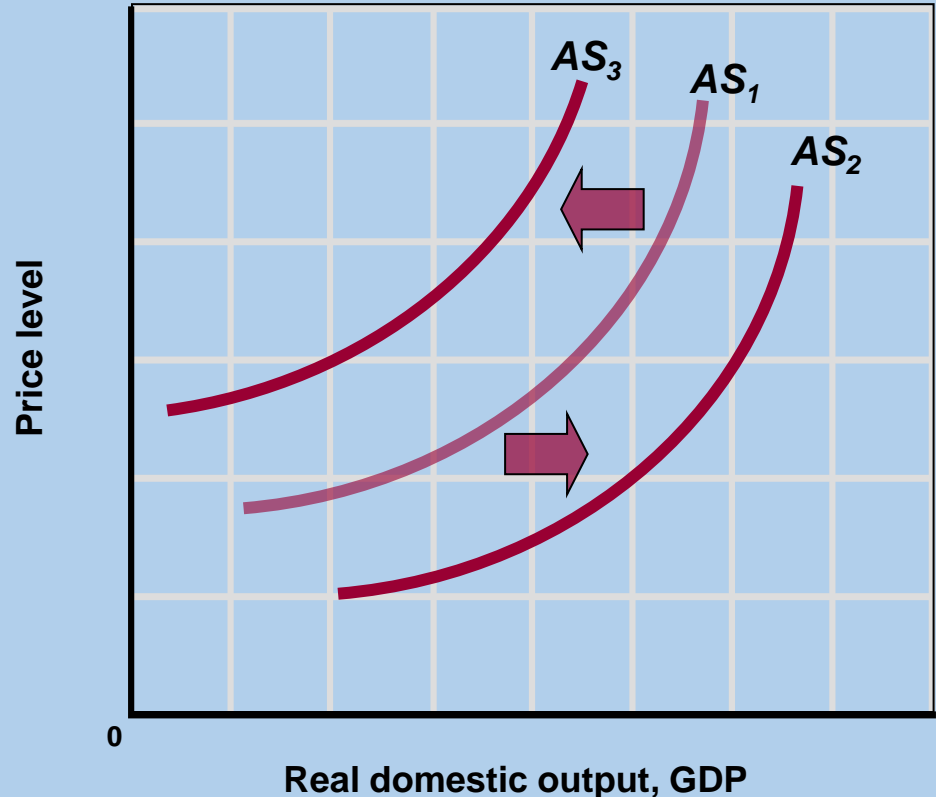
- In this case, input prices have completely adjusted to market forces.
- All product and input markets are in equilibrium and the economy is at full employment.
- At this point, the AS curve is vertical at the  $GDP_f$  point.





# Changes in Short Run Aggregate Supply

- **Input Prices:** The most common factor
  - Domestic resource prices (Labor, Capital, Land)
  - When input prices decrease, AS curve shifts to the right.
- **Taxes:**
  - If taxes on producers are decreased, the AS curve shifts to the right.
- **Deregulation:**
  - Regulations can be expensive, and will cause the AS curve to shift left.
- **Natural Disasters/War:**
  - For a small nation, this can affect the long run AS curve, but for a country like the United States, it will most likely only affect short run AS without permanently affect the level of employment.



## Factors that Shift the Short-Run Aggregate Supply Curve

### Changes in commodity prices

If commodity prices fall, . . . . . short-run aggregate supply increases.

If commodity prices rise, . . . . . short-run aggregate supply decreases.

### Changes in nominal wages

If nominal wages fall, . . . . . short-run aggregate supply increases.

If nominal wages rise, . . . . . short-run aggregate supply decreases.

### Changes in productivity

If workers become more productive, . . . . . short-run aggregate supply increases.

If workers become less productive, . . . . . short-run aggregate supply decreases.

# Changes in Long Run AS

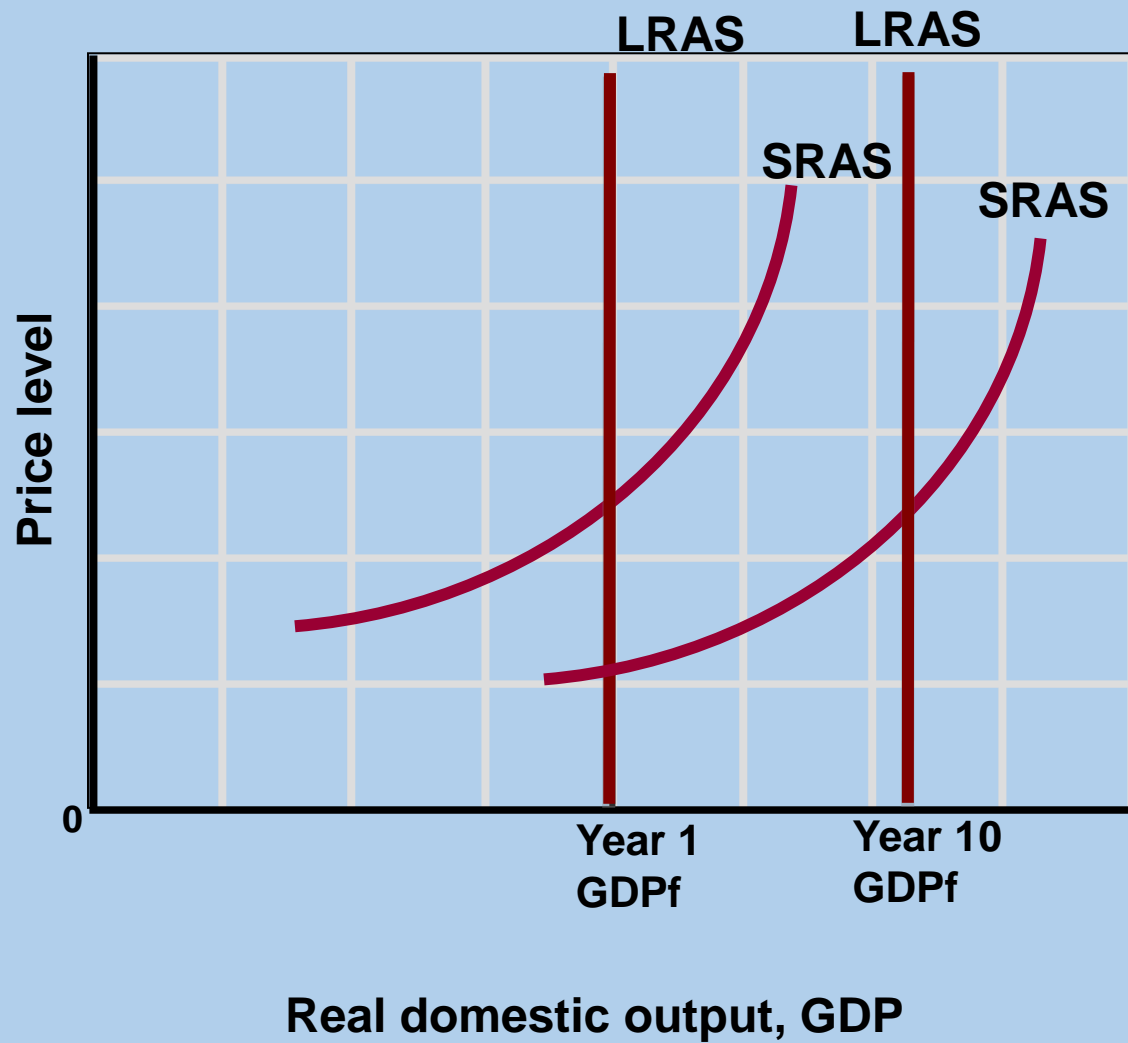
- Resources: Plentiful Land, Labor and Capital can increase the level of full employment.
- Technology: Raises the productivity of Capital and Labor
- Productivity (Human Capital): A more educated or better trained labor force can increase long run AS.
- Public Policy: Government policies such as unemployment insurance and tax incentives to invest in capital can cause GDP<sub>f</sub> to rise.

# Difference between SRAS and LRAS

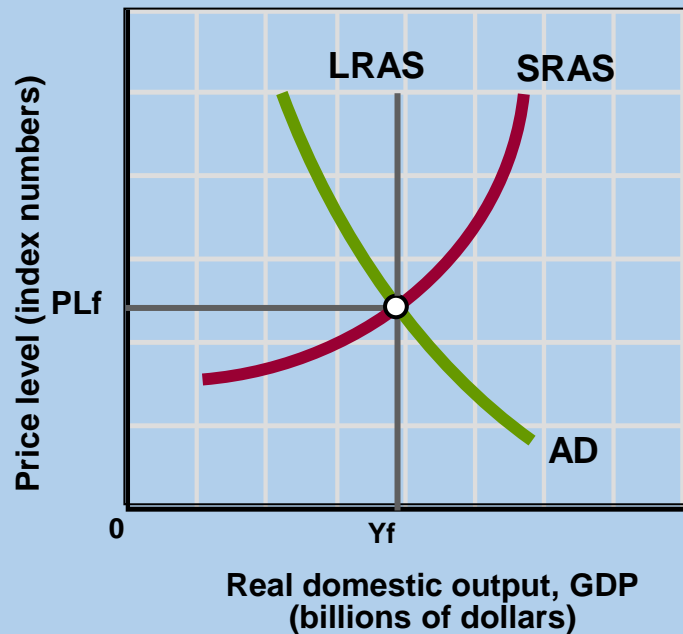
- SRAS assumes that the level of capital is fixed. (i.e. in the short run you can't build a new factory)
- However, in the short run you can increase the utilization of existing factors of production, e.g. workers doing overtime.
- In the short run, an increase in the price of goods encourages firms to take on more workers, pay slightly higher wages and produce more.
- Thus the SRAS suggests an increase in prices leads to a temporary increase in output as firms employ more workers.
- The short run aggregate supply is affected by costs of production. If there is an increase in raw material prices (e.g. higher oil prices), the SRAS will shift to the left. If there is an increase in wages, the SRAS will also shift to the left.

# LRAS

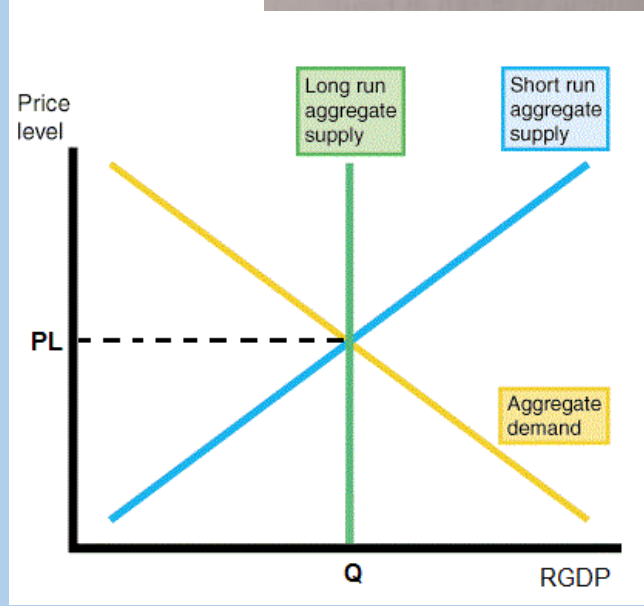
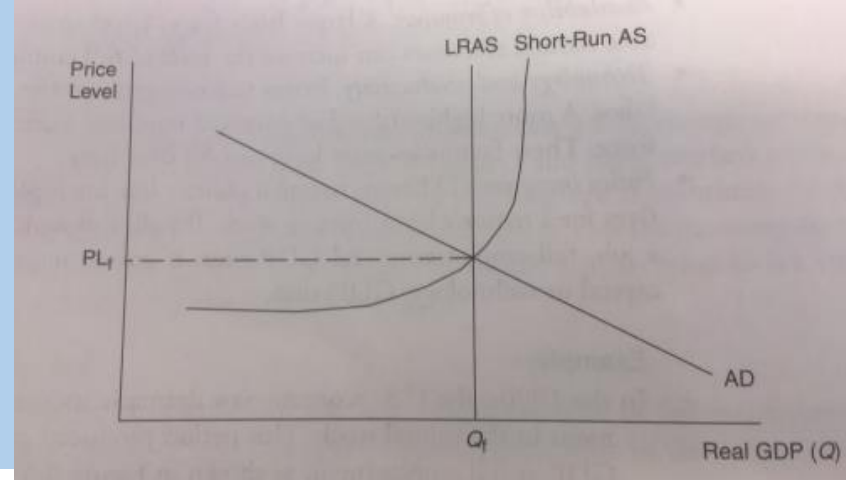
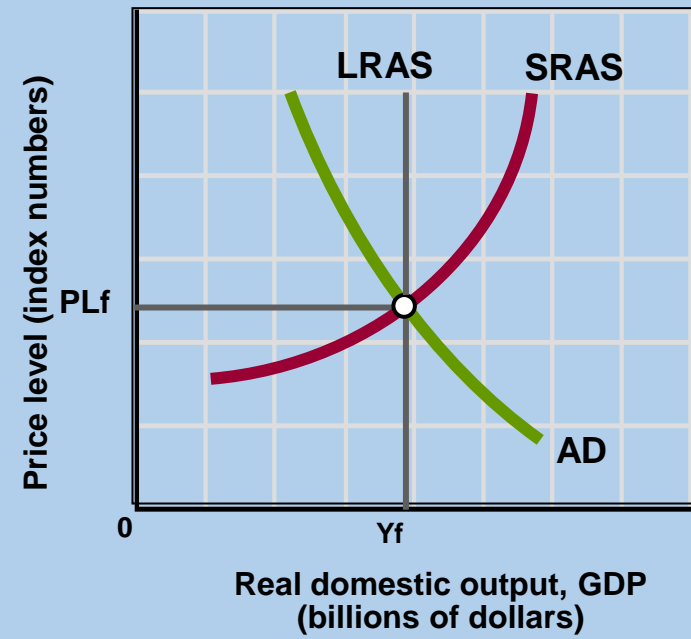
- The Long Run Aggregate Supply curve (LRAS) is determined by all factors of production – size of the workforce, size of capital stock, levels of education and labour productivity.
- If there was an increase in investment or growth in the size of the labour force this would shift the LRAS curve to the right.
- **How to know which ones to use?**
- If showing a change in wage costs or oil prices, use SRAS.
- For showing long run economic growth, and an increase in capital stock and investment, show a shift in LRAS.



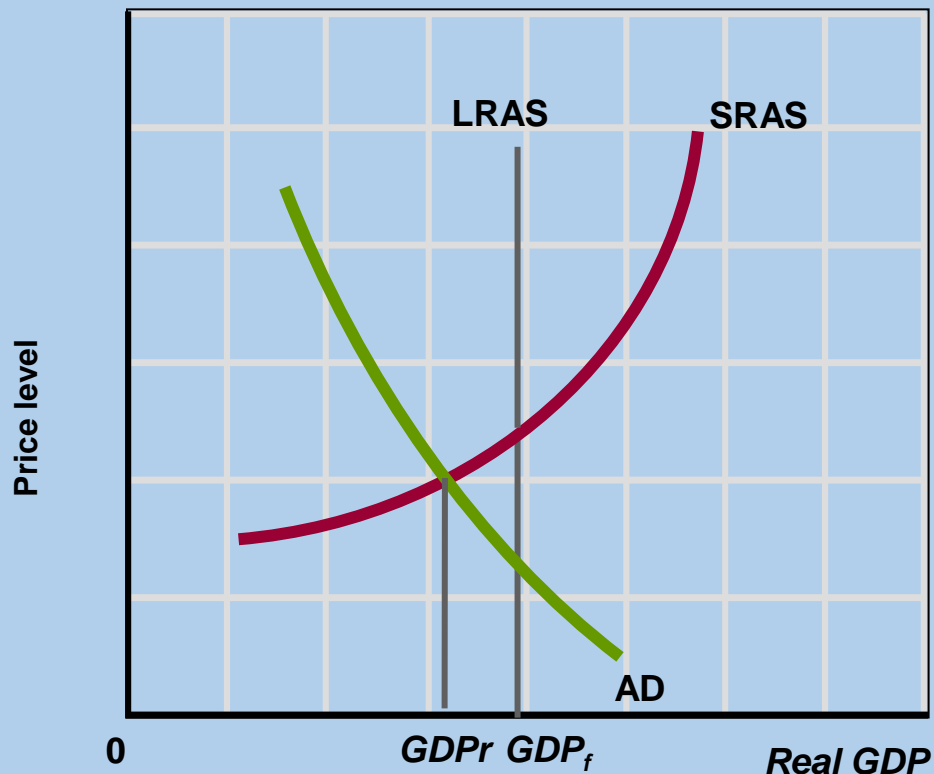
# Macroeconomic Equilibrium



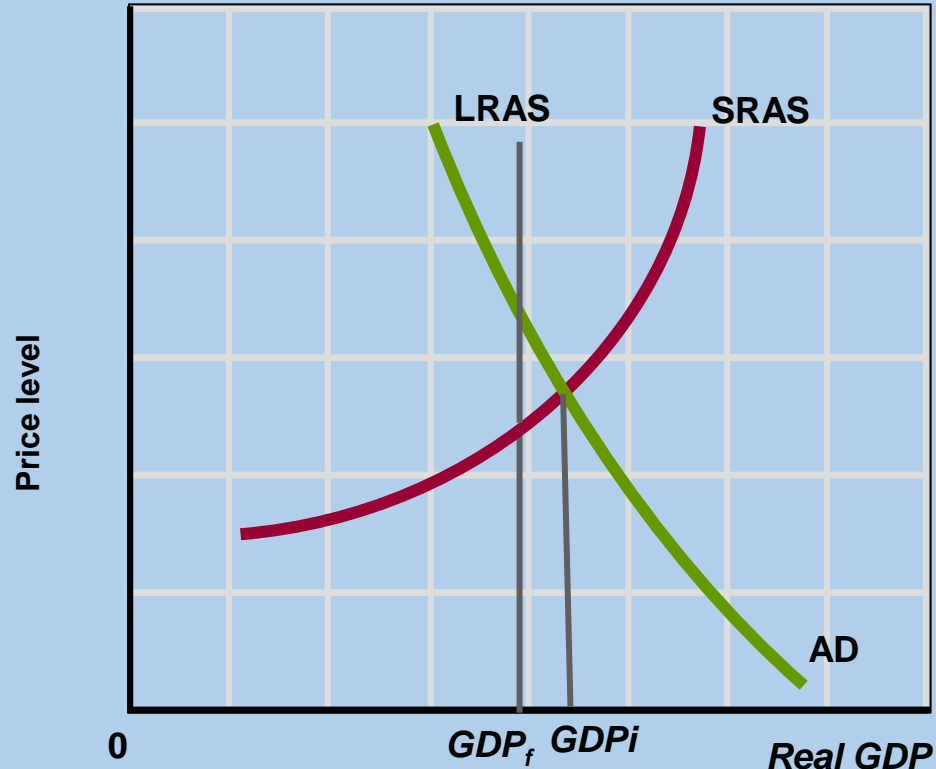
- This is an AS/AD graph at full employment and full price level at equilibrium for AD, SRAS and LRAS.
- This graph might look different but it always means the same.



# Inflation or Recession? How do you know?

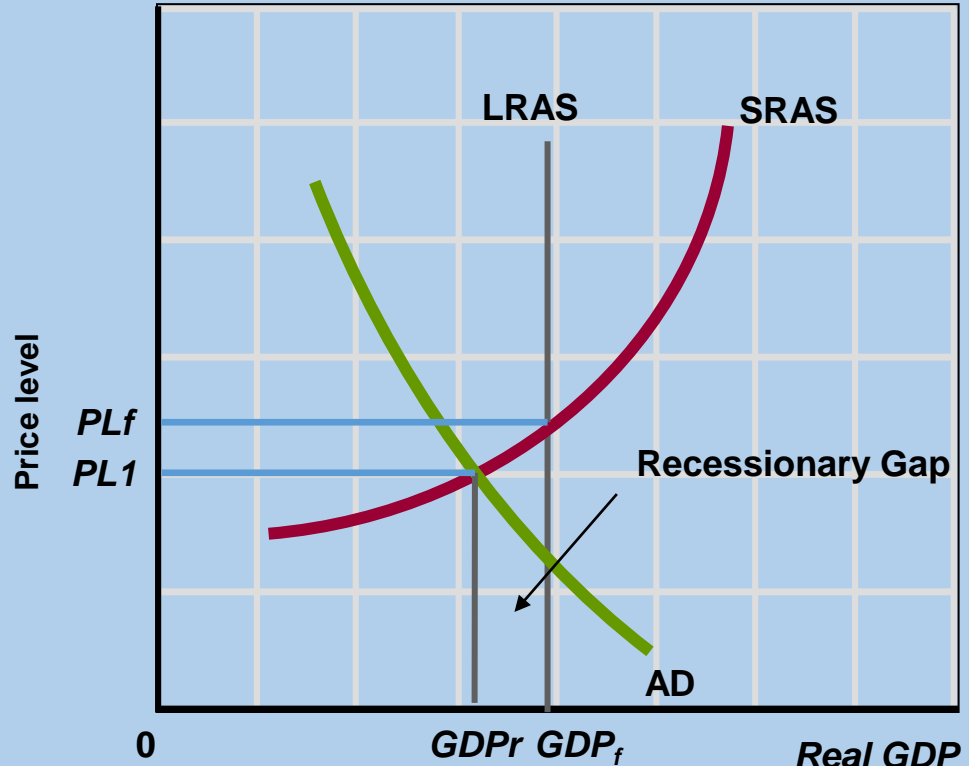


# Inflation or Recession? How do you know?



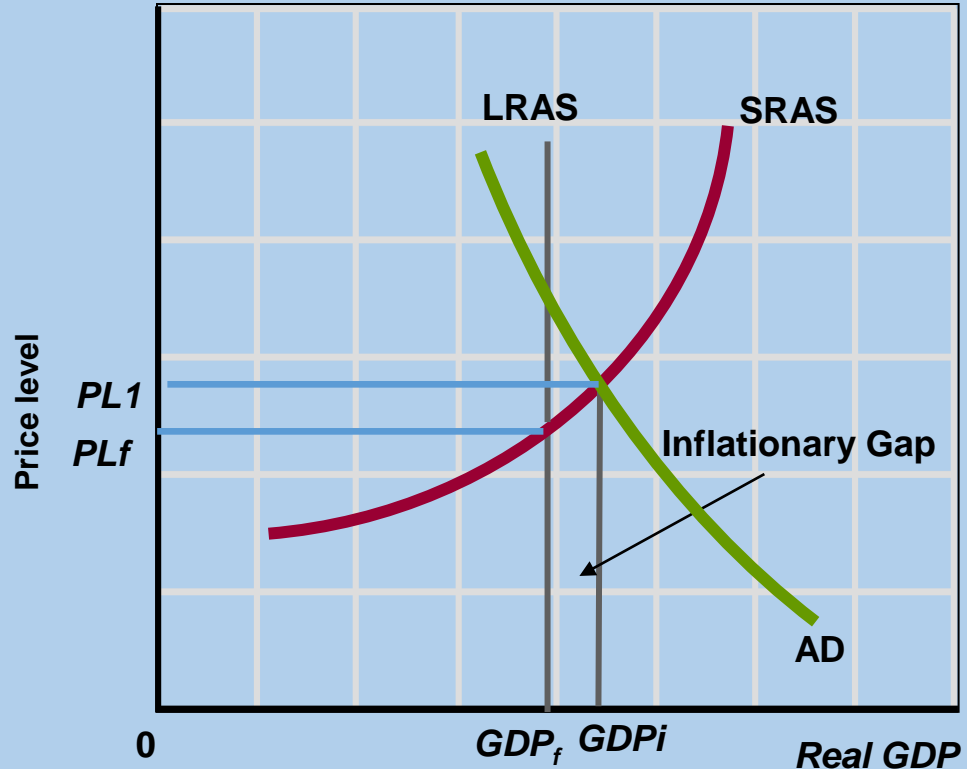
# Recessionary Gap

- When the economy is operating below  $Q_f$  ( $GDP_f$ ).
- The difference between  $GDP_r$  and  $GDP_f$  in the graph is the recessionary gap.
- You must be able to locate this on a graph and draw this graph.
- Where will the economy eventually be in the long run?

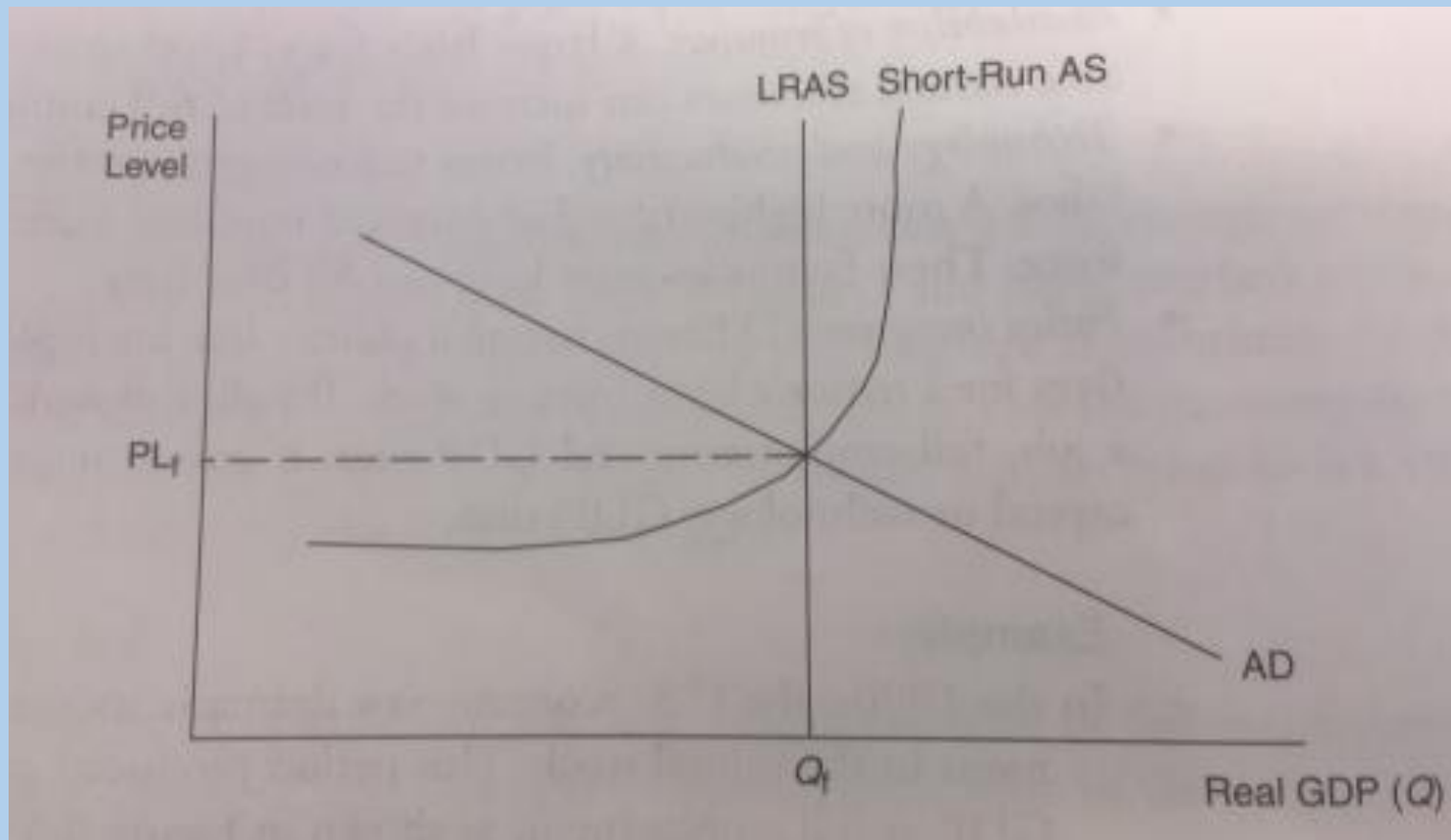


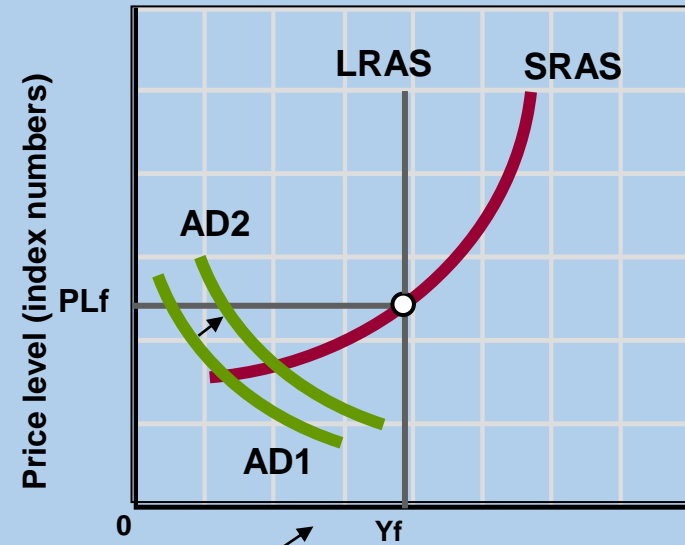
# Inflationary Gap

- When the economy is operating above  $GDP_f$  (in the long run), a rising price level can be dangerous (severe inflation)
- The difference between  $GDP_f$  and  $GDP_i$  is the inflationary gap.
- You have to be able to draw this and spot it on the graph.
- Where will the economy eventually be in the long run?



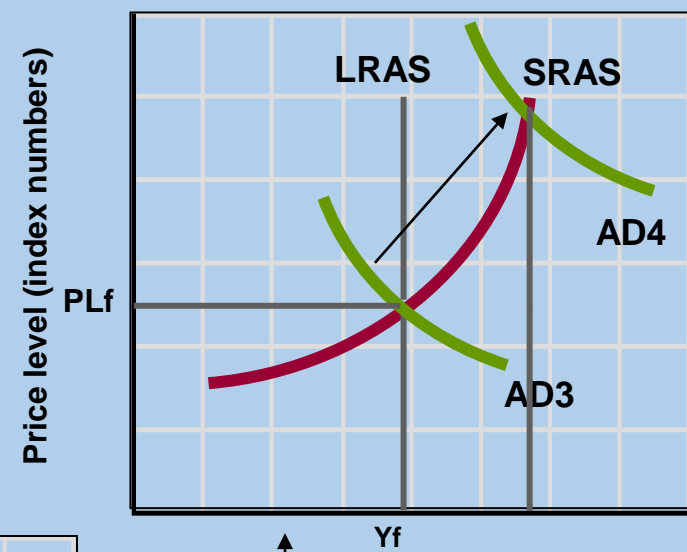
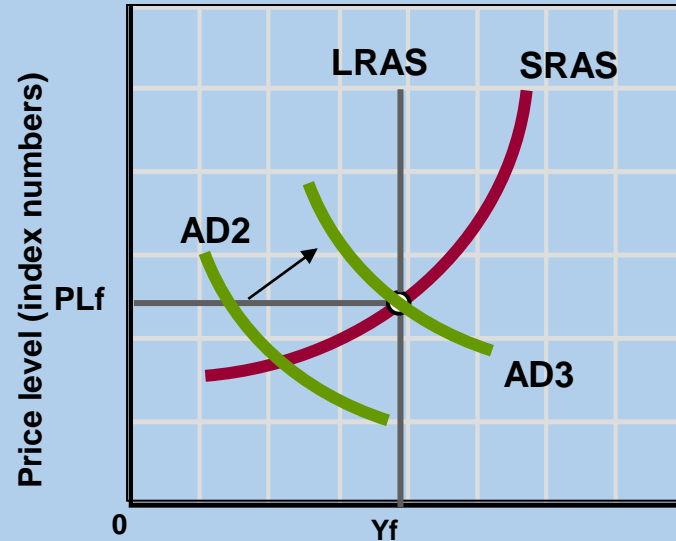
# Shifting AD with the stages and the price level





During stage 1, shift of AD increases real GDP significantly, while the price level barely changes.

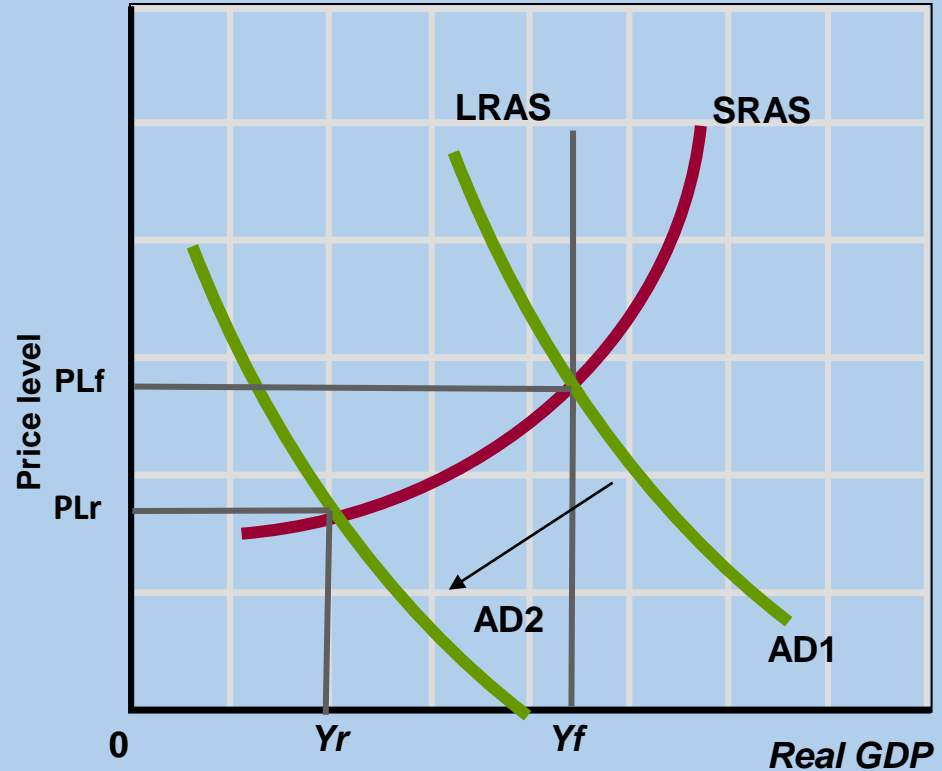
During stage 2, AD2 shifts to AD3, accelerates price level growth, real GDP growth slows and the economy is moving towards full employment. Demand Pull Inflation is caused by increased consumption by all sectors



During stage 3, AD3's shift to AD4 causes the economy to be beyond full employment, real GDP growth has very minimal growth, inflation is very high.

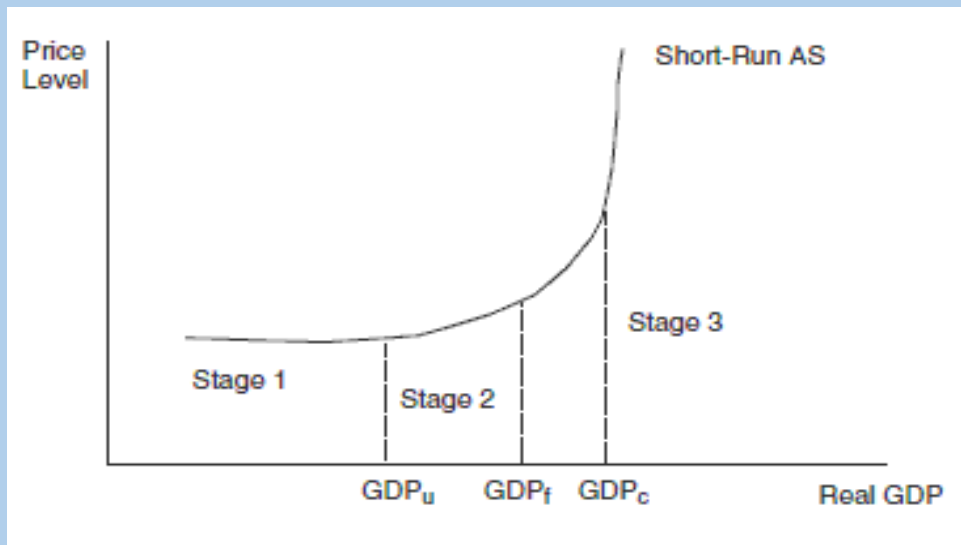
# If AD weakens (shifts to the left)

- If AD1 shifts to AD2 as shown, you have a weakening of demand.
- Real GDP and Price Levels drop.
- Unemployment Rises
- One of the main causes of a recession is falling AD and it's effect on real GDP.
- This is known as deflation. A decrease in the price levels.



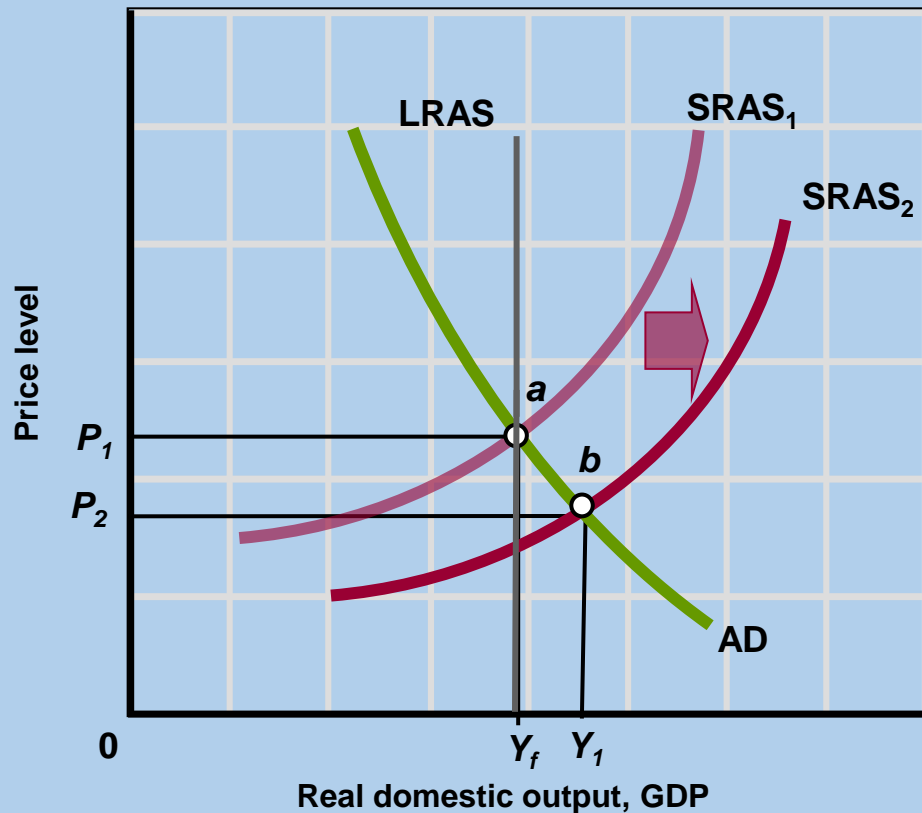
# The Multiplier and AD/AS

- The whole effect of the multiplier as observed previously is only evident during stage 1 of SRAS because price levels are not changing or changing minimally.
- Increases in investments are felt much less when you get to the later stages of SRAS.



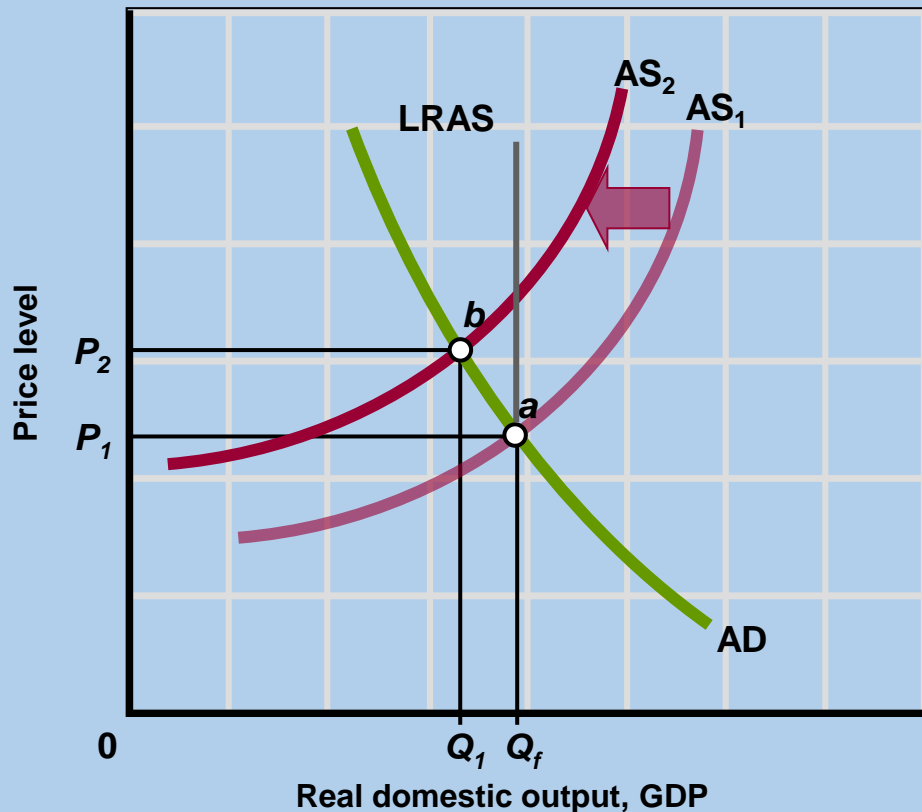
# Increasing Shifts of Short Run Aggregate Supply

- If AD stays constant, price levels go down, real GDP increases and unemployment falls.
- This is called a *supply-side boom*. It is usually temporary.



# Decreases in AS: Cost-Push Inflation

- If AD stays constant, price levels go up (increases inflation), real GDP decreases and unemployment rises.
- **This is called Cost-Push Inflation (Stagflation).**
- Very poor economic conditions in the short run.
- In the long run, the high unemployment should bring down the cost of input prices and the SRAS will shift back to the right and to full employment.

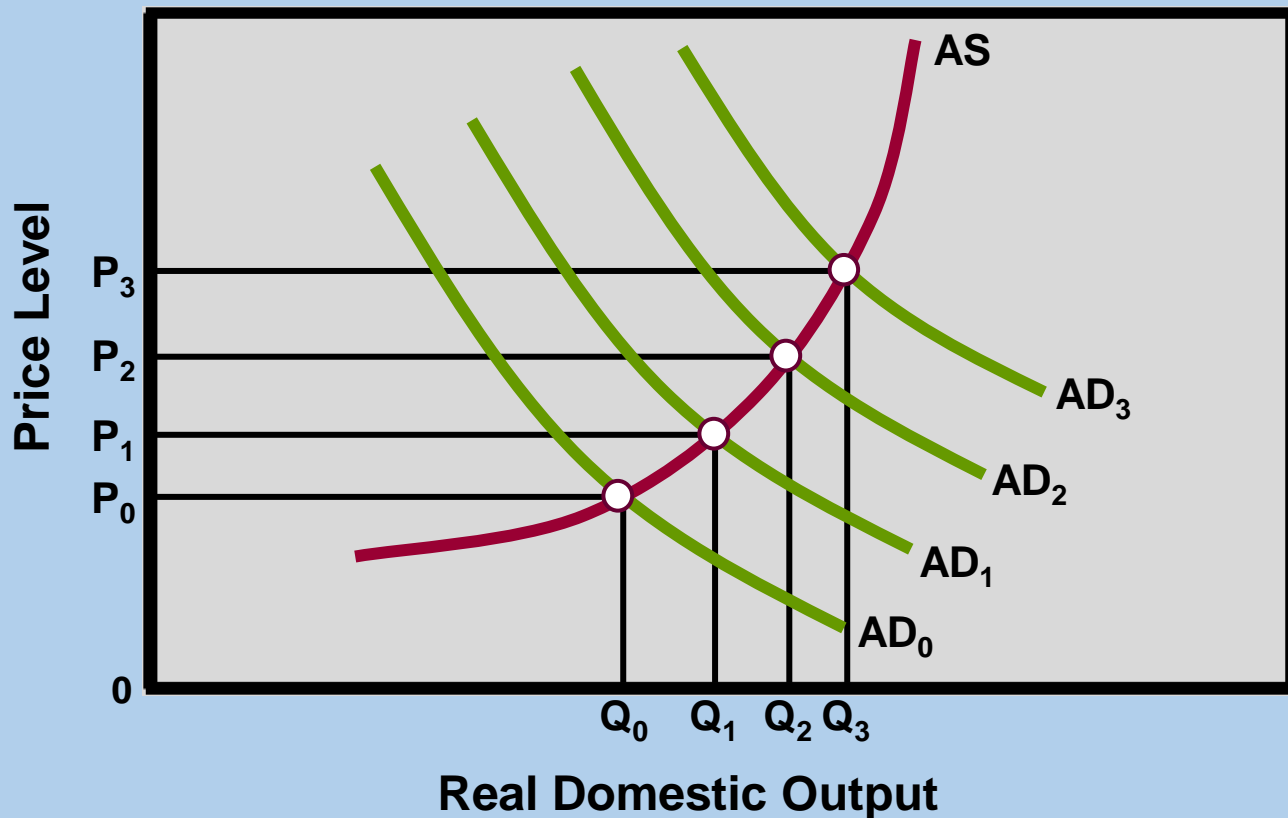


# Supply Shocks

- A phenomenon that affects the costs of firms. (Can be positive or negative)
- Positive: Lower energy costs (Gas, oil, coal, nuclear), lower labor costs
- Negative: Oil embargoes of the 1970s

# Inflation and Unemployment

- When we see short run changes in AD, we can tell that there is an inverse relationship between inflation and unemployment.
- As real GDP rises (such as during stage 2, the upward sloping stage), real GDP and price levels are increasing (inflation), but it creates jobs (unemployment decreases).



- Use this to memorize how the chart should change.
  - The opposite relationship occurs in shifts to SRAS between inflation and unemployment.

- $\uparrow$  AD causes  $\uparrow$  real GDP,  $\downarrow$  unemployment and  $\uparrow$  price level.
- $\downarrow$  AD causes  $\downarrow$  real GDP,  $\uparrow$  unemployment and  $\downarrow$  price level.
- $\uparrow$  SRAS causes  $\uparrow$  real GDP,  $\downarrow$  unemployment and  $\downarrow$  price level.
- $\downarrow$  SRAS causes  $\downarrow$  real GDP,  $\uparrow$  unemployment and  $\uparrow$  price level.

# How does an economy go back to full employment? (LRAS)

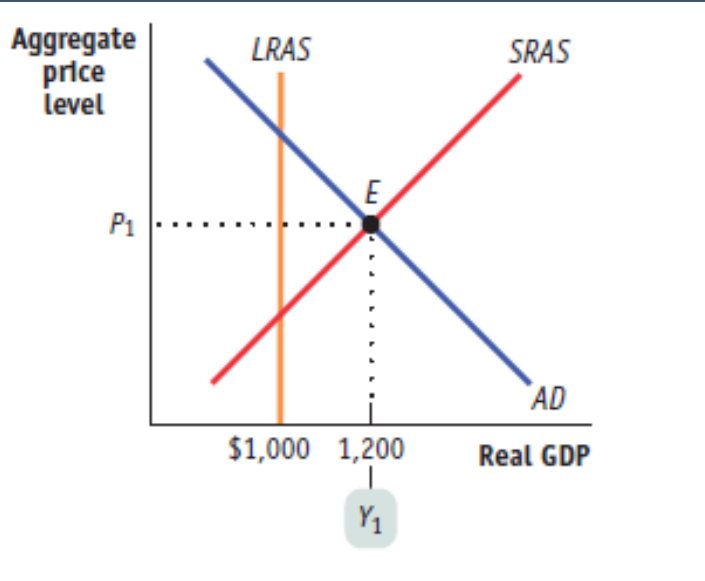
## MEMORIZE THIS!

- In the long run, regardless of the price level, the economy will produce at the full employment output.

If the economy is producing below the full employment output, the economy is in recession but eventually (in the long run) unemployed workers accept lower wages (other resource prices also fall), which means lower input costs for businesses. That shifts the SRAS right until the economy is producing the long run output (where LRAS is).

When the economy is producing more than the full employment output, workers are being over worked and there are labor shortages. Wages eventually rise, which means higher input costs. Higher input costs shift the SRAS left bringing the economy back to the full employment output.

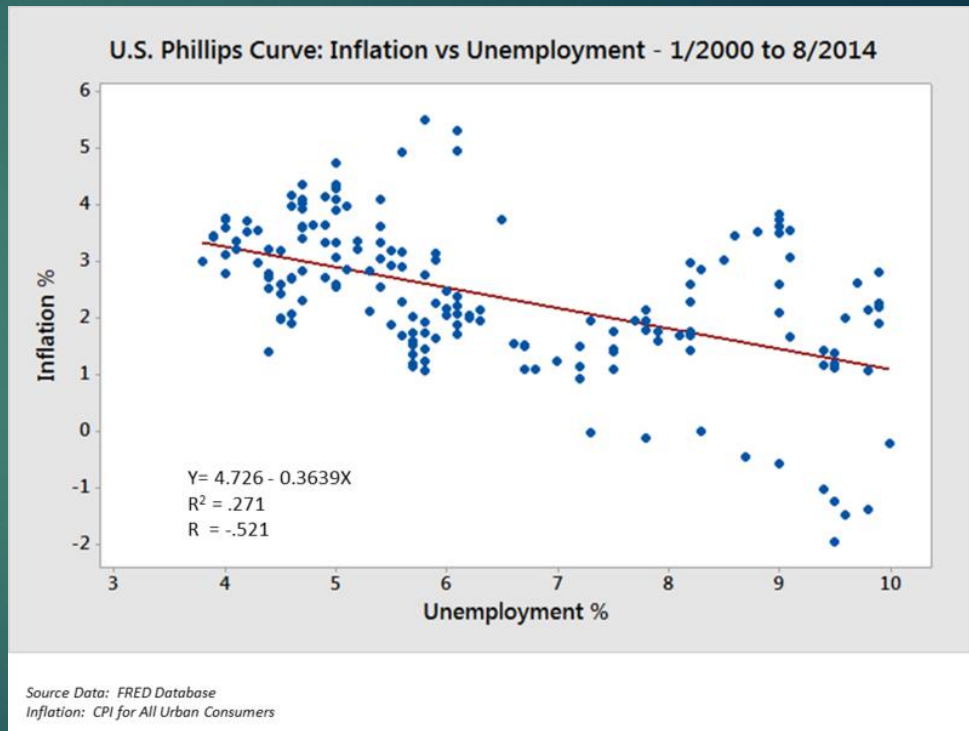
# Practice Problem # 6



- Refer to the graph.
- Is this a recessionary period, inflationary period or long run equilibrium? How do you know?
  - How will this economy adjust in the long run? (Mention unemployment, prices and wages).

# The Phillips Curve

- ▶ That inverse relationship between inflation and unemployment is known as the Philips curve.
- ▶ Fiscal stimulus, an increase in AD, would trigger the following sequence of responses:
  - a) An increase in the demand for labor as government spending generates growth.
  - b) The pool of unemployed will fall.
  - c) Firms must compete for fewer workers by raising nominal wages.
  - d) Workers have greater bargaining power to seek out increases in nominal wages.
  - e) Wage costs will rise.
  - f) Faced with rising wage costs, firms pass on these cost increases in higher prices.



# Short Run Phillips Curve

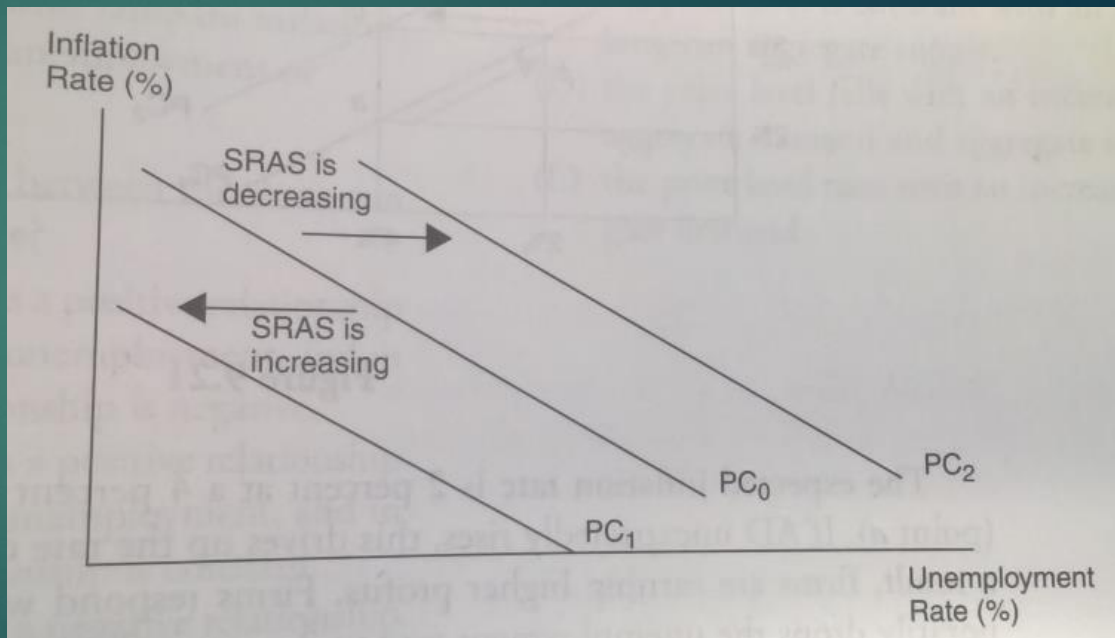
- If deflation occurs, the unemployment rates can fall below the x axis.



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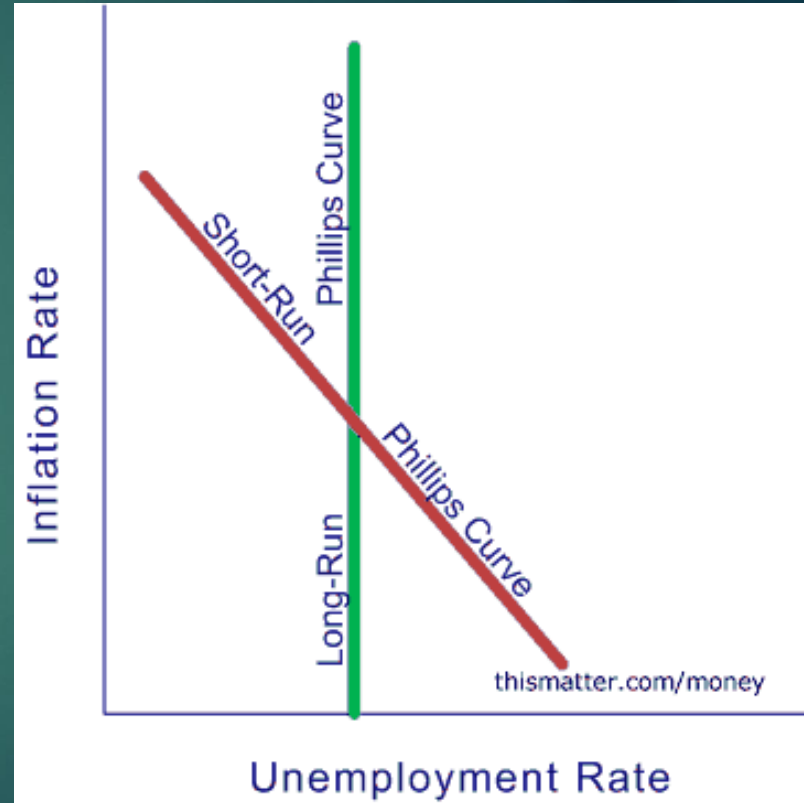
# Shifts in SRAS and the Phillips Curve

- ▶ When SRAS shifts left, we get stagflation (Rising Inflation and Unemployment).
  - ▶ This causes the Phillips Curve to shift to the right.
- ▶ When SRAS shifts right, price level and unemployment decrease. These shifts can be seen on the Phillips Curve shifting in the opposite direction.
  - ▶ This causes the Phillips curve to shift to the left.



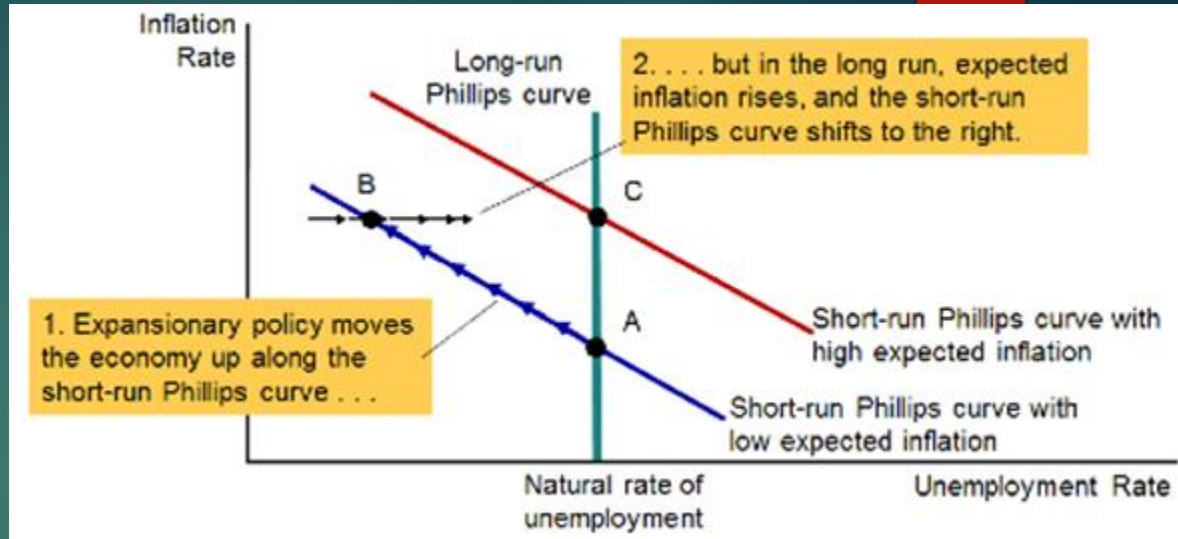
# Long-Run Phillips Curve

- ▶ The Long-Run Phillips Curve will look similar to the Long Run curve in the AD/AS model.
- ▶ It will be a vertical line at the natural rate of unemployment (Remember that the natural rate is when cyclical unemployment = 0%).
- ▶ The idea is that there is sometimes a gap between expected inflation and the actual rate of inflation.



## Expectations and the Phillips Curve

- ▶ An unexpected movement from A to B along the Phillips curve brings unemployment down to lower than the Natural Rate.
- ▶ Inflation Rises
- ▶ As more workers are hired, and they start asking for higher wages to meet inflationary pricing, the profits of firms begin to fall.
- ▶ Firms will naturally respond to this by laying off workers, thereby eventually returning to the Natural Rate of Unemployment.



### POINTS TO REMEMBER

If the aggregate demand curve shifts right, the economy slides up the Phillips curve. If the aggregate demand curve shifts left, the economy slides down the Phillips curve.

If the short-run aggregate supply curve shifts left, the Phillips curve shifts right. If the short-run aggregate supply curve shifts right, the Phillips curve shifts left.