

# Aggregate Demand and Aggregate Supply (AD-AS) Model

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BSC

November 9, 2022

# Context

- 1 We have learned many micro and macroeconomic concepts
- 2 In this chapter, we will develop the AD-AS model to help us understand the short run macroeconomic fluctuations better
- 3 Then we will explore how monetary and fiscal policies are used to stabilize the economy

# Shocks to the economy

- We know recessions are bad. What causes them?
- Why in some recessions inflation is high but it is low in others?
- The economy's behavior can be explained, predicted, and potentially manipulated by looking at
  - ▶ total (aggregate) demand
  - ▶ total (aggregate) supply

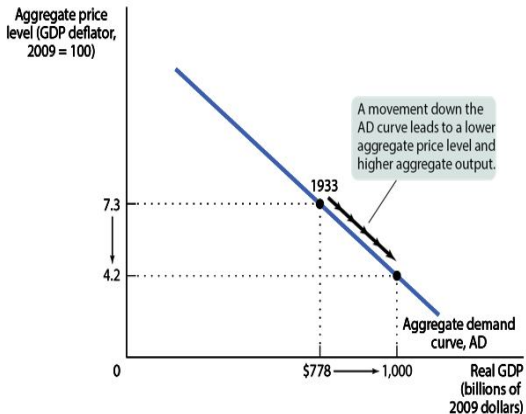
# Our plan

This is how we will go about this chapter

- Aggregate Demand
- Aggregate supply
  - ▶ Short-Run aggregate Supply
  - ▶ Long run aggregate supply
- Short run macroeconomic equilibrium
- Long run macroeconomic equilibrium
- Macroeconomic shocks
  - ▶ Demand shocks
  - ▶ Supply shocks

# The Aggregate Demand (AD) curve

AD curve shows the relationship between **the aggregate price level** and the quantity of **aggregate output demanded** by households, businesses, the government, and the rest of the world.



***AD is NOT the same thing as the demand curve in microeconomics.***

# A Warning

Many people think demand curve in microeconomics and the AD curve are the same. **They are not the same.**

## 1 Demand curve in Microeconomics

- ▶ We can analyze demand for a good **keeping price of all other goods constant**
- ▶ You can find a cheaper substitute
- ▶ Because you can switch to a cheaper good, demand curve slopes downward

## 2 Demand curve in Macroeconomics (Aggregate Demand)

- ▶ Price of **all the goods increases simultaneously** (recall price level)
- ▶ There is no cheaper substitute
- ▶ AD curve slopes downward for completely different reasons. Hint:  
 $AD = GDP = C + I + G + X - IM$

# Why does AD curve slope downward?

AD represents  $GDP = C + I + G + X - IM$ . When aggregate price level increases,  $C$ ,  $I$ , and  $X - IM$  decreases leading to lower quantity of AD.

**Why?** A change in aggregate price level affects AD in three major ways.

① The Wealth Effect of aggregate price change

- ▶ A higher aggregate price level reduces the purchasing power of households' wealth and reduces consumer spending. Example, your bank balance

② The interest rate effect of aggregate price change

- ▶ A higher aggregate price level makes households hold more "money". There is now less money available for borrowing. This leads to a rise in interest rates (and a fall in investment spending and consumer spending).

③ The International Trade Effect of aggregate price change

- ▶ A higher aggregate price level reduces exports (exports become more expensive) and increases imports (since imports are now relatively cheaper), leading to lower net exports ( $X - IM$ ). This leads to lower AD because  $GDP = C + I + G + (X - IM)$

# Why does AD curve slope downward?

Summary: Why AD slopes downward?

- ① We assume that  $G$  in  $GDP(= Y) = C + I + G + (X - IM)$  is unaffected by aggregate price level but is affected by government policy.
- ② The demand curve we learned in microeconomics slopes downward primarily because of **substitution effect**, but at the aggregate level, substitution is impossible.
- ③ Remember the three reasons why AD slopes downward
  - ① Wealth effect affects  $C$
  - ② Interest rate effect affects  $I$  and  $C$
  - ③ International trade effect affects  $X - IM$

*The key is to remember that from a macroeconomic perspective an increase in aggregate price level makes everything equally expensive at the same time. You cannot find a cheaper substitute!*

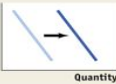
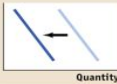
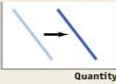
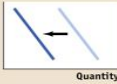
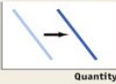
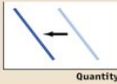
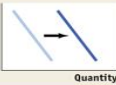
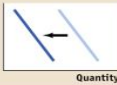
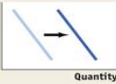
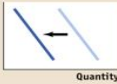


# Movement along vs a shift in AD curve

When only the aggregate price level changes, there is a movement along. When other factors change with the aggregate price level remaining unchanged, AD curve shifts. There are many shifters of AD.

- ① change in expectations
- ② change in wealth for reasons other than change in aggregate price level (such as housing market crash)
- ③ size of the existing stock of physical capital
- ④ government policies
  - ▶ fiscal policy
  - ▶ Monetary policy
- ⑤ Changes in exports and imports
- ⑥ Changes in exchange rates

# What shifts AD curve?

TABLE 12-1 Factors That Shift Aggregate Demand			
When this happens . . .	. . . aggregate demand increases	But when this happens . . .	. . . aggregate demand decreases
<b>Changes in expectations</b>			
When consumers and firms become more optimistic . . .	 <p>. . . aggregate demand increases.</p>	 <p>. . . aggregate demand decreases.</p>	
<b>Changes in wealth</b>			
When the real value of household assets rises . . .	 <p>. . . aggregate demand increases.</p>	 <p>. . . aggregate demand decreases.</p>	
<b>Size of the existing stock of physical capital</b>			
When the existing stock of physical capital is relatively small . . .	 <p>. . . aggregate demand increases.</p>	 <p>. . . aggregate demand decreases.</p>	
<b>Fiscal policy</b>			
When the government increases spending or cuts taxes . . .	 <p>. . . aggregate demand increases.</p>	 <p>. . . aggregate demand decreases.</p>	
<b>Monetary policy</b>			
When the central bank increases the quantity of money . . .	 <p>. . . aggregate demand increases.</p>	 <p>. . . aggregate demand decreases.</p>	

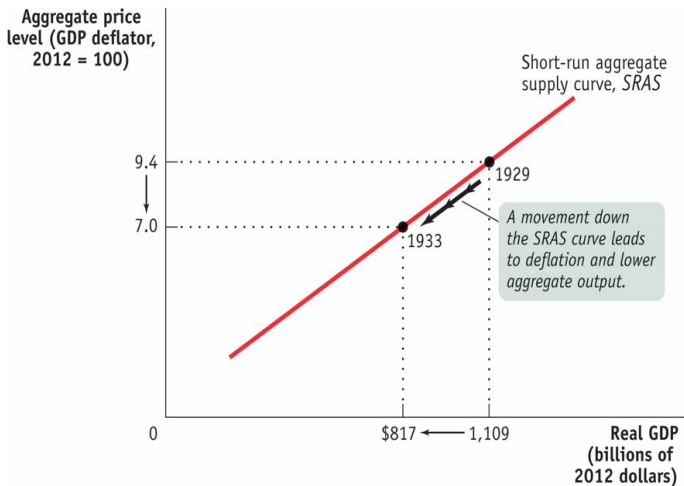
## A common error: Movement along vs. Shift in AD curve

Q: Does a change in wealth move us along the AD curve (wealth effect) or shift it?

- If it's a change in price level that affects our wealth, it's a **movement along** the AD.
  - ▶ Example: Rapid inflation shrinks our wealth.
- If it's a change in something else that affects our wealth, it's a **shift** in the AD.
  - ▶ Example: The housing market crashes.

# Short run aggregate supply (SRAS) curve

The SRAS curve shows the relationship between the aggregate price level and the quantity of aggregate output in the economy supplied in the economy



## Why SRAS curve slopes upward: **STICKY WAGES**

SRAS slopes upward because a higher aggregate price level leads to higher profit per unit of output and more output given *sticky wages*. Why?

**Profit per unit of output = price per unit of output – production cost per unit of output**

- When price changes, how does production cost react?
  - ▶ At any given point, many production costs are *fixed (or inflexible) for a certain period of time*, say a year.
  - ▶ Wage is the biggest part of such inflexible costs.
  - ▶ Usually, *nominal wages* do not change frequently because they are determined by formal or informal contracts, for a certain time frame. In addition, minimum wages are legally enforced.
  - ▶ This results into **STICKY WAGES!**
    - ★ these are the nominal wages that are slow to fall even during high unemployment and slow to rise even in the face of labor shortages. They can't be sticky forever because contracts are re-negotiated.

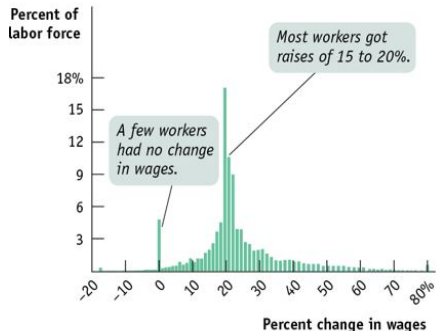
## Why SRAS curve slopes upward: **STICKY WAGES**

- When aggregate price level increases, firms increase their output prices quicker than they increase wages  $\Rightarrow$  per unit profit increases for a while.
- When aggregate price level falls firms cannot adjust wages quickly enough. So they are willing to sell less as every unit sold at lower price means a lower per unit profit.
- In an *imperfectly competitive market*, firms have power to influence market price and they do use it.
  - ▶ High demand  $\Rightarrow$  increase price and sell more
  - ▶ Low demand  $\Rightarrow$  lower price and sell less

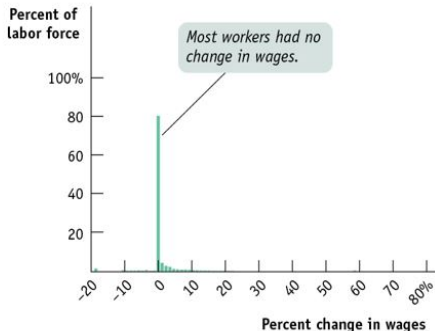
# Do we really see Sticky Wages in reality?

If the theory of sticky wages were true, we'd find evidence that wages fail to fall even during periods of high unemployment. We do.

(a) In a Prosperous Economy, 1984



(b) In a Deeply Depressed Economy, 2012



## Movement along and shift in SRAS curve

When the aggregate price level changes, we see a movement along in the SRAS curve because it affects producers' willingness to sell via its effect on per unit profit.

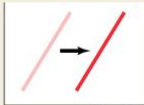
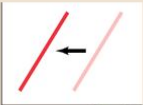

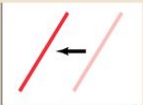
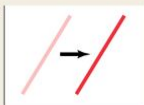
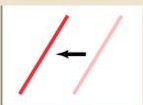
But there are other factors that affect per unit profit. Shift in SRAS occurs when factors other than aggregate price level change producers' profits at **any given price level**. Some of those are:

- commodity prices, such as oil prices.
- nominal wages
- productivity



# What shifts SRAS ?

**TABLE 12-2 Factors That Shift Aggregate Supply**

When this happens . . .	. . . aggregate supply increases	But when this happens . . .	. . . aggregate supply decreases
<b>Changes in commodity prices</b>			
When commodity prices fall . . .	 <p>Quantity</p>	When commodity prices rise . . .	 <p>Quantity</p>
<b>Changes in nominal wages</b>			
When nominal wages fall . . .	 <p>Quantity</p>	When nominal wages rise . . .	 <p>Quantity</p>
<b>Changes in productivity</b>			
When workers become more productive . . .	 <p>Quantity</p>	When workers become less productive . . .	 <p>Quantity</p>

## Practice Question

If the economy is in equilibrium and the real estate market collapses, what will likely happen?

- ① The AD curve will shift rightward
- ② The AD curve will shift leftward.
- ③ The SRAS curve will shift rightward.
- ④ The SRAS curve will shift leftward.

## Practice Question

If the economy is in equilibrium and the real estate market collapses, what will likely happen?

- ① The AD curve will shift rightward
- ② **The AD curve will shift leftward. (correct answer)**
- ③ The SRAS curve will shift rightward.
- ④ The SRAS curve will shift leftward.

## Practice Question

The short-run aggregate supply curve will shift to the right:

- ① when input costs rise. taxes rise.
- ② when interest rates rise.
- ③ when productivity rises.

## Practice Question

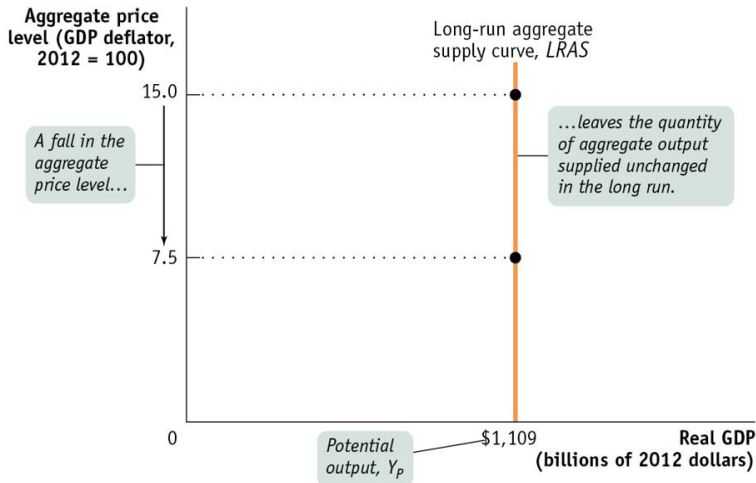
The short-run aggregate supply curve will shift to the right:

- ① when input costs rise. taxes rise.
- ② when interest rates rise.
- ③ **when productivity rises.(correct answer)**

# Long run aggregate supply (LRAS)

- We must talk about the short run and long run AS curves because *in the short run, wages are sticky, in the long run, they are fully flexible.*
- In fact, long run is the time it takes for all prices (including nominal wages) to adjust.
- LRAS shows the relationship between aggregate price level and the aggregate quantity of output sold **if prices, including nominal wages, were fully flexible.**
- In the long run, **prices have no effect on aggregate output because prices (including nominal wages) are fully flexible.**

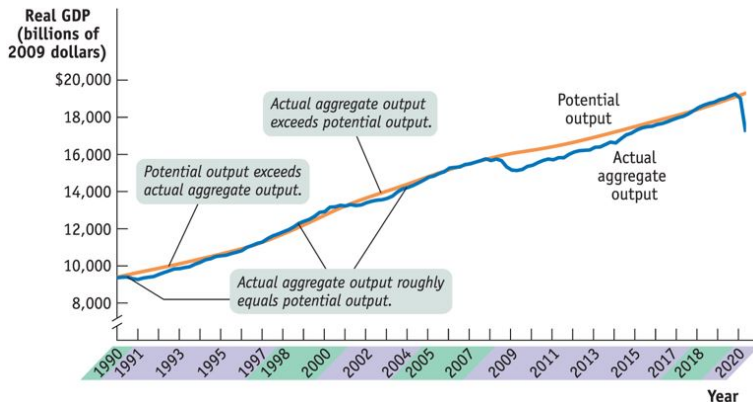
# Graphing LRAS



*Potential output is the level of real GDP the economy would produce if all prices, including nominal wages, were fully flexible.*

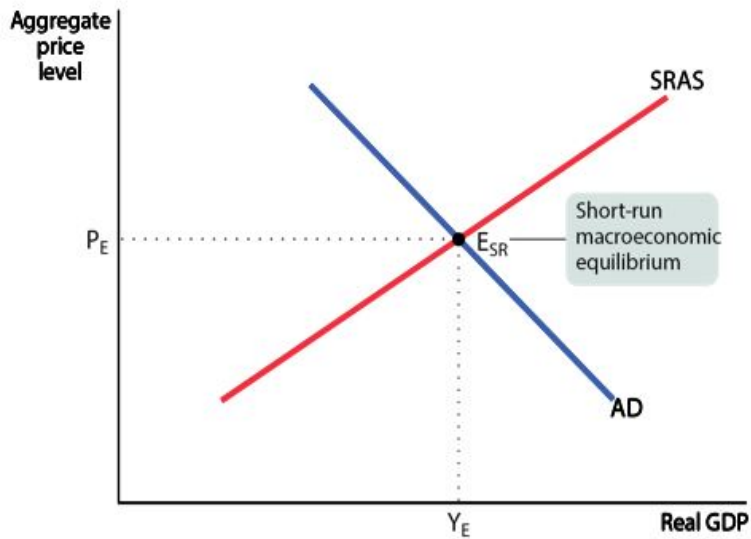
# Actual and potential output 1990 – 2016

The level of real GDP is almost always either above or below potential output because of short-run fluctuations.



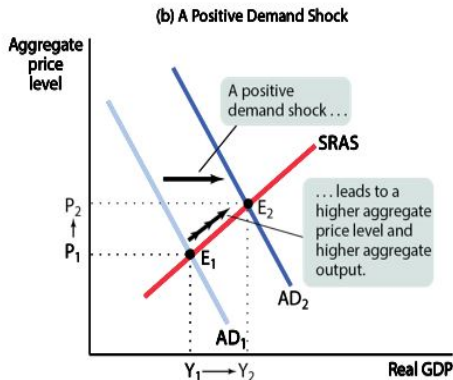
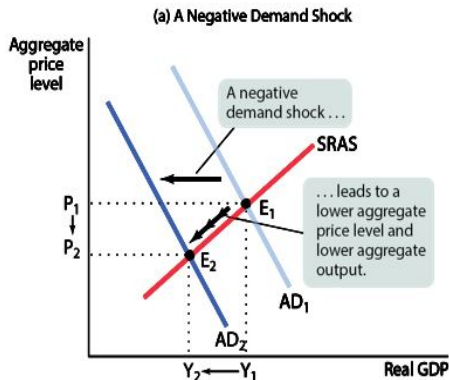


# The AD-AS model equilibrium



# Shocking the AD-AS model: Demand shock

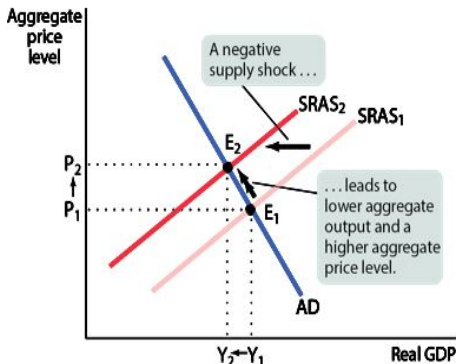
**Demand shock:** an event that shifts the aggregate demand curve.



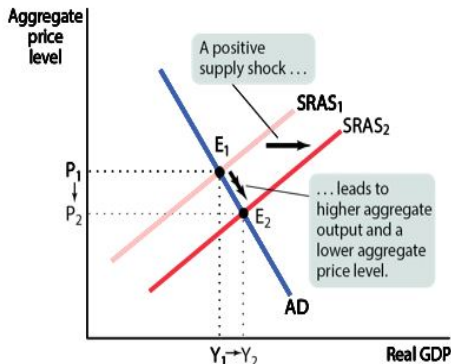
# Shocking the AD-AS model: Supply shock

**Supply shock:** an event that shifts the aggregate supply curve.

(a) A Negative Supply Shock



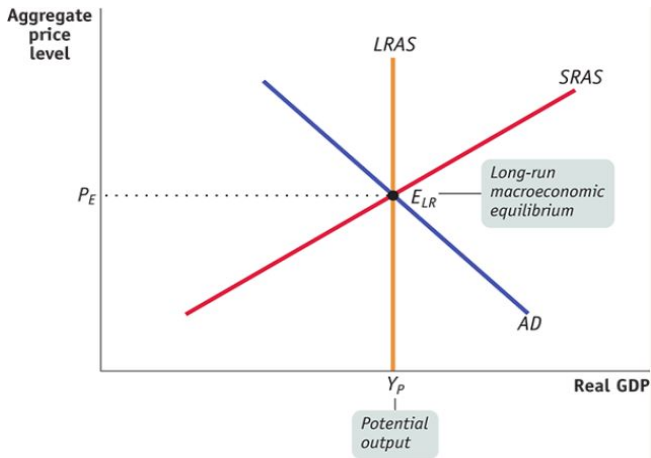
(b) A Positive Supply Shock



A negative supply shock could result into **stagflation**, a combination of increasing price levels (inflation) and falling aggregate output.

# Long run macroeconomic equilibrium

The economy is in long-run macroeconomic equilibrium **when the point of short-run macroeconomic equilibrium is on the LRAS curve.**



# Macroeconomic gaps

- **Output gap:** the percentage difference between actual aggregate output and potential output

$$= \left( \frac{\text{Actual aggregate output} - \text{Potential output}}{\text{Potential output}} \right) \times 100$$

## Two types of output gaps

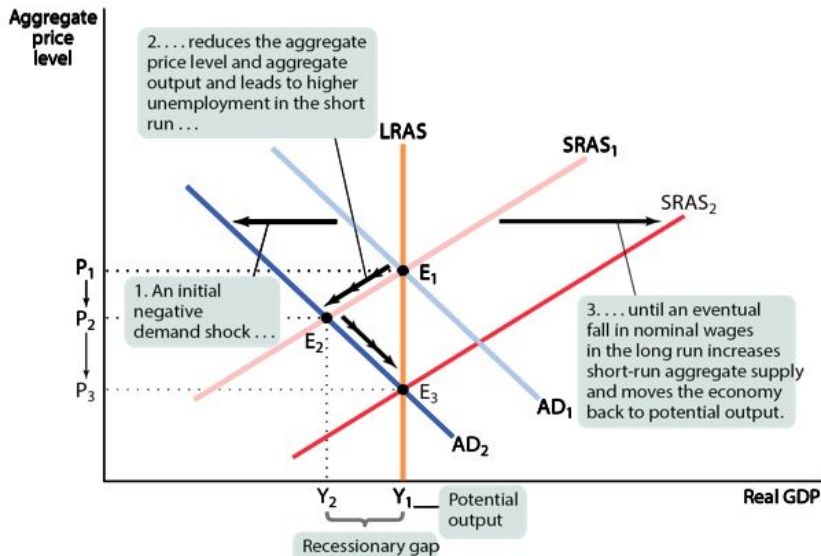
- **Recessionary gap:** when aggregate output is below potential output
- **Inflationary gap:** when aggregate output is above potential output

The economy is *self-correcting* in the long run. That is, it eventually turns back to potential output despite short run fluctuations. In other words, the *output gap tends to zero in the long run*. *Question: how long is the long run?*

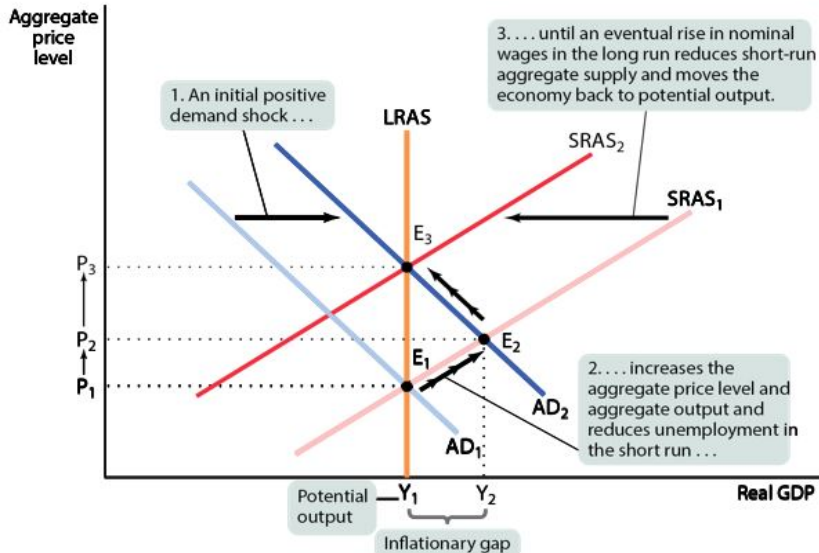
# Macroeconomic policy

- Economists believe self-correction takes around a decade!
  - ▶ J.M. Keynes “In the long run we are all dead.”
- The economy is self-correcting in the long run, but it would typically take a decade or more.
- Economists recommend that governments not wait for the economy to correct itself; that the government should use monetary and fiscal policy to get the economy back to potential output.
- This is the rationale for an active **stabilization policy**, which is the use of government policy to reduce the severity of recessions and rein in excessively strong expansions.

# SR and LR effects of a negative demand shock



# SR and LR effects of a positive demand shock



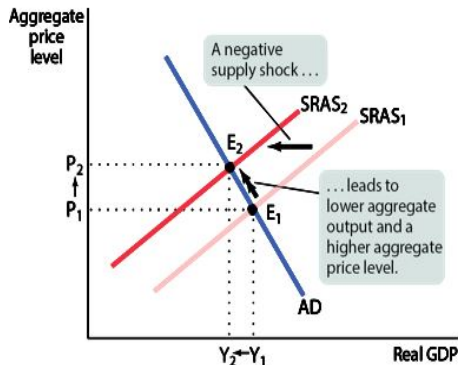


## Policy response to Demand Shocks

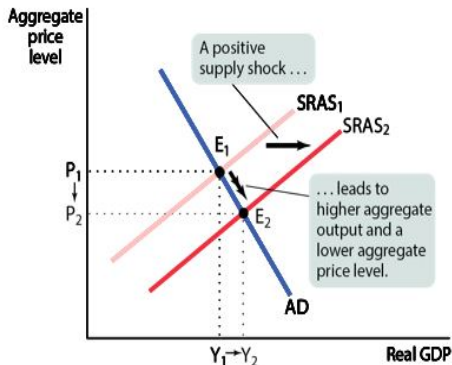
- If policy makers react quickly to the fall in aggregate demand, they can use monetary or fiscal policy to shift the aggregate demand curve back to the right. This is what they did during the COVID-19 recession in 2020.
- Instead of going through a recession, the government could make the economy stay at the original equilibrium.
- Macroeconomic policy would be desirable because
  - ▶ the temporary fall in aggregate output is associated with high unemployment
  - ▶ preventing deflation is a good thing.
- Does this mean that policy makers should always act to offset declines in aggregate demand? Not necessarily. Some policy measures may have long-term costs in terms of lower long-run growth (budget deficits, for example). Also, policy makers aren't perfectly informed, and the effects of their policies aren't perfectly predictable. This creates the danger that stabilization policy will do more harm than good.

# Supply shocks

(a) A Negative Supply Shock



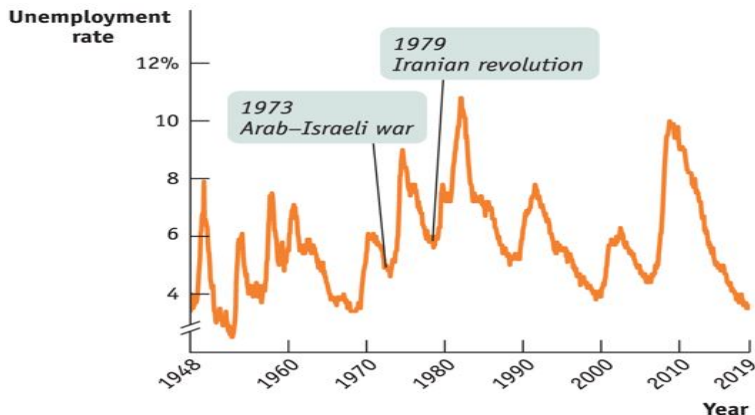
(b) A Positive Supply Shock



The U.S. economy faced a negative supply shock during the 1970s (stagflation due to the oil crisis). A positive supply shock in the late 90s (internet boom).

# Supply vs Demand shocks in reality

Which type of recession is more common? Demand shocks are the usual culprit. Negative supply shocks are rare but nasty.



The U.S. economy faced a negative supply shock during the 1970s (stagflation due to the oil crisis) and in 2020 (COVID-19). Internet boom was a positive supply shock.

# Responding to Supply Shocks: The 1970s oil shock

- A negative supply shock leads to a rise in prices and a rise in unemployment, which poses a policy dilemma:
  - ▶ Stabilization of unemployment requires an increase in aggregate demand. This leads to inflation.
  - ▶ Stabilization of prices requires a decrease in aggregate demand. This leads to higher unemployment.
- In the 1970s, the United States chose to stabilize prices at the cost of higher unemployment.

In 1973 the OPEC imposed oil embargo on the Western countries. Oil prices quadrupled between October 1973 and January 1974.

In the Summer of 1980, inflation was 14.5%. Paul Volcker, the then Fed chair increased interest rates up to 20 percent in 1981 to fight inflation. This led unemployment rate to rise from 7 to 10.8 percent!