

Aggregate Demand and Aggregate Supply (AD-AS) Model

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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

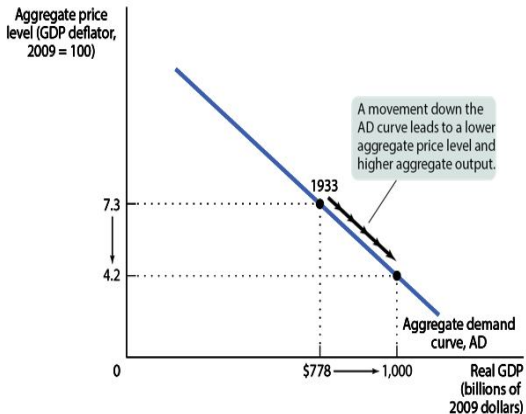
Our plan

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 $X - IM$

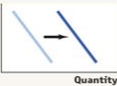
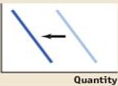
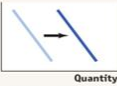
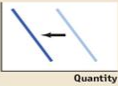
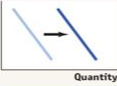
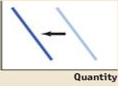
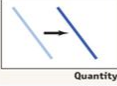
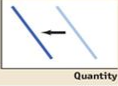
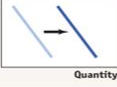
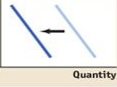
The key is to remember that from a macroeconomic perspective an increase in aggregate price level makes everything equally expensive at the same time. You cannot find a cheaper substitute!

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?

When this happens aggregate demand increases	But when this happens aggregate demand decreases
Changes in expectations			
When consumers and firms become more optimistic ...	 <p>... aggregate demand increases.</p>	When consumers and firms become more pessimistic ...	 <p>... aggregate demand decreases.</p>
Changes in wealth			
When the real value of household assets rises ...	 <p>... aggregate demand increases.</p>	When the real value of household assets falls ...	 <p>... aggregate demand decreases.</p>
Size of the existing stock of physical capital			
When the existing stock of physical capital is relatively small ...	 <p>... aggregate demand increases.</p>	When the existing stock of physical capital is relatively large ...	 <p>... aggregate demand decreases.</p>
Fiscal policy			
When the government increases spending or cuts taxes ...	 <p>... aggregate demand increases.</p>	When the government reduces spending or raises taxes ...	 <p>... aggregate demand decreases.</p>
Monetary policy			
When the central bank increases the quantity of money ...	 <p>... aggregate demand increases.</p>	When the central bank reduces the quantity of money ...	 <p>... aggregate demand decreases.</p>

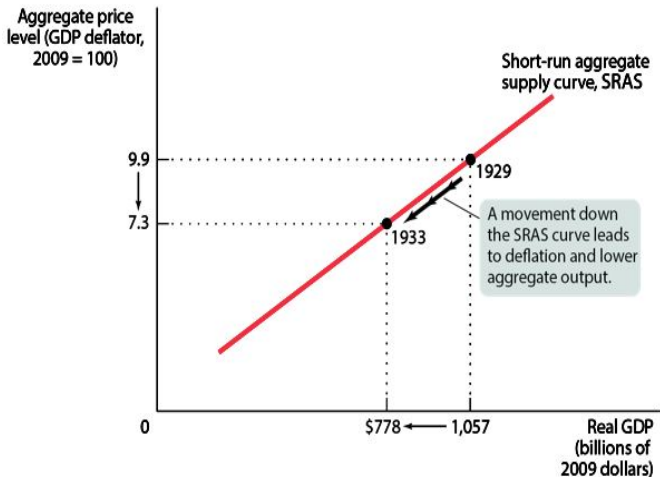
A common error: Movement along vs. Shift in AD curve

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

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

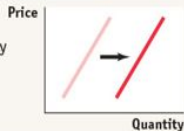
What shifts SRAS ?

When this happens aggregate supply increases

But when this happens aggregate supply decreases

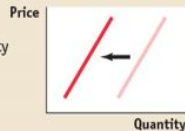
Changes in commodity prices

When commodity prices fall . . .



. . . aggregate supply increases.

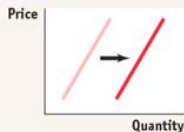
When commodity prices rise . . .



. . . aggregate supply decreases.

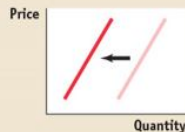
Changes in nominal wages

When nominal wages fall . . .



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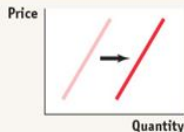
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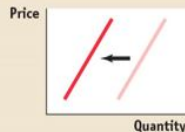
Changes in productivity

When workers become more productive . . .



. . . aggregate supply increases.

When workers become less productive . . .

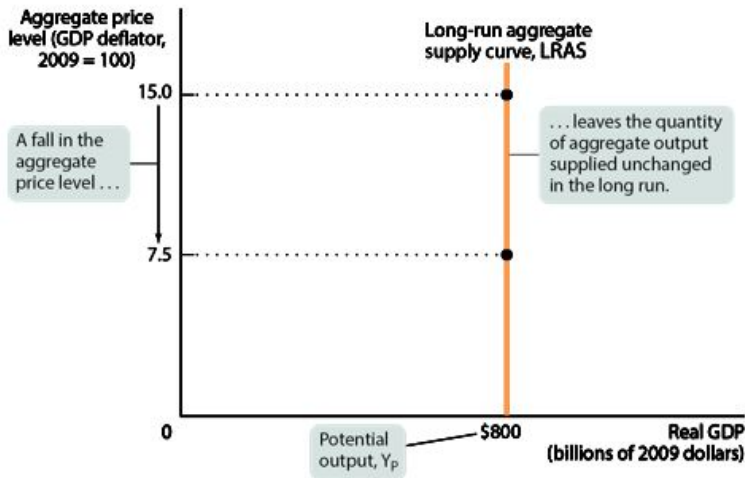


. . . aggregate supply decreases.

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.**

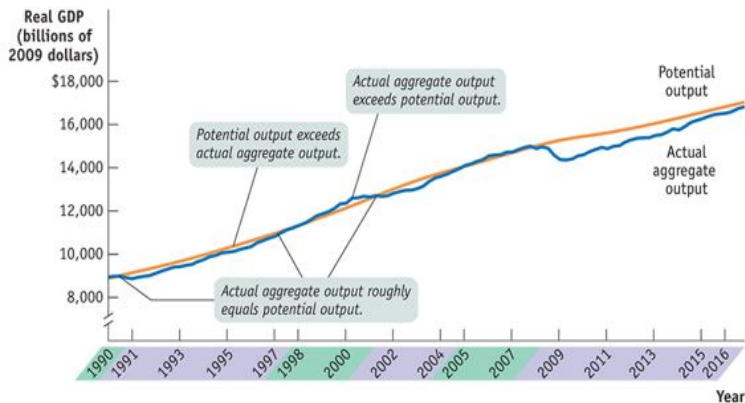
Graphing LRAS



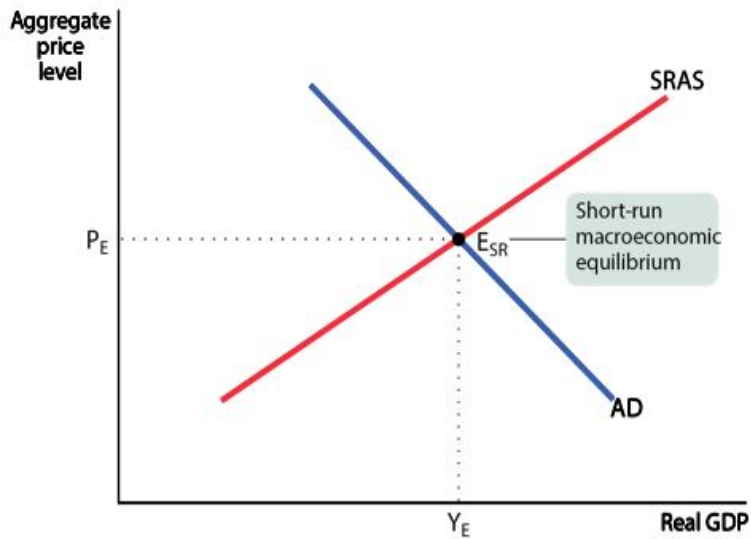
Potential output is the level of real GDP the economy would produce if all prices, including nominal wages, were fully flexible.

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.

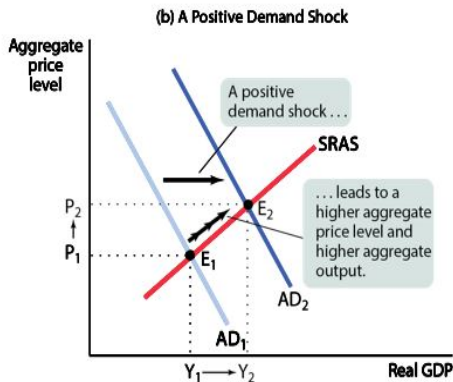
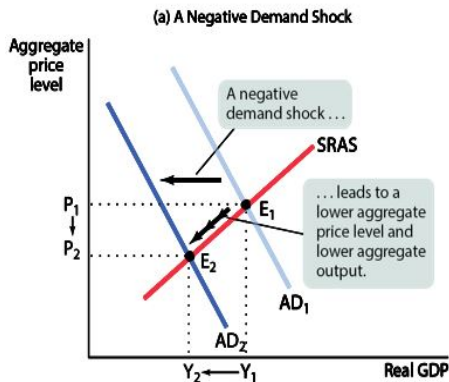


The AD-AS model equilibrium



Shocking the AD-AS model: Demand shock

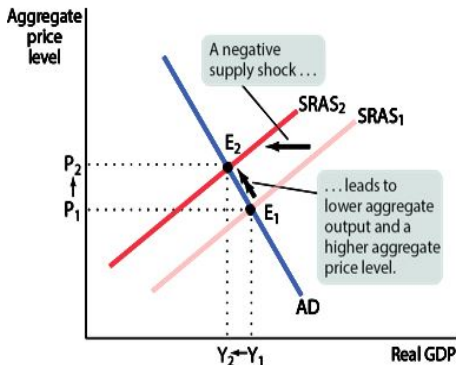
Demand shock: an event that shifts the aggregate demand curve.



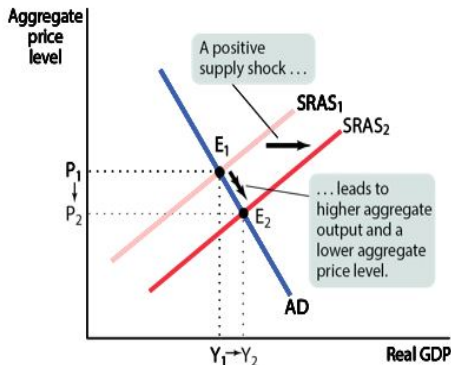
Shocking the AD-AS model: Supply shock

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

(a) A Negative Supply Shock



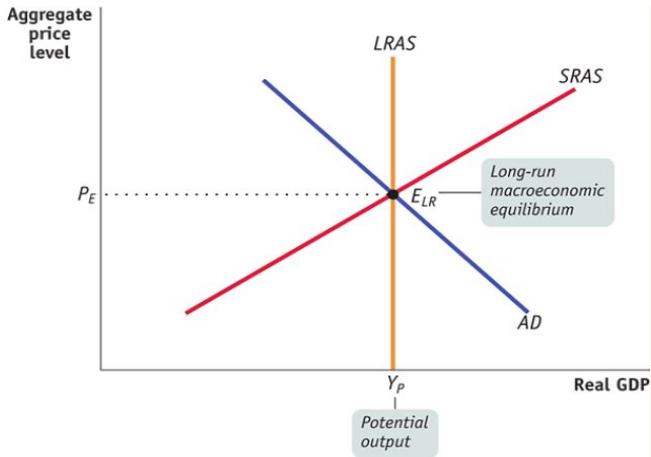
(b) A Positive Supply Shock



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

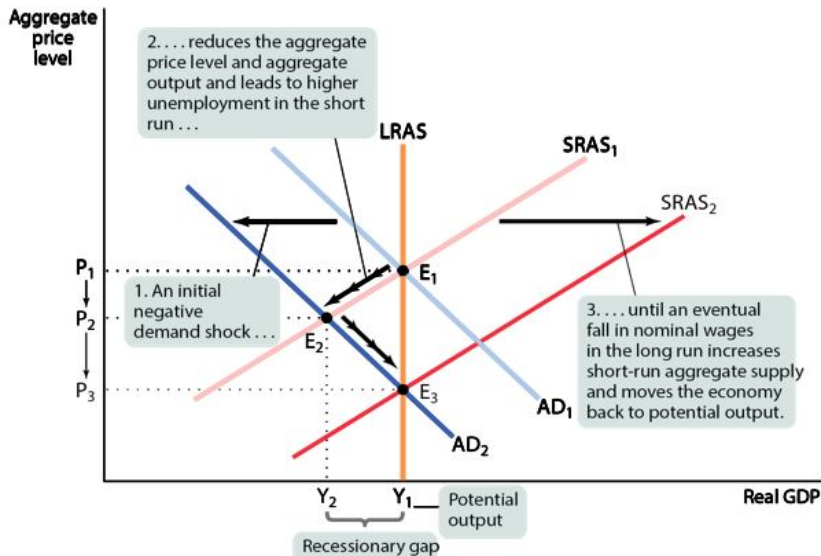
- **Recessionary gap:** when aggregate output is below potential output
- **Inflationary gap:** when aggregate output is above potential output

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?*

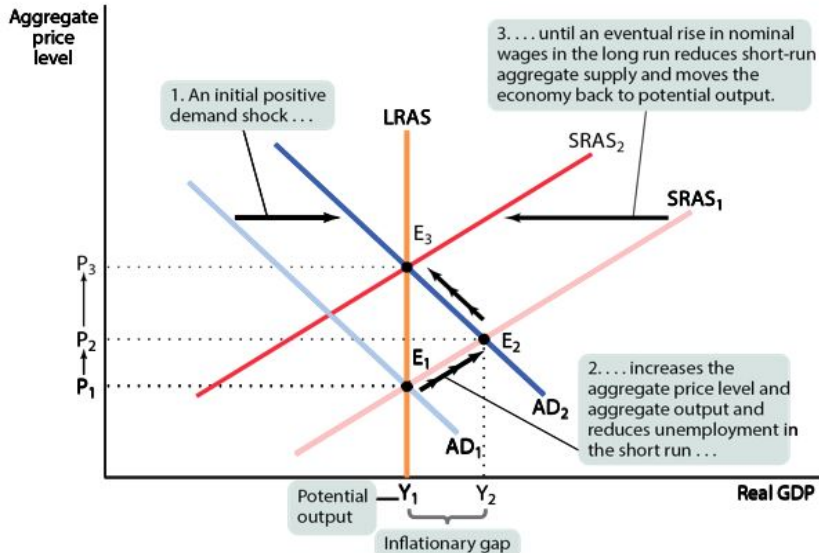
Macroeconomic policy

- Economists believe self-correction takes around a decade!
 - ▶ J.M. Keynes “In the long run we are all dead.”
- Many economists, thus, believe that government should use fiscal and monetary policy to bring economy back to the potential output in the aftermath of macroeconomic shocks.
- **Stabilization policy**
 - ▶ The use of government policy to reduce severity of recessions and reign in excessively strong expansions.
 - ▶ Stabilization policy is used to offset a demand shock.
 - ▶ Negative supply shocks pose the policy dilemma: fighting slump in output worsens inflation and fighting inflation worsens the slump.

SR and LR effects of a negative demand shock



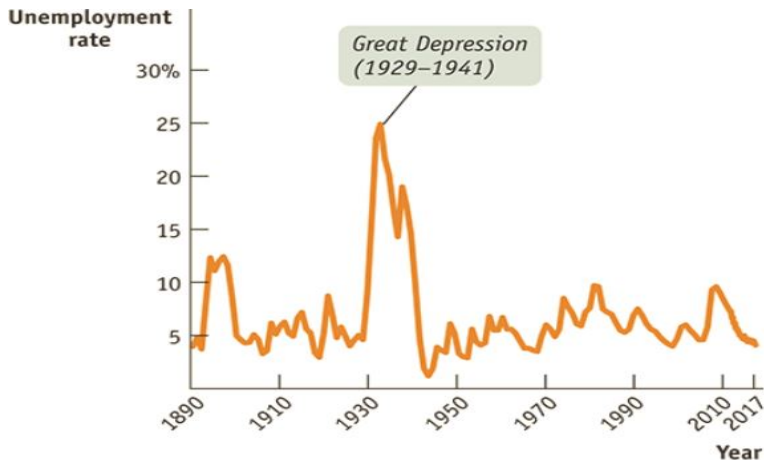
SR and LR effects of a positive demand shock



Stabilization policy in hindsight

Has stabilization policy been stabilizing?

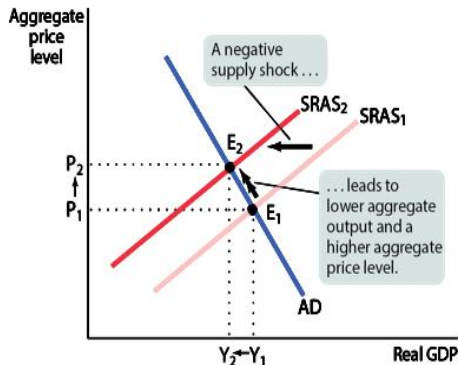
Answer: Kind of.



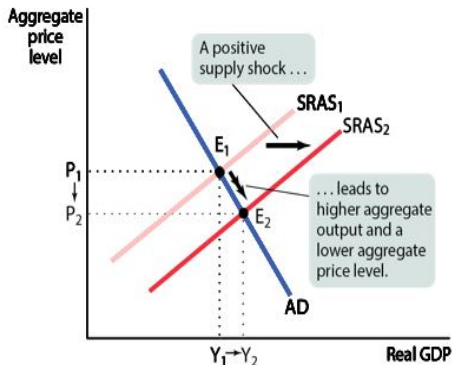
Active stabilization policy became a standard practice since 1960s.

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 shocks

- Supply shocks are unique in the sense that they move aggregate output and inflation in the opposite direction.
- The government policy can move the AD curves, but moving the AS curves is much harder.