

# EE432 Monetary Theory and Policy



## Lecture 11 Understanding Business Cycle Fluctuations

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# Outline

- Sources of Fluctuations in Output and Inflation – Demand Shock and Supply Shock
- How Do Policymakers Achieve Their Stabilization Objectives?
- Positive Supply Shocks and the Opportunity They Create
- What Accounts for the Great Moderation
- What Happens When Potential Output Changes?
- Can Policymakers Stabilize Output and Inflation Simultaneously?

# Chapter 22



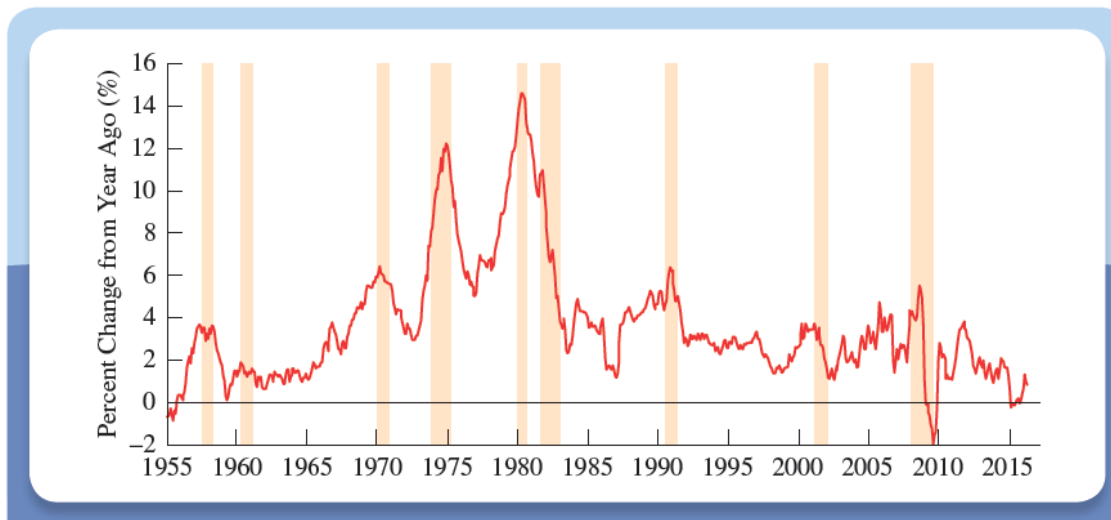
## Understanding Business Cycle Fluctuations

# Sources of Fluctuations in Output and Inflation

# Sources of Fluctuations in Output and Inflation

Figure 22.1

Inflation and the Business Cycle, 1955–2016



There appears to be a *connection* between **growth** and **changes in inflation**.

While there is no apparent *relationship between the level of inflation and recessions*,

It does appear that; the **inflation rate**, either *falls* when the **economy is contracting**; or *rises* when it is **expanding**.

# Sources of Fluctuations in Output and Inflation

Remember that **long-run equilibrium** means:

1.  $Y = Y^P$  ***output = potential output.***
2.  $\pi = \pi^T$  ***inflation = target inflation.***
3.  $\pi = \pi^e$  ***inflation = expected inflation.***

**Short-run equilibrium** is:

The point where the ***dynamic aggregate demand curve*** (AD) **intersects** the ***short-run aggregate supply (SRAS) curve.***

# Sources of Fluctuations in Output and Inflation

- Immediately after either the **SRAS curve** or **AD curve shift**, the economy will *move away from its long-run equilibrium* – so called, **short-run fluctuations**.
- Economists define ***shocks*** as *something unexpected*.

# Sources of Fluctuations in Output and Inflation

- A **shock** *shifts* the *AD* or *SRAS* curve.
  - A **supply shock** affects *costs of production*
    - For example; an **oil price increase**.
  - A **demand shock** affects *exogenous spending and thus aggregate expenditure*
    - For example; **change in consumer confidence**

# *Demand Shock*

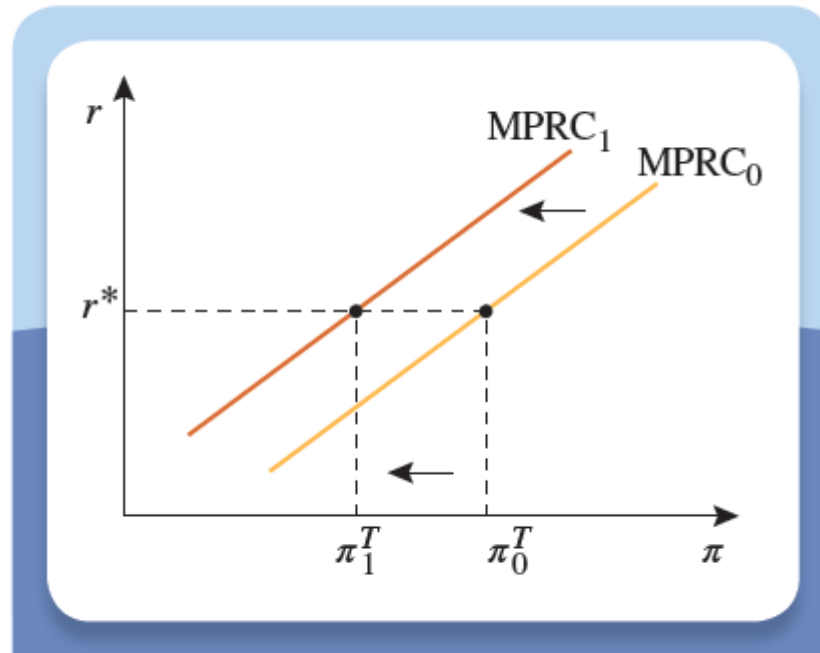
# A Decline in the Central Bank's Inflation Target

- A fall in  $\pi^T$  shifts the **monetary policy reaction curve** to the *left*.
  - The **decrease** in the **inflation target** raises the **real interest rate** policymakers set at each level of inflation.
  - This reduces aggregate expenditure **shifting** the **AD curve** to the *left* as well.
    - The economy moves to a **new short-run equilibrium**.

# A Decline in the Central Bank's Inflation Target

Figure 22.2

A Decline in the Central Bank's Inflation Target



A decline in the inflation target from  $\pi_0^T$  to  $\pi_1^T$  shifts the monetary policy reaction curve to the left from  $MPRC_0$  to  $MPRC_1$ .

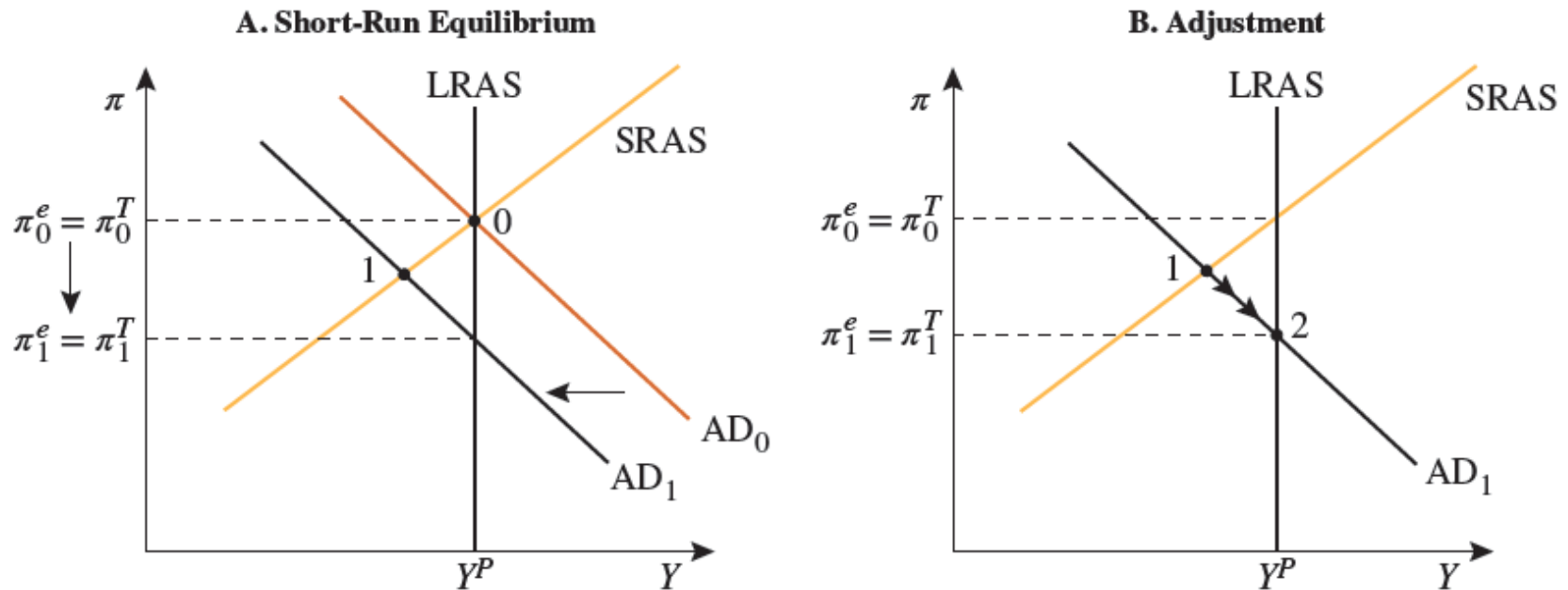
# A Decline in the Central Bank's Inflation Target

- At the new short-run equilibrium point, ***inflation*** and ***current output*** are lower than they were *prior to the monetary policy tightening*.
  - The **dynamic aggregate demand curve** shifts left, moving the economy *along the SRAS*
- **Current inflation** is less than **expected inflation**
  - **Expected inflation** *falls*, shifting the SRAS right
- The **economy** will *move* along the new dynamic aggregate demand curve *to the* new long-run equilibrium where **inflation** equals the **new central bank's target**, and **output** equals **potential output**.

# A Decline in the Central Bank's Inflation Target

Figure 22.3

A Decline in the Central Bank's Inflation Target



A decrease in the central bank's inflation target shifts the dynamic aggregate demand curve to the left from  $AD_0$  to  $AD_1$ , moving the economy from point 0 to point 1.

When the economy is at point 1, current inflation is less than the initial level of expected inflation ( $\pi_0^e$ ). As a result, expected inflation falls, shifting the short-run aggregate supply curve to the right. The process continues until the economy reaches point 2, where expected inflation equals the new inflation target ( $\pi_1^e = \pi_1^T$ ).

# An Increase in Government Purchases

- An *increase* in **government spending** shifts the **AD curve** to the right.
- The *economy* moves from the original *short-run equilibrium* to a ***new short-run equilibrium***.
  - The immediate impact is to **raise** both **current output** and **inflation**.

# An Increase in Government Purchases

- Because **current inflation exceeds expected inflation**, this can't be the long-run effect.
- **Expected inflation *rises*, shifting the SRAS curve to the left.**
  - As the economy travels along aggregate demand, **current inflation *rises* and current output *falls*** until the point at which the **dynamic aggregate demand curve crosses the LRAS curve**

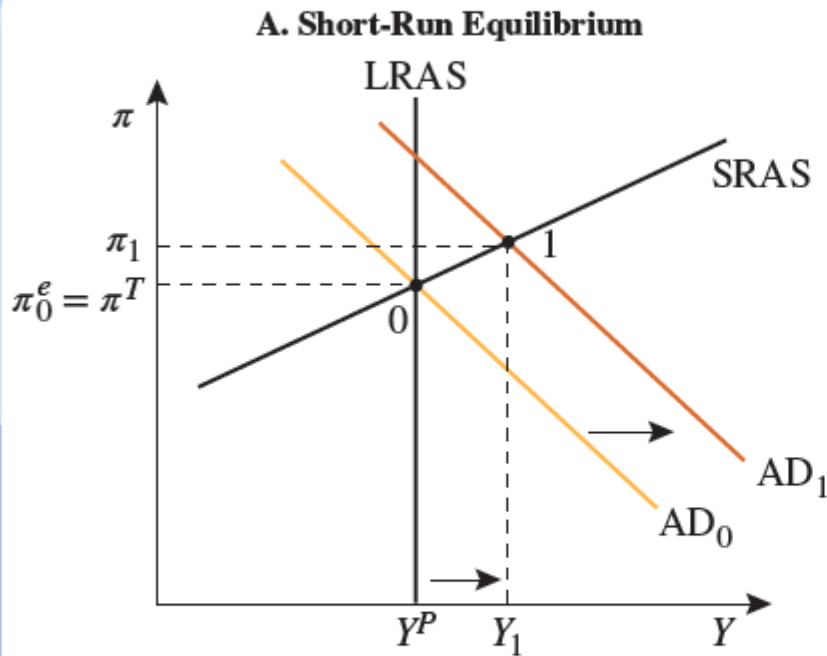
# An Increase in Government Purchases

- **Inflation** is *higher* at the new equilibrium point than it at the original.
- This is *above* the **policymakers' original inflation target,  $\pi^T$**
- **Unless monetary policy adjusts**, when the *dynamic aggregate demand curve* shifts to the *right*, **inflation will rise**.

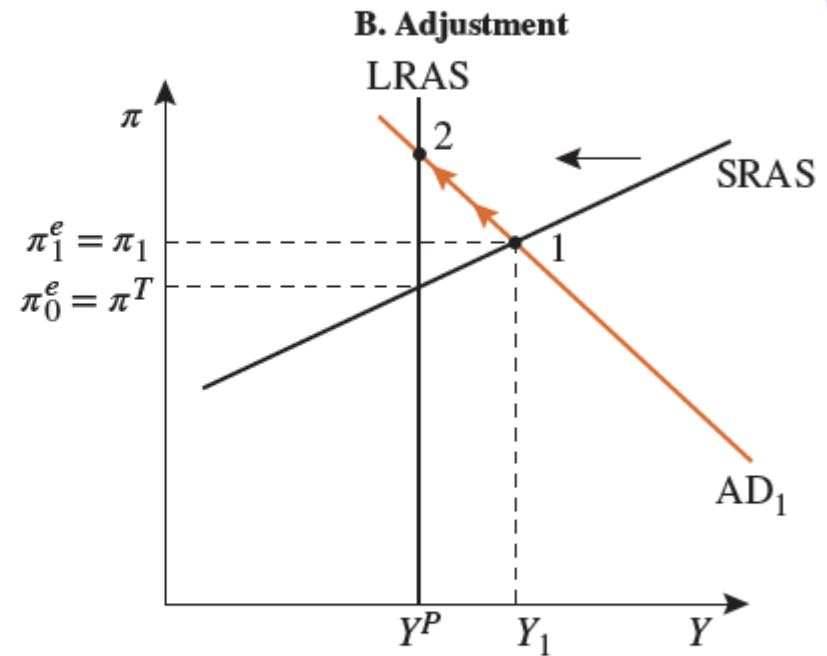
# An Increase in Government Purchases

Figure 22.4

An Increase in Government Expenditure



An increase in government expenditure shifts the AD curve to the right from  $AD_0$  to  $AD_1$ . This moves the economy from point 0 to point 1. In the short run, output rises to  $Y_1$ , while inflation increases to  $\pi_1$ .



When the economy is at point 1, current inflation is initially above expected inflation ( $\pi_1 > \pi_0^e$ ). As expected inflation rises in response, the short-run aggregate supply curve shifts to the left, moving the economy along  $AD_1$  toward point 2.

# An Increase in Government Purchases

- As long as monetary policymakers remain committed to their *original inflation target*, they need to do something to *get the economy back to the point where it began*.
- In this case, **tighter monetary policy shifts the AD curve to the left**.
  - This brings the economy back to the *long-run equilibrium* where **output equals potential output** and **inflation equals the central bank's target**.
- **Without a change in target inflation, *an increase in government purchases causes a temporary increase in both output and inflation*.**

# Summary of Impact of Increase in Dynamic Aggregate Demand on Output and Inflation

<b>Source</b>	<p>Shift in the monetary policy reaction curve</p> <ul style="list-style-type: none"><li>• Increase in inflation target</li><li>• Decrease in long-run real interest rate</li></ul> <p>Increase in aggregate expenditure</p> <ul style="list-style-type: none"><li>• Consumer confidence up</li><li>• Business optimism up</li><li>• Government purchases up</li><li>• Net exports up</li></ul>
<b>Result</b>	Dynamic aggregate demand shifts right
<b>Short-run impact</b>	<p><math>Y</math> increases</p> <p><math>\pi</math> increases</p>

# *Supply Shock*

# Shifts in Short-Run Aggregate Supply

- Changes in production costs *shift* the SRAS curve.
- A negative supply shock that *increases production costs*; for example, *increase in the price of oil*, will shift the SRAS curve to the left, reducing the amount supplied at every level of inflation
  - Higher inflation and lower growth

# Shifts in Short-Run Aggregate Supply

- The **short-run equilibrium** moves to where the **new SRAS curve *meets* AD**.
- This *creates* a condition referred to as **stagflation**.
  - Economic stagnation coupled with ***increased*** inflation.
- **Expected inflation *rises*** as well and because **current inflation is *below*** this level, the **SRAS curve shifts back to the right**

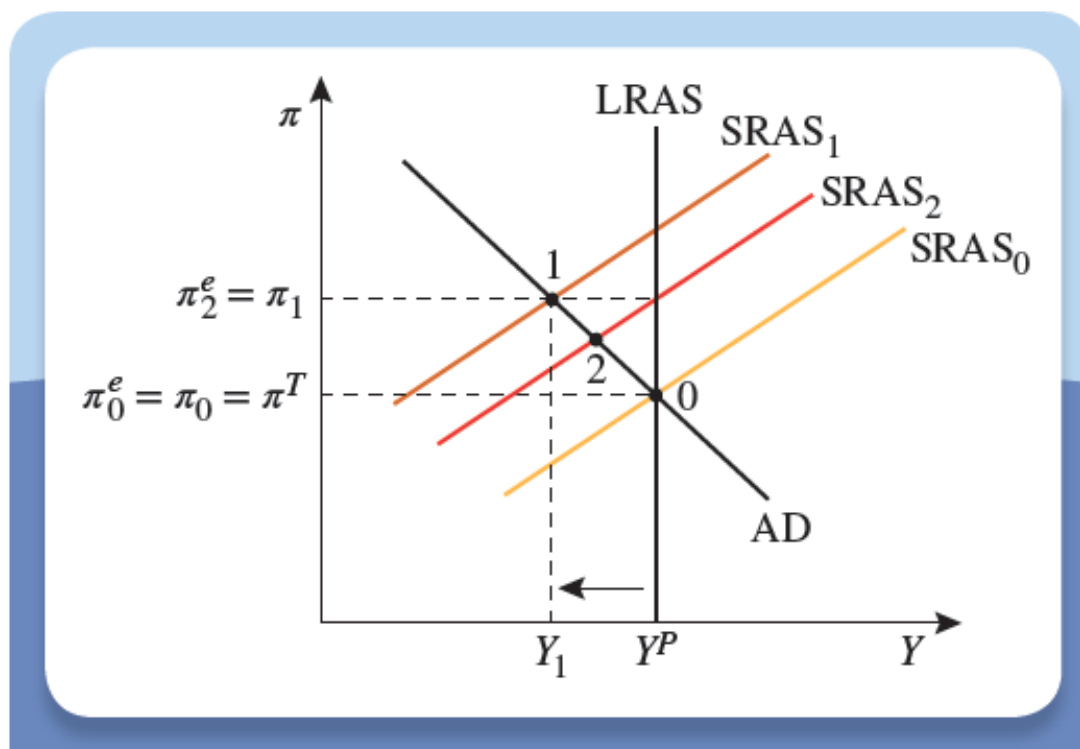
# Shifts in Short-Run Aggregate Supply

- **Inflation** continues to *fall* and **output** *continues to rise* until **current inflation** and **expected inflation** *return* to the **central bank's inflation target**, and **output** equals **potential output**.
- ***Inflation is at its highest and output at its lowest immediately, following a negative shock to SRAS***
- ***Over time, self-correcting forces will unwind the shock, restoring long-run equilibrium***

# Shifts in Short-Run Aggregate Supply

Figure 22.5

A Negative Supply Shock



A negative supply shock shifts the SRAS curve to the left, moving the short-run equilibrium from point 0 to point 1, raising inflation to  $\pi_1 > \pi^T$ . At point 1, current inflation is *below* the intersection of  $SRAS_1$  and LRAS that marks expected inflation in the long run, so the SRAS curve shifts back right to  $SRAS_2$ , which intersects the LRAS at the point where expected inflation ( $\pi_2^e$ ) equals  $\pi_1$ . The SRAS curve continues to shift right until inflation and expected inflation again equal target inflation at point 0.

# Shifts in Short-Run Aggregate Supply

- As with an increase in government purchases, a **supply shock** has no effect on the economy's *long-run equilibrium point*.
- A **supply shock** causes **inflation** to *rise temporarily* and *then fall*.
  - This happens at the same time that **current output** *falls temporarily* and *then rises*.
- In the **long run**, the economy *returns* to the point where **output** equals **potential output** and **inflation** equals the **central bank's target**.

# Shifts in Short-Run Aggregate Supply

**Table 22.2**

Impact of a Decline in Short-Run Aggregate Supply on Output and Inflation

<b>Source</b>	Negative supply shock <ul style="list-style-type: none"><li>• Increase in production costs</li><li>• Increase in expected inflation</li></ul>
<b>Result</b>	Short-run aggregate supply curve shifts left
<b>Short-run impact</b>	Y falls $\pi$ increases

# How Do Policymakers Achieve Their Stabilization Objectives?

# How Do Policymakers Achieve Their Stabilization Objectives?

- The aggregate demand-aggregate supply framework is useful *in understanding how **monetary and fiscal** policymakers seek to stabilize output and inflation using **stabilization policy**.*
- When shifting their reaction curve, **central bankers shift AD**.
  - They cannot shift the **SRAS** curve.
- This means **monetary policymakers can neutralize demand shocks, but cannot offset supply shocks.**

# How Do Policymakers Achieve Their Stabilization Objectives?

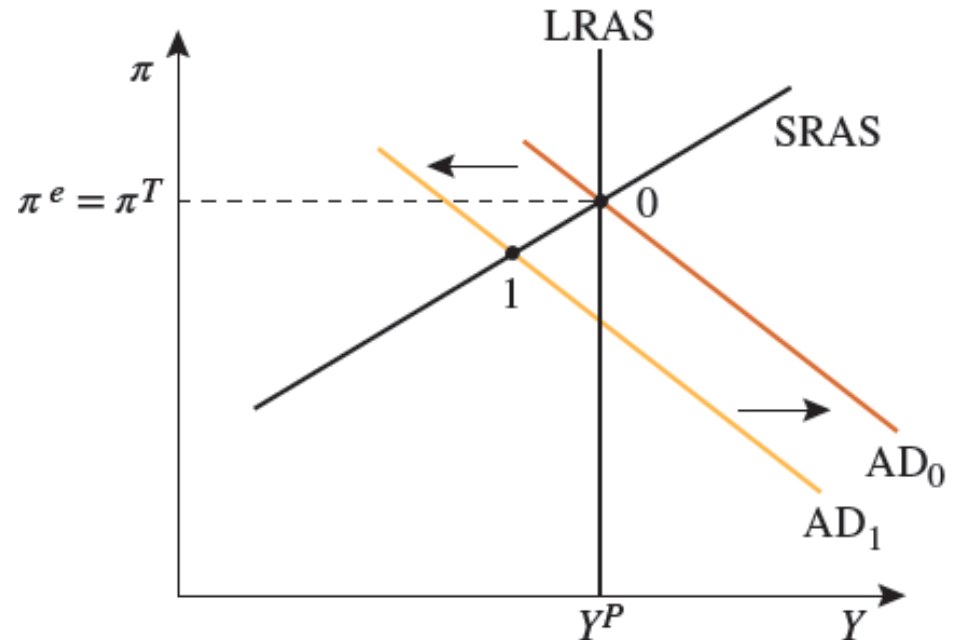
- **Positive supply shocks** that *raise output* and *lower inflation* provide policymakers with an *opportunity*.
  - Central bankers **can guide** the economy to a **new, lower inflation target** *without inducing a recessionary output gap*.
- **Fiscal policy** *can work* to **stabilize** the economy

# Monetary Policy

- A reduction in consumption and investment, **shifts** the dynamic aggregate demand curve to the **left**
  - Current inflation would **fall below** expected inflation and current output to **fall below** potential output.

# Monetary Policy

- **Drop in consumer or business confidence:**  
 $AD_0 \rightarrow AD_1$   
Economy: points  $0 \rightarrow 1$
- ***Stabilization* requires shifting AD back to where it started.**



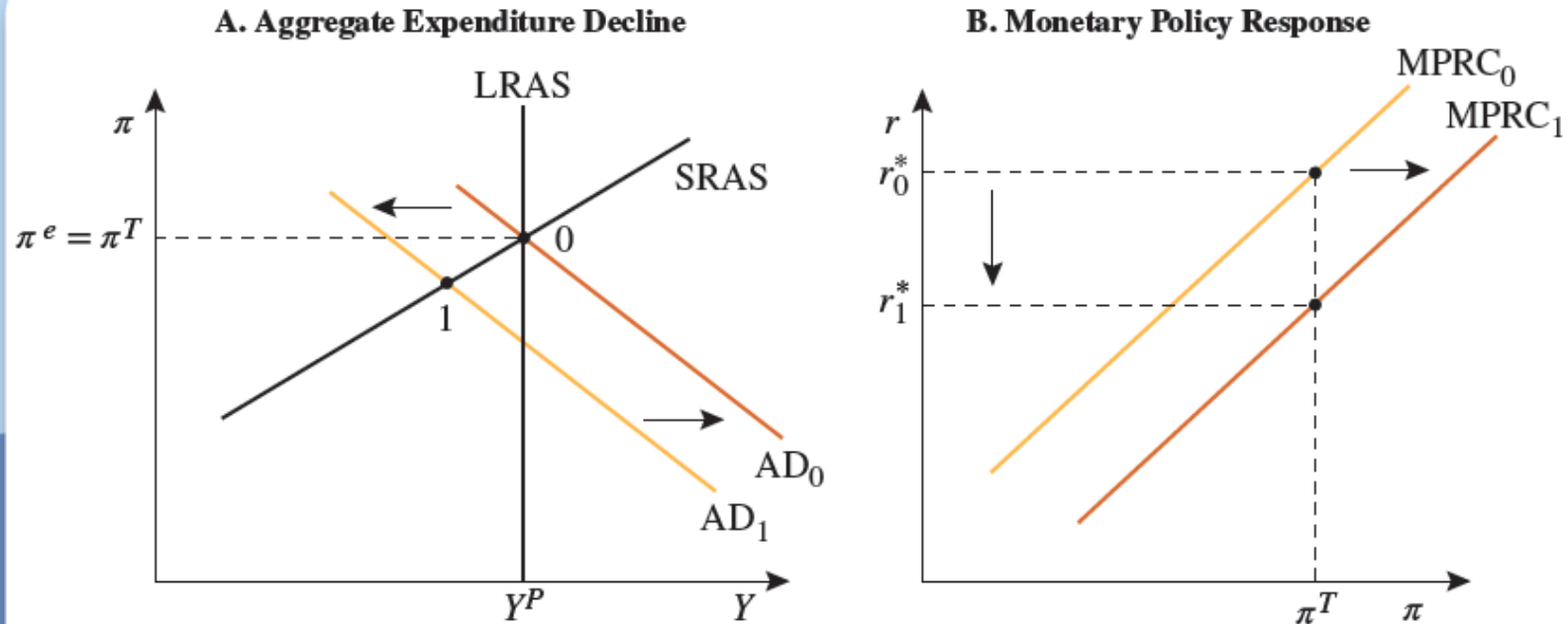
# Monetary Policy

- Policymakers will conclude that the **long-run real interest rate** has ***fallen***.
- If the ***inflation target stays the same***, the ***drop*** in **aggregate expenditure** prompts them to ***shift the monetary policy reaction curve*** to the ***right***.
  - This ***reduces*** the level of the **long-run real interest rate**.
- The **AD curve** now ***shifts right***, **back to its original level**.
- The policy response means the **economy** will be **back at long run equilibrium**.

# Monetary Policy

Figure 22.7

Stabilizing a Shift in Dynamic Aggregate Demand



Following a drop in consumer or business confidence the dynamic aggregate demand shifts to the left from  $AD_0$  to  $AD_1$ , moving the economy from point 0 to point 1. Realizing this, monetary policymakers shift their MPC to the right, shifting the dynamic aggregate demand curve back to where it started and returning the economy to point 0.

Following a drop in consumer confidence, the long-run real interest rate falls from  $r_0^*$  to  $r_1^*$ . Policymakers respond by shifting their reaction curve from  $MPC_0$  to  $MPC_1$ , shifting the AD curve back to its original position,  $AD_0$ .

# Monetary Policy

- *In practice, it is extremely **difficult to keep inflation and output from fluctuating** when aggregate expenditure changes.*
- There are two reasons:
  - It takes time to recognize *what has happened*.
  - **Changes in interest rates** do not have an **immediate impact** on the economy.

# Discretionary Fiscal Policy

There are two types of **fiscal policy**:

## 1. Automatic stabilizers

- *Operate without any further actions on the part of the government.*
- *Examples: unemployment insurance and the proportional nature of the tax system.*

## 2. Discretionary policy

- *Relies on **fiscal policymakers' decisions**.*
- *Changes aggregate expenditures shifting the dynamic aggregate demand curve.*

# Discretionary Fiscal Policy

- **Fiscal policy** *can* act just like monetary policy to offset *shifts in the dynamic aggregate demand curve* and stabilize *inflation and output*.
- Two shortcomings:
  1. *Discretionary fiscal policy works slowly*
  2. It is almost *impossible to implement effectively*

# Discretionary Fiscal Policy

- Because **economic data** only become *available several months after they are collected*, the economy is *often halfway through a recession before* there is a consensus that a downturn has actually started.
- This means that discretionary fiscal policy is *likely to have its biggest impact* when it is *no longer needed*.

# Discretionary Fiscal Policy

- Economics clearly come into *conflict with politics* where *fiscal stimulus* is concerned.
  - For economists, the ***best policies*** are the ones that **influence a few key people to *change their behavior***, avoiding rewarding people who do what they would *have done* anyway.
  - For politicians, the ***best policies*** are programs that **reward the *largest number of people*** possible.
- Discretionary fiscal policy is a ***poor stabilization tool***.

# Positive Supply Shocks and the Opportunity They Create

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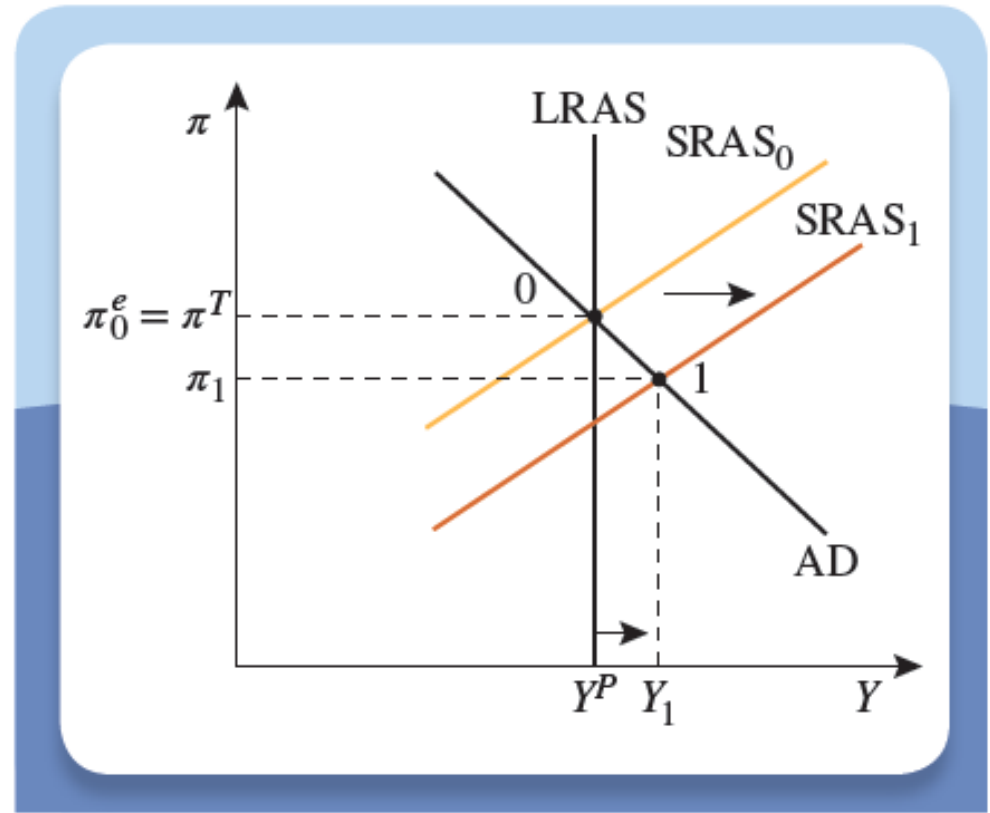
- When **production costs *fall*** - a ***positive* supply shock**
- The **SRAS curve shifts** to the **right**.
  - This ***drives up*** inflation and **output** immediately.
  - **Current inflation is *below* expected inflation** and **expectations initially *fall***.
- This leads to **inflation *above* expected inflation** so ***expectations start to rise*** and the **SRAS curve shifts** to the **left**.
  - This continues **until the economy returns to the *original* long-run equilibrium**.

# Positive Supply Shock

- **Fall in production costs shifts SRAS Right.**
  - Economy 0→1
- **Inflation is *above* expected inflation and SRAS moves back to original level.**
  - Economy 1→0

Figure 22.8

A Positive Supply Shock



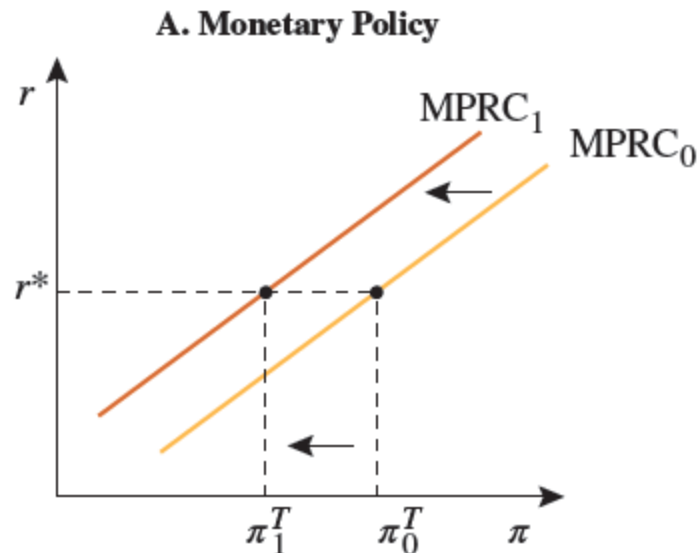
# Positive Supply Shocks and the Opportunity They Create

- A **positive supply shock** *creates an opportunity* for policymakers to **guide the economy to a new, lower inflation target** without inducing a recession.
  - Central bankers will shift the **monetary policy reaction curve** to the **left**.
  - The **AD** shifts **left** as well.
  - This **continues until** it reaches the point where the **new SRAS curve intersects** the **LRAS curve**.

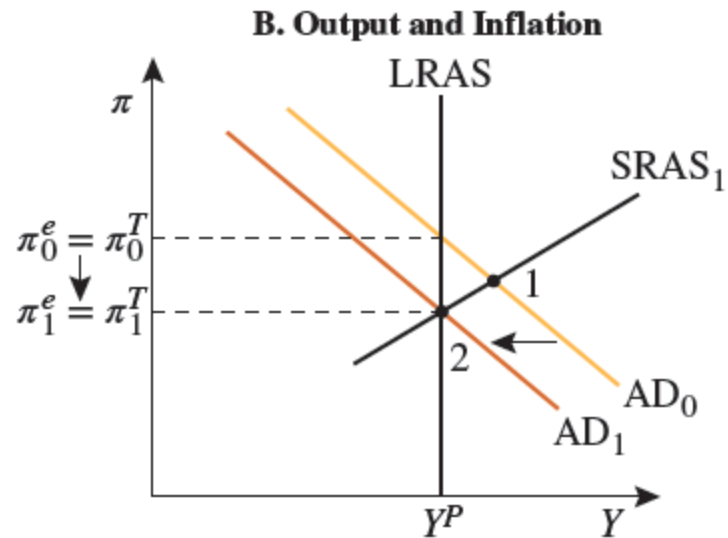
# Positive Supply Shocks and the Opportunity They Create

Figure 22.9

Lowering the Inflation Target



A decline in the inflation target from  $\pi_0^T$  to  $\pi_1^T$  shifts the monetary policy reaction curve to the left from  $MPRC_0$  to  $MPRC_1$ .



Following a positive supply shock, policymakers can reduce their inflation target by shifting the dynamic aggregate demand curve from  $AD_0$  to  $AD_1$ . This lowers expected inflation from  $\pi_0^e$  to  $\pi_1^e$ . Instead of going to point 1, the economy moves to point 2.

# What Accounts for the Great Moderation

# What Accounts for the Great Moderation

- The **1990s** brought **unprecedented economic stability** - the “**Great Moderation**” in the volatility of real growth.
  - From 1991 to 2001 *there were 10 years of solid growth and inflation fell steadily.*
  - The *volatility* of inflation and growth *dropped by more than half.*
- This **prosperity** and **stability** was *shared across the industrialized world.*

# What Accounts for the Great Moderation

There are **three possible explanations** for this worldwide economic performance:

1. Everyone was *extremely lucky*.
2. Economies have *become more flexible* in absorbing external economic disturbances.
3. **Monetary policymakers** have figured out *how to do their job more effectively*.

# What Accounts for the Great Moderation

- Difficult to argue that the stability was just good fortune—*financial markers* were not *calm*.
- Advances in *information technology* have increased **manufactures' flexibility** in *responding to changes in demand*.
  - Resulting in *dramatic declines in inventories* at every stage of the production process.
- **Innovations** in *mortgages* and *other forms of personal credit* made it *easier* for households and businesses *to borrow*.
  - **Rising levels of risky debt** eventually led to record **defaults** *during the financial crisis*.

# What Accounts for the Great Moderation

- That leaves **monetary policy** as the **only remaining explanation**.
- **Central bankers** must focus on **raising real interest rates** *when* **inflation goes up** and **lowering them** *when* **inflation goes down**.
- **Keeping inflation low and stable** is **necessary** for **reducing economic volatility**, the deep recession that began in December 2007 shows that it is **not sufficient**.

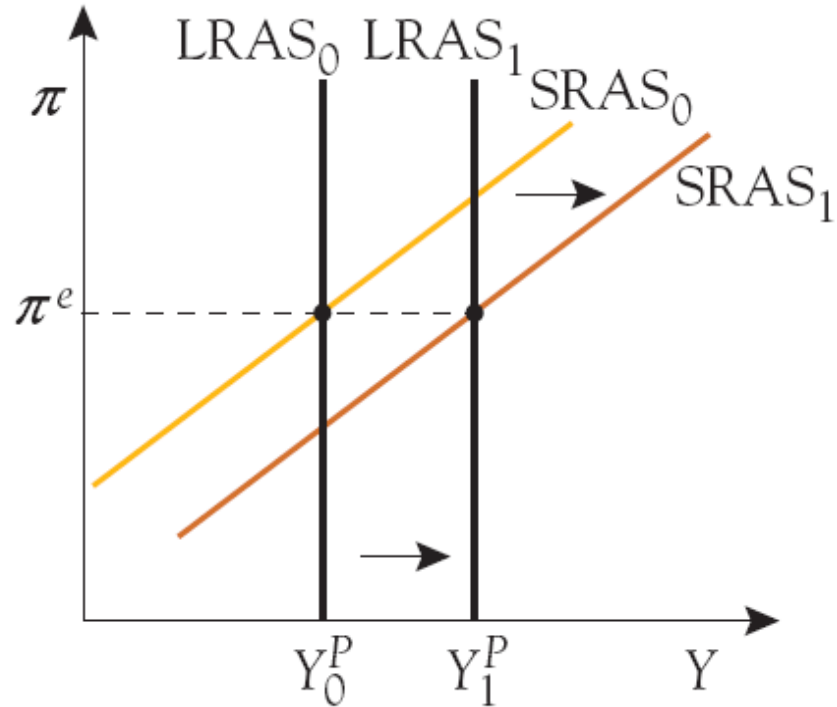
# What Happens When Potential Output Changes?

# What Happens When Potential Output Changes?

- *What happens when  $Y^P$  increases due to an increase in productivity?*
  - The long-run aggregate supply curve will shift to the right as  $Y^P$  increases.
  - An *increase in productivity* reduces costs of production, so it is a positive supply shock as well.
  - The **SRAS curve** will shift right.
    - Remember that the **SRAS curve** intersects the **LRAS curve** at the point *where current inflation equals expected inflation*.

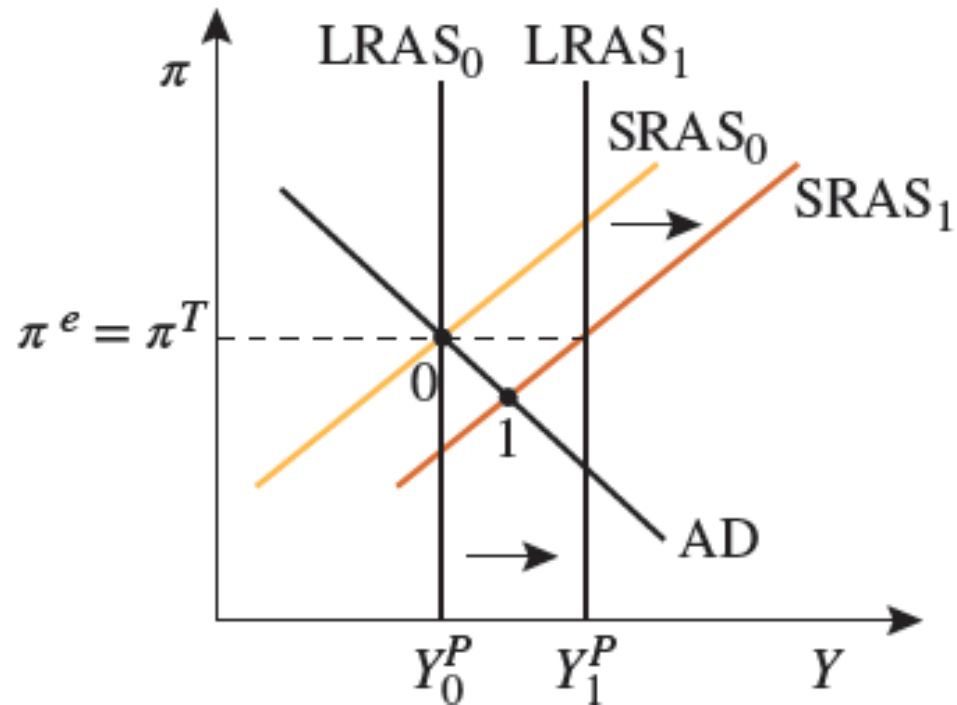
# What Happens When Potential Output Changes?

- An increase in  $Y^P$  shifts **SRAS** *right* and shifts **LRAS** *right*.
- But **SRAS** still *crosses* **LRAS** where  $\pi = \pi^e$ .
- **SRAS** shifts the *same distance* as **LRAS**.



# What Happens When Potential Output Changes?

- *In the short-run, **output and inflation** are determined by the intersection of SRAS and AD.*
- Since **AD** is **unchanged**, the *economy is at point 1* in the short-run.



# What Happens When Potential Output Changes?

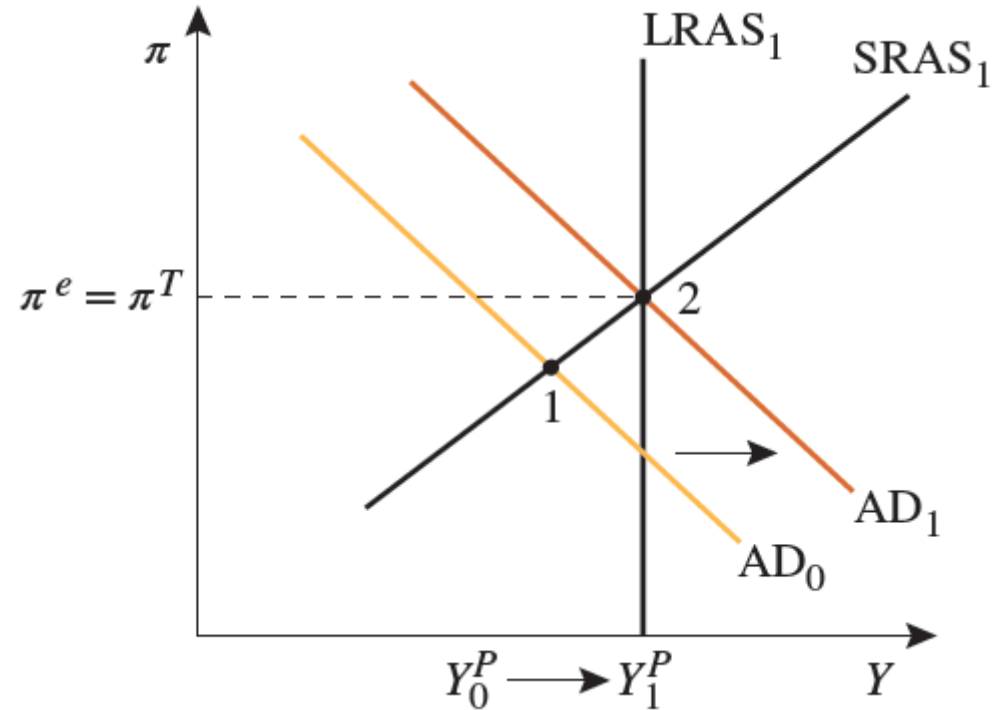
- In the **long run, output** must *go to the new level of potential output*,  $Y^P_1$ .
- *How it gets there* depends on *what monetary policymakers do*.
- *If policymakers* are happy with their ***inflation target***, they will ***work to move the economy*** to the point on the **LRAS curve consistent with** their **target**.

# What Happens When Potential Output Changes?

- But the **higher** level of **potential output** *comes along with a lower long-run real interest rate.*
  - **Returning inflation** to its *higher level* means shifting the **MPC** to the **right**.
  - This shifts **AD** to the **right**.
  - The policy adjustment will *drive **output** and **inflation** up* until they reach their new LR equilibrium level at the *original inflation target* and  $Y^P_1$ .

# What Happens When Potential Output Changes?

- With  $\pi^T$  unchanged, policymakers shift AD right.
- The economy *moves to the new level of potential output and the original  $\pi^T$  at point 2*.

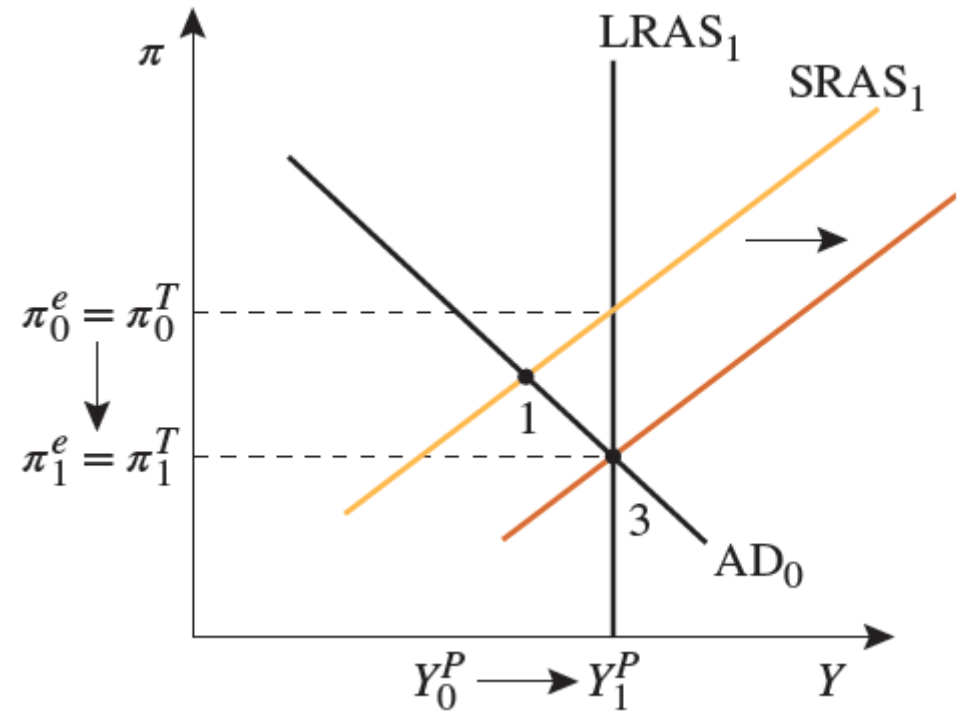


# What Happens When Potential Output Changes?

- If policymakers now do nothing, expected inflation *exceeds* current inflation
  - The SRAS curve to the *right*.
  - Inflation *falls* even *further*
- Long run in this case is at a *new* lower inflation target at the *new* potential output.

# What Happens When Potential Output Changes?

- With a **new, lower**  $\pi^T$ : policymakers *allow the economy to move to point 3*.
- They do this by *leaving the monetary policy reaction curve alone*.



# What Happens When Potential Output Changes?

- *In the 1990s the LRAS curve shifted to the right, and the Fed **took the opportunity** to reduce their implicit inflation target.*
- *At the time, this was referred to as **opportunistic disinflation**.*
  - Declines in inflation
- **Real-business cycle theory:** *prices and wages are flexible, so inflation adjusts rapidly, current output always equals potential output, and all **business-cycle fluctuations** arise from **changes in potential output***

# What Are the Implications of Globalization for Monetary Policy?\*

- Shifting the factors of production *from domestic to foreign factories* is the same as U.S. producers **finding a *new, cheaper technology*** to produce domestically.
  - Improvements in technology *increase potential output*
- Our conclusion is that ***globalization and trade do reduce inflation in the short run.***
  - And *just like* any **positive supply shock** they provide an **opportunity to reduce inflation permanently.**

# Can Policymakers Stabilize Output and Inflation Simultaneously?

# Can Policymakers Stabilize Output and Inflation Simultaneously?\*

- ***Short run*** fluctuations in output and inflation are ***caused by*** either ***demand shifts*** or ***supply shifts***.
- By ***shifting*** their monetary policy reaction curve, policymakers ***offset demand shocks***.
- ***Unfortunately, supply shocks*** are a ***different*** story.
  - There is ***no way*** to ***neutralize*** them.

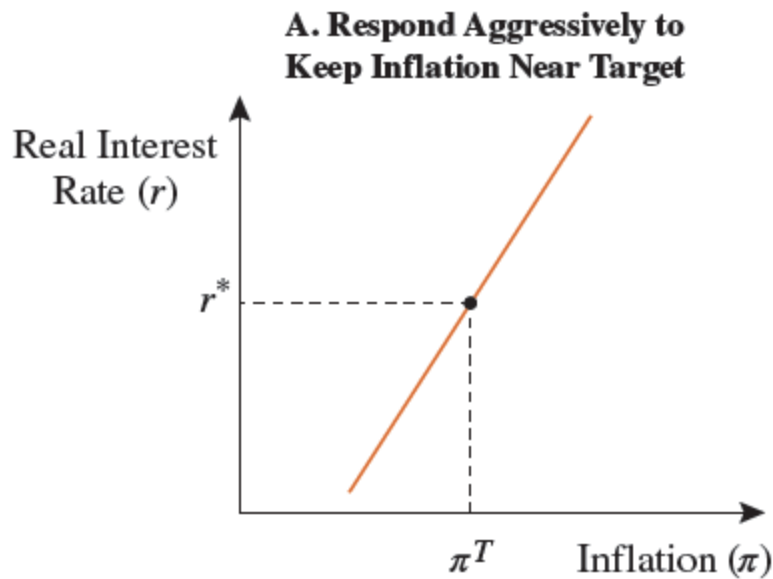
# Can Policymakers Stabilize Output and Inflation Simultaneously?\*

- Monetary policymakers can shift the **AD curve**, but cannot move the **SRAS curve**.
- Central bankers can *choose how aggressively they react to deviations of inflation from their target* caused by **supply shocks**.
  - *Picking the slope of their MPRC, which determines the slope of the AD curve.*

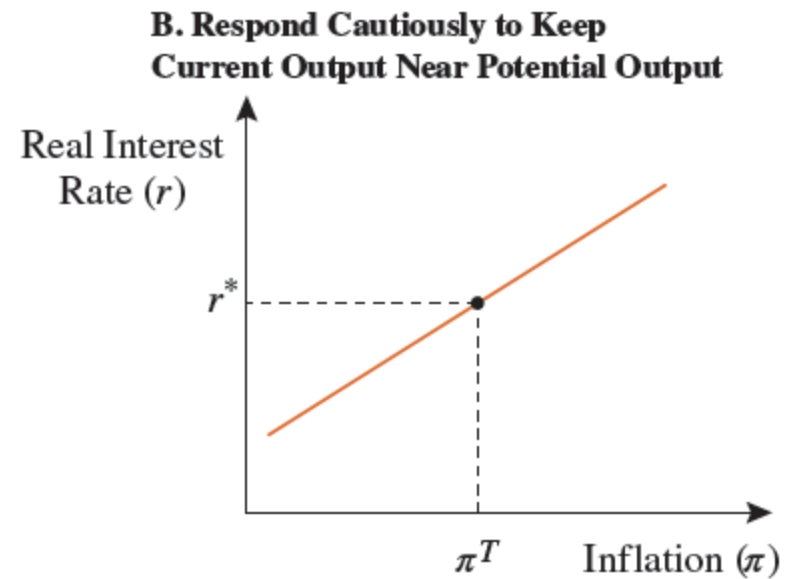
# Can Policymakers Stabilize Output and Inflation Simultaneously?\*

Figure 22.12

The Slope of the Monetary Policy Reaction Curve



Central bankers who are intent on keeping inflation close to the target will move interest rates aggressively when inflation rises.



Central bankers more concerned about keeping output close to potential will move interest rates by less in reaction to an inflation increase.

# Can Policymakers Stabilize Output and Inflation Simultaneously?\*

- The *more aggressively* policymakers are **keeping** current inflation *close to target*, the *steeper* their monetary policy reaction curve,
  - The *flatter* the AD curve.
  - By **controlling the slope of AD**, policymakers *choose the extent* to which **supply shocks translate into changes in output or changes in inflation**.
- The *more* central bankers **stabilize inflation**, the **more volatile output** will be, and vice versa.
  - There is a **tradeoff**.

# Can Policymakers Stabilize Output and Inflation Simultaneously?\*

- A ***relatively*** flat AD curve implied by the ***steep*** monetary policy reaction curve means:
  - A negative supply shock prompts a ***large decline*** in current output and a ***small increase*** in current inflation.
- By reacting aggressively, policymakers *ensure* that inflation (and inflation expectations) *remain* close to their target.
- Stable inflation *means* volatile output.

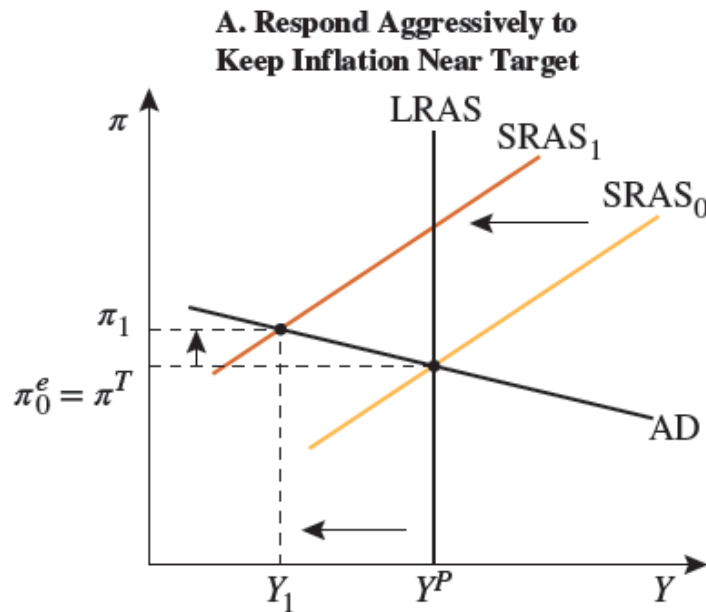
# Can Policymakers Stabilize Output and Inflation Simultaneously?\*

- When policymakers **worry about *more short-run fluctuations in output* than about *temporary movements in inflation***, they will choose a relatively ***flat*** monetary policy reaction curve.
  - The result is a **steep AD curve**.
- **Inflation *rises* and output *falls***
  - The **output gap** is ***small*** while the **deviation of inflation from expected inflation** is ***large***
- **Expected inflation *rises significantly* and *slowly* adjusts back to target.**
- **Stable output *means* volatile inflation.**

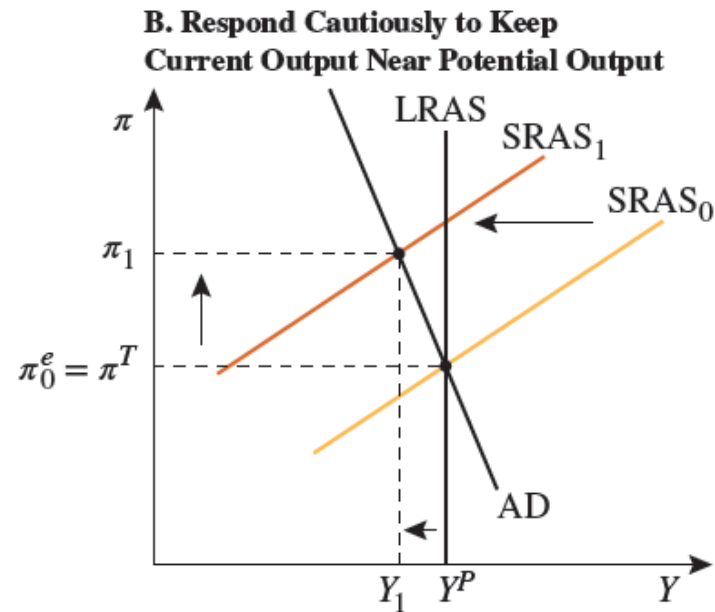
# Can Policymakers Stabilize Output and Inflation Simultaneously?\*

Figure 22.13

The Policymaker's Choice



Central bankers intent on keeping inflation close to the target will move interest rates aggressively when inflation rises and create bigger fluctuations in output.



Policymakers more concerned about keeping output close to potential will move interest rates by less in reaction to an inflation change, resulting in bigger fluctuations in inflation.

End of lecture