



Lecture 9

Aggregate Demand and Aggregate Supply

2

Recap

- ▶ In the Keynesian model used in previous lectures
 - ▶ Assume that firms are willing to meet demand for their products at preset prices
 - No raising of prices!
 - ▶ Policymakers can eliminate output gaps by taking actions (e.g. G or T , MS) that affect the level of autonomous expenditure
 - ▶ However, prices do not remain fixed indefinitely
 - ▶ Basic Keynesian model is useful in understanding the role of spending (G , C , or I) in the determination of short-run output, but it does not explain the behaviour of **inflation** and the policies used to control it

3

Lecture Outline

- ▶ Aggregate demand
 - ▶ Relationship between short-run equilibrium output Y and the rate of inflation π
- ▶ Aggregate supply
 - ▶ Short-run and long-run aggregate supply
 - ▶ Link between inflation and output gap
- ▶ AD-AS Diagram
- ▶ AD-AS analysis: how economy is affected by
 - ▶ Aggregate spending shocks
 - ▶ Inflation shocks
 - ▶ Shocks to potential output
 - ▶ Anti-inflationary monetary policy

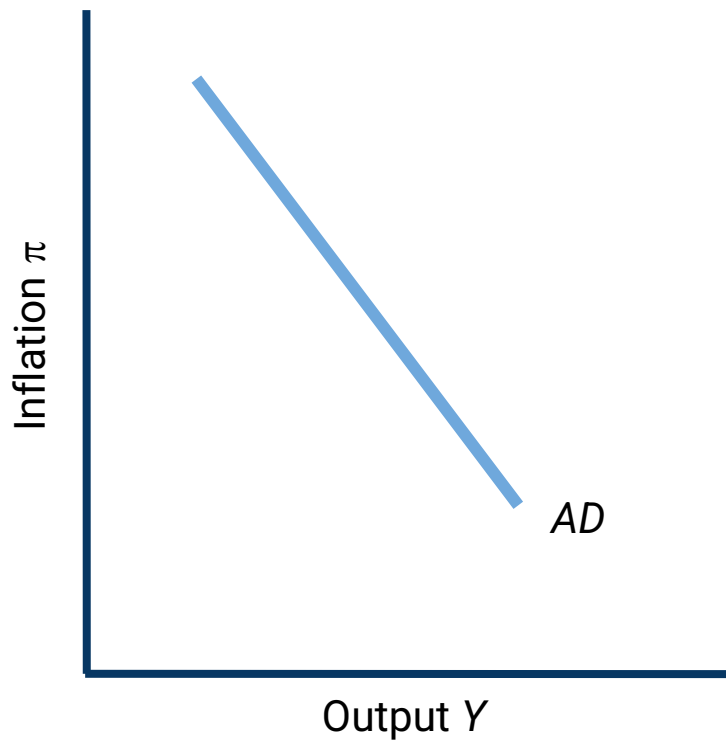
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Aggregate Demand

5

Aggregate Demand Curve

- ▶ Shows the relationship between SR equilibrium output Y and rate of inflation π
- ▶ As $Y = PAE$, AD curve also shows the relationship between planned spending and inflation

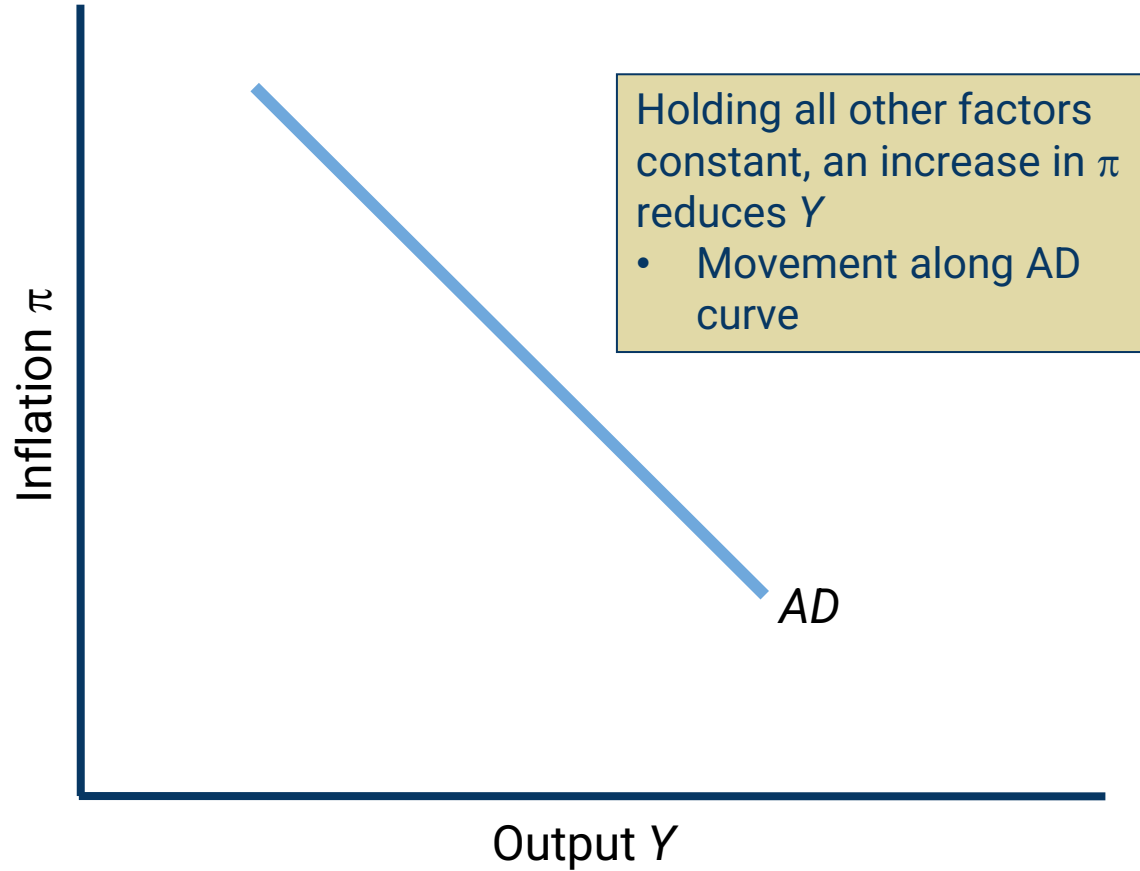


6

Aggregate Demand Curve

- ▶ AD curve is downward slopping
 - ▶ Y and π are inversely related
 - ▶ One important reason: response of central bank to increase in inflation
 - ▶ Recall: policy reaction function
 - $r = 0.01 + 0.5 \left(\frac{Y - Y^*}{Y^*} \right) + 0.5\pi$
 - $r = \bar{r} + g\pi$
 - ▶ Central bank raises real interest rate when inflation raises
 - ▶ $\pi \uparrow \rightarrow r \uparrow \rightarrow \text{autonomous expenditure} \downarrow \rightarrow Y \downarrow$

Aggregate Demand Curve



8

Other Reasons for the Downward Slope of AD Curve

1. Inflation → reduces real value of money held by the public, reducing wealth and spending
2. Inflation → redistributes resources from less affluent people, who spend a high percentage of their disposable income, to more affluent people, who spend a smaller percentage of their disposable income
3. Inflation → uncertainty about future prices, so households and business may be more cautious in spending
4. Inflation → prices of exported goods rises, lowering exports

Algebra of Aggregate Demand

- ▶ $PAE = C + I + G + NX$

$$= \bar{C} + c(Y - T) - ar + \bar{I} - br + \bar{G} + \bar{NX}$$

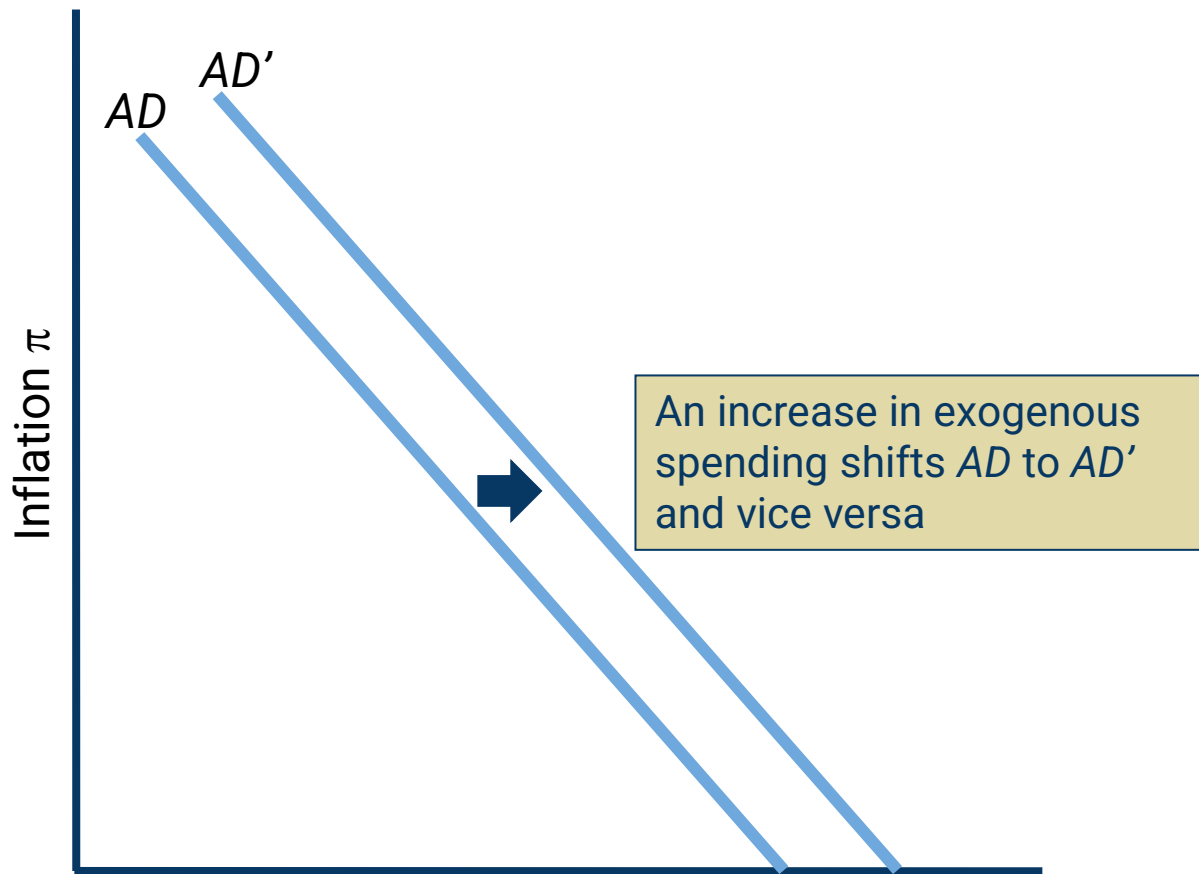
$$= \bar{C} - cT + \bar{I} + \bar{G} + \bar{NX} + cY - (a + b)r$$
- ▶ Solving for short-run equilibrium, $Y = PAE$:
- ▶ $Y = \left(\frac{1}{1-c}\right) [\bar{C} - cT + \bar{I} + \bar{G} + \bar{NX} - (a + b)r]$
- ▶ To incorporate π , substitute in $r = \bar{r} + g\pi$
- ▶ $Y = \left(\frac{1}{1-c}\right) [\bar{C} - cT + \bar{I} + \bar{G} + \bar{NX} - (a + b)(\bar{r} + g\pi)]$

$$= \underbrace{\left(\frac{1}{1-c}\right) [\bar{C} - cT + \bar{I} + \bar{G} + \bar{NX} - (a + b)\bar{r}]}_{\text{intercept}} - \underbrace{\left(\frac{a+b}{1-c}\right)g}_{\text{slope}}\pi$$

Factors that Shift the AD Curve to the Right

- ▶ For a given level of inflation, if there is a change in the economy that increases SR equilibrium output, AD curve shifts to the right
- 1. Exogenous **increase** in spending
 - ▶ Increase in spending unrelated to output (Y) or real interest rate (r)
 - ▶ E.g. fiscal policy, consumer confidence, technology advancement, foreign demand

An increase in Exogenous Spending

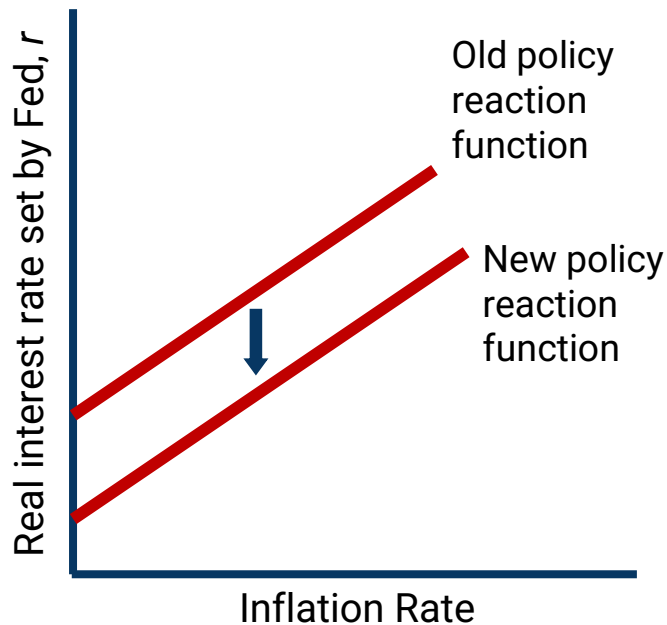


Factors that Shift the AD Curve to the Right

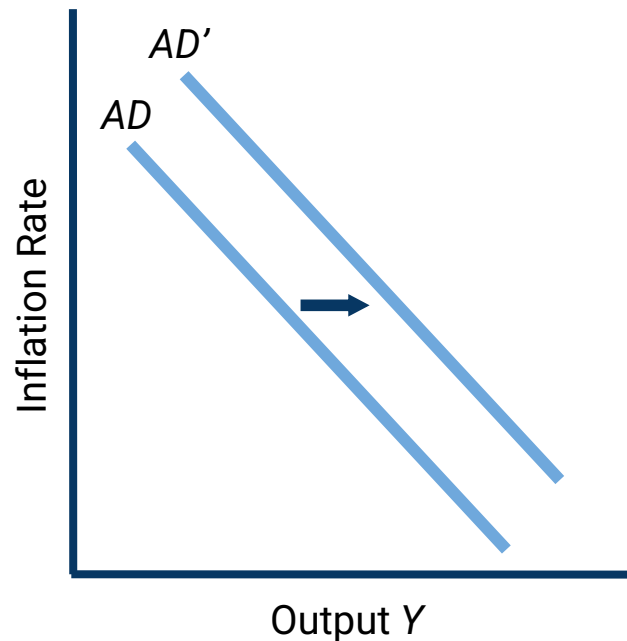
- ▶ For a given level of inflation, if there is a change in the economy that increases SR equilibrium output, AD curve shifts to the right
- 1. Exogenous **increase** in spending
 - ▶ Increase in spending unrelated to output (Y) or real interest rate (r)
 - ▶ E.g. fiscal policy, consumer confidence, technology advancement, foreign demand
- 2. **Downward shift** of the Fed's reaction function
 - ▶ Lower real interest rates for all levels of inflation rate
 - ▶ If there is no change in the Fed's reaction function, changes in inflation correspond to movements along the AD curve

13

Downward Shift in the Fed's Policy Reaction Function

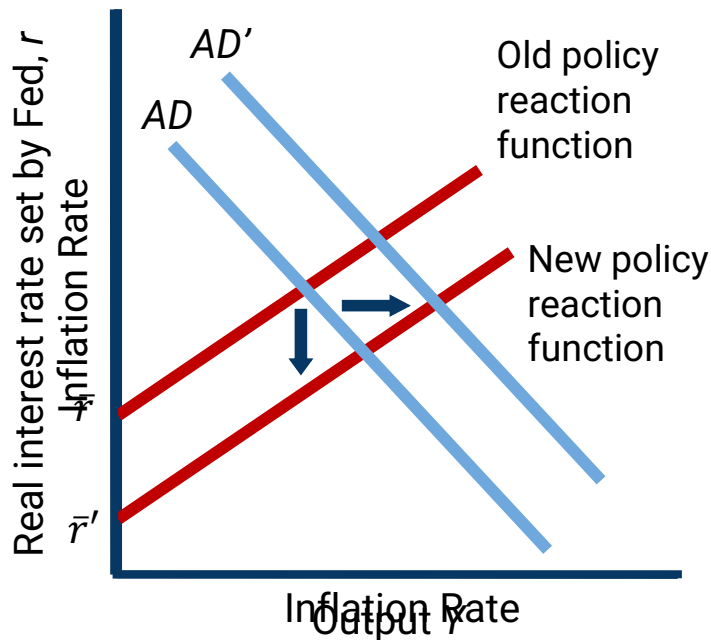


Fed "loosens" monetary policy – shifting reaction curve



The new Fed policy decreases r and AD shifts to AD'

Downward Shift in the Fed's Policy Reaction Function



The Fed lowers its policy rate by shifting the reaction function

- ▶ Algebraically:
- ▶ $r = \bar{r} + g\pi$
- ▶ A downward shift of policy reaction function: $\bar{r} \rightarrow \bar{r}'$, $\bar{r}' < \bar{r}$
 - ▶ For all value of π , Fed will set a lower r
 - ▶ Lower r boosts C and I
- ▶ Aggregate demand curve shifts to the right
- ▶
$$Y = \left(\frac{1}{1-c}\right) [\bar{C} - cT + \bar{I} + \bar{G} + \bar{NX} - (a+b)\bar{r}'] - \left(\frac{a+b}{1-c}\right)g\pi$$

Factors that Shift the AD Curve to the Left

- ▶ For a given level of inflation, if there is a change in the economy that **decreases** SR equilibrium output, AD curve shifts to the **left**
- 1. Exogenous **decrease** in spending
 - ▶ Decrease in spending unrelated to output (Y) or real interest rate (r)
- 2. **Upward shift** of the Fed's reaction function
 - ▶ Higher real interest rates for all levels of inflation rate



Aggregate Supply

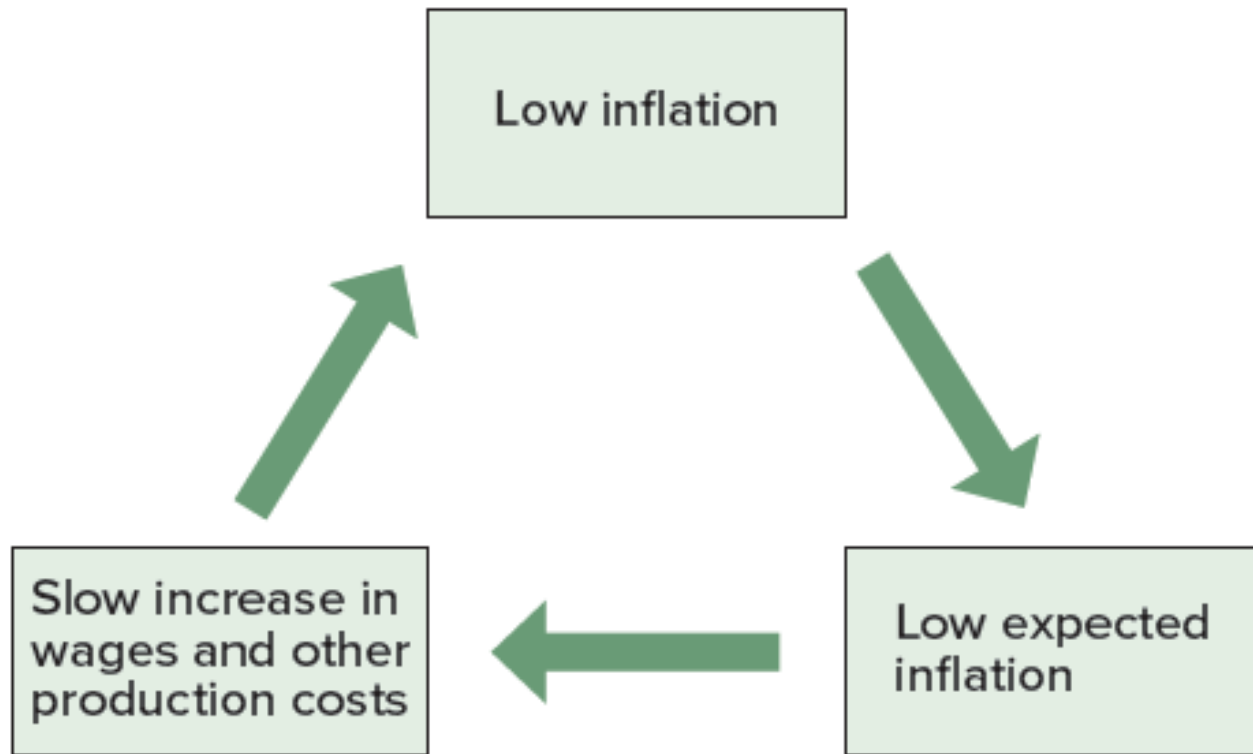
Inflation Inertia

- ▶ Inflation will remain roughly constant, or have *inertia*, if operating at Y^* and there are no external shocks to the price level
 - ▶ In low-inflation industrial economies, inflation tends to change slowly from year to year
 - ▶ Inflation inertia occurs for two reasons:
 - Inflation expectations
 - Long-term wage and price contracts

Inflation Expectations

- ▶ Negotiation of future wages and prices take into account expected rate of inflation
- ▶ The higher the expected rate of inflation, the more nominal wages and costs of other inputs will tend to rise, leading to higher actual inflation
- ▶ People's expectations of inflation are largely influenced by their recent experience

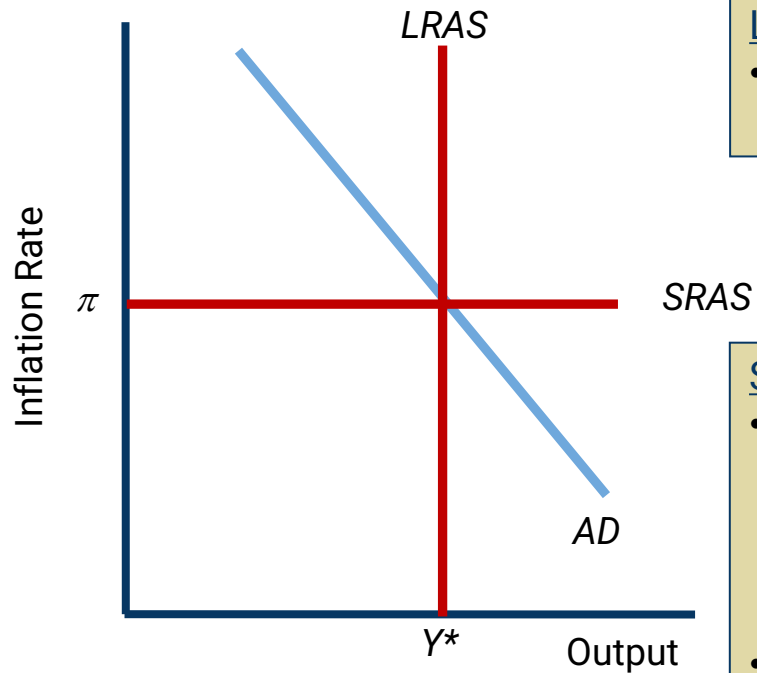
A Virtuous Circle of Low Inflation and Low Expected Inflation



Long-Term Wage and Price Contracts

- ▶ Union wage contracts set wages for several years
- ▶ Contracts setting the price of raw materials and parts for manufacturing firms also cover several years
- ▶ Effects of expectations are reinforced by the existence of long-term wage and price contracts

Short-run and Long-run Aggregate Supply



Long-run aggregate supply (LRAS)

- A vertical line showing the economy's potential output Y^*

Short-run Aggregate Supply (SRAS)

- A horizontal line showing the current rate of inflation, π , as determined by past expectations and pricing decisions
- In the SR, producers supply whatever output is demanded at preset prices

22

AD-AS Diagram

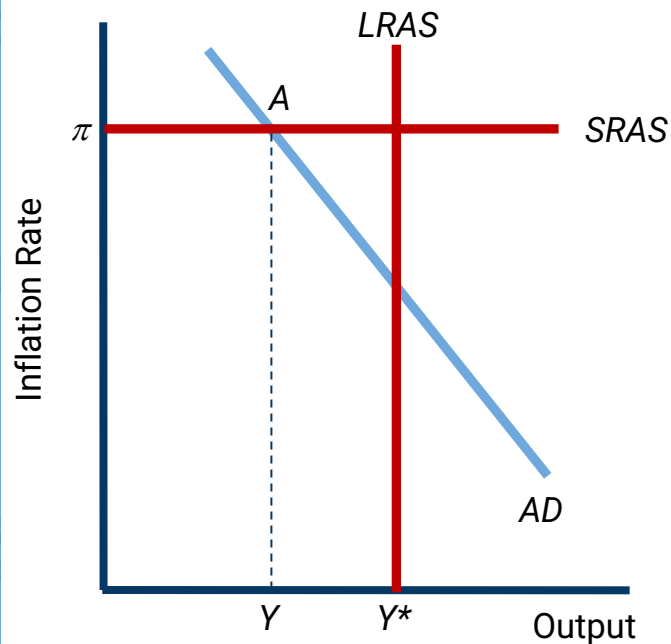
► Short-run equilibrium

- **Inflation** = value determined by past expectations and pricing decisions
- **Output** = level of SR equilibrium output that is consistent with that inflation rate
- Graphically, SR equilibrium occurs at the intersection of AD curve and SRAS line

► Long-run equilibrium

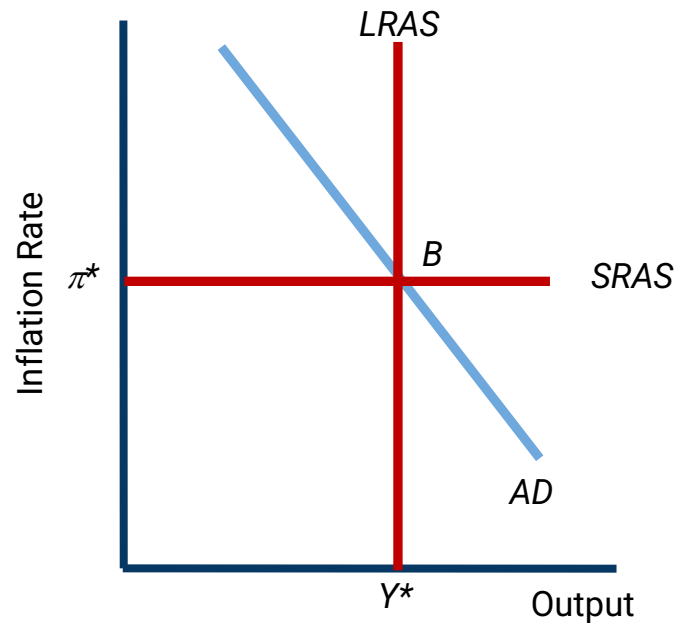
- Actual output = potential output
- The inflation rate is stable
- Graphically, LR equilibrium occurs when AD curve, SRAS line, and LRAS line all intersect at a single point

Short-run and Long-run equilibrium



Short-run Equilibrium, A

- Intersection point of AD and SRAS (π)



Long-run Equilibrium, B

- AD, SRAS (π^*), LRAS (Y^*) intersect at the same point

Sources of Inflation

- ▶ Although rate of inflation tends to be inertial, it does change over time
- ▶ Three factors that cause inflation rate to change:
 1. Output gap
 2. Inflation shock
 3. Shock to potential output

The Output Gap and Inflation

Relationship of output
to potential output

Behaviour of inflation

1. No output gap
 $Y = Y^*$



Inflation remains unchanged

2. Expansionary gap
 $Y > Y^*$



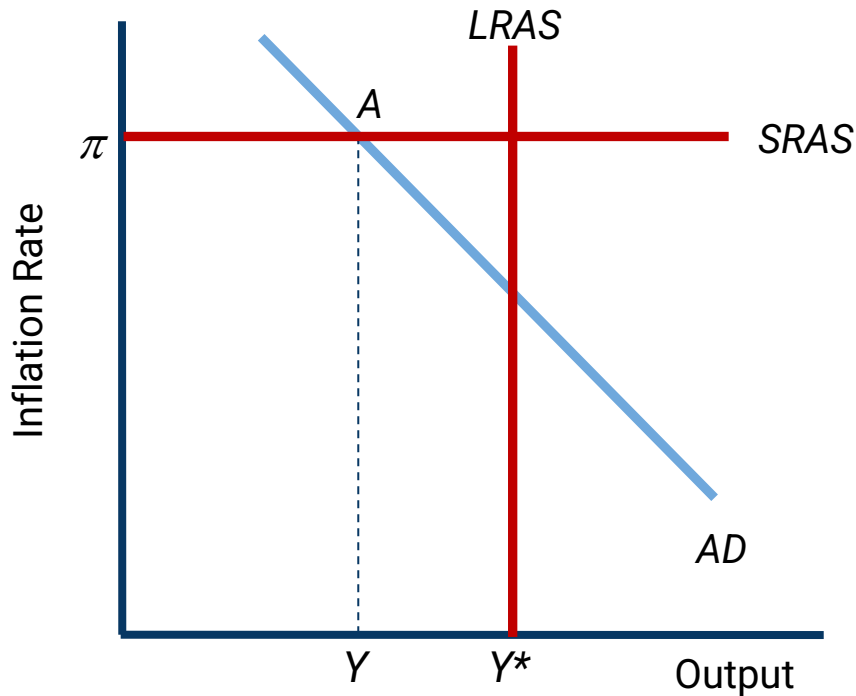
Inflation rises
 $\pi \uparrow$

3. Recessionary gap
 $Y < Y^*$



Inflation falls
 $\pi \downarrow$

Adjustment Process to a Recessional Gap

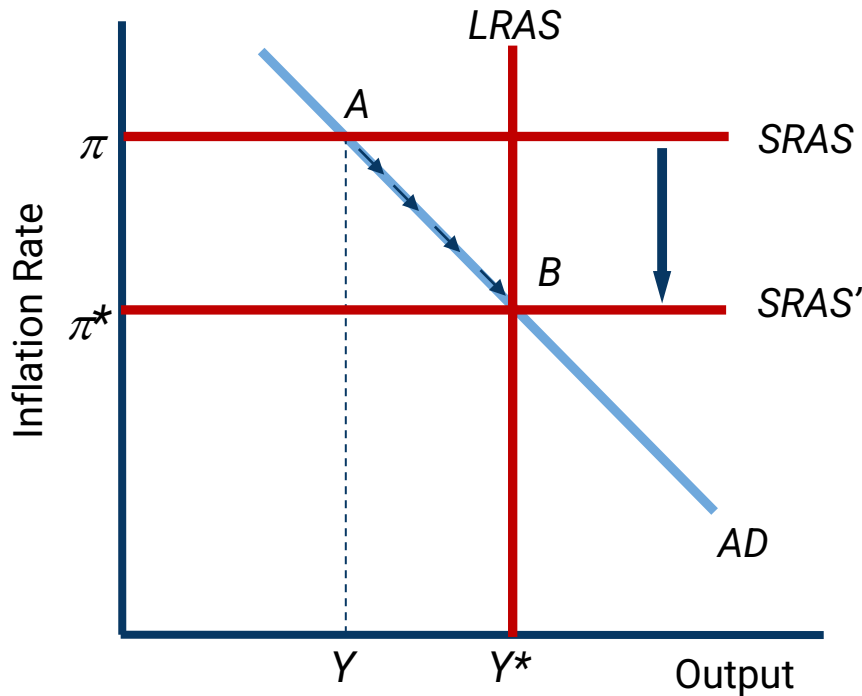


- Short-run equilibrium at A
- Inflation π equals value determined by past expectations and past pricing decisions
- Output Y equals level of SR equilibrium consistent with inflation rate π
- $Y < Y^* \rightarrow$ recessionary gap

Adjustment Process to a Recessionary Gap

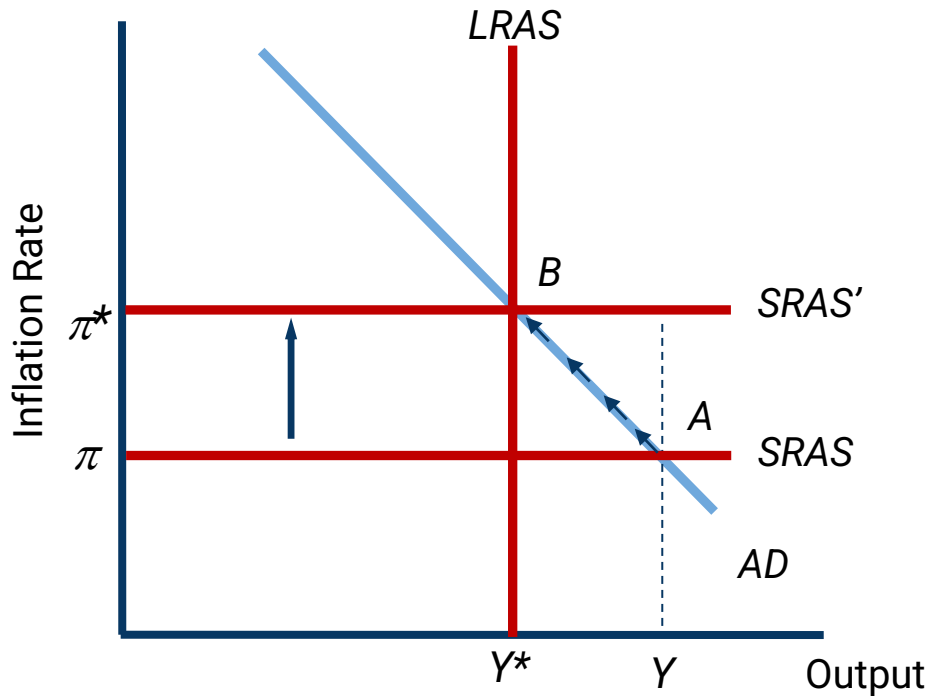
- ▶ Firms are selling an amount less than their capacity to produce → slow down the rate at which they increase their prices
- ▶ π falls, the Fed lowers r and Y increases
- ▶ Falling π also reduces uncertainty which increases Y
- ▶ As Y increases, cyclical unemployment falls (Okun's law)
- ▶ Adjustment continues until long-run equilibrium is reached

Adjustment Process to a Recessional Gap (Graphically)



- Recessionary gap $\rightarrow \pi$ gradually falls, SRAS line moves downward
- SR equilibrium output gradually increases as SR equilibrium point moves down AD curve
- LR equilibrium at Y^*, π^*

Adjustment Process to an Expansionary Gap



- SR equilibrium output at Y
- $Y > Y^* \rightarrow$ expansionary gap
- π gradually increases, SRAS line moves upward
- SR equilibrium output gradually decreases as SR equilibrium point moves up AD curve
- LR equilibrium at Y^*, π^*

The Self-Correcting Economy

- ▶ In the long-run the economy tends to be self-correcting
- ▶ The Keynesian model does not include a self-correcting mechanism
- ▶ The Keynesian model concentrates on the **short-run** with no price adjustment
- ▶ The self-correcting mechanism concentrates on the long-run with price adjustments
- ▶ Are monetary and fiscal policies still needed to stabilize output?

The Self-Correcting Economy

- ▶ A slow self-correcting mechanism
 - ▶ Fiscal and monetary policy can help stabilize the economy
- ▶ A fast self-correcting mechanism
 - ▶ Fiscal and monetary policy are not effective and may destabilize the economy
- ▶ The speed of correction will depend on:
 - ▶ The use of long-term contracts
 - ▶ The efficiency and flexibility of labor markets
- ▶ Fiscal and monetary policy are most useful when attempting to eliminate large output gaps

33

AD-AS Analysis

Sources of Inflation

- ▶ Three factors that can influence inflation rate

1. Output gap
 - Excessive aggregate spending

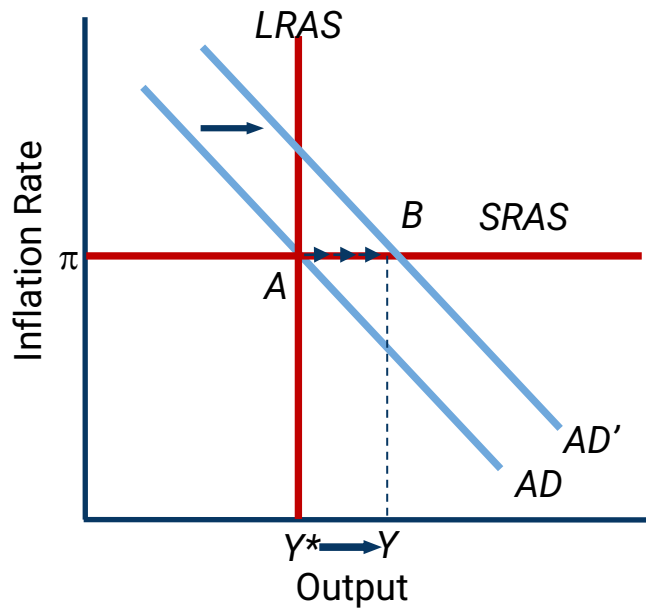
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2. Inflation shock
 3. Shock to potential output

Aggregate supply shock

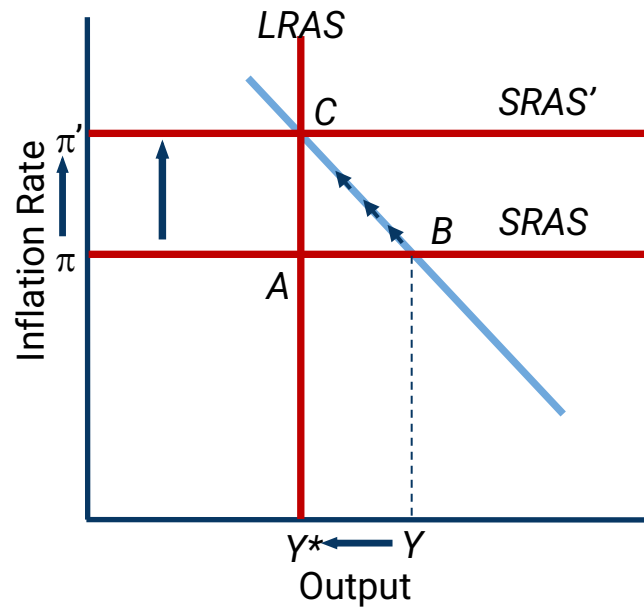
- ▶ (2) or/and (3)
- ▶ Adverse aggregate supply shocks of both types reduce output and increase inflation

35

Expansionary Gap caused by Excessive Aggregate Spending



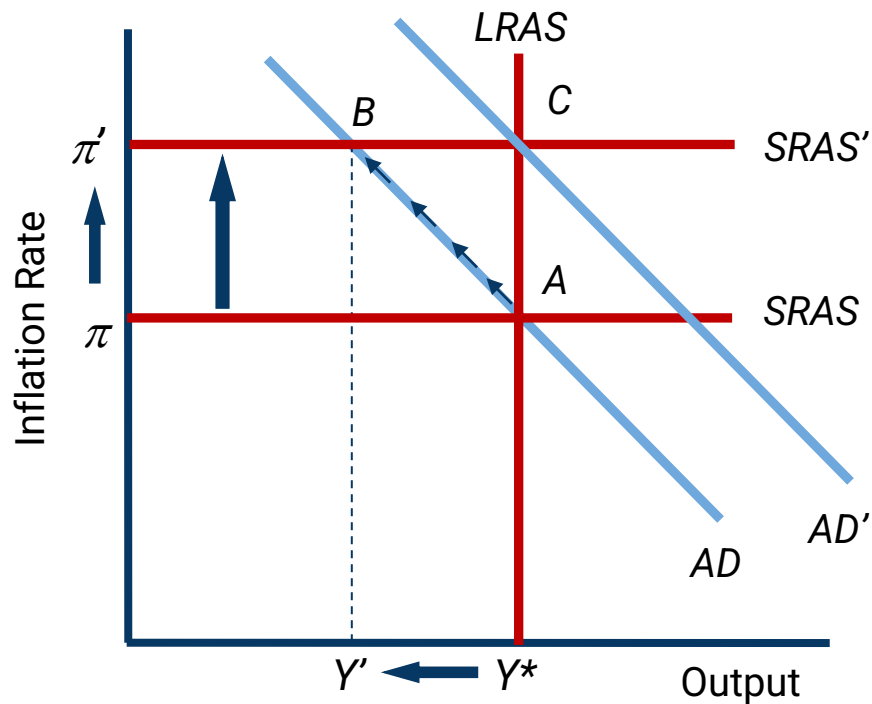
- Military spending increase
- AD increase
- Expansionary gap



- π increases
- SRAS shifts to SRAS'
- LR equilibrium Y^* and π^*

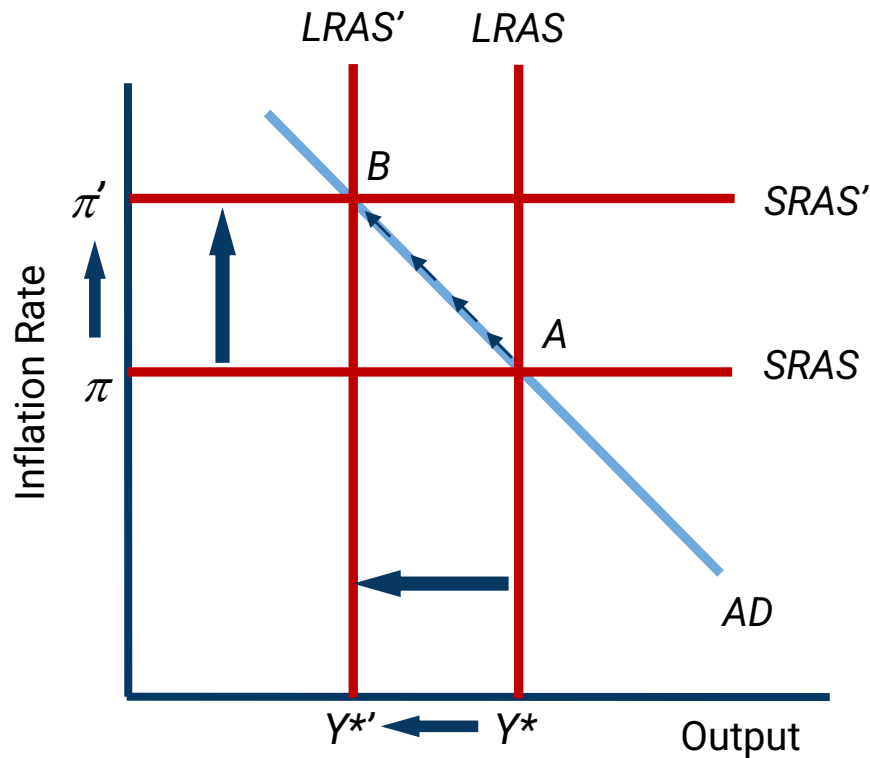
- ▶ Inflation shock
 - ▶ A sudden change in the normal behaviour of inflation, unrelated to the nation's output gap
- ▶ Examples
 - ▶ OPEC embargo of 1973
 - ▶ Drop in oil prices in 1986

Adverse Inflation Shock



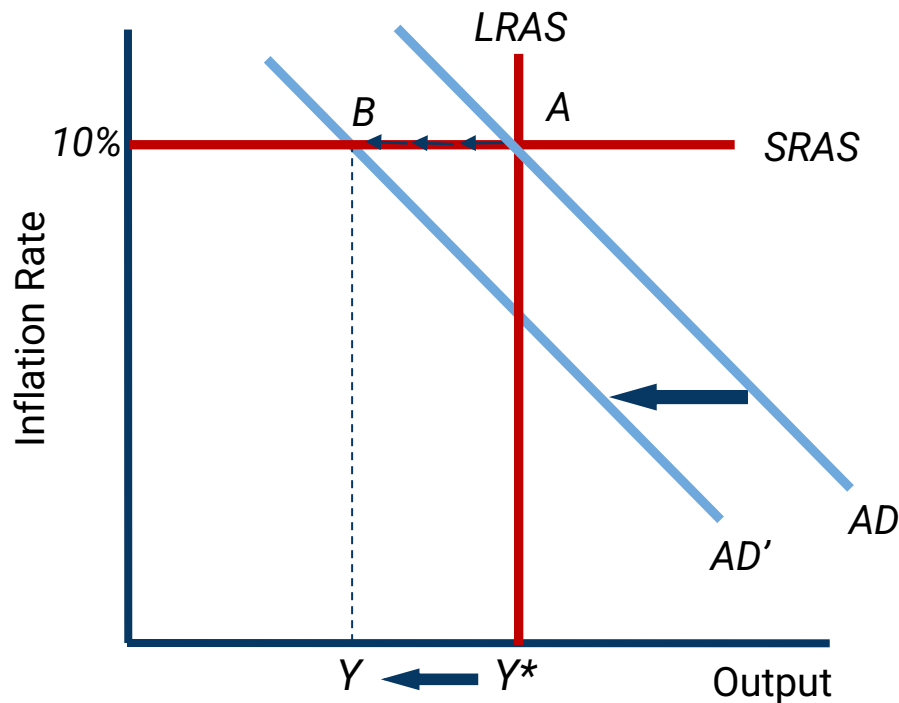
- Initial LR equilibrium at A, $Y^* = Y$
- Inflation shock, π increases to π' ($SRAS'$)
- SR equilibrium at B, $Y' < Y^*$; recessionary gap and higher inflation (stagflation)
- No policy intervention $\rightarrow \pi$ falls; LR equilibrium at A
- With policy intervention $\rightarrow AD$ shifts to AD' ; $Y = Y^*$; π rises to π'

Shock To Potential Output



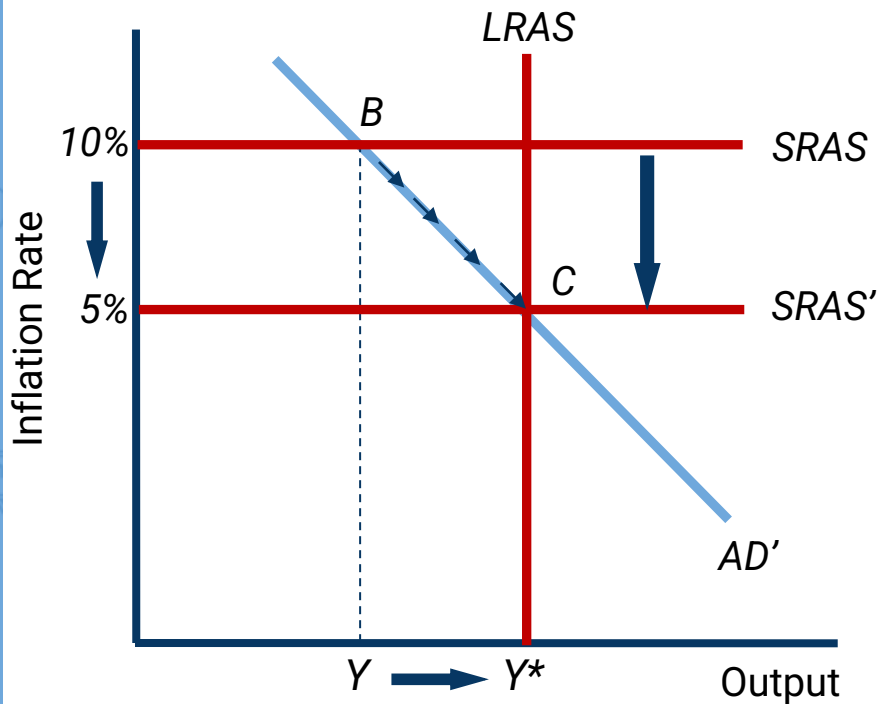
- Initial LR equilibrium at A, $Y = Y^*$
- Adverse shock to potential output, Y^* falls to $Y^{*'}$
- $Y = Y^* > Y^{*'} \rightarrow$ expansionary gap
- π increases, $SRAS$ rises to $SRAS'$
- New LR equilibrium at B
 - $Y = Y^{*'}$
 - π increased to π'
 - Decline in output is permanent

SR Effects of Anti-inflationary Monetary Policy



- Initial LR equilibrium at A, $Y^* = Y$
- $\pi = 10\%$
- Fed tightens monetary policy, AD shifts to AD'
- New SR equilibrium at B
- $Y < Y^*$ -- recessionary gap

LR Effects of Anti-inflationary Monetary Policy



- SR equilibrium at B; recessionary gap
- π falls to 5%; SRAS falls to SRAS'
- Y rises to Y^*
- New LR equilibrium at C; lower inflation rate; Y at Y^*

THANKS!

Any questions?

You can find me at

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