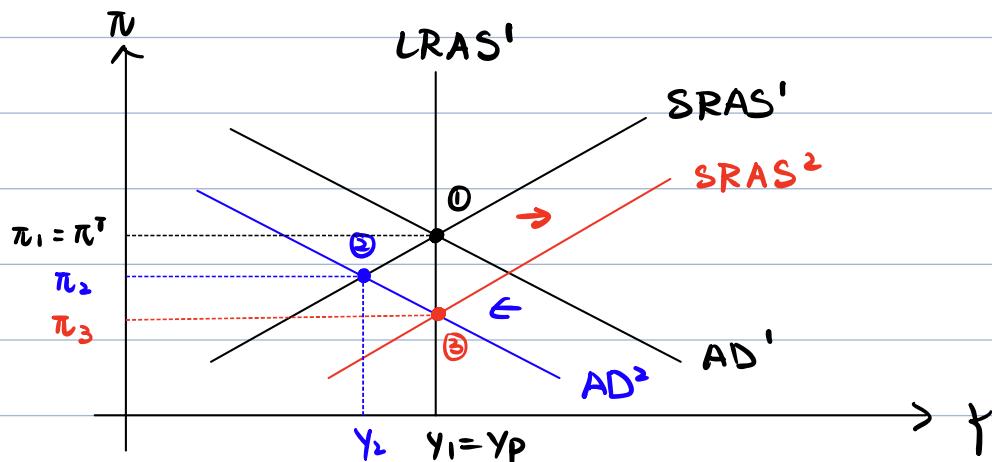


# WIO = AD and AS Policy Analysis

## 1.1 Negative AD Shock (no policy Response)



Negative AD Shock  $\Rightarrow$  AD Curve shift left / down

$$\text{New Equilibrium} \left\{ \begin{array}{l} (1) \quad Y_2 < Y_p \quad Y \downarrow \\ (2) \quad \pi_2 < \pi_T, \quad \pi \downarrow \end{array} \right.$$

$y_2 < y_p$  = negative Output gap  $\Rightarrow$  Slack Labor market

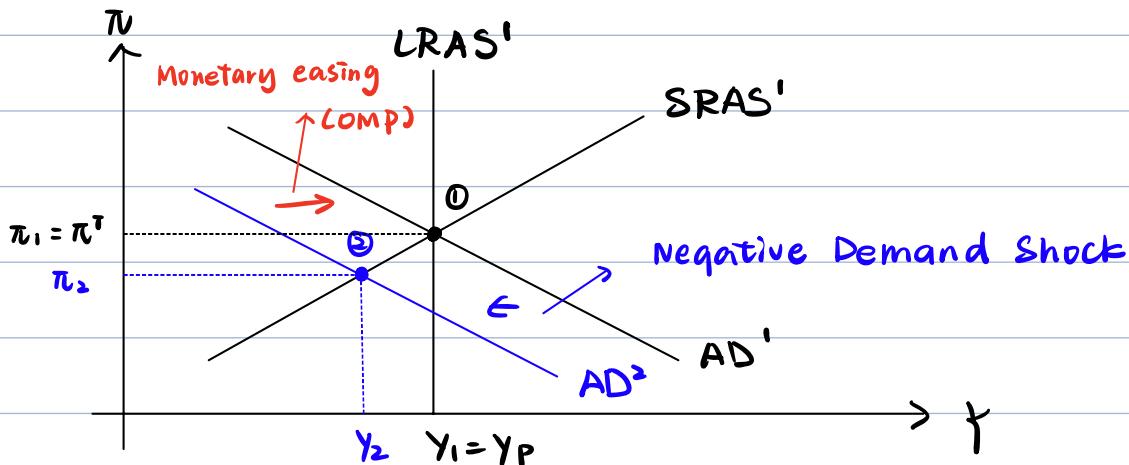
$\Rightarrow w \downarrow \Rightarrow$  cost of production  $\downarrow \Rightarrow p \downarrow \Rightarrow \pi \downarrow \Rightarrow \pi^e \downarrow$



SRAS will shift right

$$\text{New Long-Run Equilibrium} = \left\{ \begin{array}{l} (1) \quad Y = Y_p \\ (2) \quad \pi = \pi_3 \quad (\pi_3 < \pi_2 < \pi^e) \end{array} \right.$$

## 1.2 Negative AD Shock (with policy intervention)



At ① = The negative Demand Shock Shifts AD Left

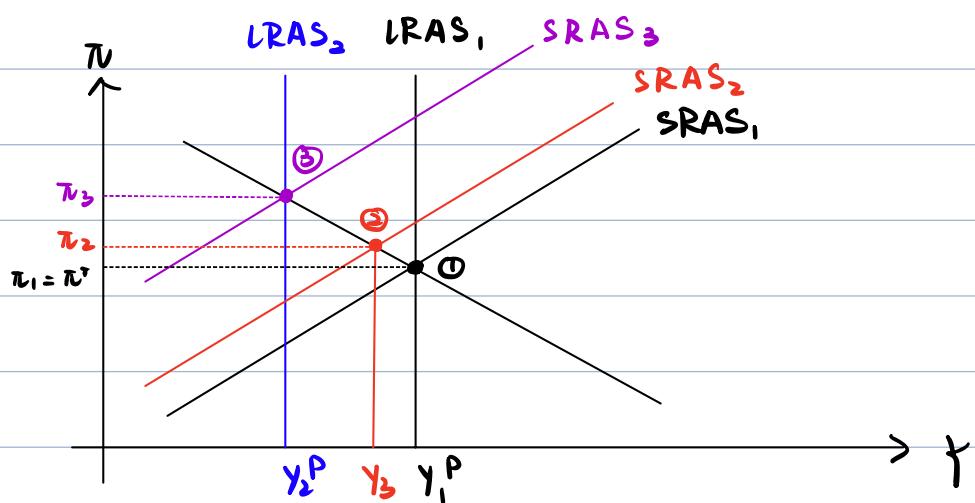
At ② =  $y_2 < y_p \Rightarrow$  gov will take Monetary easing  
OMP



Shift AD right back to ①

## 2. Long Run Supply Shock

2.1 Negative Permanent Shock (NO policy Response)  
(E.g. Wars / natural disaster)



Negative permanent shock =  $\downarrow y_p$

At Equilibrium 1 =

$$\downarrow y_p \Rightarrow \text{SRAS: } \underline{\pi} = \pi^e + r(\underline{y} - y_p) + p \Rightarrow \pi \uparrow \Rightarrow \pi^e \uparrow$$

Result = SRAS shift left

At Equilibrium 2 =

$y_3 > y_2^P \Rightarrow$  positive output gap  $\Rightarrow$  tight labor market  
 $\downarrow \Rightarrow w \uparrow \Rightarrow$  cost of production  $\uparrow \Rightarrow p \uparrow \Rightarrow \pi \uparrow \Rightarrow \pi^e \uparrow$

Result: SRAS shift to the left

At Equilibrium 3:

$$\pi = \pi_3, \quad y_2 = y_2^P$$

Result = Permanent negative shock Leads to

↓ (1) High inflation ( $\pi$ ) ↑

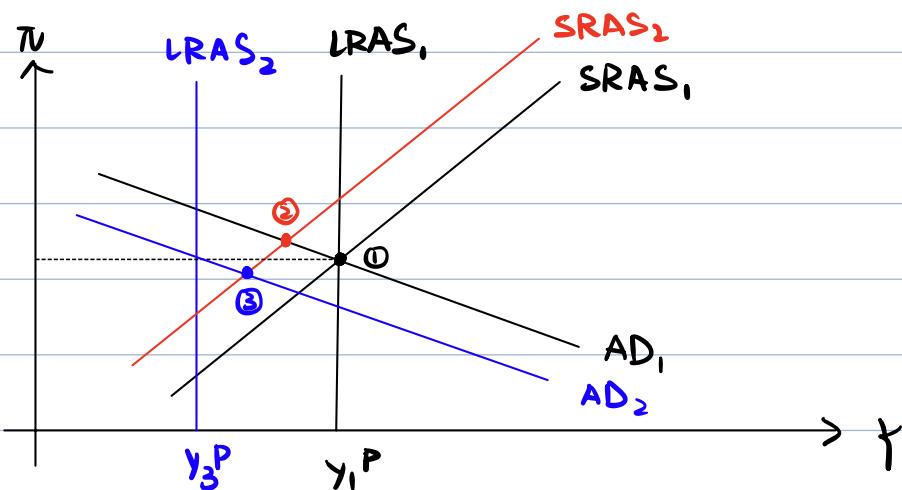
↓ (2) Low GDP ( $y$ ) ↓

By Neo-classical explanation of business cycle =

"The real business cycle Theory" suggest that

shocks to individuals' preferences and technology shift LRAS → this generates short-run fluctuations

## 2.2 Negative Permanent Shock (Policy Response)



(1) Negative permanent shock  $\Rightarrow$  Shift LRAS left

↓

result { (1)  $\pi \uparrow$   
(2)  $y_3^P < y_1^P$  (negative output gap)

↓

(2) Gov responds to negative output gap by

"Monetary tightening" (contractionary MP) via OMS

$\Rightarrow$  Shift AD left / down

↓

New Long-run Equilibrium at  $\Theta =$

{ (1)  $y = y_3^P$  ( $y_3^P < y_1^P$ )  $\Rightarrow$  low output

| (2)  $\pi = \pi_3$  ( $\pi_3 < \pi^T$ )  $\Rightarrow$  low inflation

# Problem with Negative Supply Shock with policy response =

It does not increase production capacity  
(low output)

# Solution to long-run Supply Shock:

enhance production capacity

{ (1) invest capital stock

| (2) ↑ labor supply

↳ which can shift potential output to the right

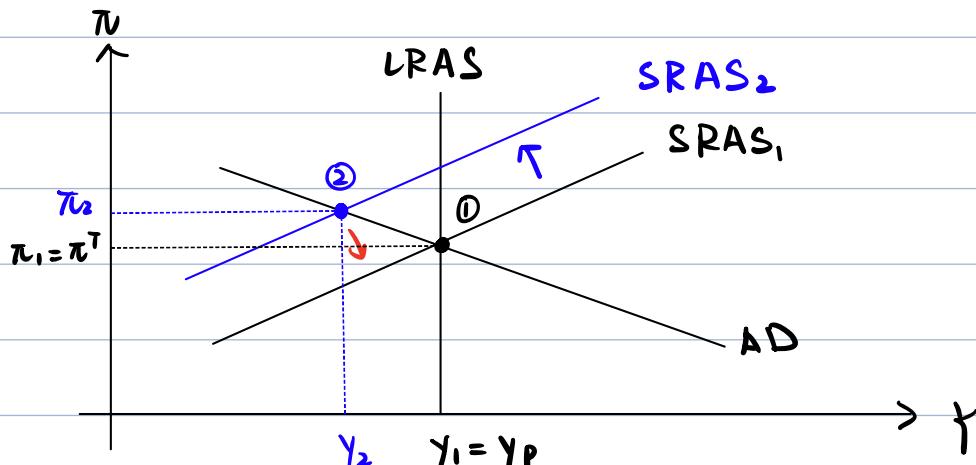
3. Short Run Supply Curve (Price or Supply Shock)

Eg: (1) ↑ Price of imported goods (oil or other raw materials)

(2) ↑ wage due to change in labor union

or change in legislation

3.1 Short Run Supply Shock (No policy Response)



(1) Negative Supply Shock :  $P_{\text{imported}} \uparrow$



By SRAS :  $\pi_v = \pi_v^e + \gamma (y - y_p) + P$

$\uparrow$                                $\uparrow$



$P_{\text{imported}} \uparrow$  shifts SRAS to the left / up



Result  $\left\{ \begin{array}{l} \pi_v = \pi_v^2 \quad (\pi_v^2 > \pi_v^1) \\ y_2 < y_p \Rightarrow \text{negative output gap} \end{array} \right.$

(2)  $y_2 < y_p$  : negative output gap



the labor market is slack  $\Rightarrow w \downarrow \Rightarrow p \downarrow \Rightarrow \pi \downarrow \Rightarrow \pi_v^e \downarrow$



SRAS will shift down



Result :  $\left\{ \begin{array}{l} y_1 = y_p \\ \pi_1 = \pi_v^p \end{array} \right.$

## # Problem of the Short run Supply Shock

- At (2) :  $\left\{ \begin{array}{l} (1) \pi_v^2 > \pi_v^1 \Rightarrow \text{High inflation} \\ (2) y_2 < y_p \Rightarrow \text{Low GDP} \\ (3) u > u_n \Rightarrow \text{High unemployment} \end{array} \right.$



"Okun's Law" :  $(u - u_n) = -\frac{1}{2} (y - y_p)$

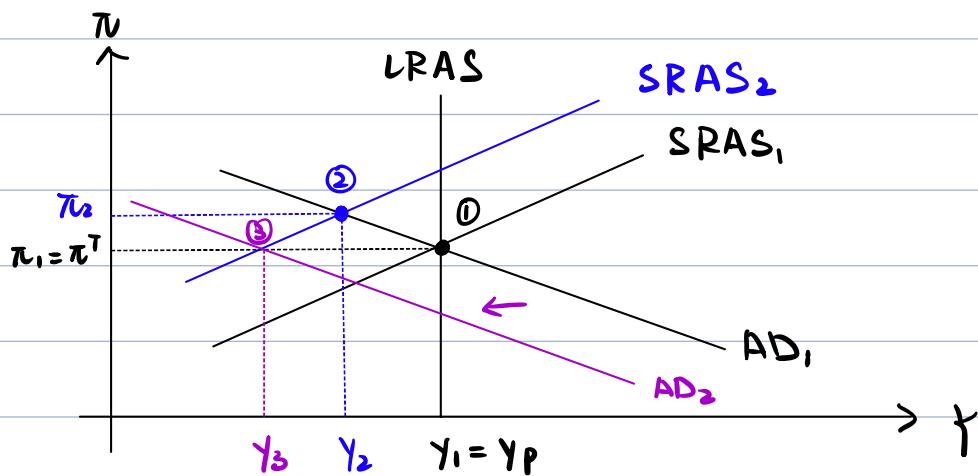
$> 0$                                $< 0$



need to make a choice

- $\left\{ \begin{array}{l} (1) \text{Stabilise price (Decrease inflation)} \\ (2) \text{Stabilise output (Increase GDP)} \end{array} \right\}$  Trade-off

# (1) Policy Intervention (Decrease Inflation)



CB decides to close inflation gap ( $\pi - \pi^T$ )



"Monetary tightening" = Contractionary MP



Shift AD down



③

$$\text{result} = \begin{cases} (1) \pi = \pi^T \\ (2) Y_3 < Y_P \end{cases}$$

Temporary Solution

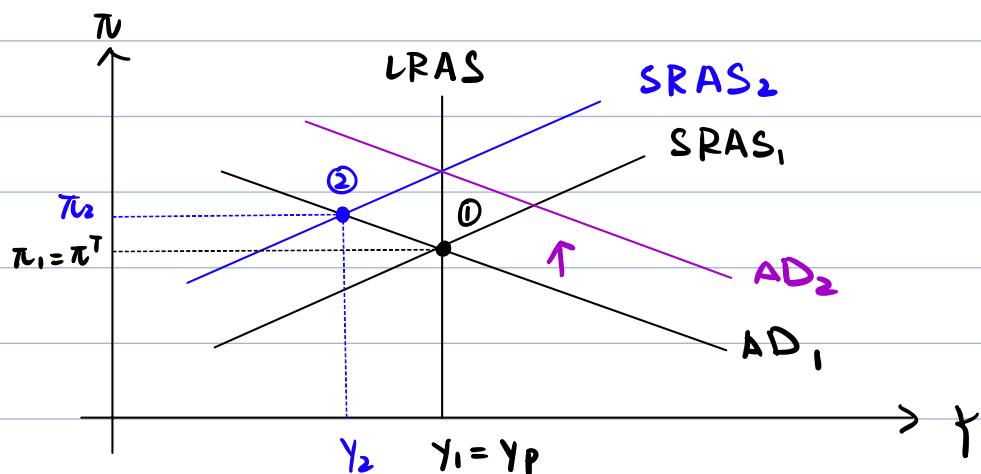
↓  
"Solution"

(1) Since  $Y_3 < Y_P =$

Automatic Stabilising will shift SRAS to the right

(2) To keep inflation rate at target level, we should  
make sure that AD moves as well

## (2) Policy Intervention (Decrease Output gap)



cB decides to close output gap ( $Y_2 - Y_p$ )



"Monetary easing" = expansionary MP



Shift AD up ↑



result { (1)  $\pi_3 > \pi_p$   
 (2)  $Y = Y_p$

4. why we have Short-Run Fluctuation?

(1) Real Business cycle theory (Neo-classical)

Business cycles are due to change in  $Y_p$   
Permanent Supply Shocks

① No role for Monetary policy

(2) New keynesian

Business cycles are due to AD and  
Short-run Supply (price) Shock

② Monetary policy has a role

## 5. Monetary policy at Zero Lower Bound (ZLB)

### 5.1 Overview of Monetary Policy

- (1) we use MP to affect short-term interest rate ( $i$ )
- (2) Traditional Monetary tools
  - { 1 > Open market operation
  - 2 > Discount loan

5.2 When  $i \approx 0 \Rightarrow$  problem of zero lower bound =  
the traditional Monetary tool will not work

↓

By Arbitrage Condition =

Short-term (nominal) interest rate ( $i$ ) cannot be negative

But real interest rate ( $r$ ) can be negative if  $i < \pi$

↳ By Fisher Equation:  $r = \frac{i - \pi}{1 + i} \text{ if } (i < \pi)$

### 5.3 Monetary Policy Equation

$$\text{MP: } r = \bar{r} + \gamma \pi$$

↓  
autonomous rate

Changes in autonomous rate ( $\bar{r}$ ) will shift MP curve

- { (1)  $\uparrow \bar{r} \Rightarrow$  Monetary tightening  $\Rightarrow r \uparrow \Rightarrow \downarrow I \Rightarrow \downarrow y^{\text{ad}}$
  - (2)  $\downarrow \bar{r} \Rightarrow$  Monetary easing  $\Rightarrow r \downarrow \Rightarrow \uparrow I \Rightarrow \uparrow y^{\text{ad}}$
- ↓

Since CB cannot directly change real interest rate ( $r$ ),  
CB changes the short-term interest rate ( $i$ )  
policy rate

Example =

r	y
-2	10
-1	9.5
2	9

(1) At  $\pi_v = 3\%$ ,  $r = 2\%$

(2)  $\downarrow \pi_v$  from  $3\%$   $\rightarrow 2\%$

(3) CB follows Taylor principle =  $r = 2\%$

(4)  $r = \bar{r} - \pi_v$

$$-2\% = \bar{r} - 2\%$$

$\bar{r} = 0\%$   $\Rightarrow$  Zero lower Bound

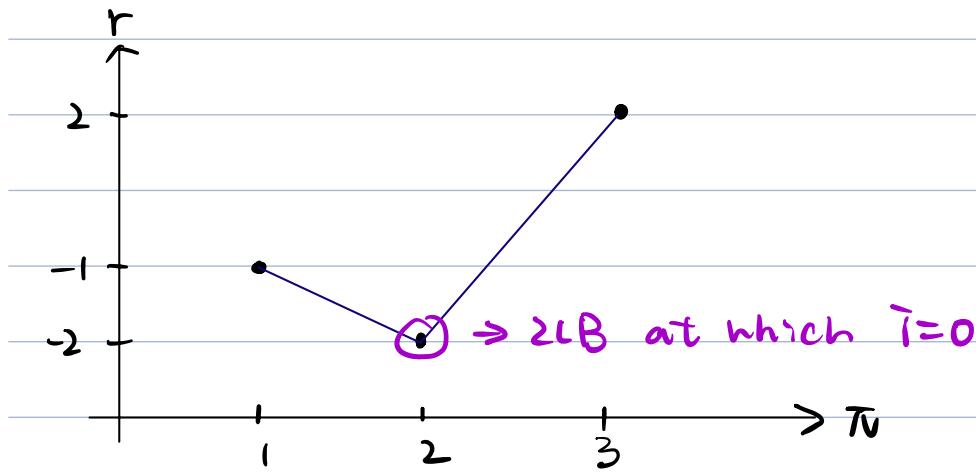
(5) Now suppose  $\pi_v = 1\%$ ,

$$r = \bar{r} - \pi_v$$

$$r = 0 - 1\% = -1\%$$

↓

Draw new MP curve

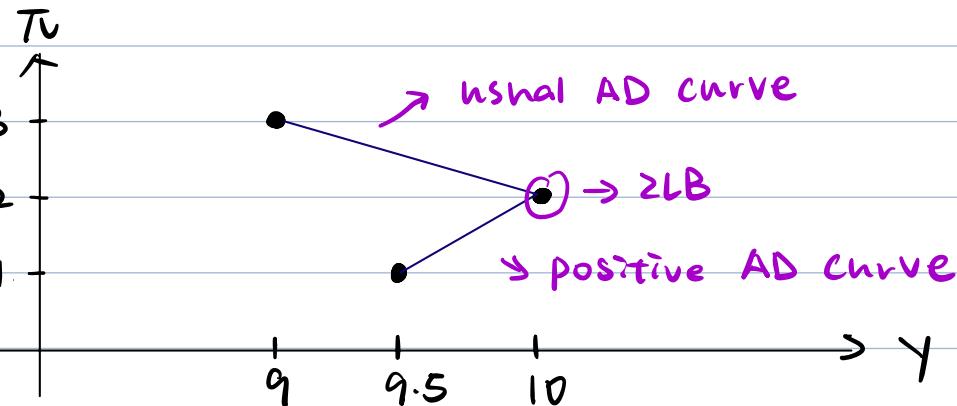


Conclusion:

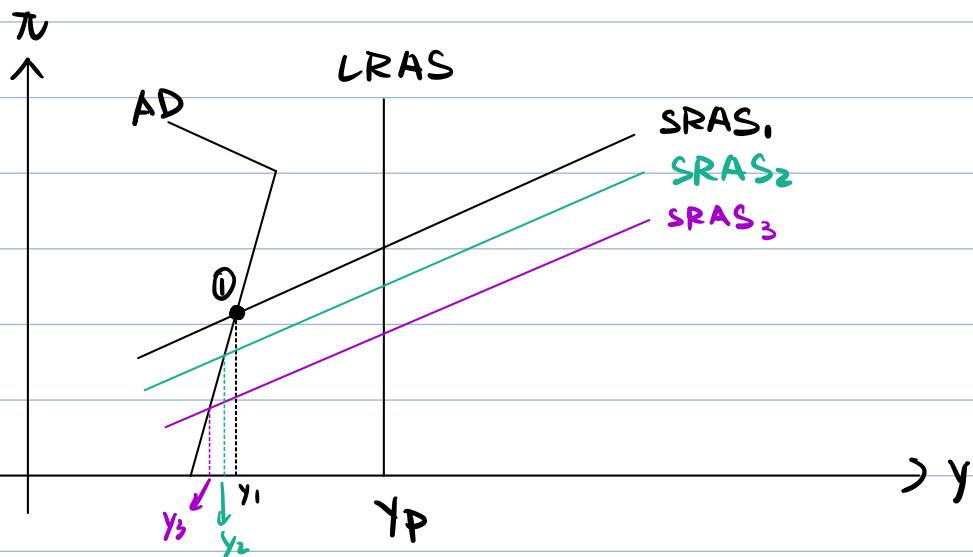
If we have zero lower bound, MP curve will be kinked

Draw AD curve

$\pi$	$r$	$y$
1	-1	9.5
2	-2	10
3	2	9



#### 5.4 Self-correcting Mechanism at ZLB



At ①:  $y_1 < y_P \Rightarrow \downarrow \pi^e \Rightarrow$  shift SRAS down

At ②:  $y_2 < y_P \Rightarrow \downarrow \pi^e \Rightarrow$  shift SRAS down

↓

At ZLB: Self-correcting Mechanism will not work

↓

{ (1) Low  $\pi$

"Deflation spiral" | (2) Low  $\uparrow \rightarrow$  (3) High  $v_n$

## 5-4 At zero lower bound (ZLB)

↓

- (1) "Self-correcting mechanism" does not work
- (2) But policy intervention is required
- (3) Yet, traditional policy tool does not work

↓

So, new policies were developed

↳ Liquidity premium

At ZLB: we can't affect Short-term interest rate (r),

↓ therefore we cannot affect  $r = \pi - \bar{f}$

But, we can reduce real cost of borrowing ( $r_c$ )

↓

we can increase liquidity to reduce financial friction

( $\bar{f}$ )

As given by  $r_c = r + \bar{f}$   
real cost of borrowing → financial friction

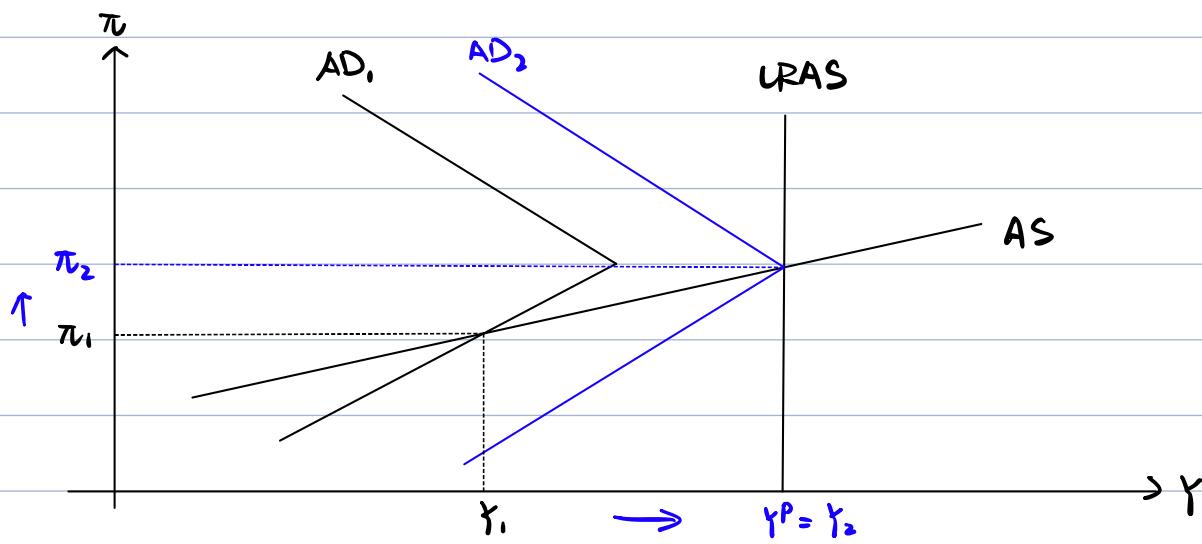
↓

By reducing  $\bar{f}$ , we are able to ↓ real cost of borrowing ( $r_c$ )

↓

Hence, we can affect  $r_c$  through liquidity premium

↓  $r_c \Rightarrow \uparrow AD$



## >> Quantitative Easing

At ZLB:

we cannot affect short-term interest rate ( $r_{SP}$ )  
by changing the short-term nominal interest rate ( $\bar{r}_{SR}$ )  
(it cannot be negative)

↓

But we can change the long-term real interest rate

$$r_{\text{long-term}} = r_{\text{short-term}} + \text{time premium}$$

↓

Quantitative Easing: Buying long-term private Asset

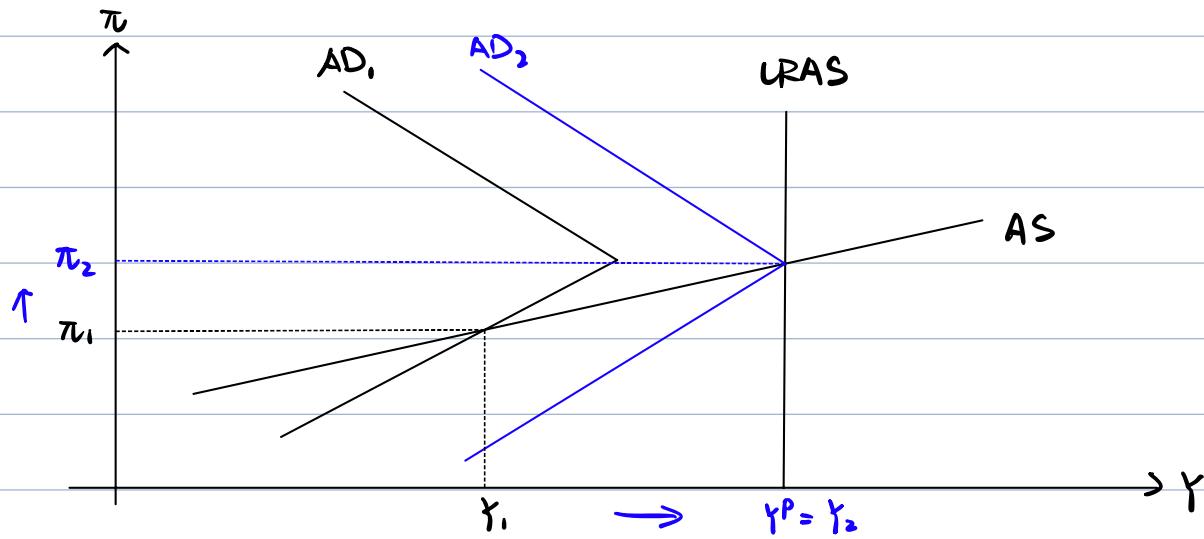
→ reduce uncertainty  $\Rightarrow \downarrow$  premium

↓

$\downarrow r_{\text{long-term}}$

↑

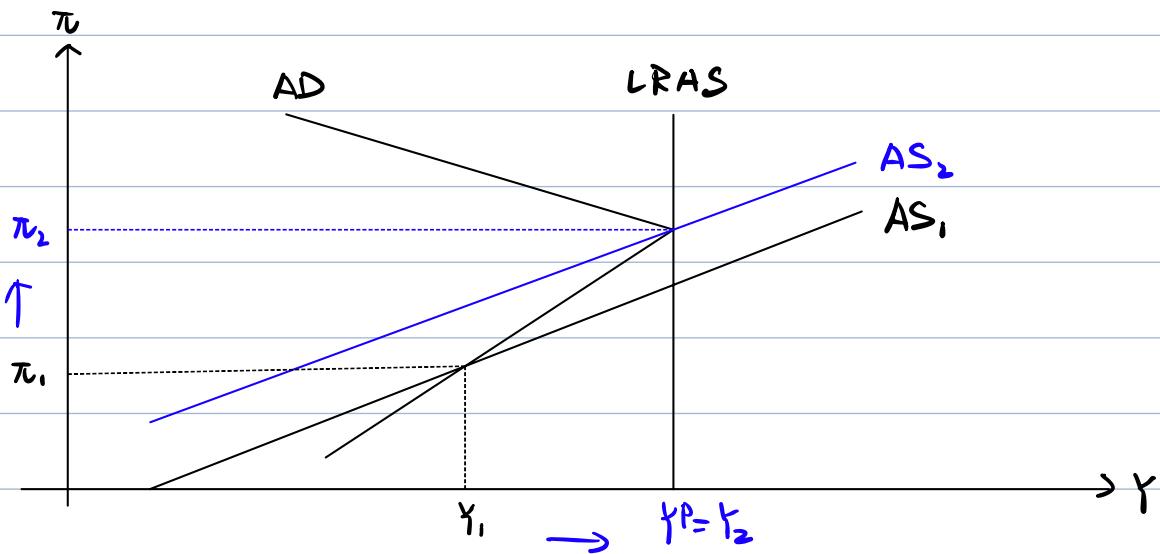
$\uparrow AD$



### 3> Forward Guidance (Management of Expectations)

$\downarrow \pi^e \Rightarrow$  Forward Guidance shifts SRAS

{ Liquidity premium and QE affect AD  
Forward Guidance affects AS



p

## Ex: Japan uses Forward Guidance + Quantitative Easing tgt

### Abenomics and the Shift in Japanese Monetary Policy in 2013

#### 安倍经济学与 2013 年日本货币政策的转变

- A major policy shift occurred in Japan with the election of Prime Minister Shinzo Abe.  
随着首相安倍晋三的当选，日本发生了重大政策转变。
- First, the Bank of Japan was pressured to double its inflation target.  
首先，日本银行受到了加倍其通货膨胀目标的压力。
- Second, the central bank engaged in a program of quantitative easing.  
其次，中央银行实施了量化宽松计划。
- This two-pronged attack would lower real interest rates while raising inflationary expectations.  
这种双管齐下的政策将降低实际利率，同时提高通货膨胀预期。

