AS/AD Model
Applications

Prof. Lutz Hendricks

Econ520

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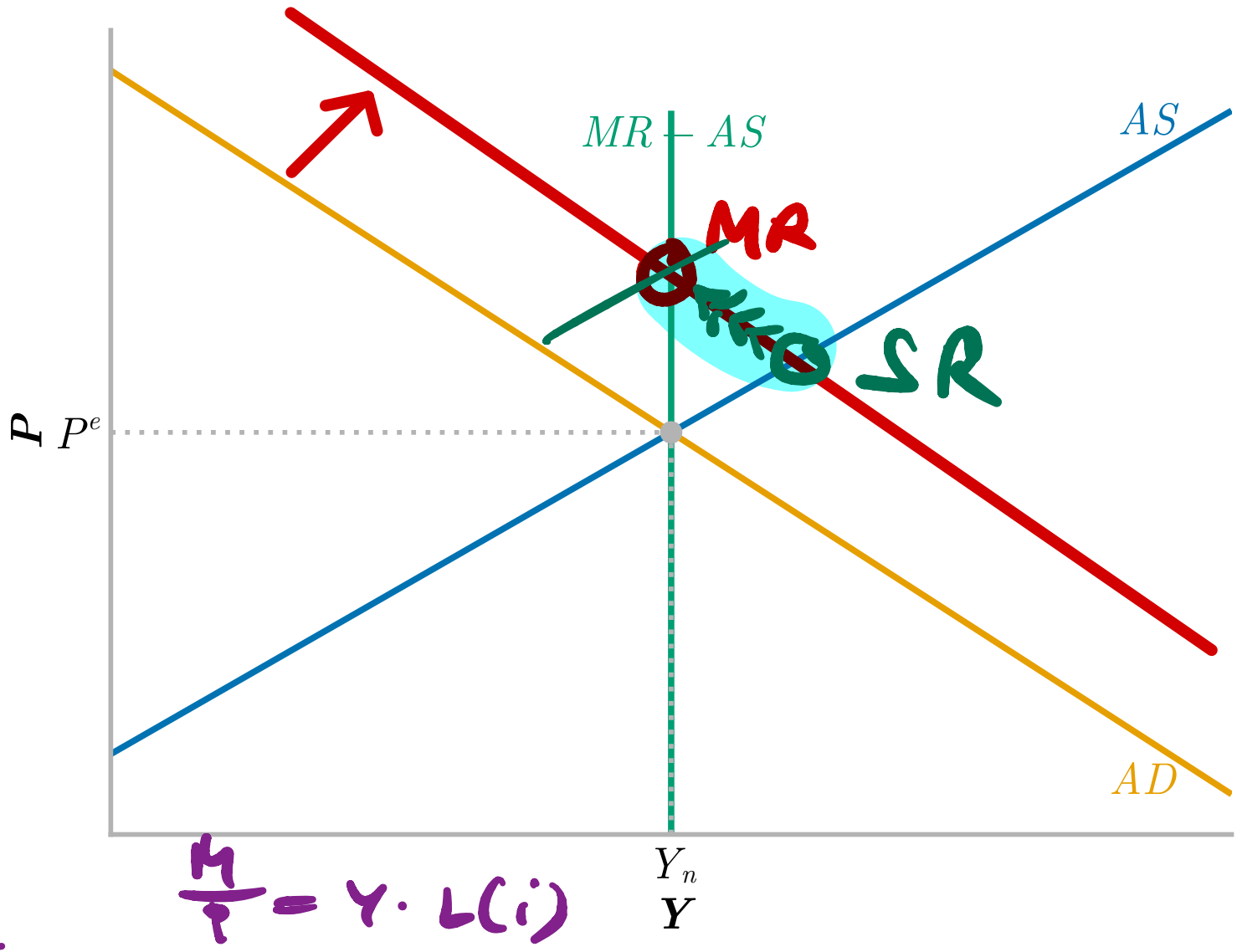
Monetary Expansion: $M \uparrow$



$\frac{M}{P} = Y \cdot L(i)$

$\bar{Y} = \bar{C} + \bar{I} + \bar{G}$ → I − → i −

MR

Y −

P ↑

C(Y−T)

I(Y, i)

i

G −

$\frac{M}{P}$ −

MR-AS $Y = F\left(\frac{1}{1+\mu}, Z\right)$

AS $Y = F\left(\frac{P}{P^e}, \frac{1}{1+\mu}, Z\right)$

AD IS + LM

LM shifts right

$\Rightarrow$ AD right

Shock : M ↑

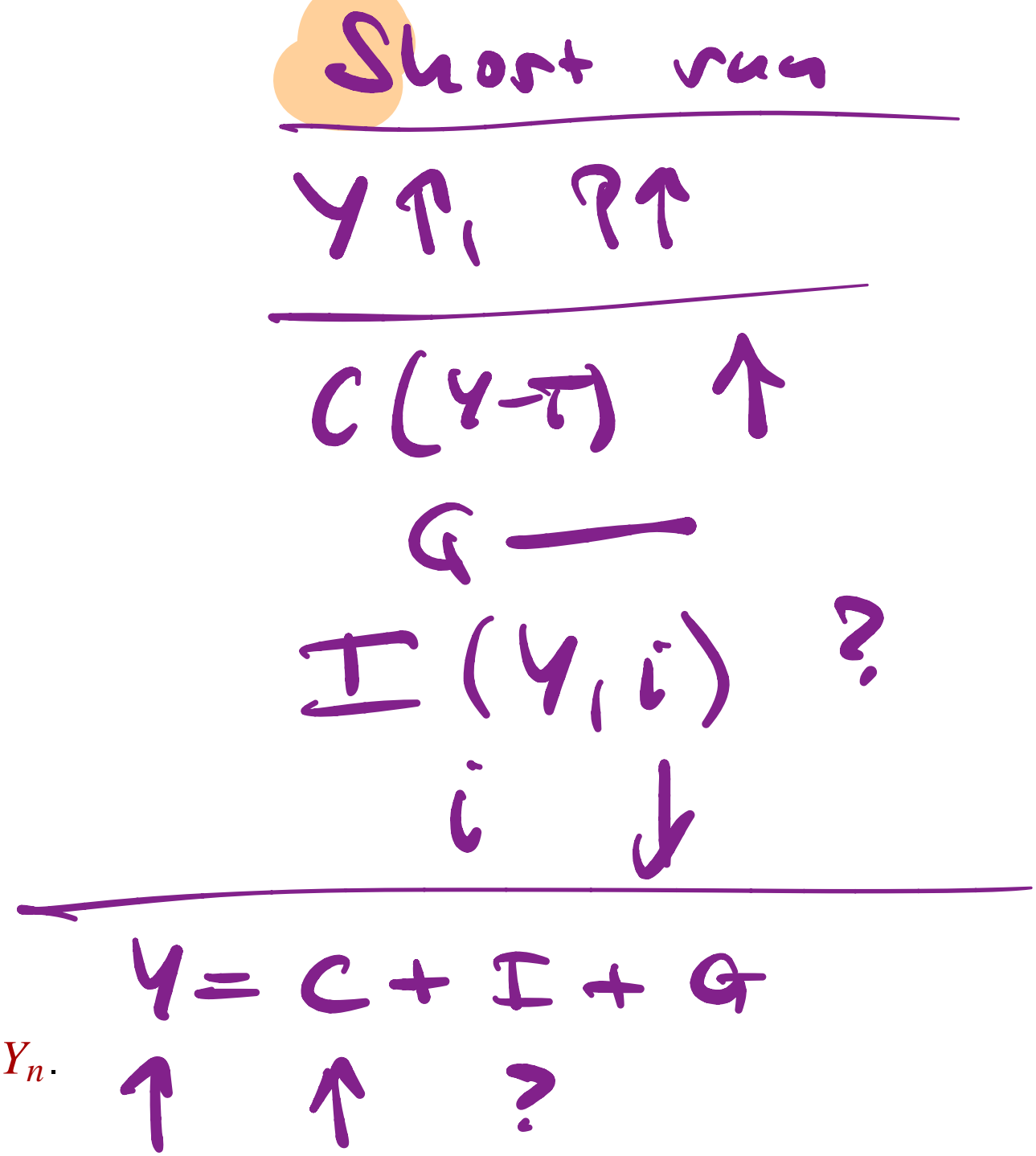
Monetary Expansion

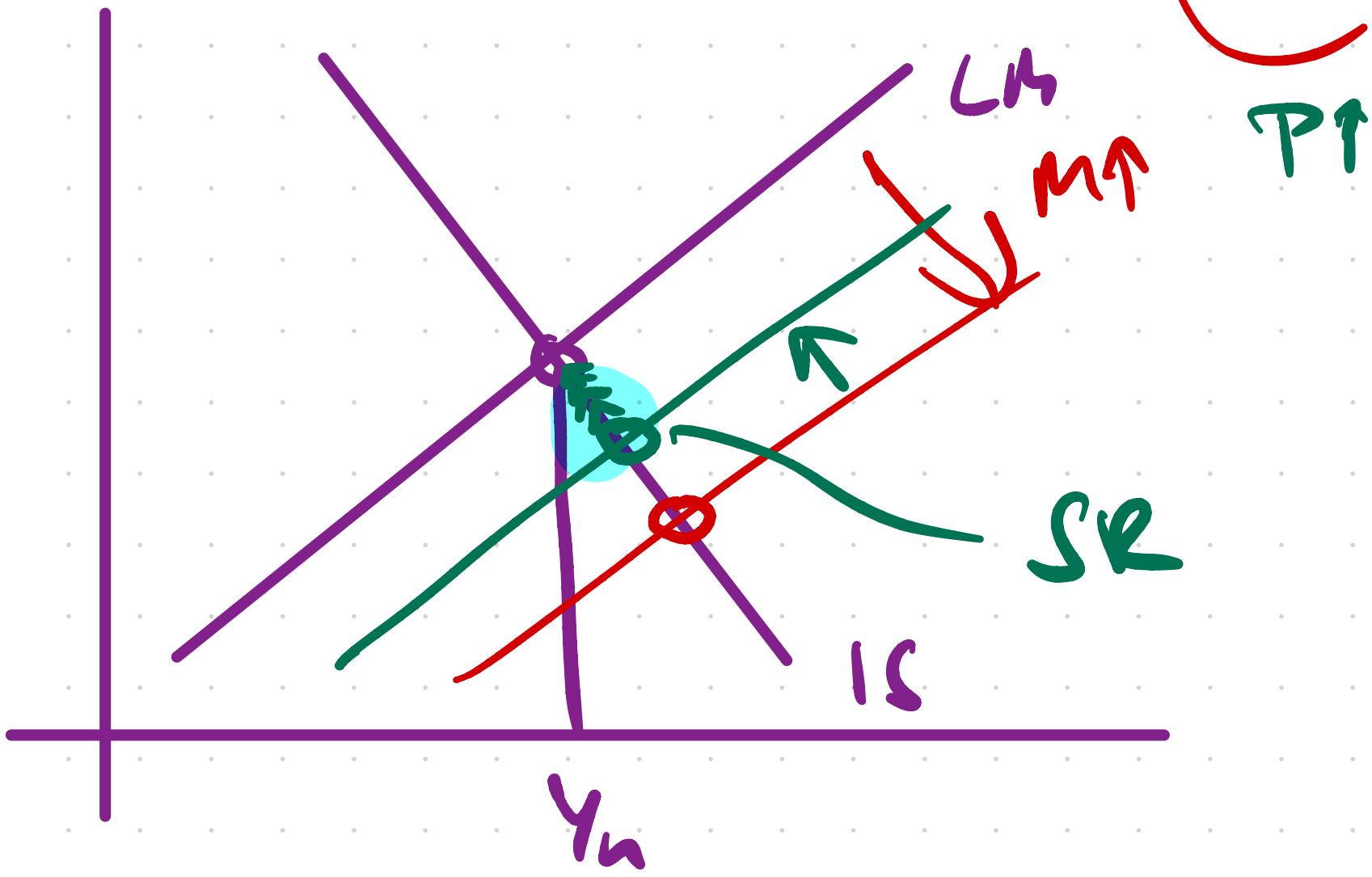
Medium run:

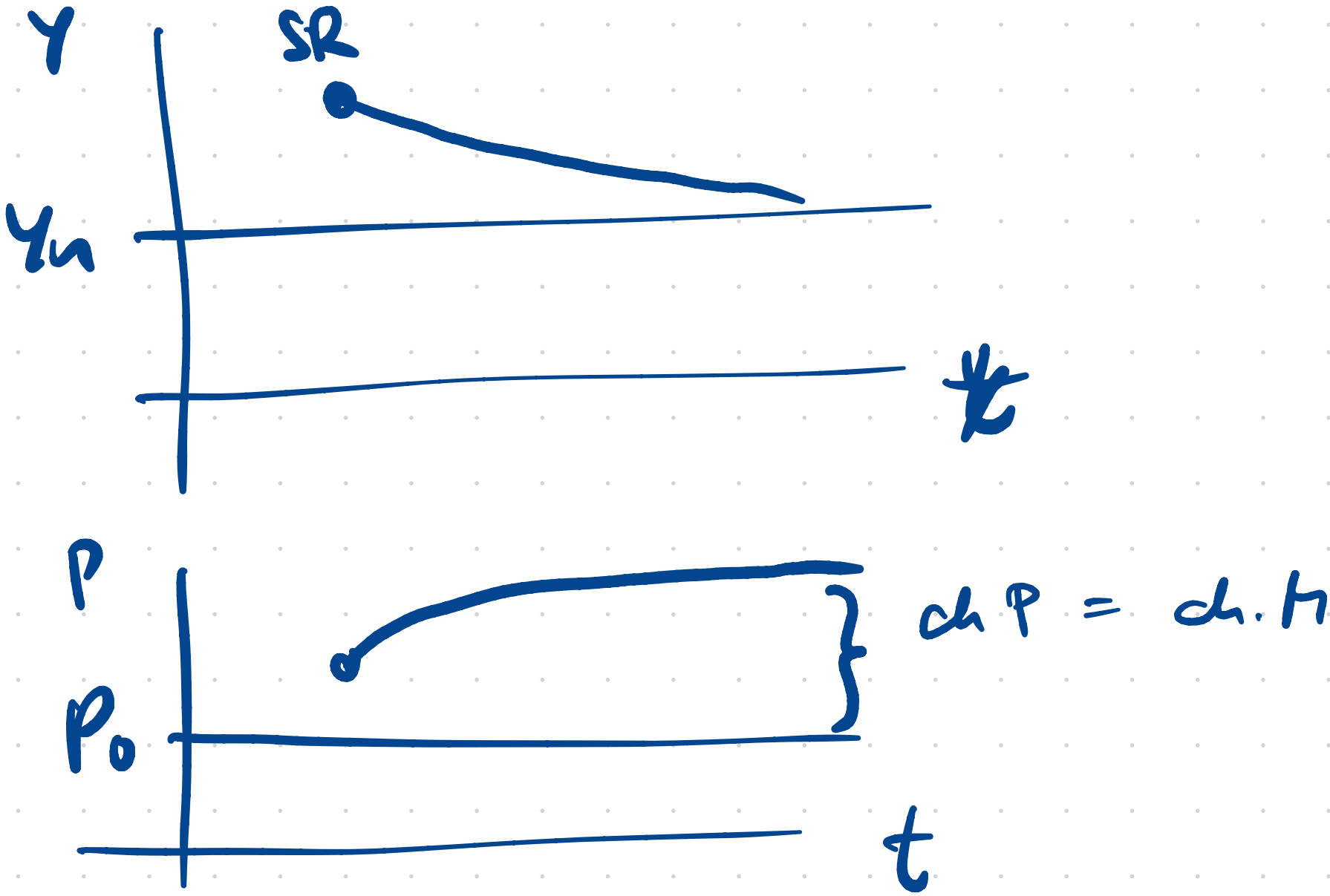
Short run:

Transition:

- AS shifts toward Y_n.




M↑
LM
M↑
P↑
SR
IS
Y_n
i↓


Y
SR
Y_n
t
P
P_0
$\Delta P = \Delta \cdot h$
t

Key points

MR-AS

- determines medium run Y_n
- independent of AD shocks

SR-AS

- not shifted in SR because P^e fixed
- only supply shocks shift SR-AS
- shifts over time as P^e adjusts

AD

- only shifts once (in response to the shock)
- does not shift during SR $\rightarrow$ MR transition

Monetary Expansion

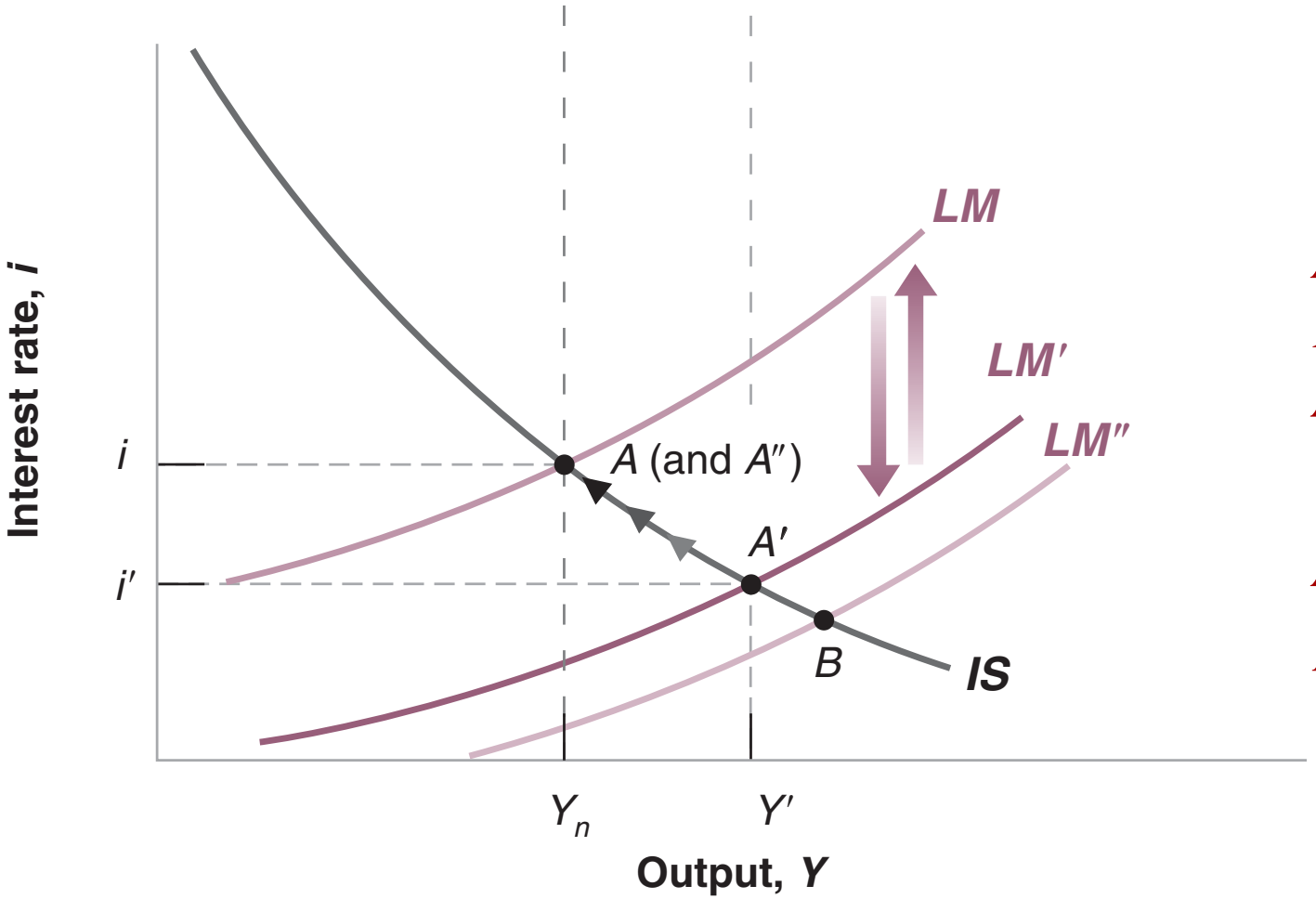
Result

Money is neutral in the medium run:

- M affects prices, but not any real variables
- Doubling M doubles P

This is why we may ignore money in the long-run growth analysis.

Intuition



A: initial equilibrium

B: SR, fixed P

A': SR equilibrium

- higher P

A: MR equilibrium

$M \uparrow \Longrightarrow i \downarrow \Longrightarrow I \uparrow$

How to analyze shocks

Work with the equations first

- AD: $Y^D = Y^D(M/P, G, T)$
- $SR-AS$: $Y = F\left(\frac{P}{P^e}\frac{1}{1+m}z\right)$
- $MR-AS$: $Y = F\left(\frac{1}{1+m}z\right)$

Which equations shift?

- simply look for where M shows up in the equations
- MR-AS and SR-AS: do not contain M; do not shift
- AD: contains M; shifts

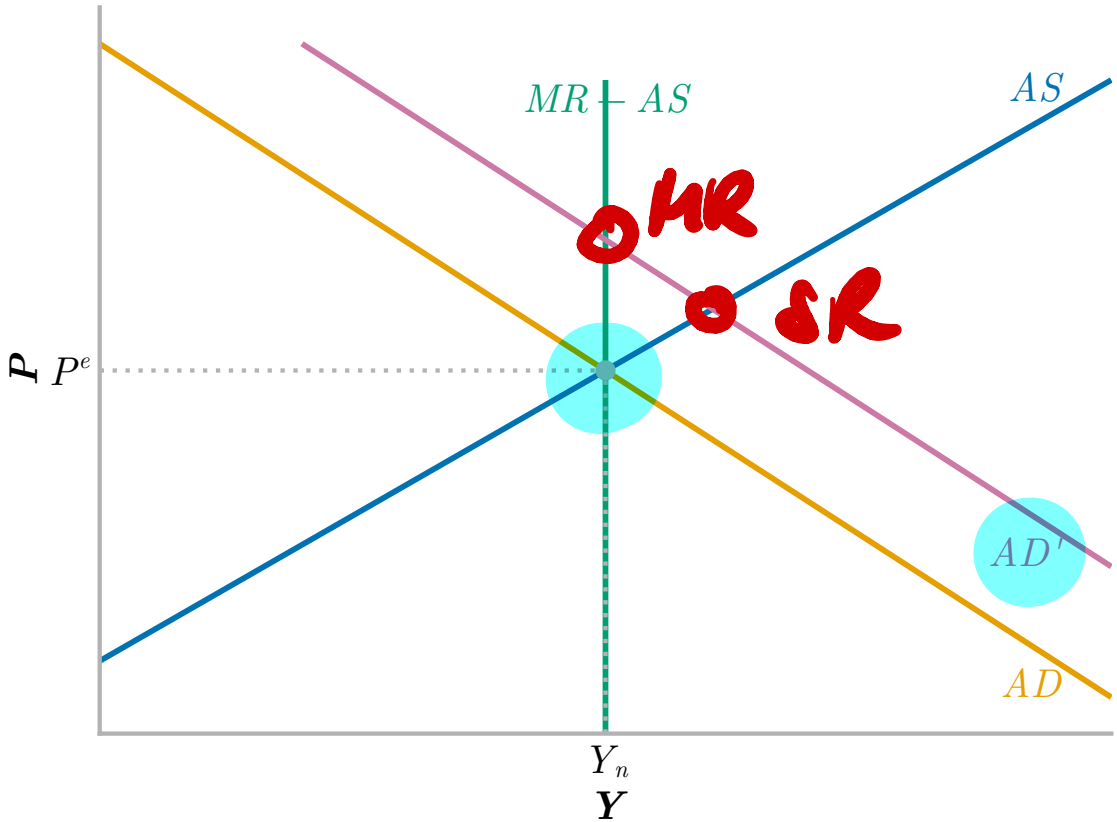
How to analyze shocks

Which way does AD shift when $M \uparrow$?

- simple intuition: a shock that increases demand shifts AD out
- precise answer: a shock that shifts IS or LM right also shifts AD right
  - because AD traces out intersections of IS and LM

How to analyze shocks

Now we have this diagram:



Mark the equilibrium points:

- medium run: MR-AS and AD
- short run: SR-AS and AD

How to analyze shocks

Now we know how Y and P change in SR and MR.

Next task: figure out what happens to other variables.

Other variables: MR

- we know: Y unchanged, $P \uparrow$
- first try: look at determinants of variables
  - $C(Y-T)$ unchanged
  - $I(Y,i)$ - we don't know i yet
- second try: look at market clearing
  - $Y = C + I + G \implies I$ unchanged $\implies i$ unchanged
  - $M/P = Y \times L(i) \implies M/P$ unchanged

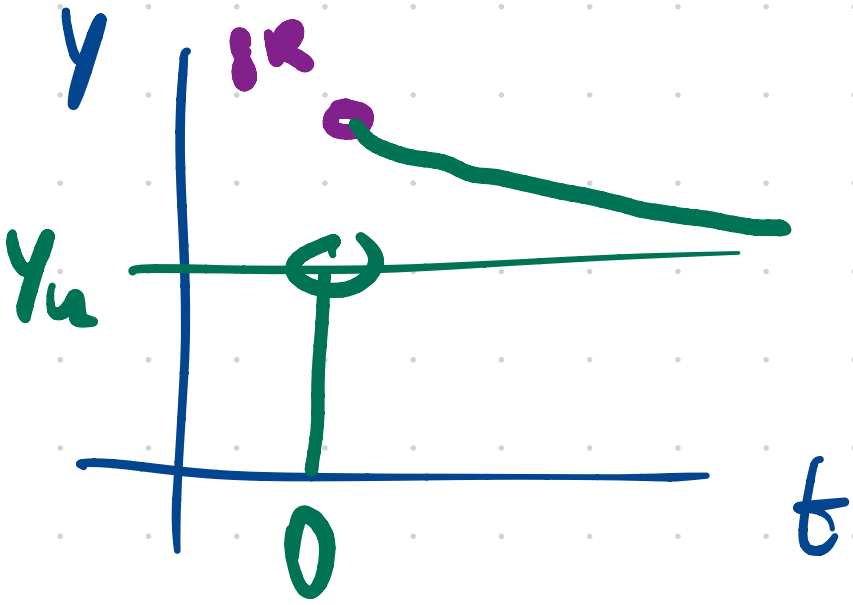
How to analyze shocks

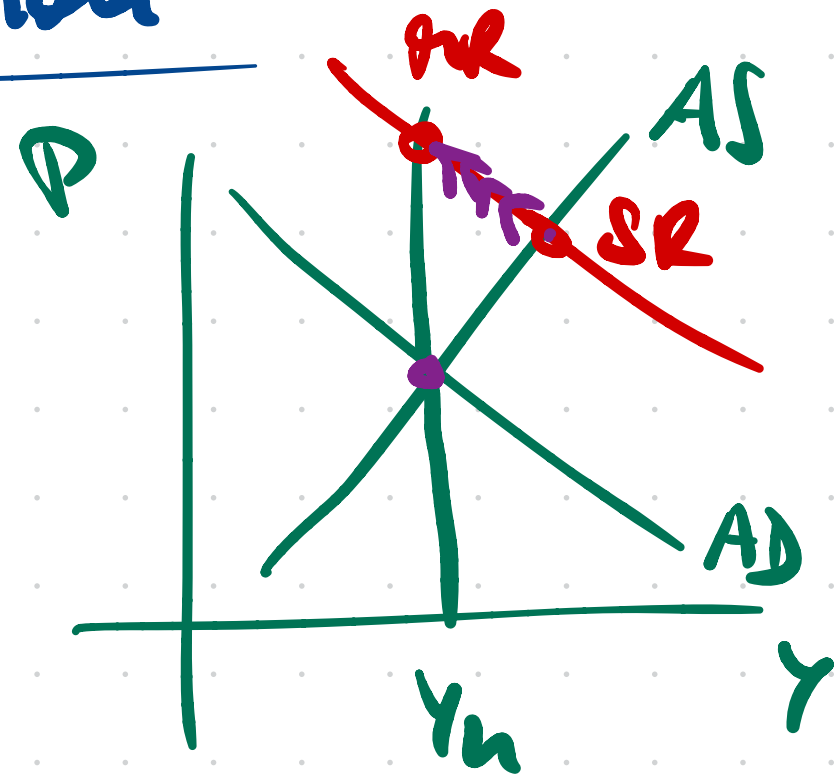
Other variables: SR

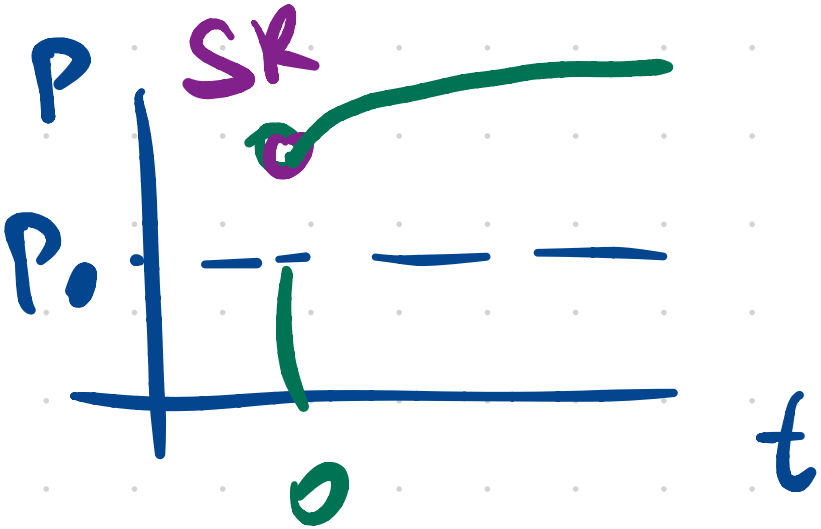
- we know: $Y \uparrow$ and $P \uparrow$
- first try:
  - $C(Y-T) \uparrow$
  - $I(Y,i)$ - we again don't know i yet
- second try: market clearing
  - $Y \uparrow = C \uparrow + I + G$ seems ambiguous for change in I
  - but since $MPC < 1$: $(Y-C) \uparrow = I \uparrow + G$
  - $M \uparrow / P \uparrow = Y \uparrow \times L(i)$ - not helpful (still don't know i)

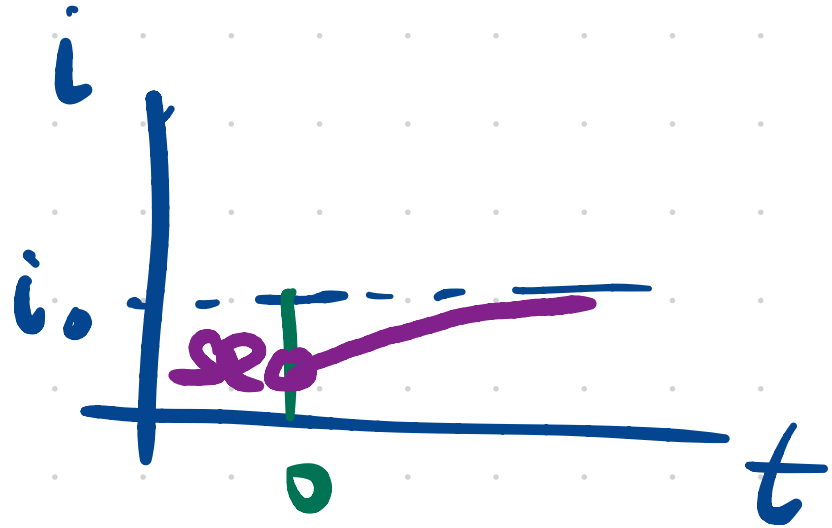
Final step: look at the $IS-LM$ diagram to get intuition.

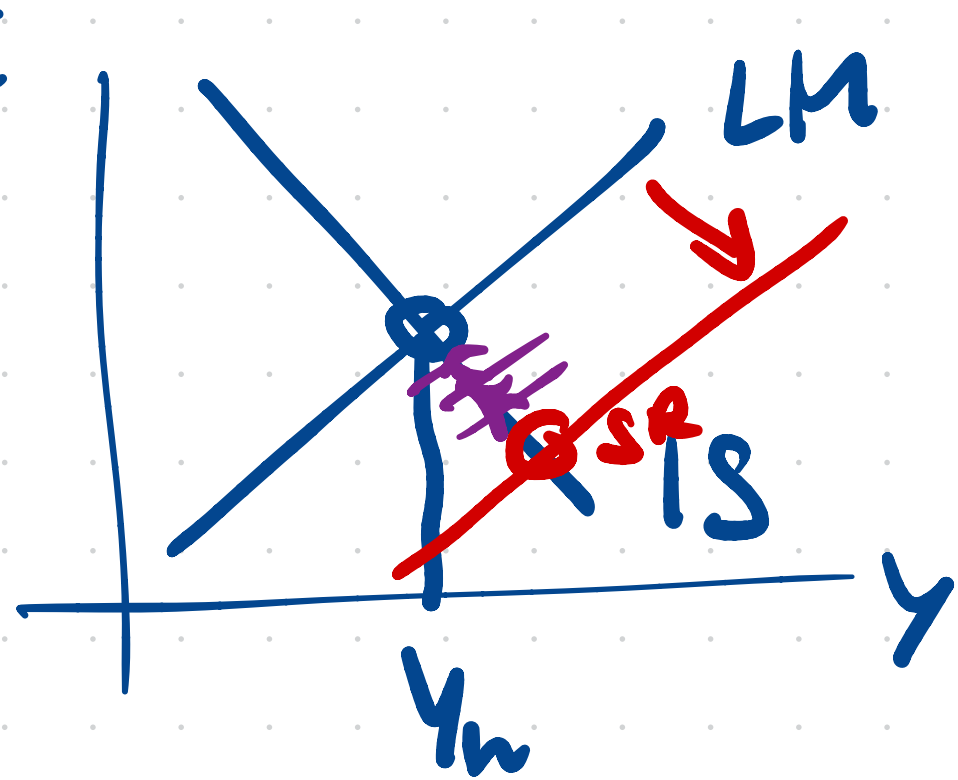
Monetary expansion







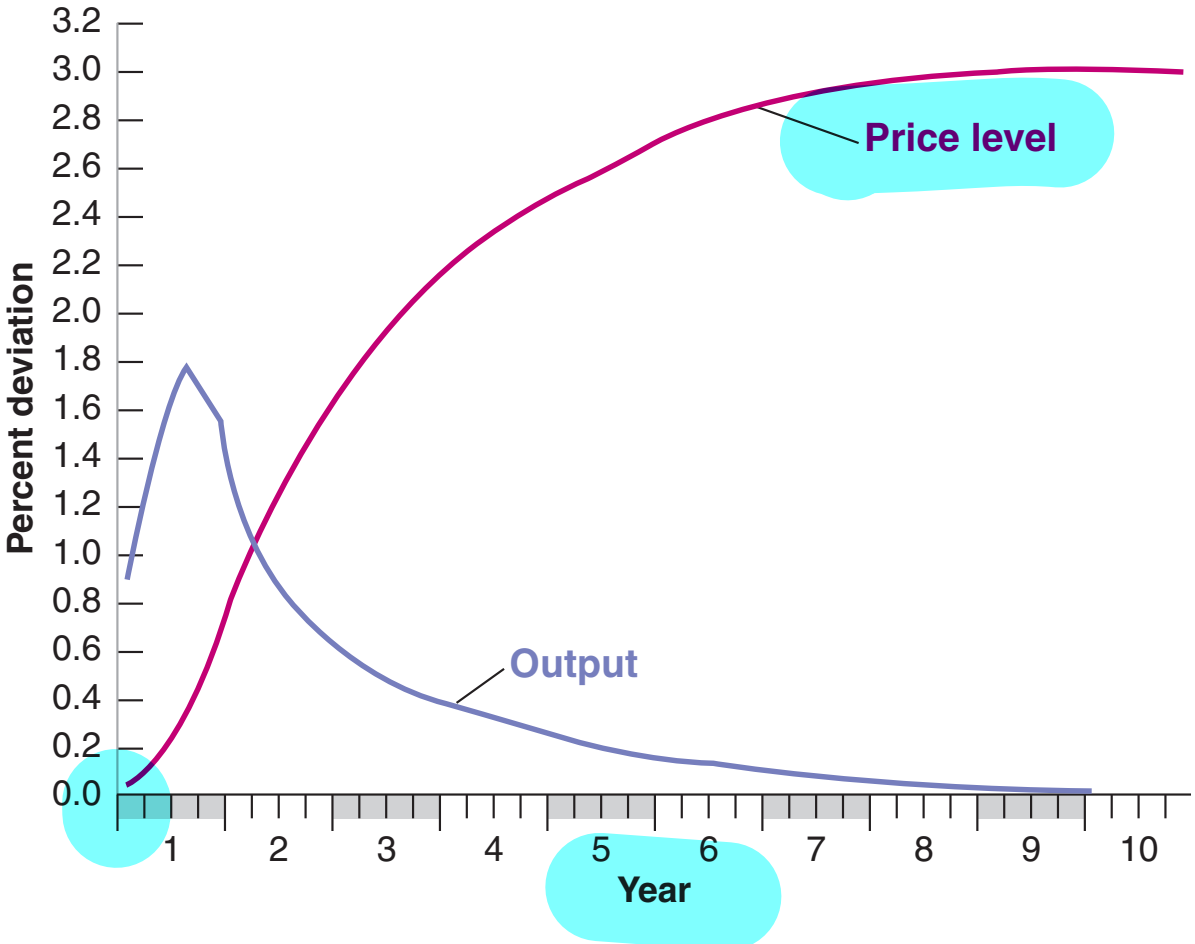




$Y \rightarrow$ " $M\uparrow$, $P\uparrow$

Transition $P\uparrow \Rightarrow$ LM left

Empirical Evidence



Estimated macro models imply:

- the peak effect of monetary policy hits after nearly 1 year
- it takes several years for the real effects to wear off

Why Monetary Policy Is Hard

Suppose the economy is hit by an adverse AD shock

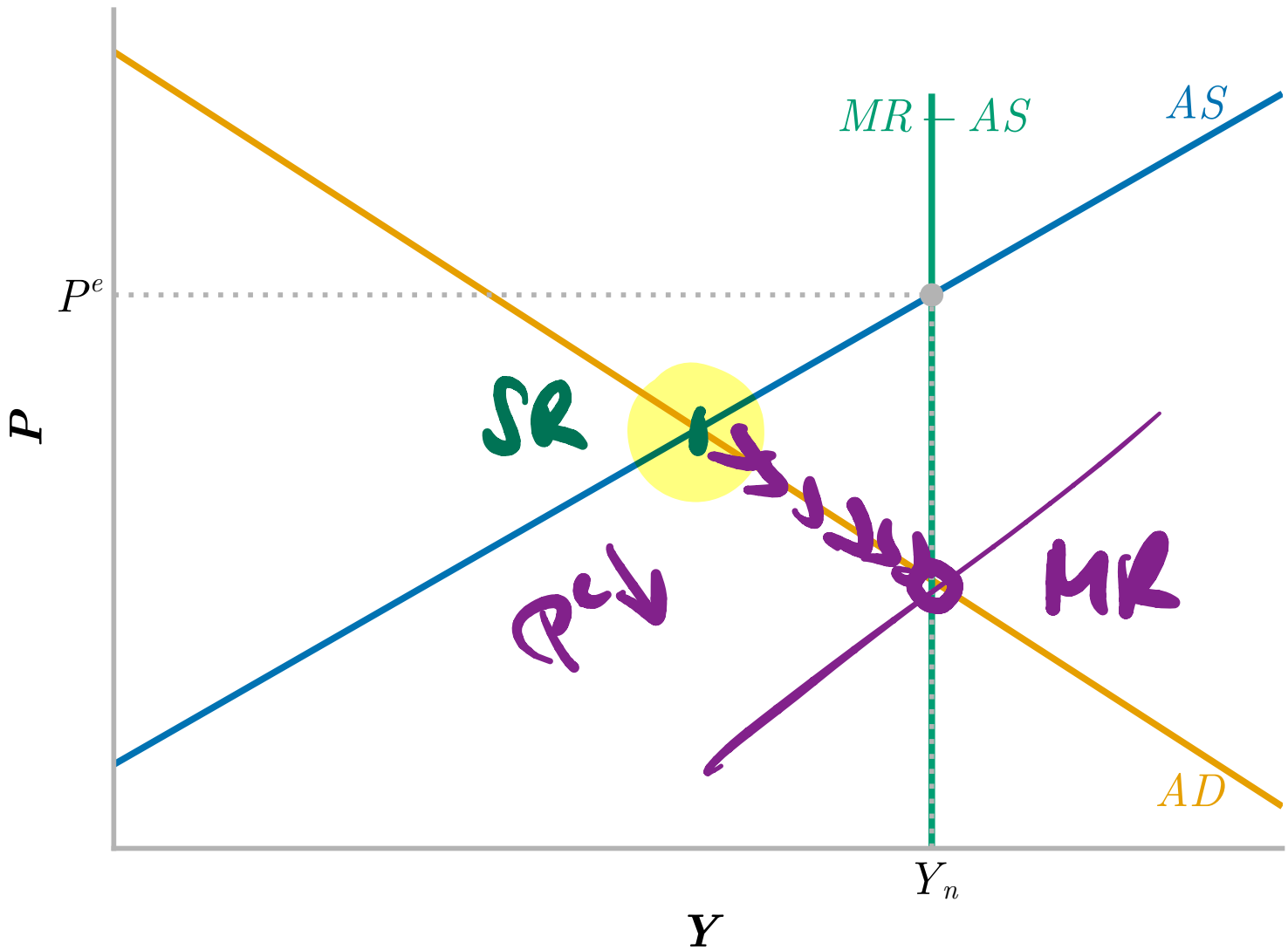
The Fed counters by expanding M

There is a long lag between the increase in M and the shift in AD

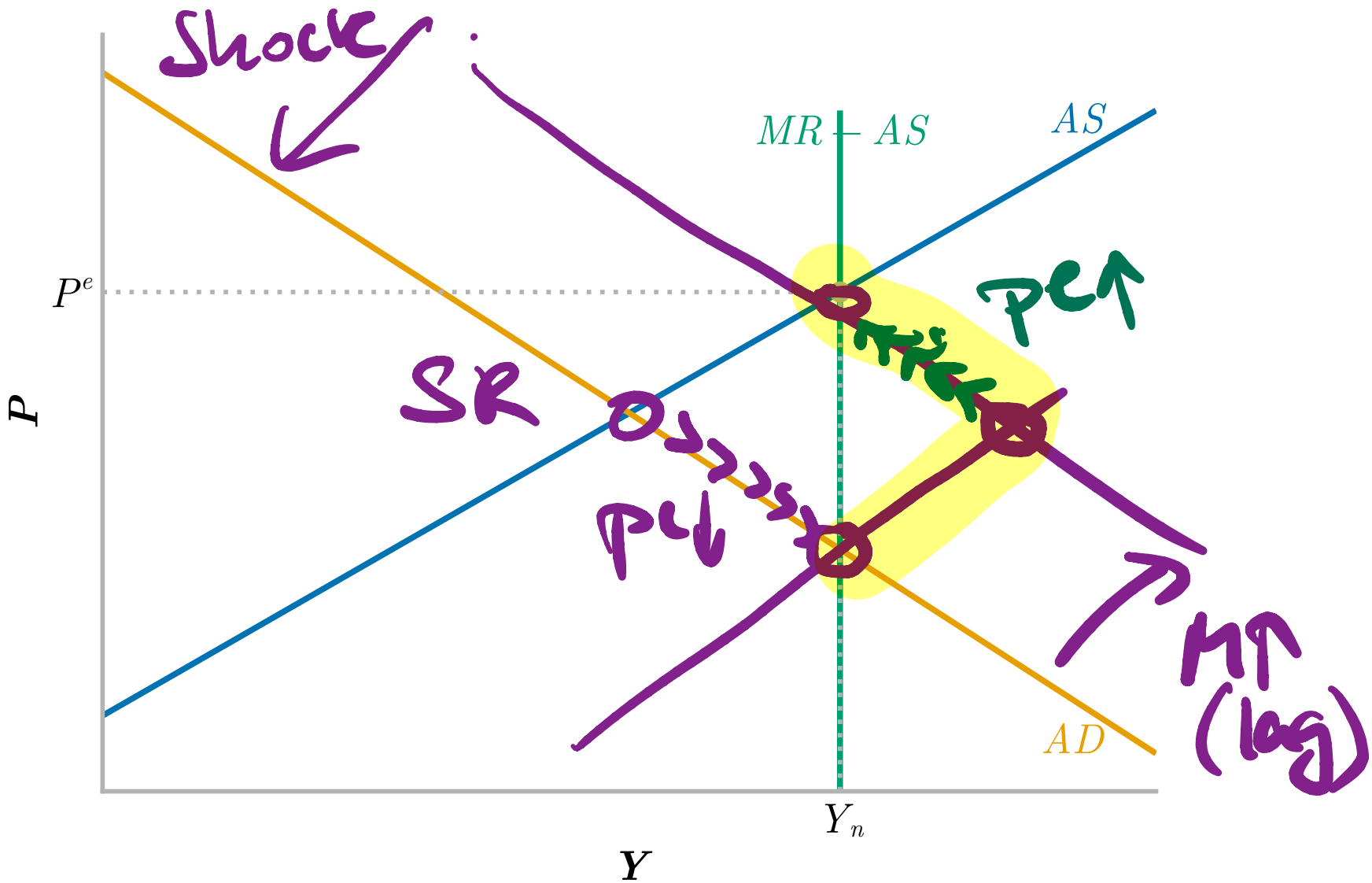
Policy options:

1. Do nothing
2. Raise M to shift the short-run equilibrium to Y_n
3. Raise M, but by less

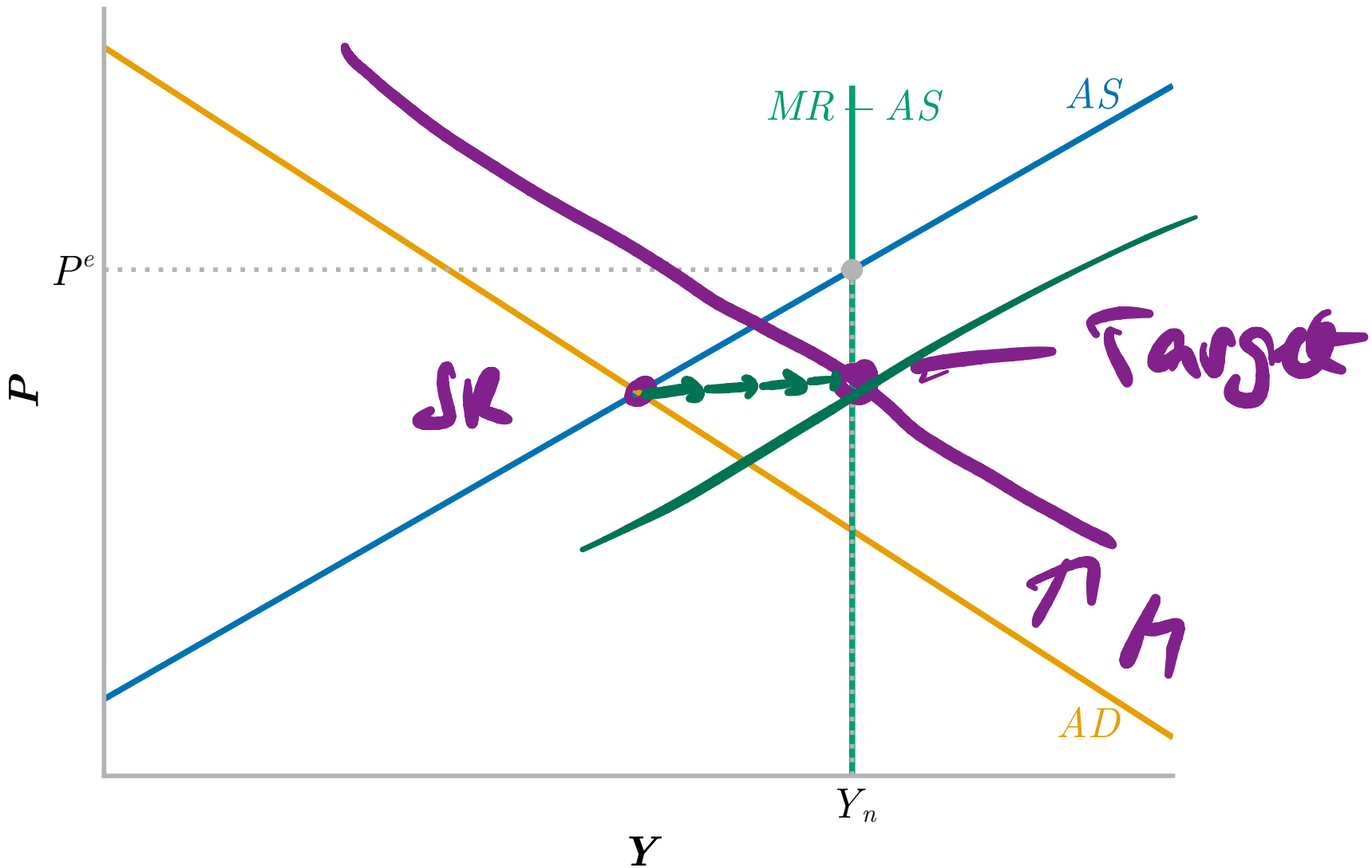
Option 1: Do Nothing



Option 2: Shift SR to Y_n



Option 3: Shift SR by Less

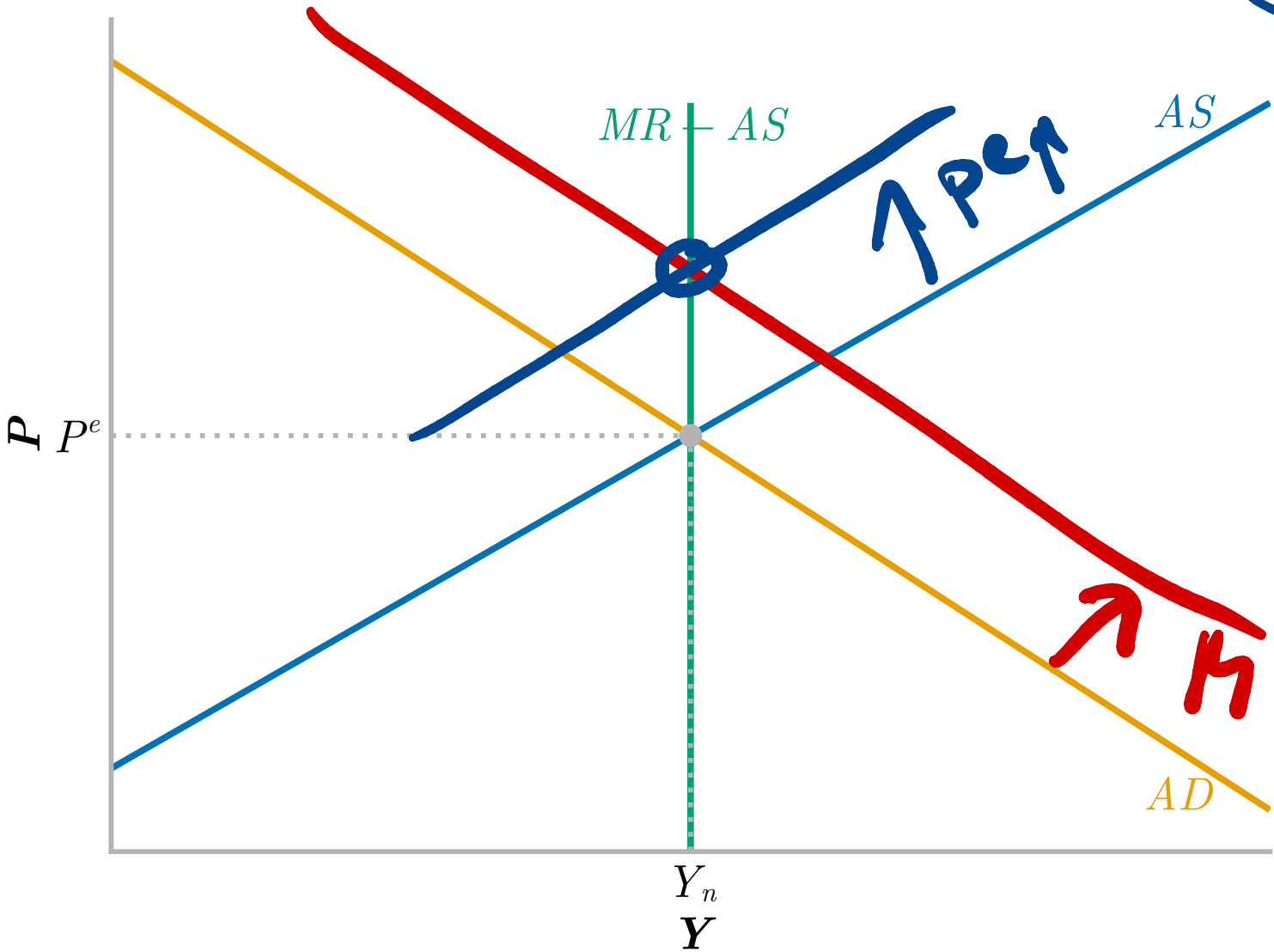


Summary

1. **Do nothing**
   Slow adjustment towards Y_n
   A period of deflation (might get "entrenched")
2. **Raise M to shift the short-run equilibrium to Y_n**
   Overshooting
3. **Raise M, but by less**
   Speedier adjustment to Y_n without inflation
   Hard to implement

The Role of Expectations

What does an anticipated monetary expansion look like?



The Role of Expectations

Key point

Unanticipated monetary policy has real effects.
Anticipated monetary policy just changes prices.

This is an overstatement.

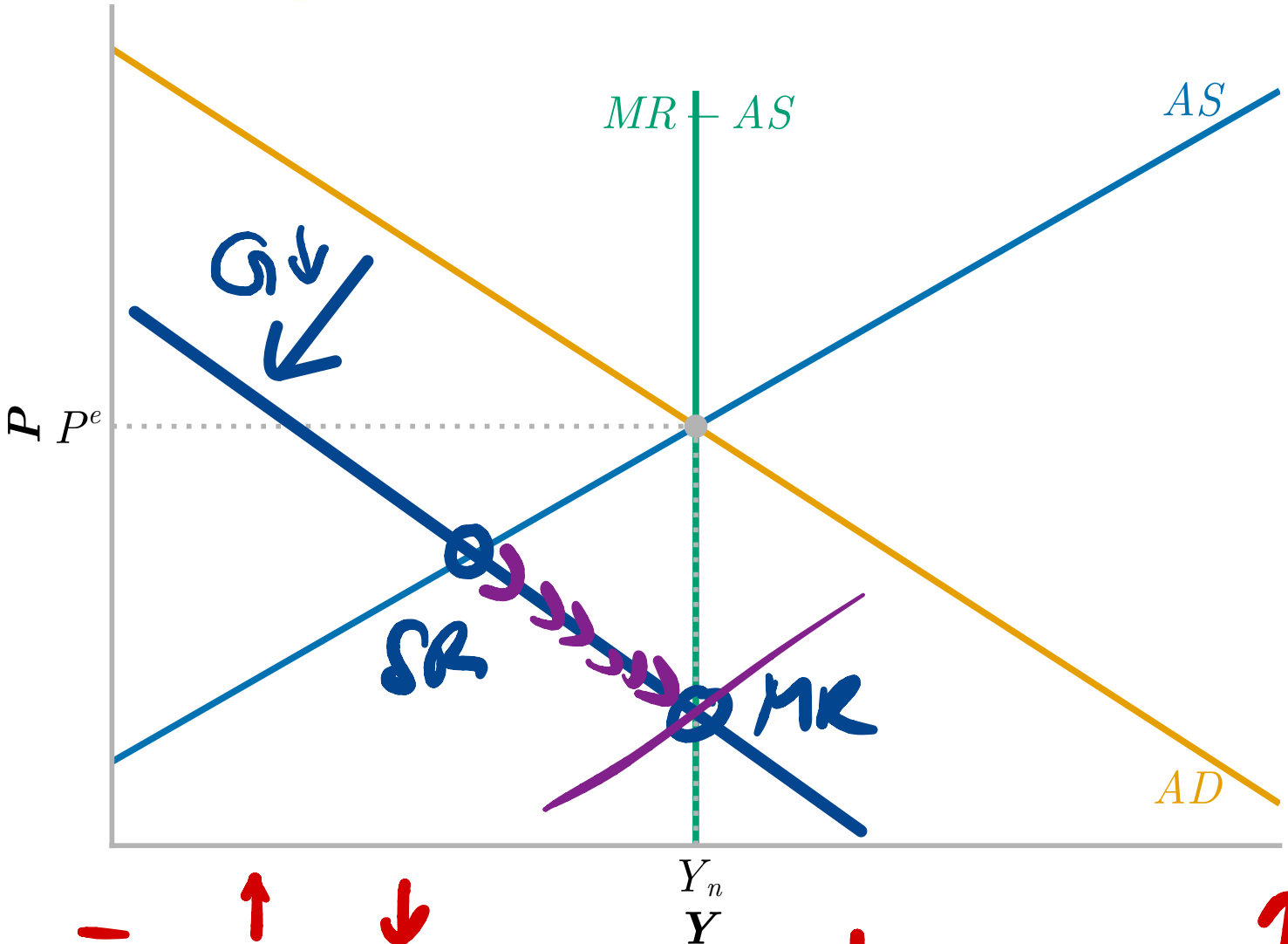
- In reality, not all prices will adjust ahead of time.

But:

- In the long run, monetary policy is neutral.
- Even in the short run, anticipated monetary policy is weak.

Deficit Reduction

The shock: $G \downarrow$.



MR
Y —
P↓
C —
I ↑
G ↓
i ↓
MP ↑

$\bar{Y} = \bar{C} + \bar{I} + \bar{G}$ (↑ ↓)

$\frac{M}{P} = \bar{Y} \cdot L(i)$ (↑)

SR

Y↓, r↑↓

C ↓

I(Y, i) ?

G ↓

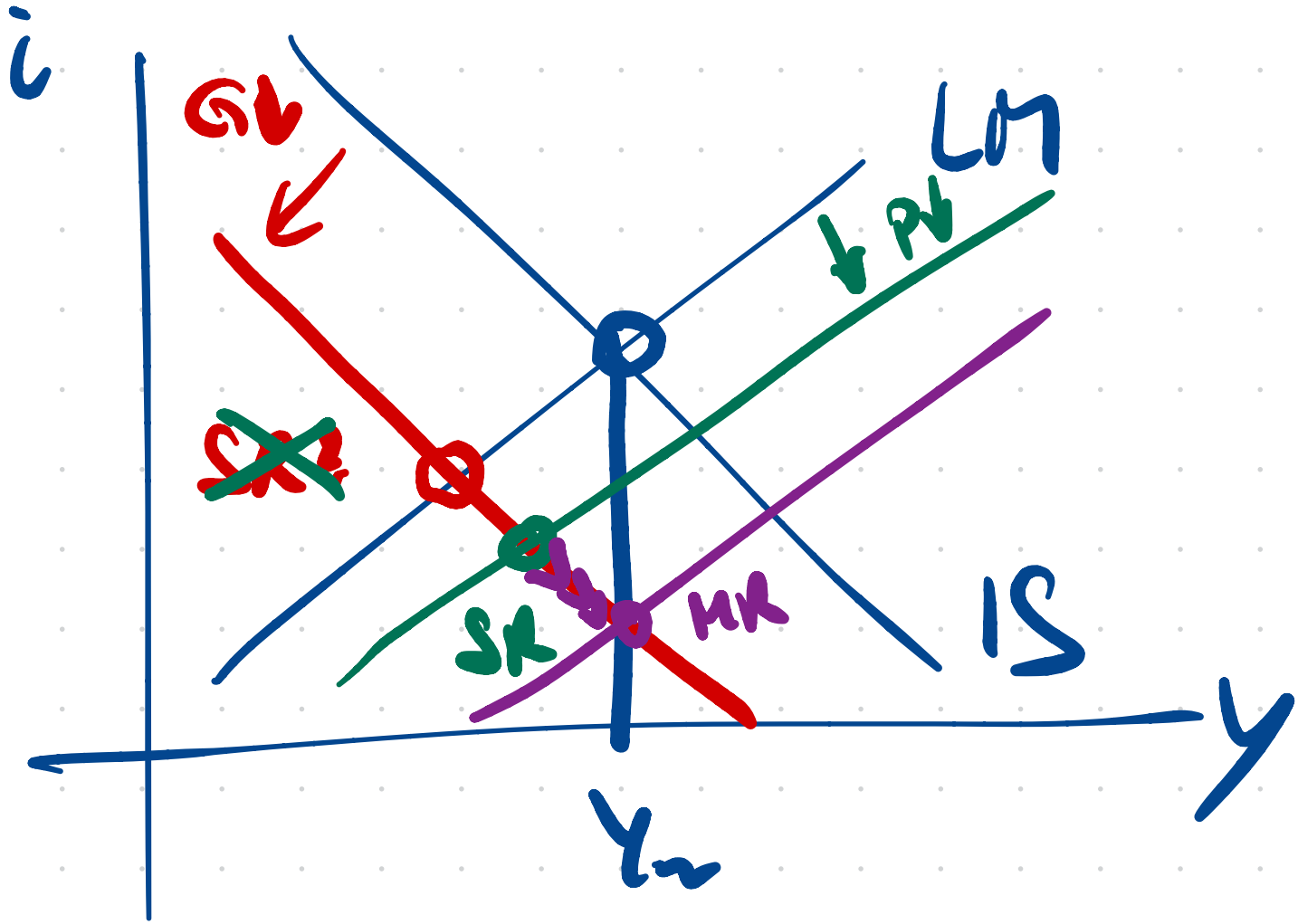
i ↓

M/P ↑

$Y = C + I + G$

$(Y - C) = I + G$

↓ ? ↓


i
G↓
LM
↓PL
SR
SR
MR
IS
Y
Yn

Deficit Reduction

Medium run:

- AS:
- AD:

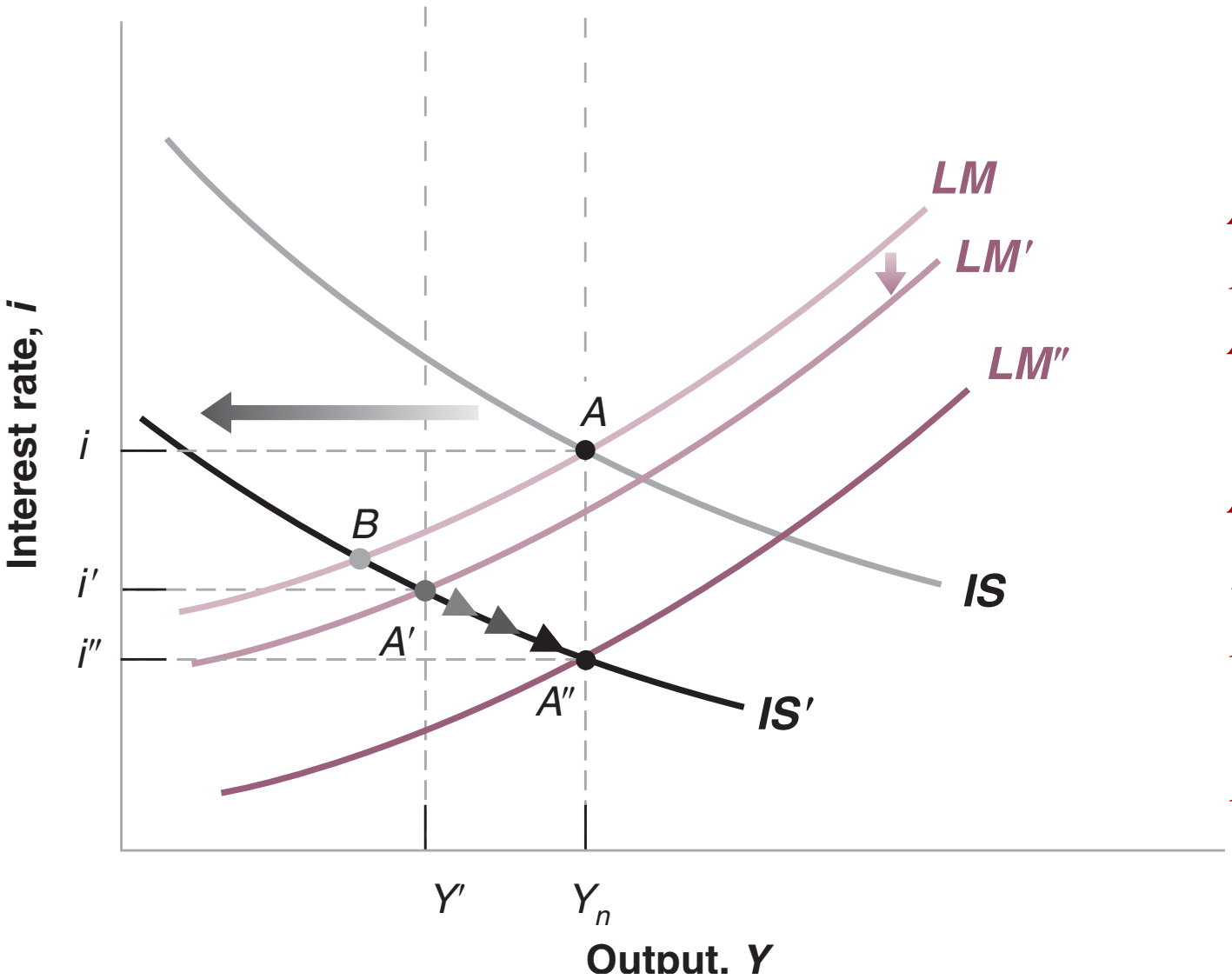
Short run:

- AS:
- AD:

Transition:

- AS shifts towards Y_n

Deficit Reduction



A: initial equilibrium

B: SR with fixed P

A': SR equilibrium

- lower P shifts LM

A'': MR equilibrium

Short run:

$P \downarrow \Longrightarrow M/P \uparrow \Longrightarrow i \downarrow$

Medium run:

$P \downarrow \Longrightarrow LM \downarrow$

Deficit Reduction

Short run:

- $Y \downarrow$
- I ambiguous ($Y \downarrow$ but $i \downarrow$)

Medium run:

- Y returns to natural level
- $I \uparrow$: crowding in

Long run:

- $K \uparrow \Longrightarrow Y \uparrow$

This is the source of frequent disagreement: how to trade off the short run pain against the long run gain.

Summary

	Short run			Medium run		
	Y	i	P	Y	i	P
$M\uparrow$	$\uparrow$	$\downarrow$	$\uparrow$	–	–	$\uparrow$
$G\uparrow$	$\uparrow$	$\uparrow$	$\uparrow$	–	$\uparrow$	$\uparrow$

Short-run effects of shocks differ from medium-run effects.

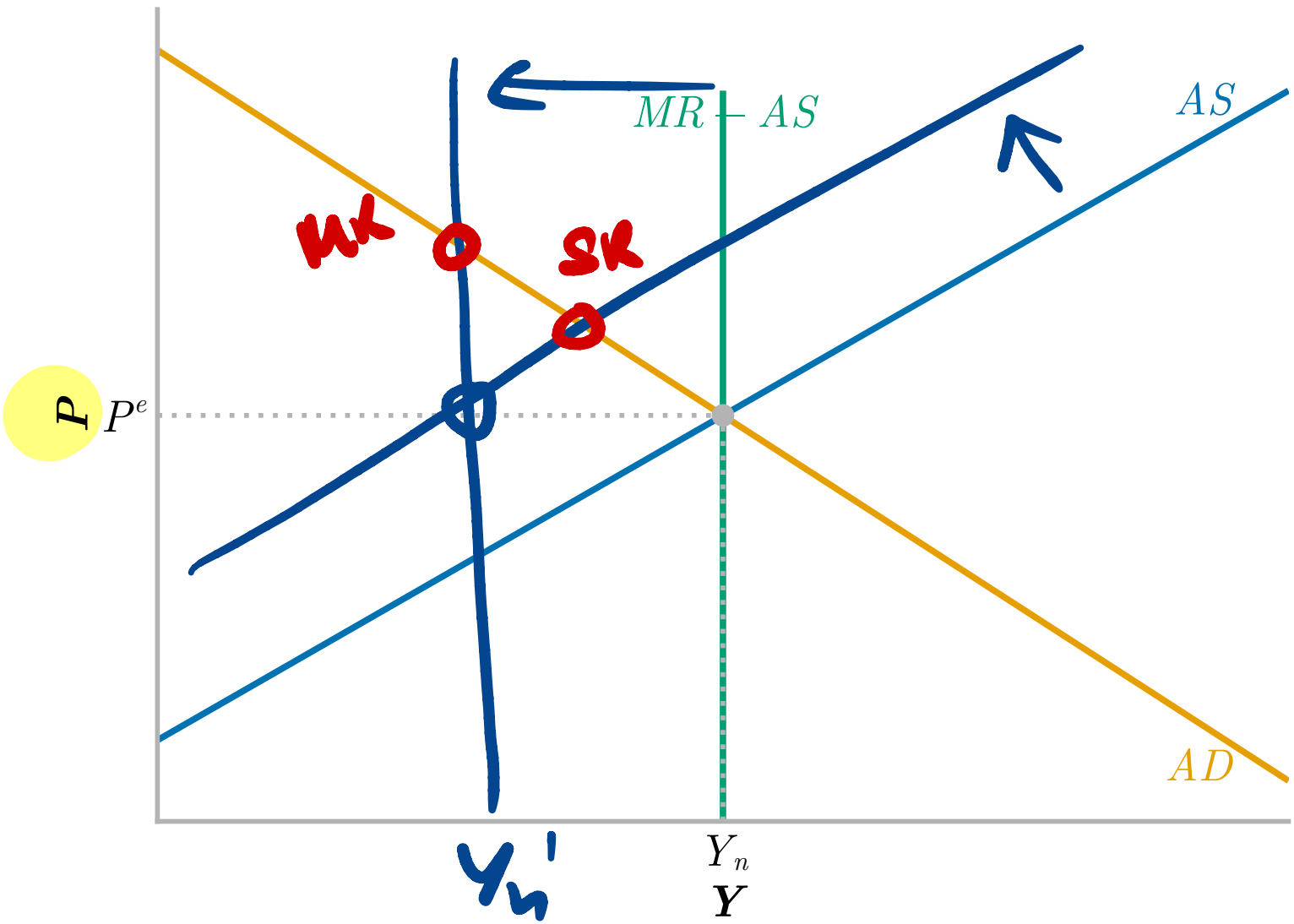
Intuition: In the short run, wages do not fully adjust (b/c P^e is sticky).

Adverse Supply Shock

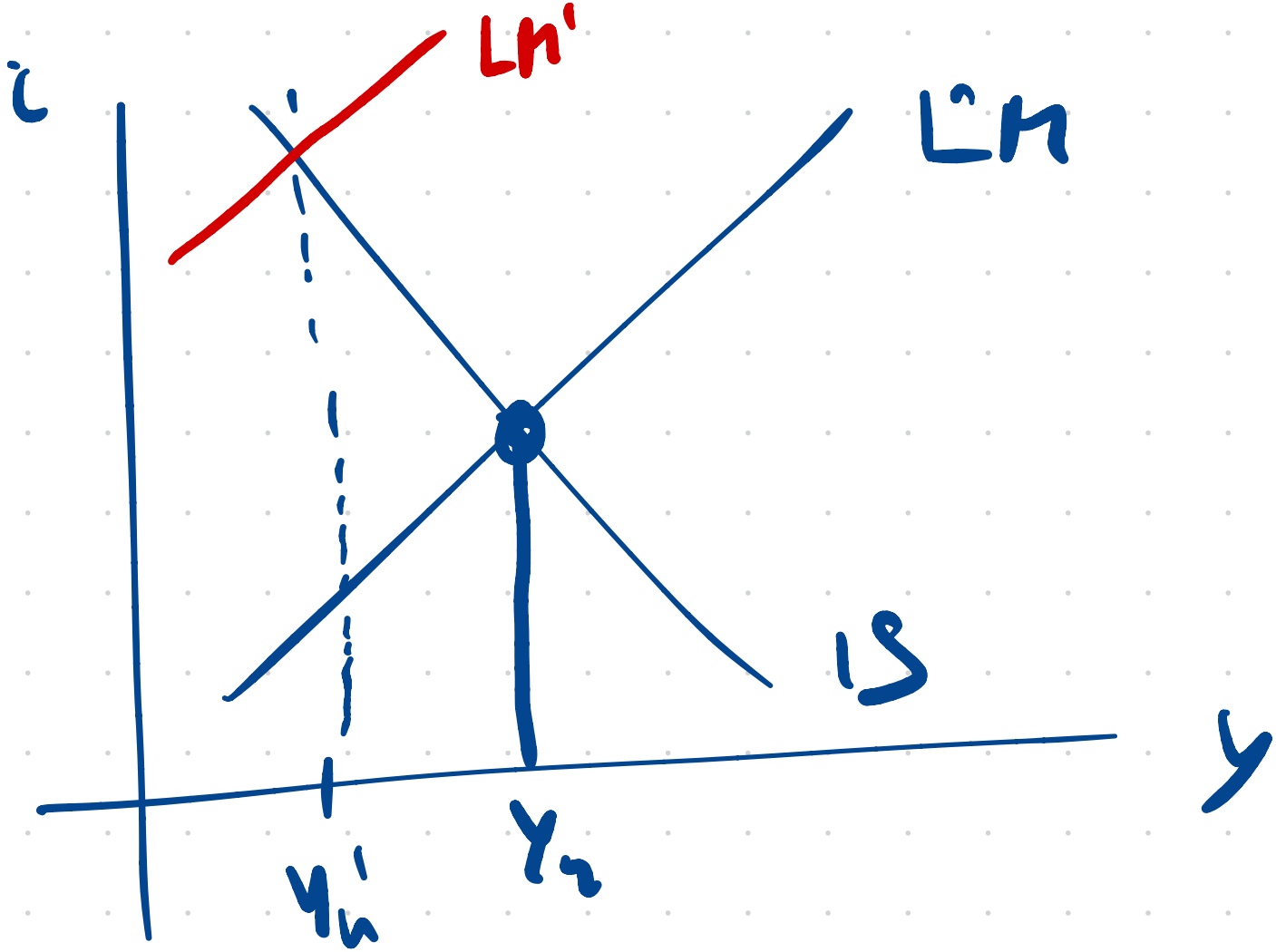
- Example: **permanent** increase in the price of oil
- Main effect: given wages, prices must rise
- Model as increase in markup: $m \uparrow$.

$$\frac{W}{P} = \frac{1}{1+m} \downarrow$$

Adverse Supply Shock



$$Y^s = F\left(\frac{P}{P^e}, \frac{1}{(1+m)}, z\right)$$



$$\frac{M}{P} = Y \cdot L(i)$$

Adverse Supply Shock

Medium run:

- MR-AS:
- Y:
- P:

Short run:

- SR-AS:
- Y:
- P:

Transition: AS shifts towards Y_n.

Stagflation

Demand shocks: output and prices move together.

Supply shocks: output and prices move against each other.

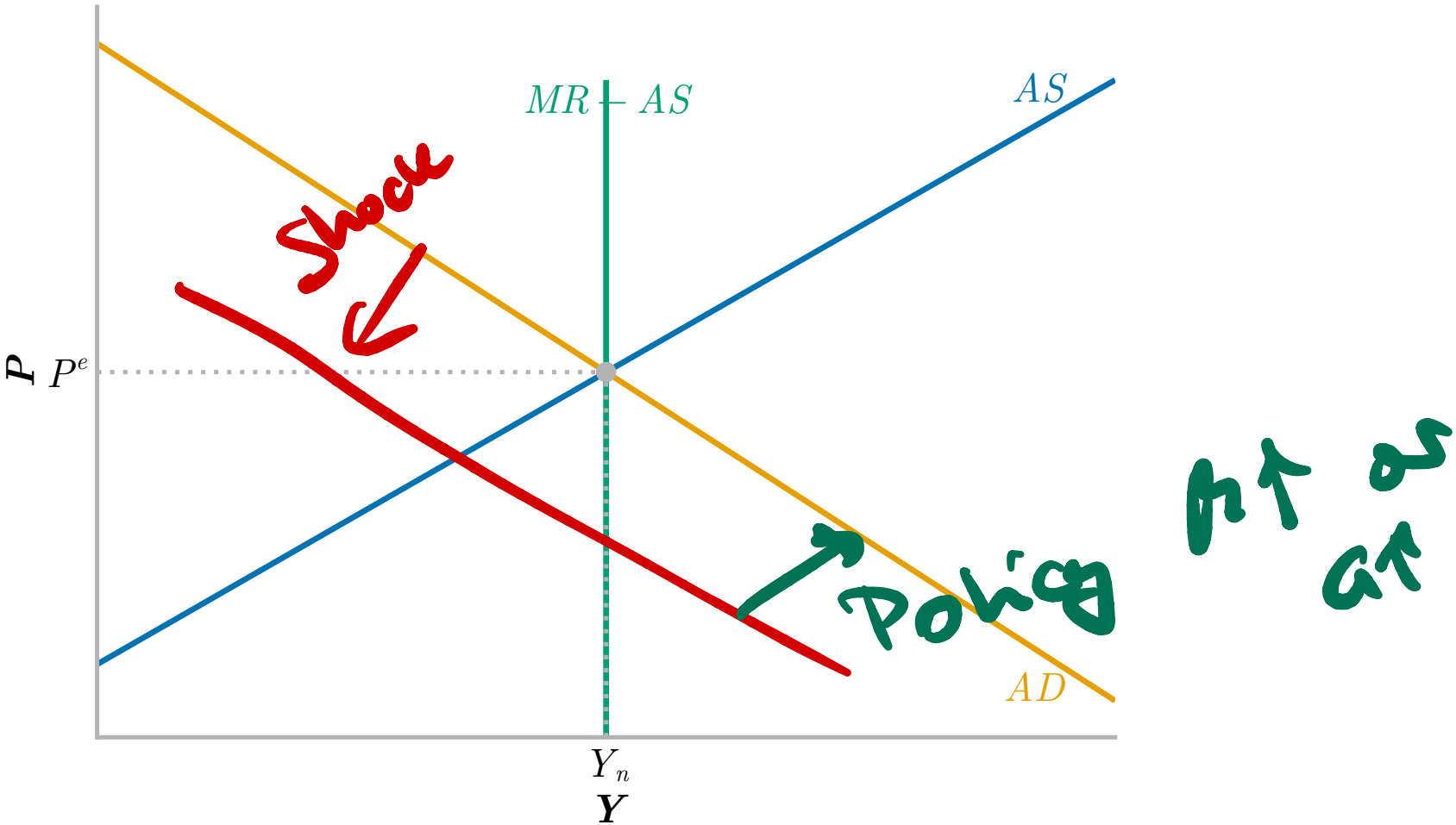
Stagflation:

- adverse supply shock creates **stag**nation and in**flation**.

Stabilization Policy

How should policy respond to recessions?

Case 1: Adverse demand shock



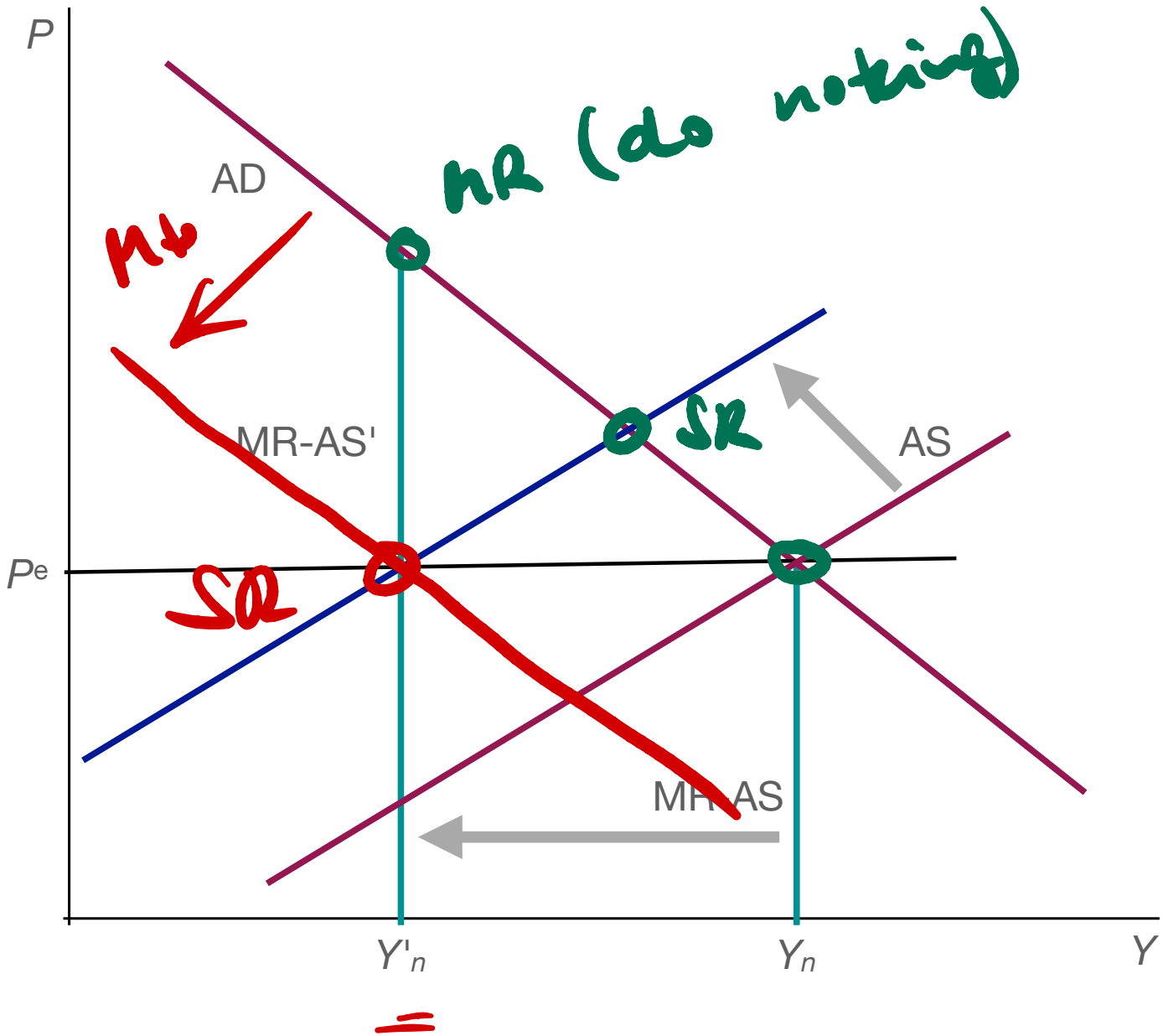
Stabilization Policy

Case 2: Adverse supply shock

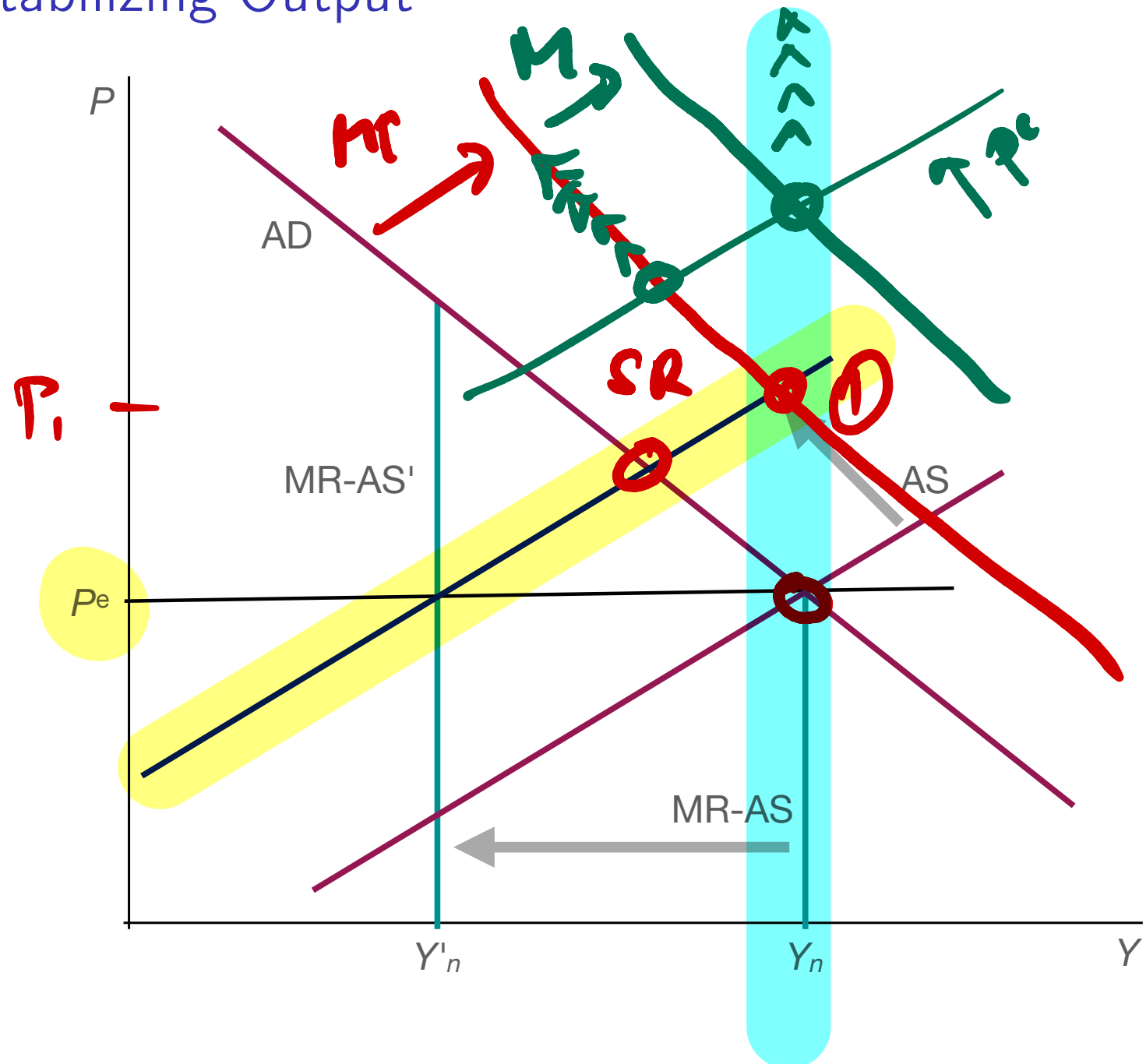
Two policy options:

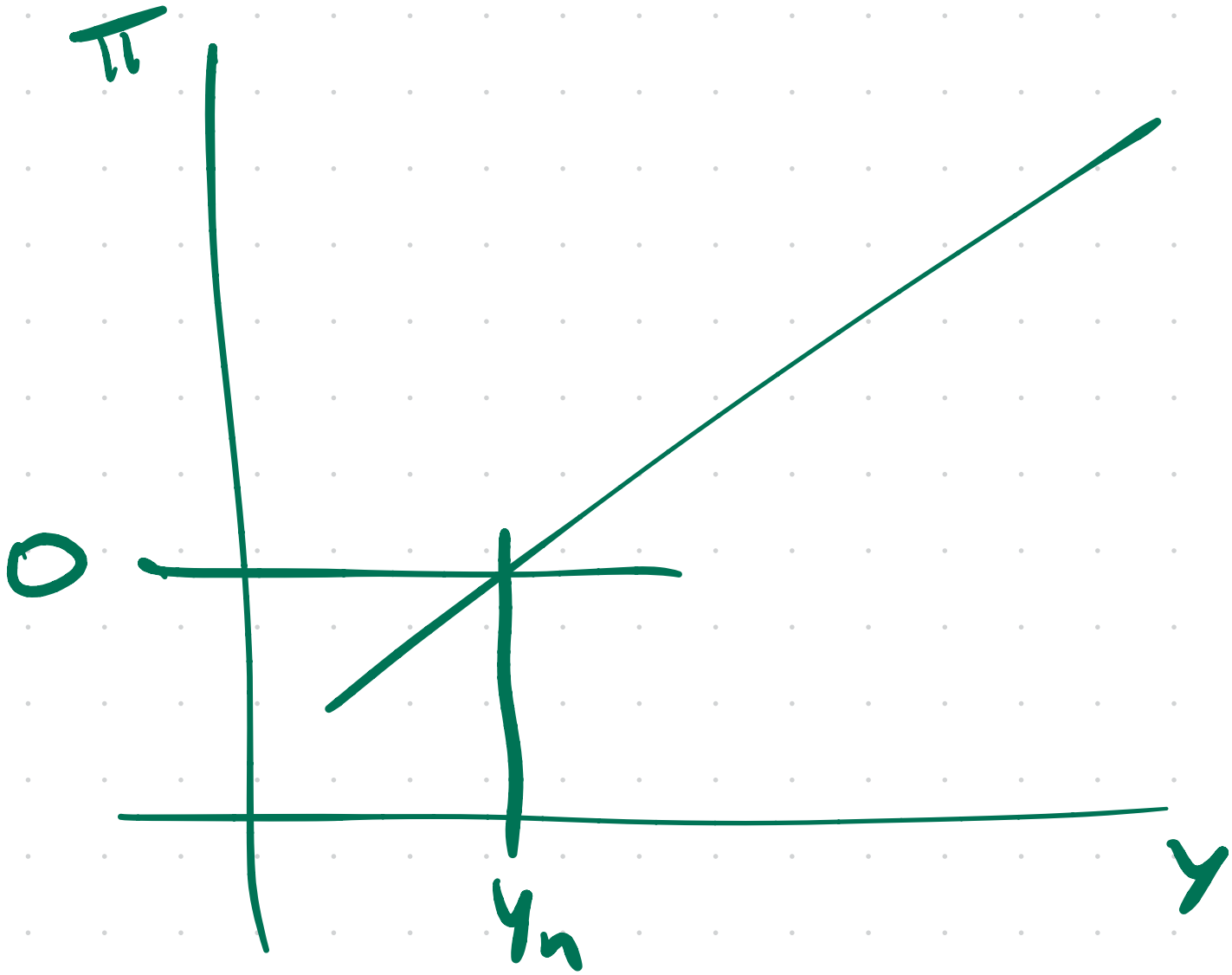
1. Stabilize prices
2. Stabilize output

Stabilizing Prices



Stabilizing Output




π
0
y_n
y

Stabilizing Output

Key point

After a supply shock

- stabilizing output at the original level fails
- the attempt produces ongoing inflation.

Stabilization Policy

What happens if policy makers misdiagnose the source of the shock?

Historical examples?

Reading

Blanchard/Johnson, Macroeconomics, 6th ed, ch. 7