AS/AD Model

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Econ520

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Objectives

In this section you will learn

1. how to put IS/LM and labor market clearing together
2. how to derive aggregate supply and demand curves
3. how to analyze policies and shocks
4. why the economy tends towards potential output in the long run

Aggregate Supply (AS)

Aggregate Supply

The aggregate supply curve is simply the labor market clearing condition

Recall

$$Y^s = F(W/P^e, z) \tag{1}$$

$$= F\left(\frac{P}{P^e}\frac{1}{1+m}, z\right) \tag{2}$$

F is upward sloping in W/P^e.

Properties of AS

Holding constant P^e: $Y \uparrow \Longrightarrow P \uparrow$

Intuition:

Holding constant Y: $P^e \uparrow \Longrightarrow P \uparrow$

Intuition:

When $P = P^e$: $Y = Y_n$ and $u = u_n$

these values define Y_n, u_n.

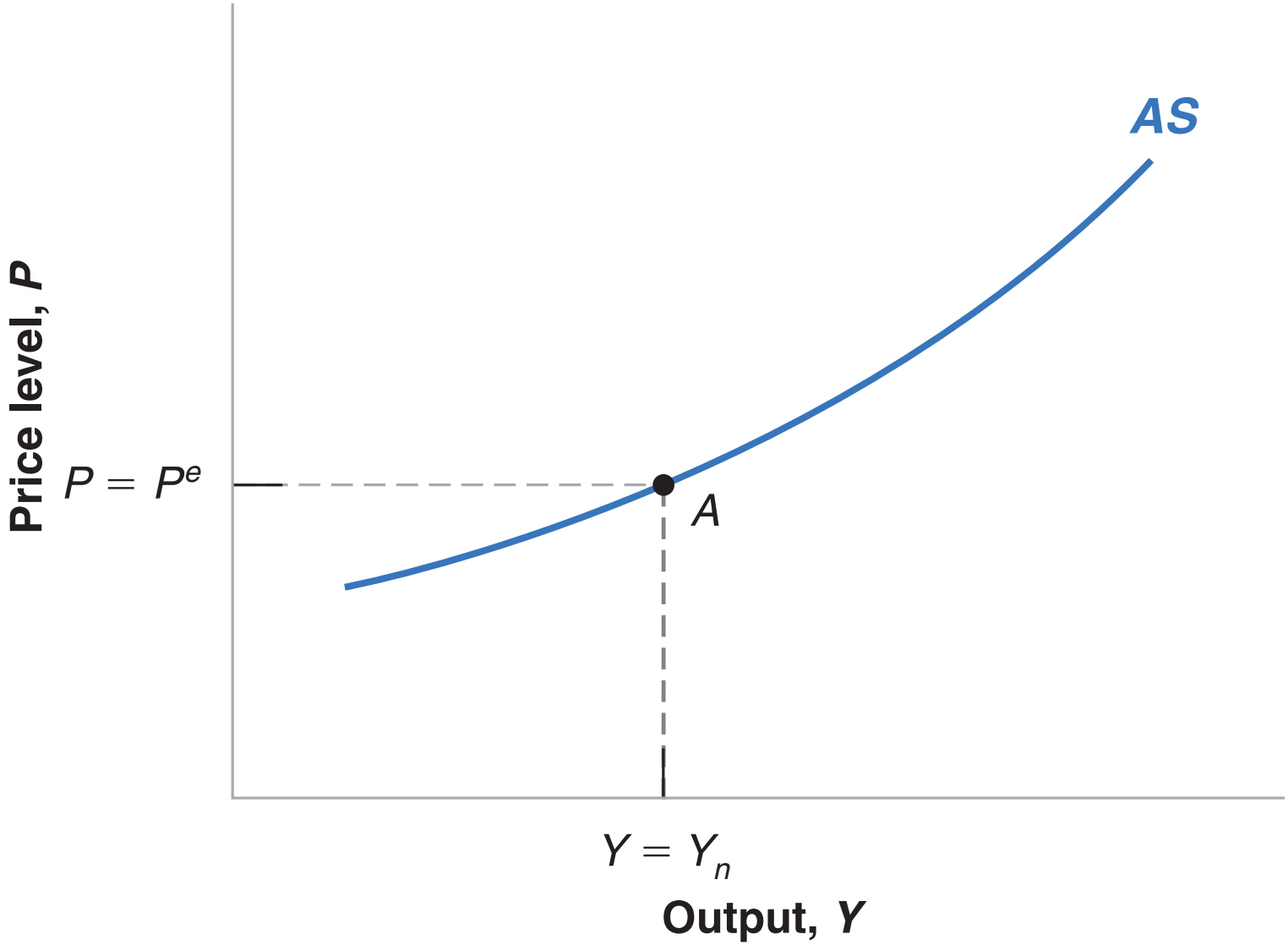
Shifters of AS

Labor market policies (z); e.g., unemployment insurance

Production costs + competition (m); e.g., oil prices

Price expectations (P^e)

Aggregate Supply



What shifts AS?

Aggregate Demand (AD)

Aggregate Demand

- AD combines IS and LM
- Recall:
  - IS: $Y = C(Y-T) + I(Y,i) + G$
  - LM: $M/P = YL(i)$
- Combine the two, so that i is eliminated

$$\mathbf{AD}: Y = Y(\underset{+}{M/P}, \underset{+}{G}, \underset{-}{T}) \tag{3}$$

- This is downward sloping: $P \uparrow \Longrightarrow Y \downarrow$
- Intuition: ...

Deriving AD

The linear case:

- IS: $Y = Y_0 + a_1 Y - a_2 i$
- LM: $M/P = L_0 - \alpha i$
  (assuming that money demand does not depend on Y)

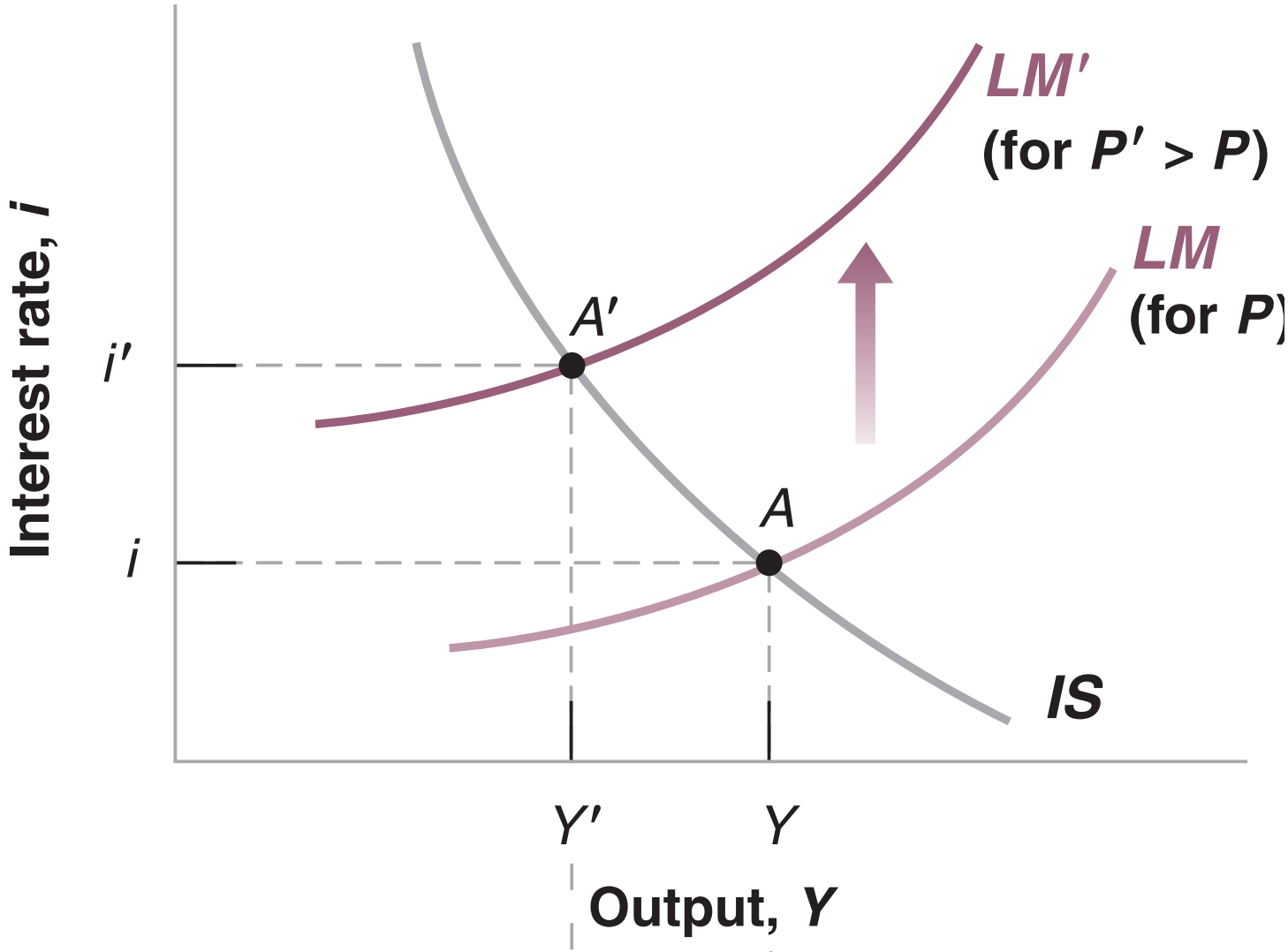
LM: $i = (L_0 - M/P)/\alpha$

AD

$$Y(1 - a_1) = Y_0 - a_2(L_0 - M/P)/\alpha \tag{4}$$

$$Y = \frac{Y_0 + a_2(M/P - L_0)/\alpha}{1 - a_1} \tag{5}$$

Deriving AD Graphically



Trace out intersection of IS/LM as $P \uparrow$.

AD Shifters

- Anything that shifts IS or LM left shifts AD left (towards lower Y)
- Examples
  - IS: $G\downarrow, T\uparrow, C_0\downarrow$
  - LM: $M\downarrow$
- These are exactly the shocks that reduce Y in the short-run model
- AD really collects all short-run equilibria, one for each P.

Equilibrium

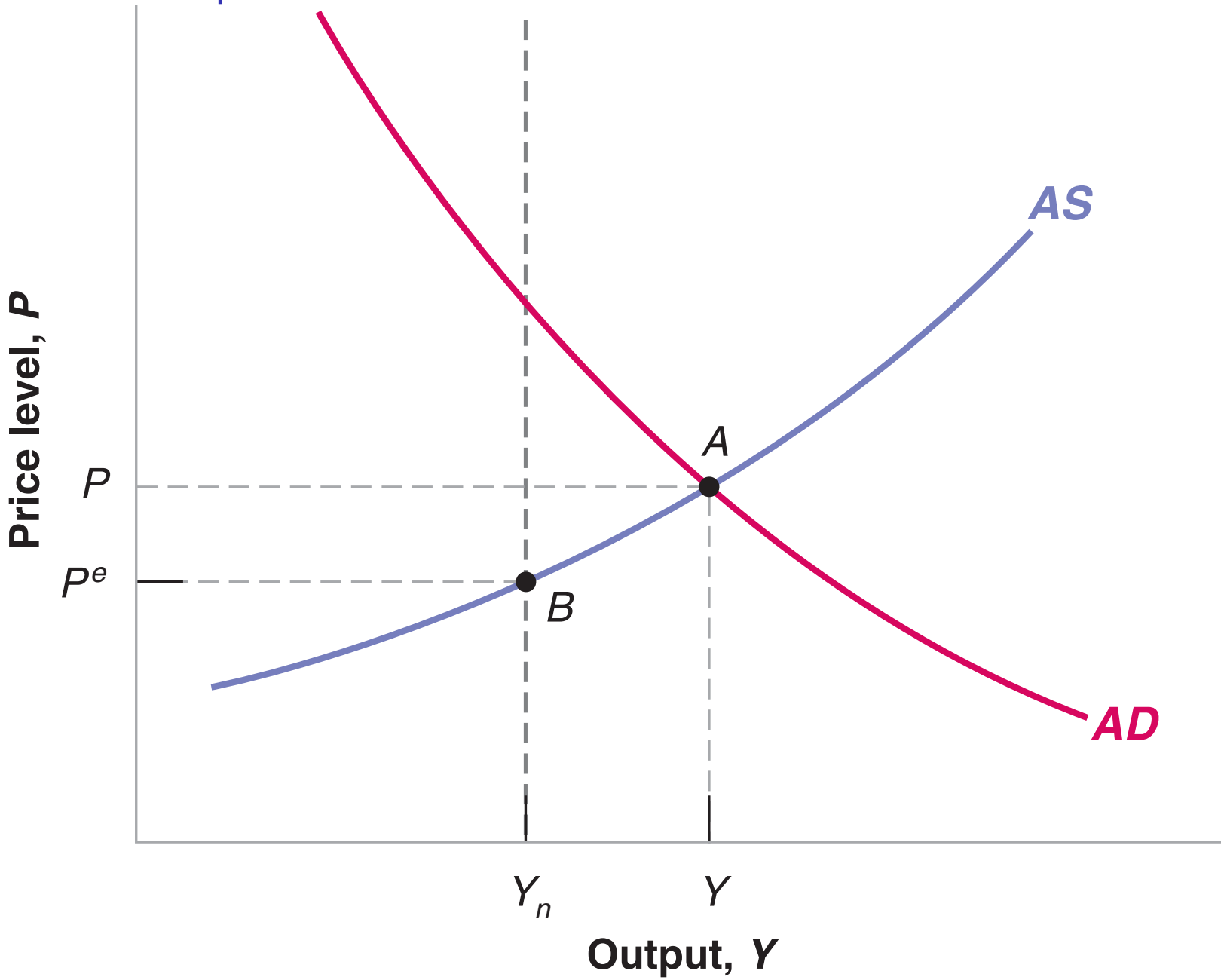
Equilibrium summary

Curve	Equation	Shifters
AS	$Y = F\left(\frac{P}{P^e}\frac{1}{1+m}, z\right)$	$m\uparrow, P^e\uparrow, z$
AD	$Y = C(Y-T)+G+I(Y,i)$ $M/P = YL(i)$	$M/P\uparrow, G\uparrow, T\downarrow$

Short run: P^e given.

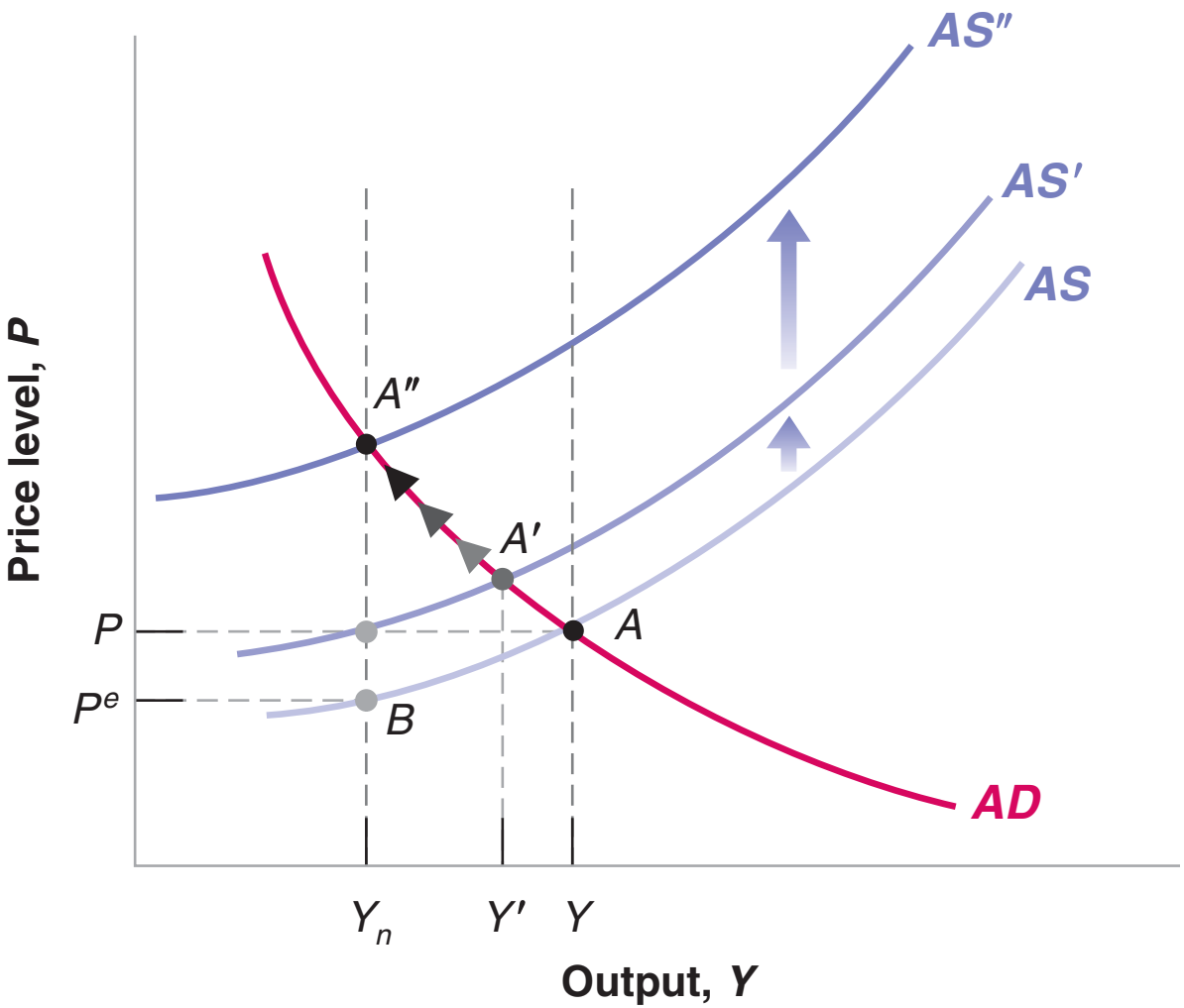
Medium run: $P^e \to P$.

Short-run Equilibrium



Clear all markets for a given P^e

Transition Towards Medium-run



Expectations adjust towards $P^e = P$

AS shifts up

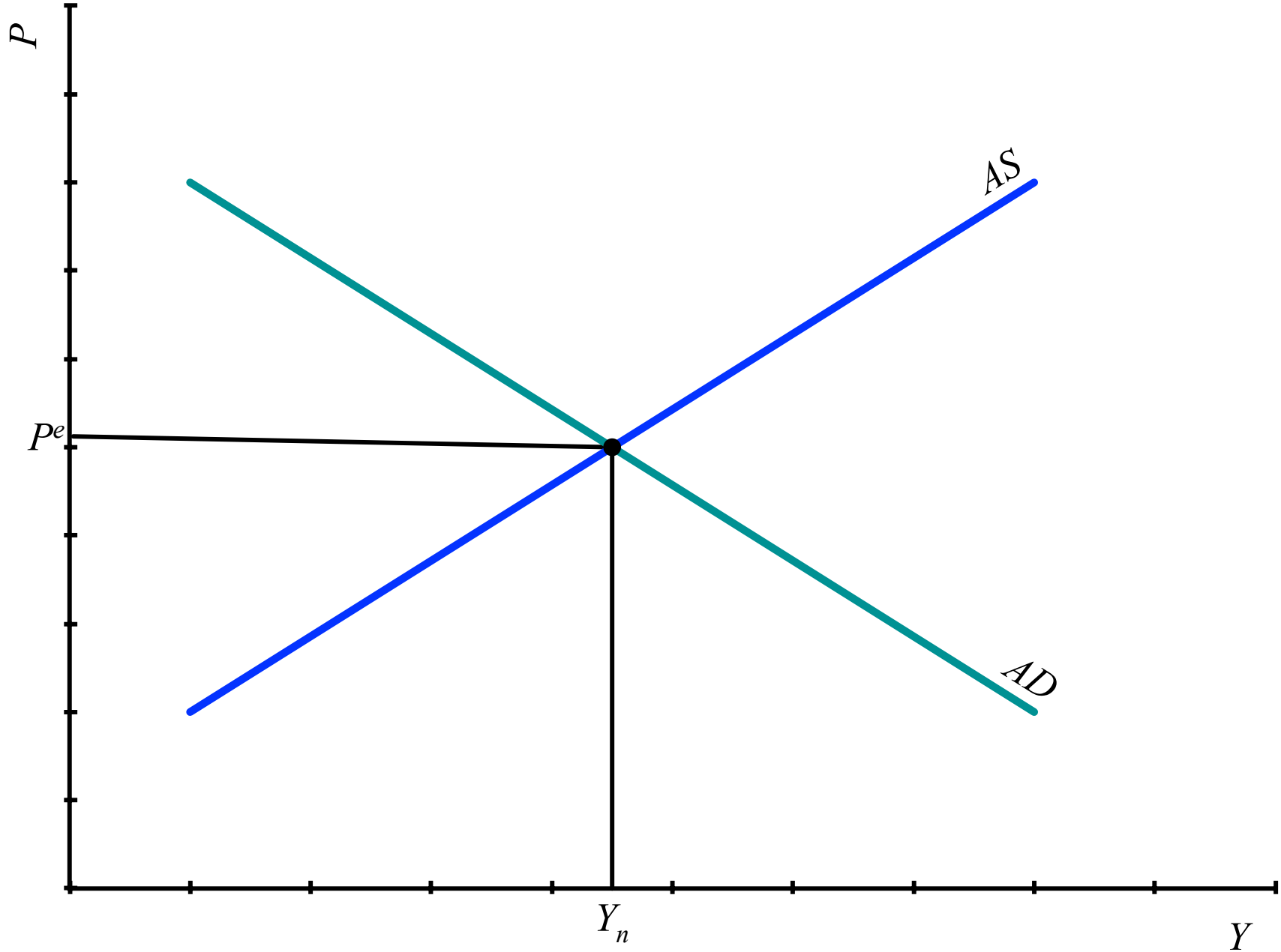
$Y \to Y_n$

Analyzing the Model

1. Start with the medium run:
   1.1 vertical supply: $Y = Y_n$
   1.2 on the point of the AD curve where $P = P^e$
2. Apply a shock
   2.1 find the new medium run $(P^e = P)$
   2.2 Y_n only changes if m or z were shocked
   2.3 find the new short-run (P^e unchanged)
3. Transition
   3.1 AS curve shifts towards new medium run equilibrium

Applications

Monetary Expansion: $M \uparrow$



Monetary Expansion

Medium run:

Short run:

Transition:

- AS shifts toward Y_n.

Monetary Expansion

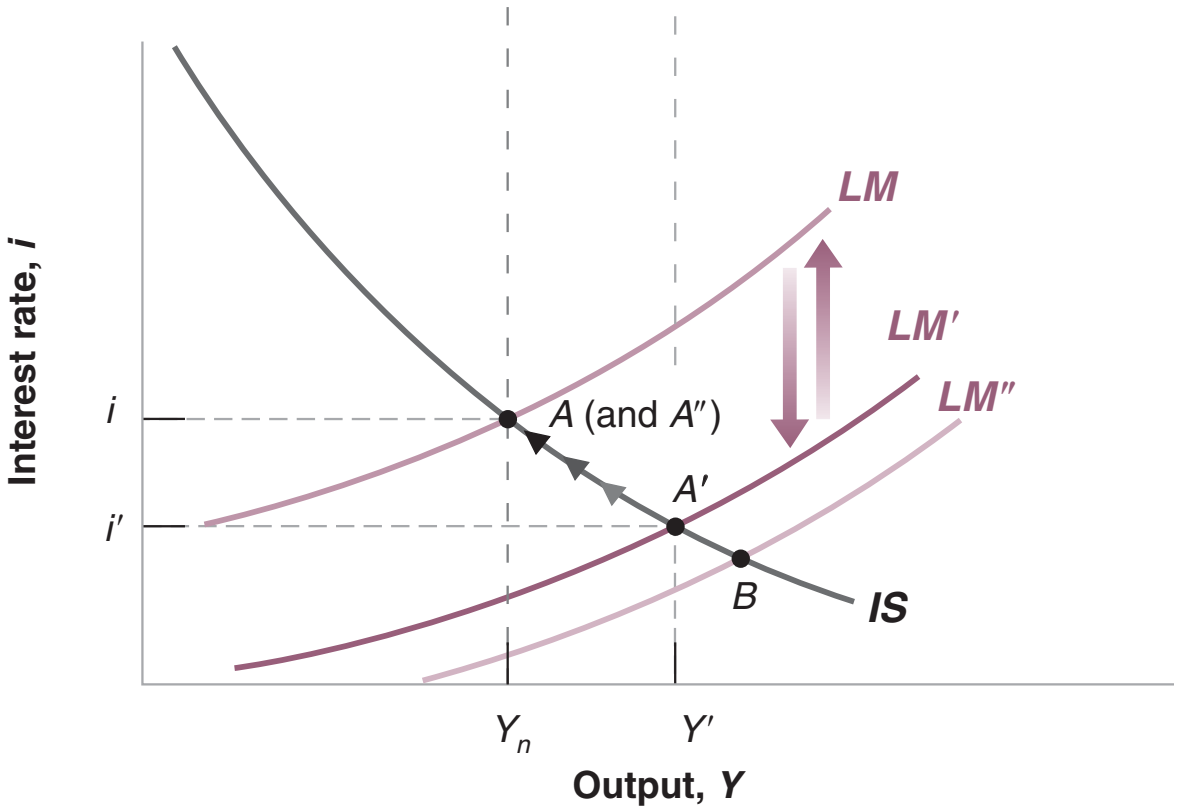
Result

Money is neutral in the medium run:

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

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

Intuition

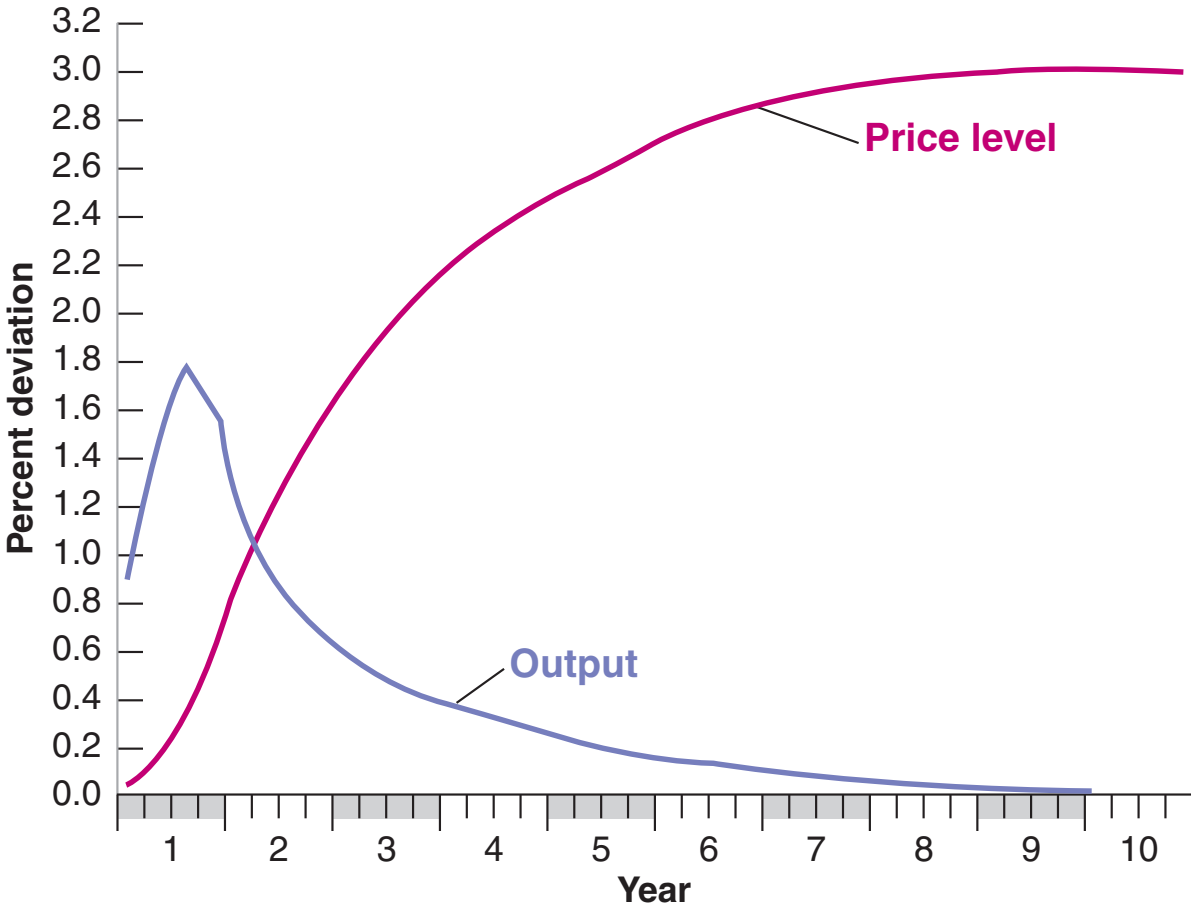


$M \uparrow \Longrightarrow i \downarrow \Longrightarrow I \uparrow$

With fixed P: $A \to B$ (IS/LM)

$P \uparrow$ dampens the short-run effect

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

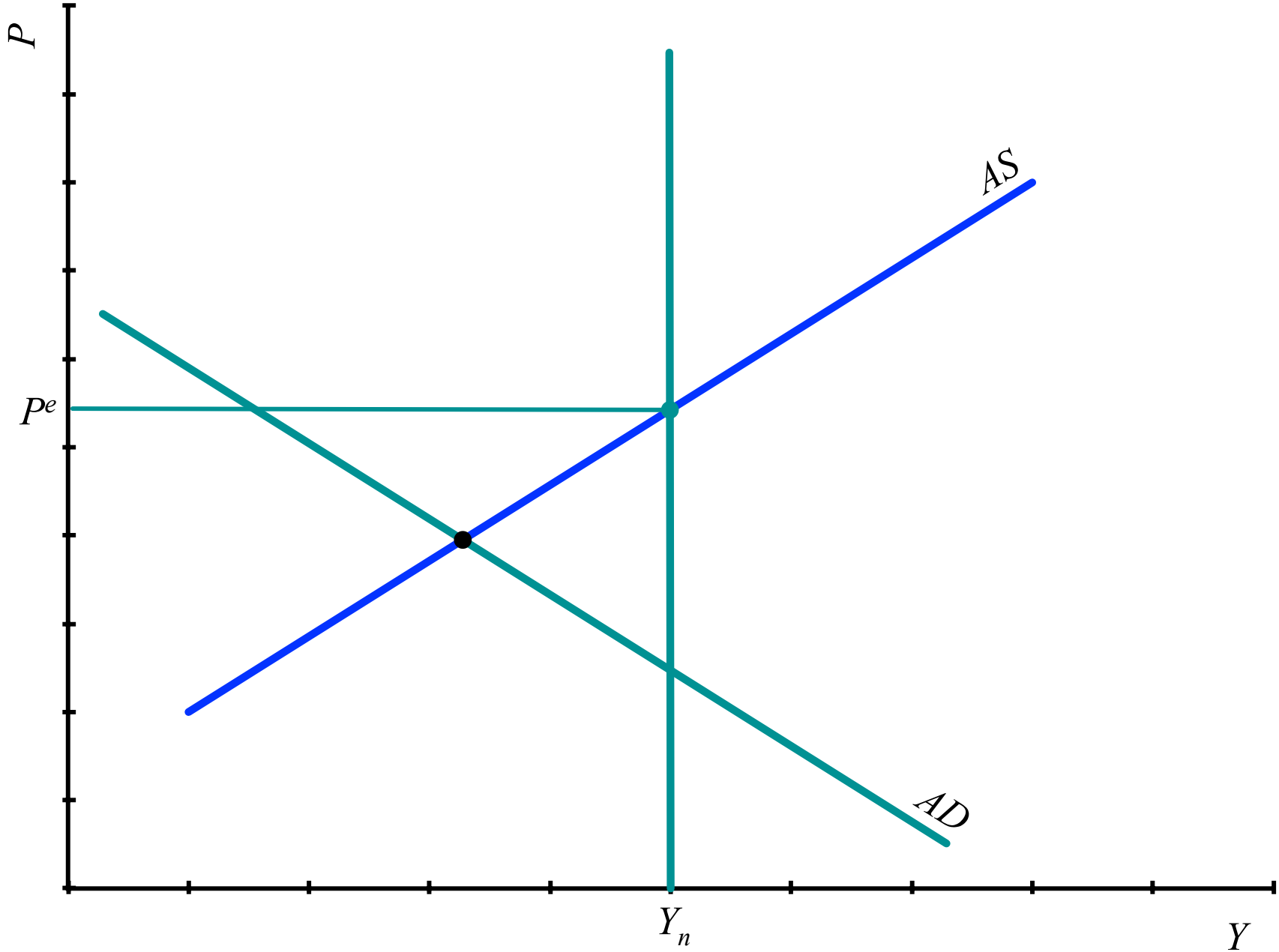
Suppose the economy is hit by an adverse AD shock

The Fed counters by expanding M

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

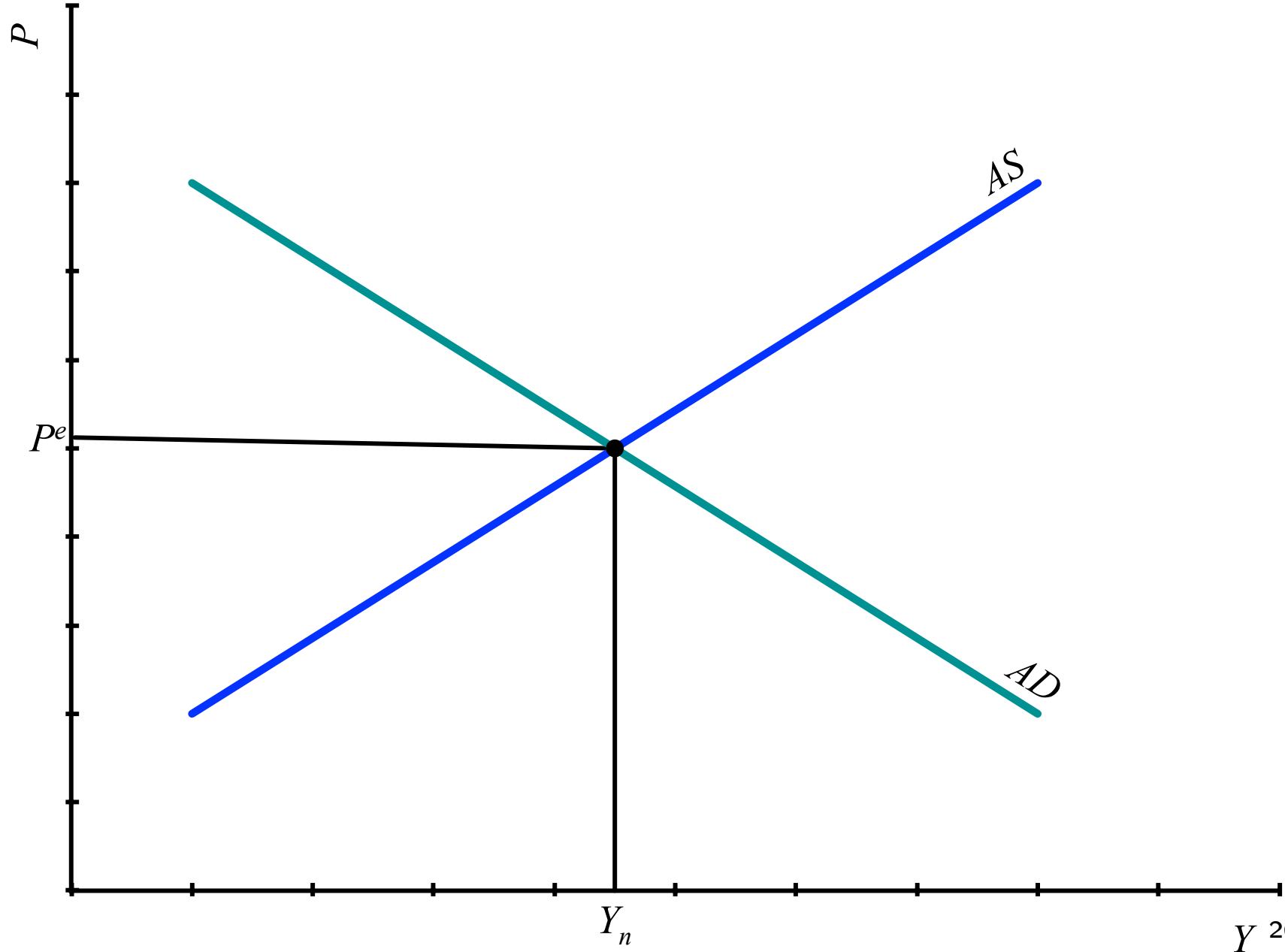
What happens?

Why Monetary Policy Is Hard



Deficit Reduction

The shock: $G \downarrow$.



Deficit Reduction

Medium run:

- AS:
- AD:

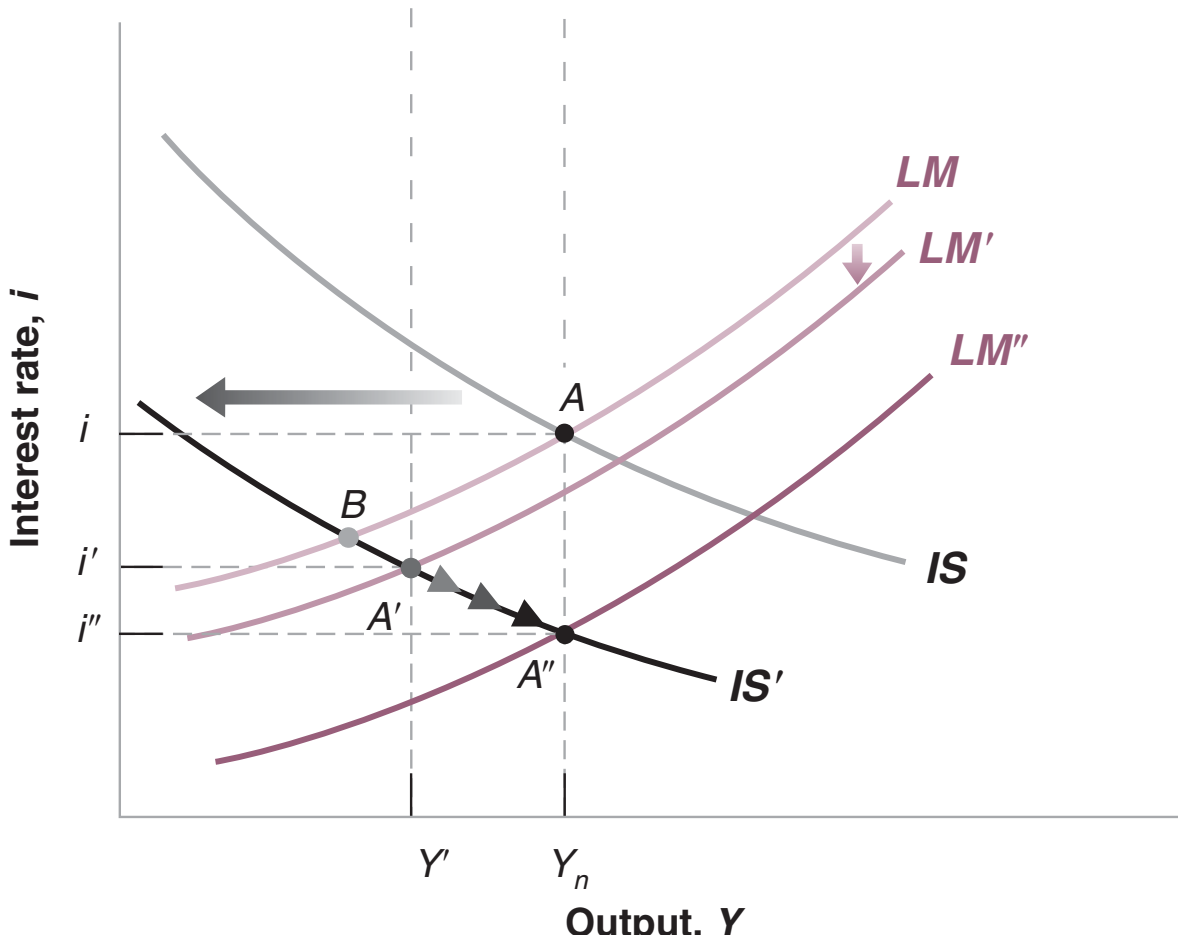
Short run:

- AS:
- AD:

Transition:

- AS shifts towards Y_n

Deficit Reduction



With fixed P: $A \to B$.

Short run: $G \downarrow \Longrightarrow P \downarrow \Longrightarrow M/P \uparrow \Longrightarrow i \downarrow$

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 current 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
$M\uparrow$	$\uparrow$	$\downarrow$	$\uparrow$	–	–	$\uparrow$
$G\uparrow$	$\uparrow$	$\uparrow$	$\uparrow$	–	$\uparrow$	$\uparrow$

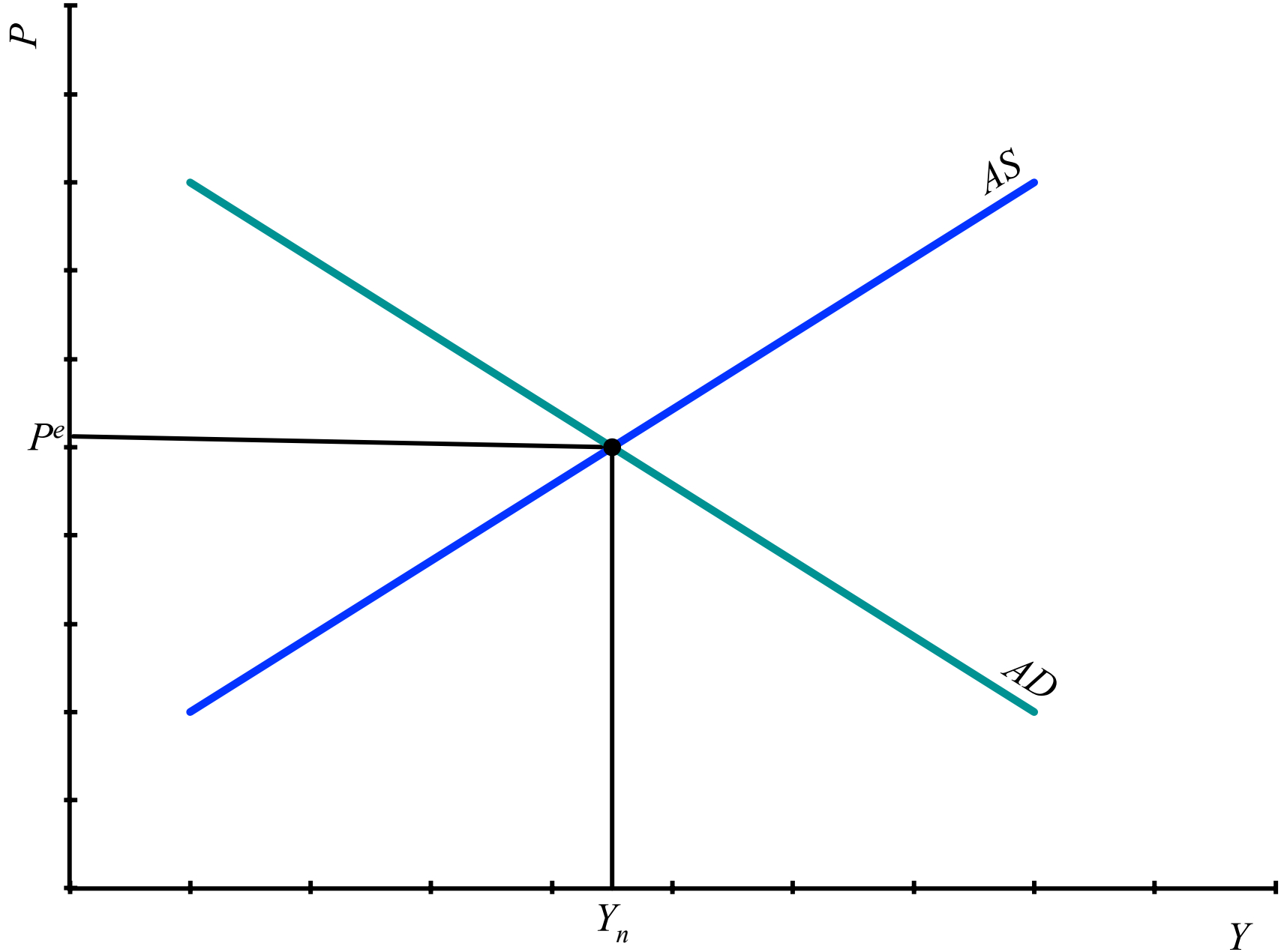
Short-run effects of shocks differ from medium-run effects.

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: $m \uparrow$.

Adverse Supply Shock



Adverse Supply Shock

Medium run:

Short run:

Transition: AS shifts towards Y_n.

Stagflation

Demand shocks: output and prices move together.

Supply shocks: output and prices move against each other.

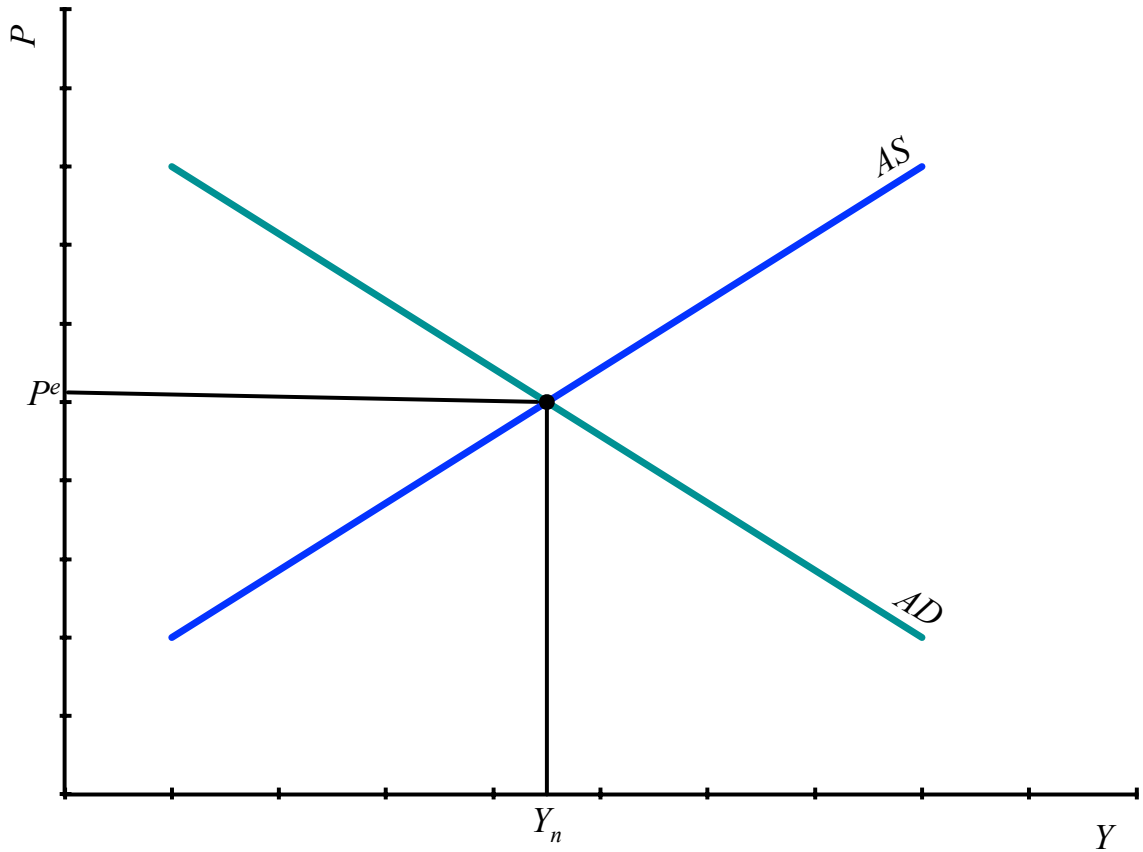
Stagflation:

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

Stabilization Policy

How should policy respond to recessions?

Case 1: Adverse demand shock



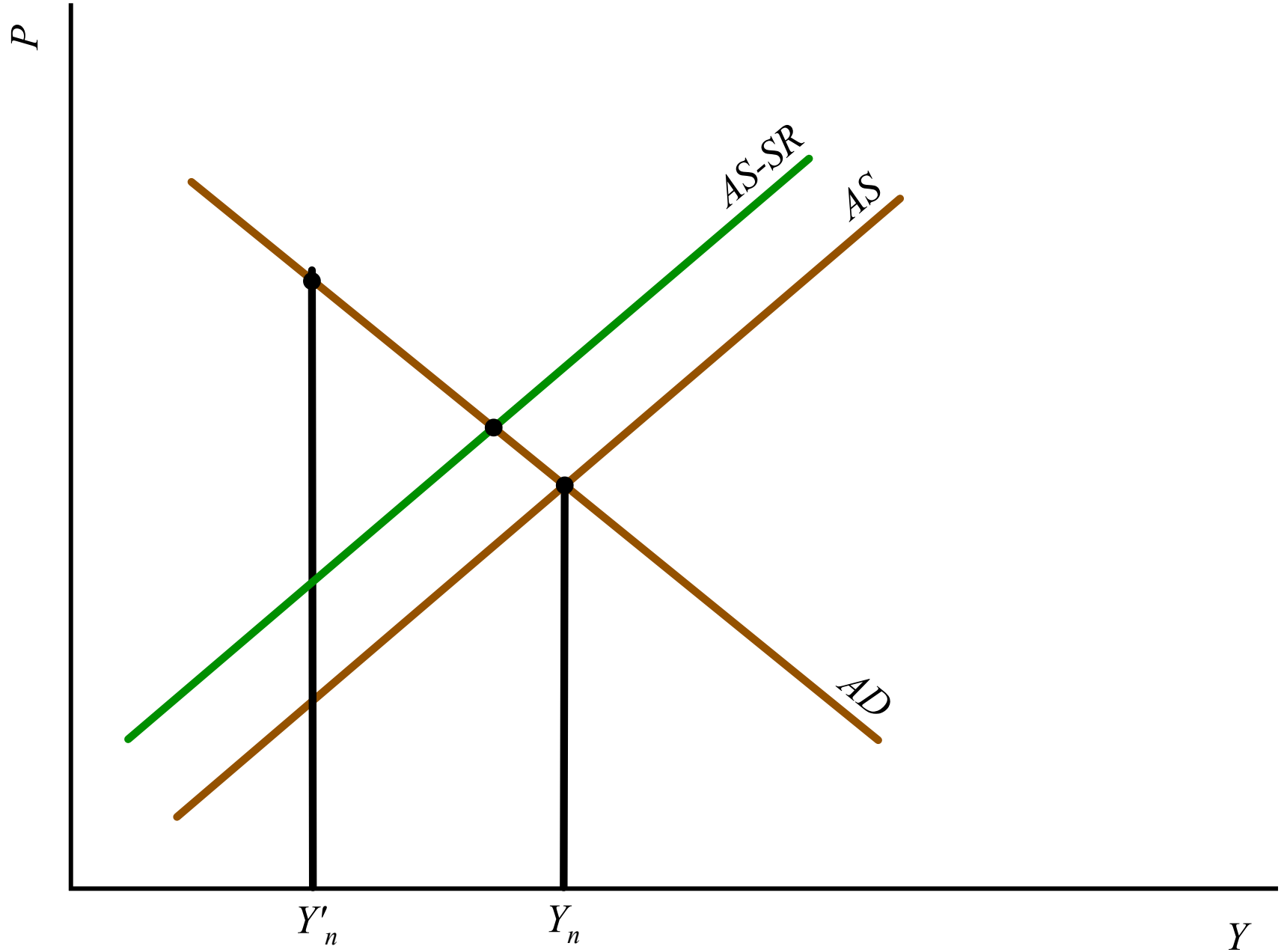
Stabilization Policy

Case 2: Adverse supply shock

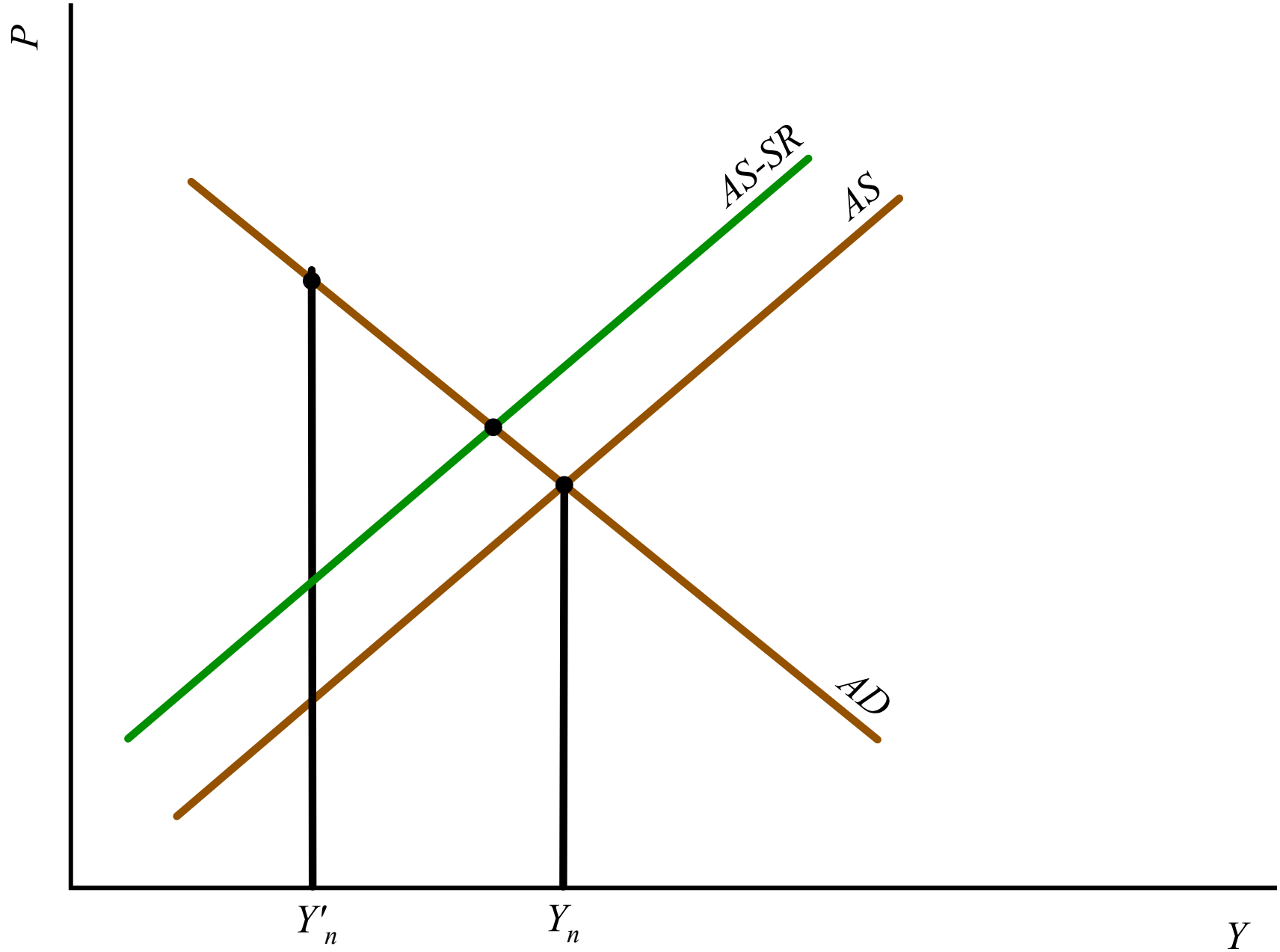
Two policy options:

1. Stabilize prices
2. Stabilize output

Stabilizing Prices



Stabilizing Output



Stabilization Policy

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

Historical examples?

Reading

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