INTERMEDIATE MACROECONOMICS

7 – THE IS-LM-PC MODEL

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Share 3 take-aways from the reading (textbook Chapter 9)

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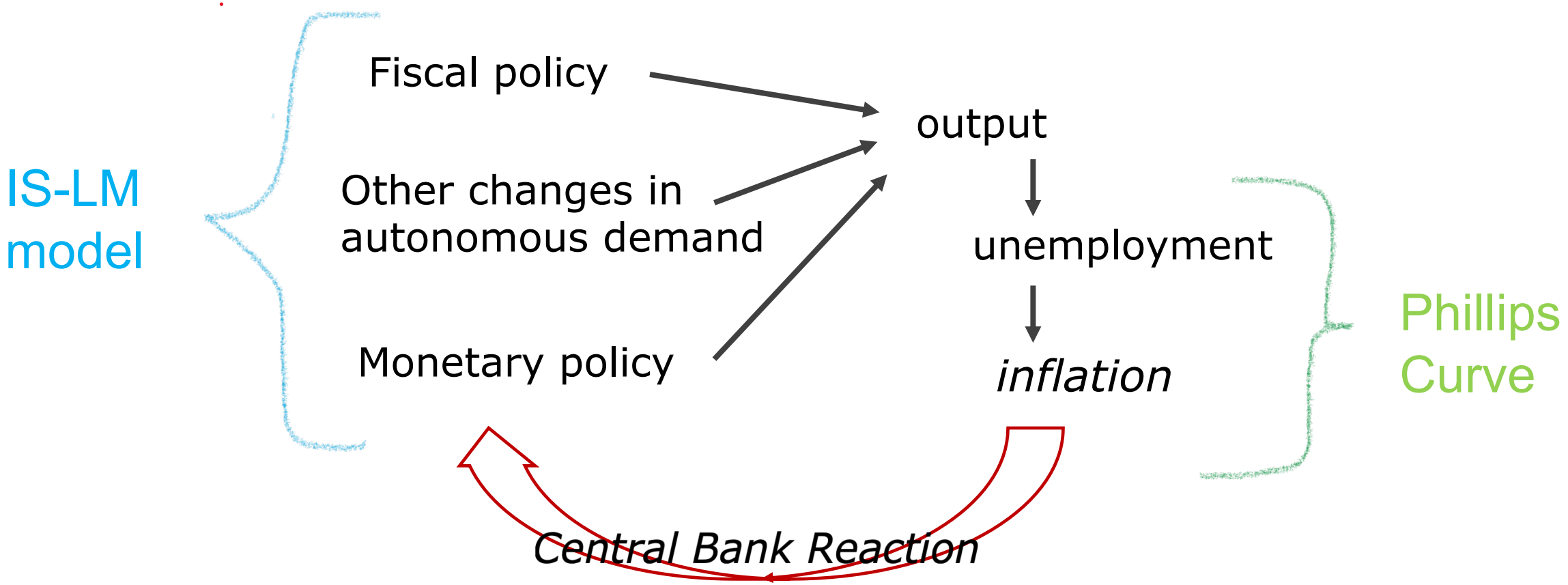
From the Short to the Medium Run: The IS-LM-PC Model

In Chapters 3 through 6 we looked at equilibrium in the goods and financial markets and saw how, in the short run, output is determined by demand. In Chapters 7 and 8, we looked at equilibrium in the labor market and derived how unemployment affects inflation. We now put the two parts together to characterize the behavior of output, unemployment, and inflation, in both the short run and the medium run. When confronted with a macroeconomic question about a particular shock or a particular policy, this model, which we shall call the IS-LM-PC (PC for Phillips curve), is typically the model I start from. I hope you find it as useful as I do.

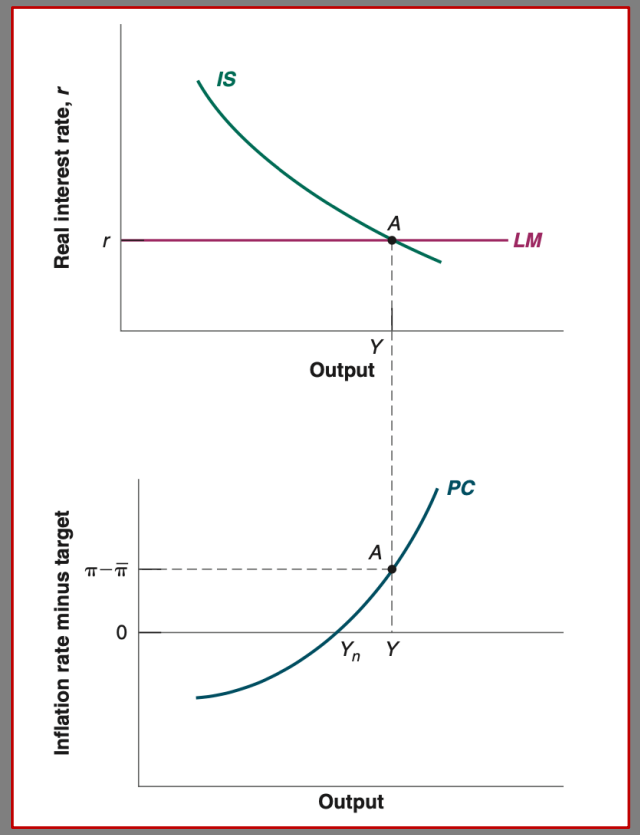
Section 7: The roadmap

1. The IS-LM-PC model.
2. The Central Bank & the medium-run equilibrium.
3. Policy evaluation according to the IS-LM-PC model.
4. Problems & complications.

IS-LM-PC: The main ideas



7.1 THE IS-LM-PC MODEL



IS-LM + PC

- IS Curve:

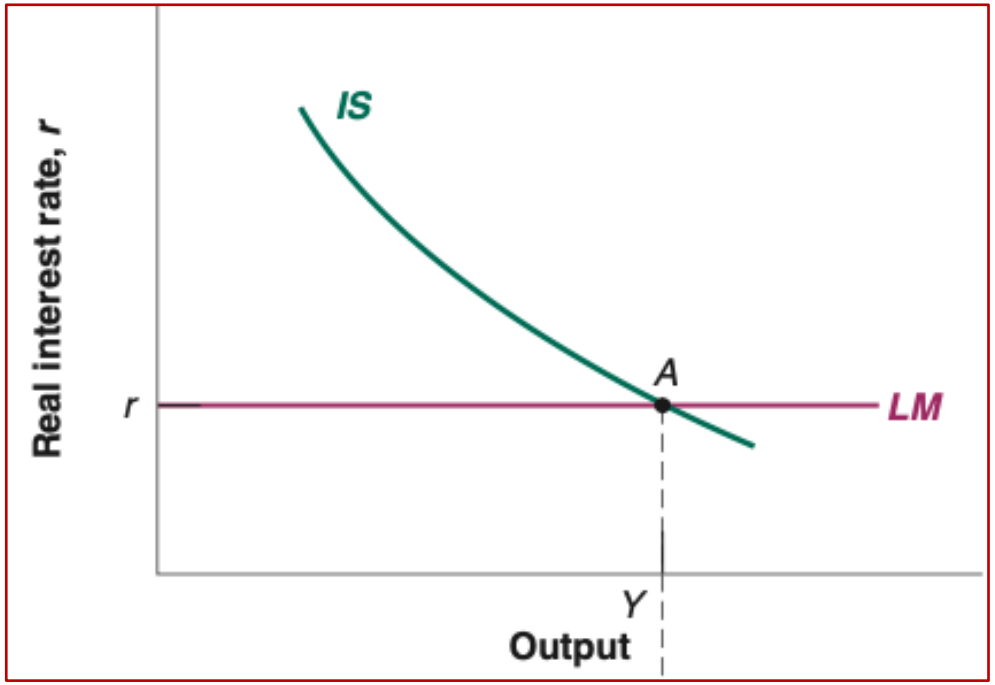
$$Y = C(Y - T) + I(Y, r) + \bar{G}$$

- LM Curve:

$$r = \bar{r}$$

- PC Curve:

$$\pi - \pi^e = -\alpha(u - u_n)$$



The PC in terms of output

- *Okun's law*: The higher *Y*, the lower *u*.
- After some algebra (see textbook), can rewrite PC as

$$\pi - \pi_e = (\alpha/L)(Y - Y_n)$$

Output gap

- With 'accelerationist' PC:

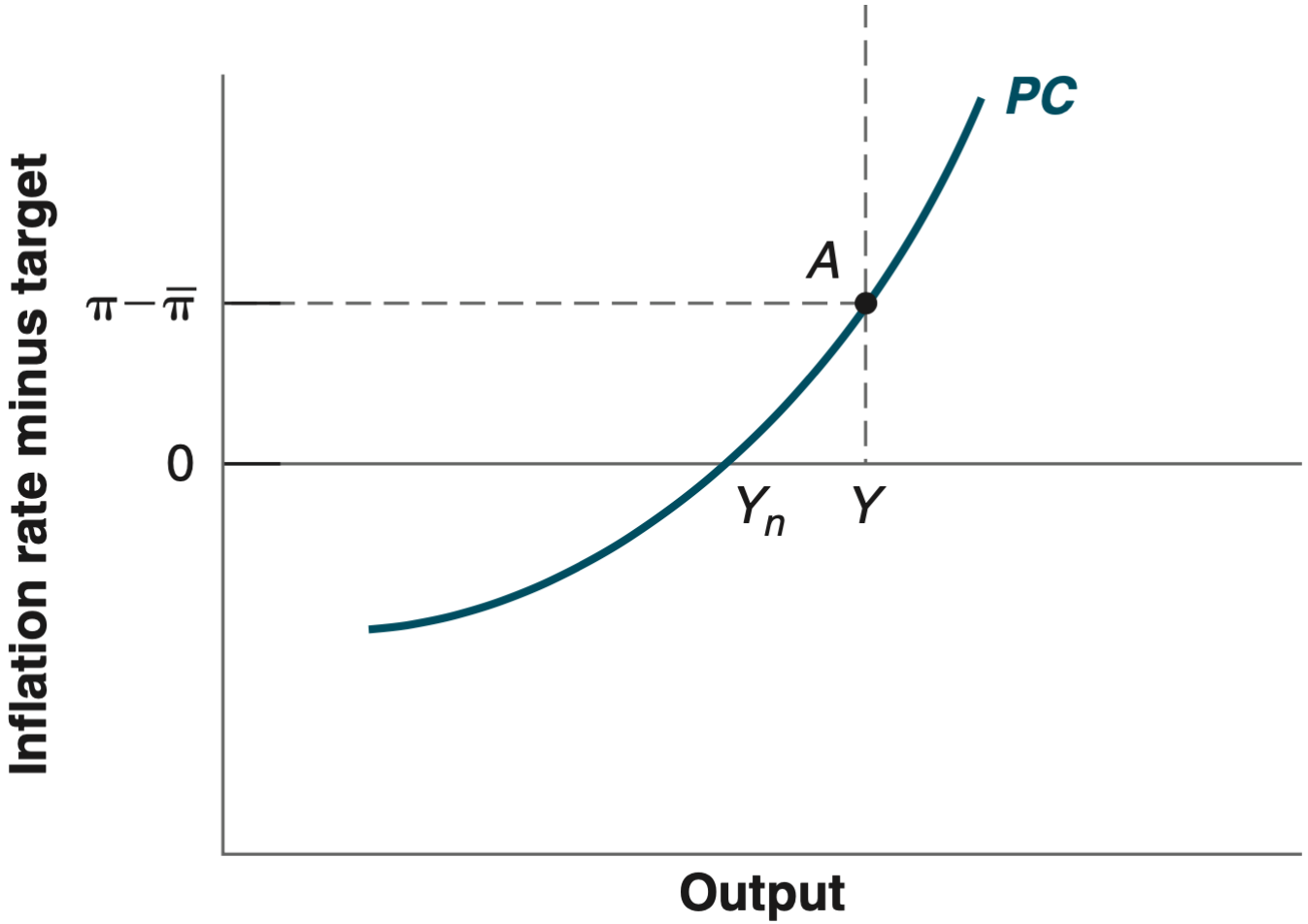
$$\pi_t - \pi_{t-1} = (\alpha/L)(Y - Y_n)$$

- With 'original' PC:

Assume $\bar{\pi}$ is the Fed's target

$$\pi_t = \bar{\pi} + (\alpha/L)(Y - Y_n)$$

The PC in terms of output (with anchored expectations)



Positive slope: why?

Higher output

↓

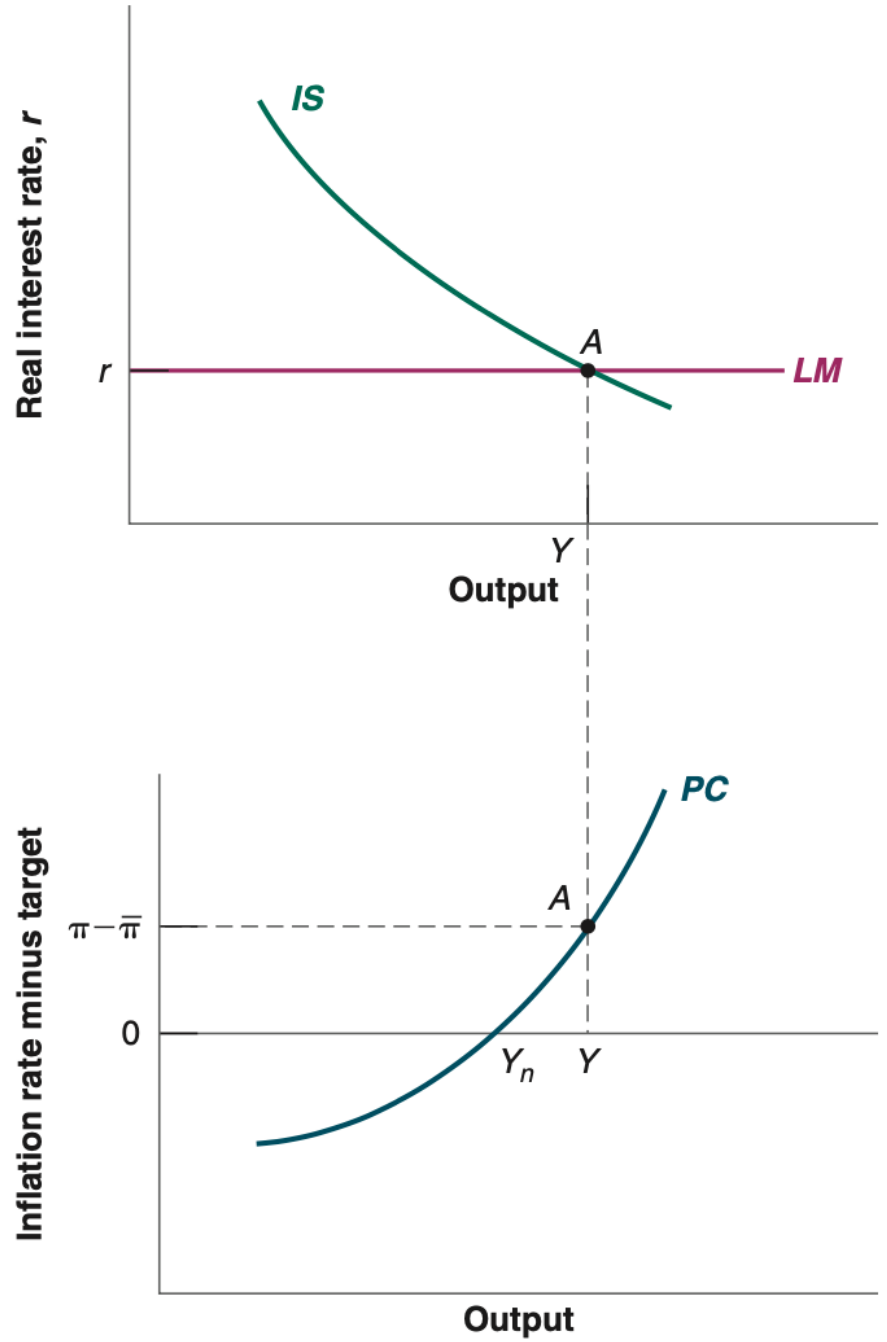
Lower unemployment

↓

Higher inflation

The IS-LM-PC model

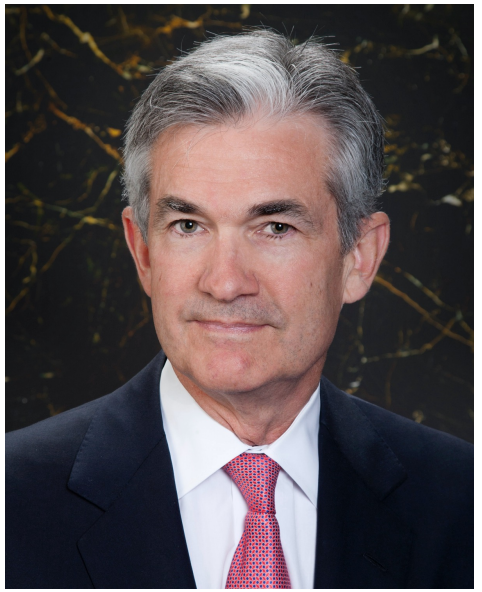
- Aggregate demand determines short-run output level (*IS-LM*).
- The level of output determines the rate of inflation (*PC*).



7.2 THE CENTRAL BANK & THE MEDIUM-RUN EQUILIBRIUM

Intermediate Macroeconomics (ECON 204) – Fall 2022
Instructor: Daniele Girardi

The Central Bank's monetary policy rule



- Original PC with anchored expectations

$$\pi_t - \bar{\pi} = (\alpha/L)(Y - Y_n)$$

  - $\bar{\pi}$ = Central Bank's inflation target (2% in the US)

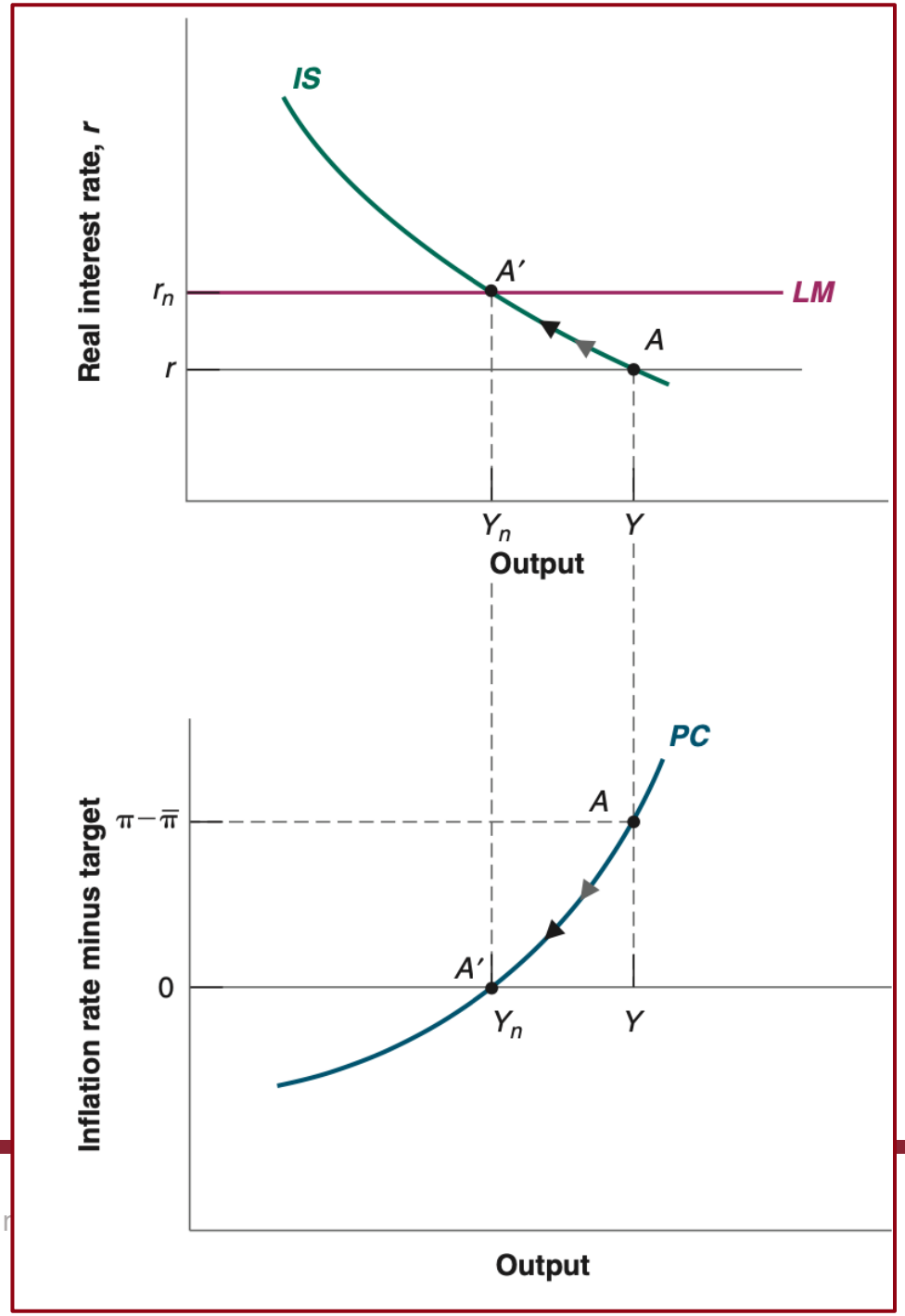
$Y > Y_n$ → $u < u_n$ → $\pi_t > \bar{\pi}$ → CB raises *r*.

$Y < Y_n$ → $u > u_n$ → $\pi_t < \bar{\pi}$ → CB cuts *r*.

$Y = Y_n$ → $u = u_n$ → $\pi_t = \bar{\pi}$ → CB keeps *r* constant.

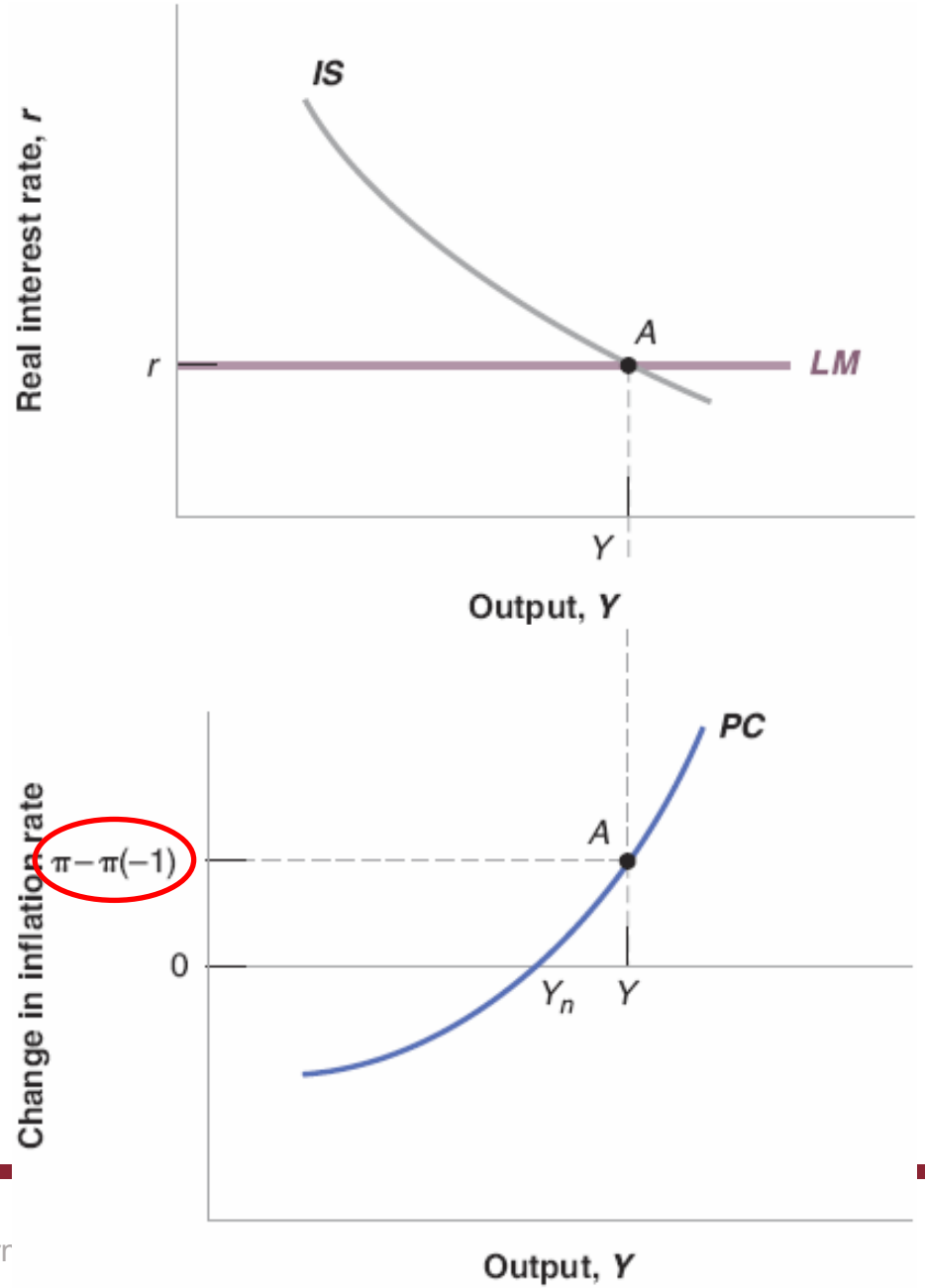
The medium run equilibrium

- Central Bank's monetary policy rule makes the economy converge to a *medium-run equilibrium.*
- In the *medium-run equilibrium:* $u=u_n$, $Y=Y_n$ & $\pi = \bar{\pi}$.
- The corresponding interest rate is called equilibrium (or *natural)* rate r_n



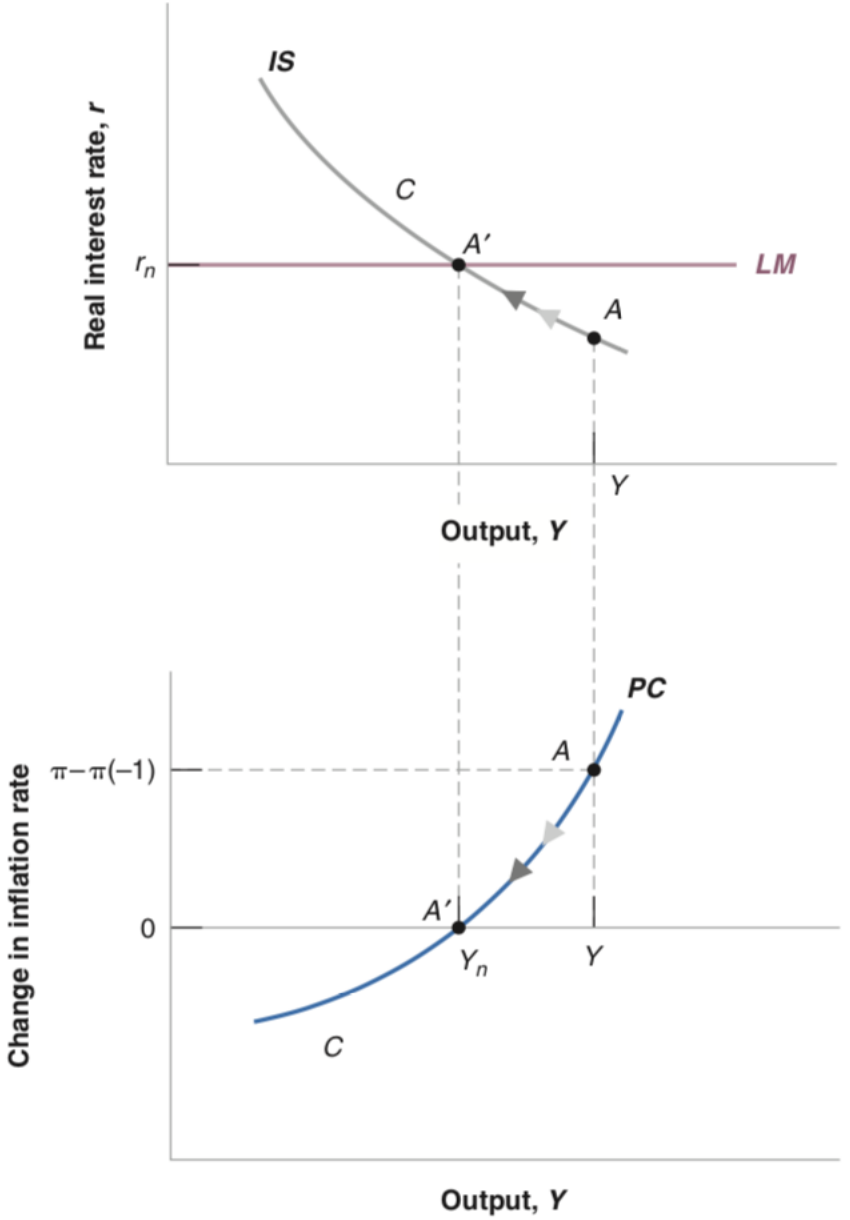
What if expectations were de-anchored?

- *De-anchored* expectations:
  - $\pi^e = \pi_{t-1}$
  - PC: $\pi_t - \pi_{t-1} = (\alpha/L)(Y - Y_n)$
- Output above potential means inflation *increasing over time*.
- What will the Central Bank do?



The case of deanchored expecations

- CB starts increasing r.
- When r hits r_n, inflation stops increases and stabilizes *but at a higher rate*.
- Central Bank needs to increase *r* further, above r_n, so that inflation starts decreasing.
- When back at $\pi = \bar{\pi}$, Central Bank will lower the rate to r=r_n



Why only the Central Bank?

Why should we use monetary and not fiscal policy to lead economy towards potential output?

Typical case for using only monetary policy:

- More flexible.
- Smaller consequences for public debt.
- Technocrats are better (& more credible) than politicians in managing the economy.

Anchored vs. deanchored expectations: takeaways

- With anchored expectations, a 'overheated' economy "just" requires restoring $Y=Y_n$.
  - As soon as $u=u_n$, we have $\pi = \bar{\pi}$.
- With de-anchored expectations, a 'overheated' economy requires a 'depression' period (a period with $Y<Y_n$) to restore $\pi = \bar{\pi}$
  - $u=u_n$ means inflation stabilizes ($\pi_t - \pi_{t-1}=0$), but at a higher level.
  - To bring it back you need $Y<Y_n$ for some time.

> Disinflation is more painful if expectations are de-anchored.

7.3 POLICY EVALUATION ACCORDING TO THE IS-LM-PC MODEL

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Effects of fiscal consolidation in the IS-LM-PC model

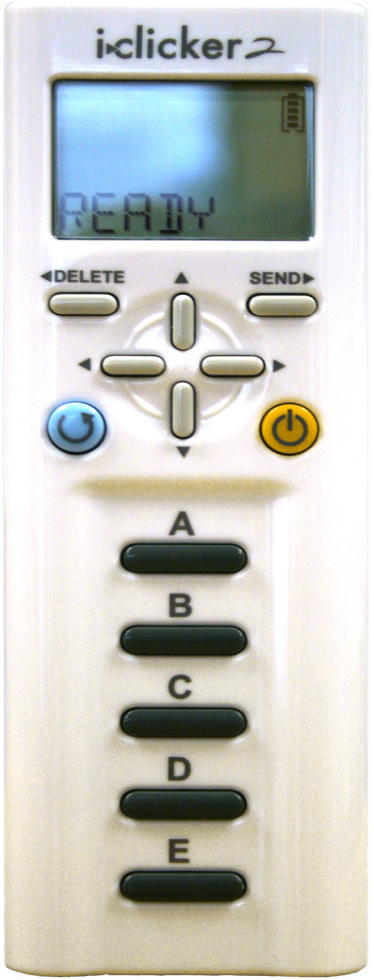
- *Fiscal consolidation*: G down or T up.
- What happens to output & inflation *in the short-run*?
  - Short-run = before Central Bank can react.
- What happens to output & inflation *in the medium-run?*
  - Medium-run = after CB has reacted and all effects have fully occurred.

Clicker question

- Assume initially $Y=Y_n$.
- Consider a *fiscal consolidation*.

What happens to output & inflation in the short-run (before Central Bank can react)?

A. Output goes up, inflation goes up.
B. Output goes up, inflation goes down.
C. Output goes down, inflation goes up.
D. Output goes down, inflation goes down.



Clicker question

- Assume initially $Y=Y_n$.
- Consider a *fiscal consolidation*.

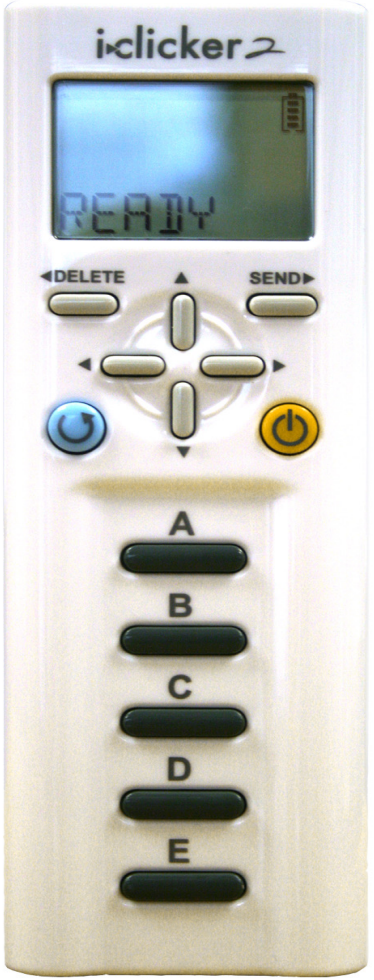
In the medium-run, how does fiscal consolidation affect potential output?

A. Y_n goes up.

B. Y_n goes down.

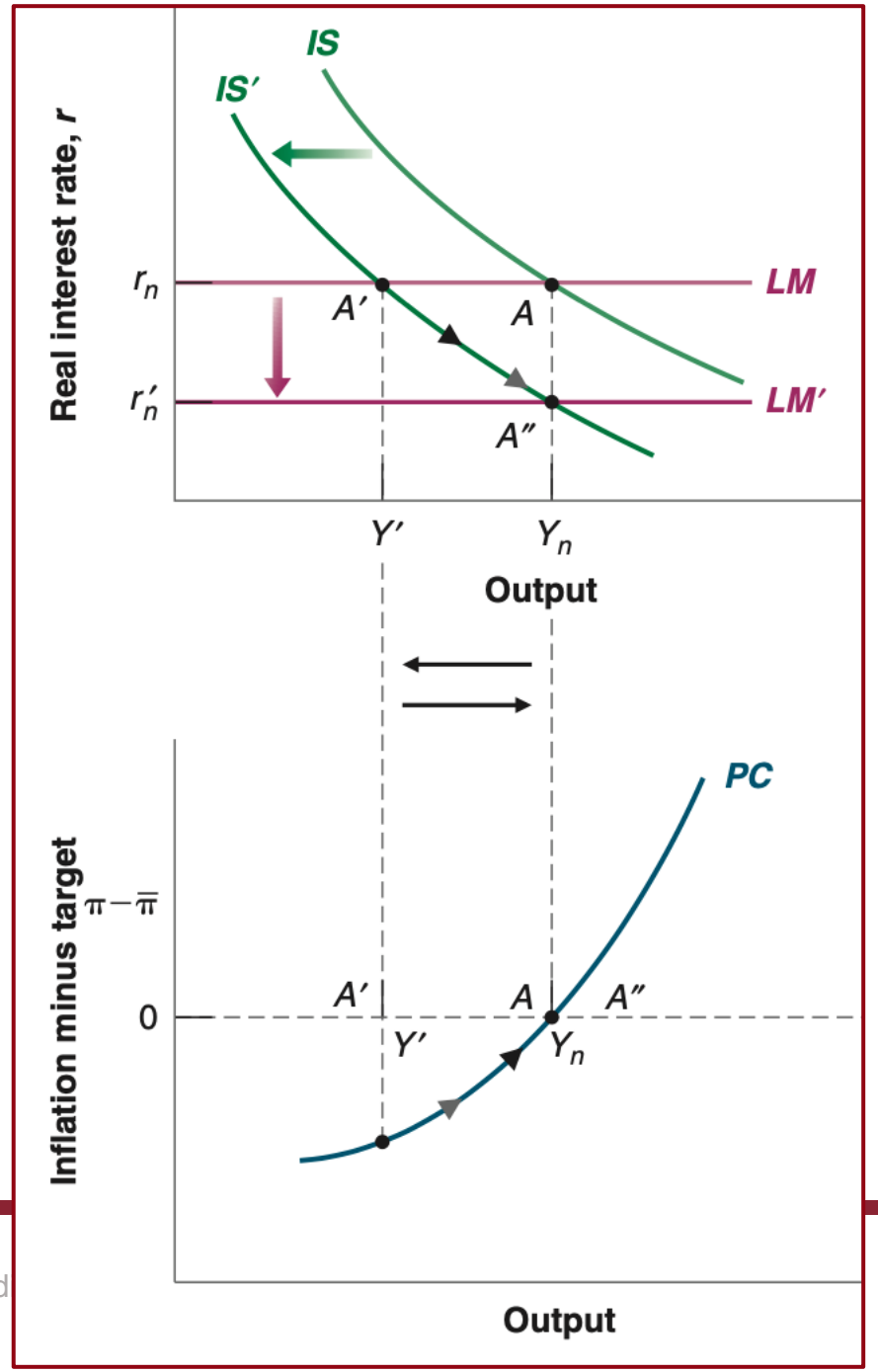
C. Y_n is unaffected

D. Not possible to say.



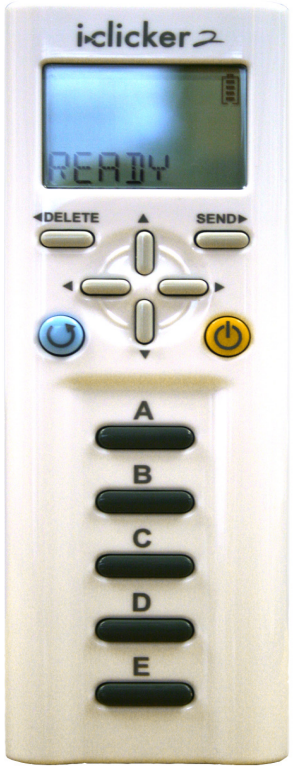
Effects of fiscal consolidation in the IS-LM-PC model

- IS Curve shifts down.
- *Short-run*: Y and π down.
  - Also r_n goes down.
- *CB reaction*: cut *r* until $\pi = \bar{\pi}$ & $Y = Y_n$.
- New medium-run equilibrium:
  - $Y = Y_n, \pi = \bar{\pi}\ and\ r = r_n'$



Effects of *oil price increase* in the IS-LM-PC model

- Can be modelled as an increase in the mark-up *m*.



Clicker question

What is the effect of an increase in the mark-up *m* on potential output Y_n?

A. Y_n goes up.

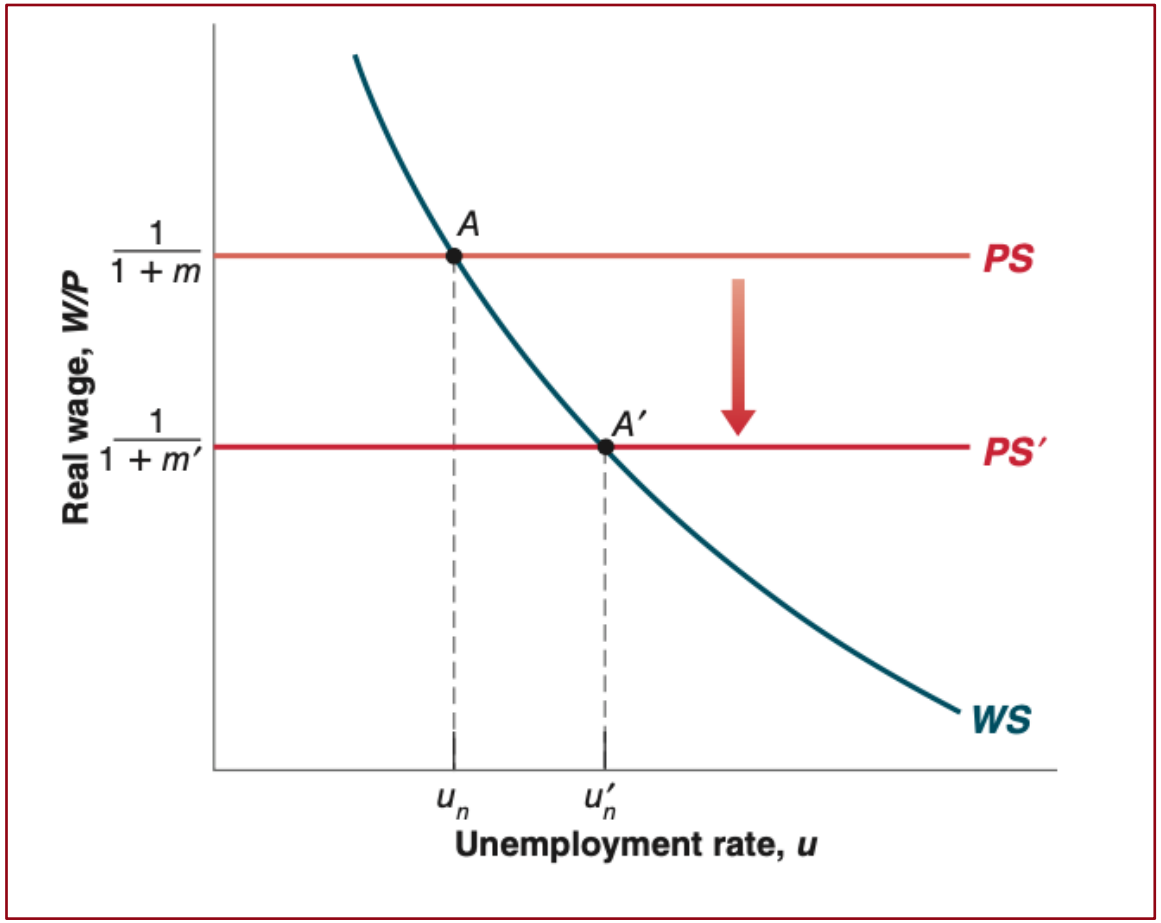
B. Y_n goes down.

C. Y_n is unaffected.

D. Not possible to say.

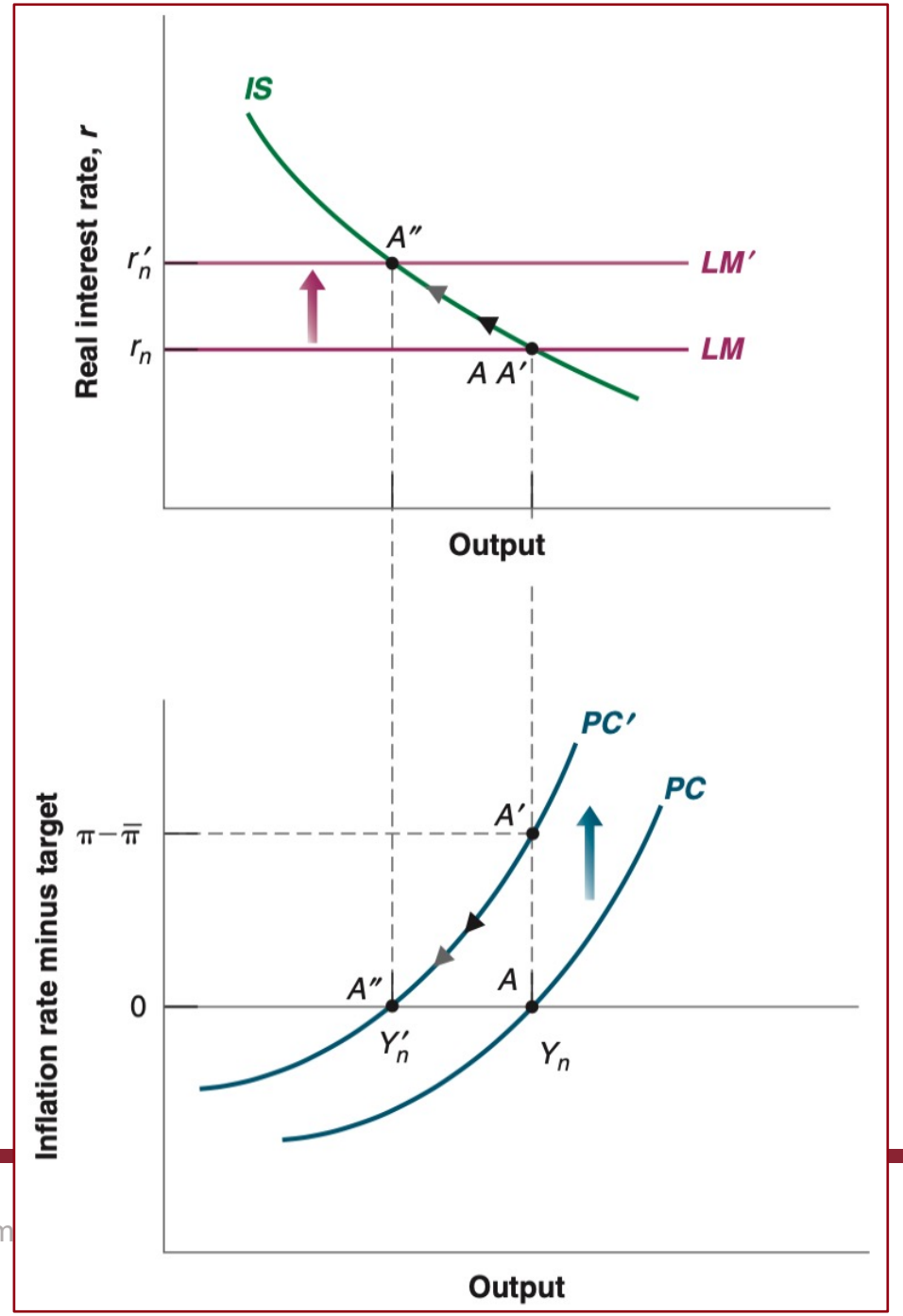
Effects of *oil price increase* in the IS-LM-PC model

- Can be modelled as an increase in the mark-up *m*.
- Price-setting curve shifts down.
- Higher u_n
- Lower Y_n



Effects of *oil price increase* in the IS-LM-PC model

- PC curve shifts up.
- Short-run: same output but higher inflation (point A')
- Central bank raises rate to match the new higher r_n.
- Medium-run: inflation back to target but *lower output* (point A")



7.4 PROBLEMS AND COMPLICATIONS

Complications: Some things are hard to observe!

- Uncertainty about the slope of the PC and the value of Y_n and u_n.
- Hard to distinguish a change in *output gap* from a change in *potential output*.
- Hard to distinguish a temporary shock from a permanent one.
- Monetary policy affects the economy with a lag.
- We have no rule to know when expectations get de-anchored.

Problems: Why adjustment might fail

- Some of the assumptions of the IS-LM-PC model might not hold.
- Three key (potentially problematic) assumptions:

1. Monetary policy is always effective.
2. Potential output is not affected by aggregate demand.
3. Low/high interest rates have no big detrimental side-effects.

Problems: Why adjustment might fail

1. Is monetary policy always effective?

- There is evidence that rising rates decreases economic activity.
- But it's unclear if interest rate cuts are effective in boosting demand.
- Zero Lower Bound problem: can't just cut rates when they are already zero.

Problems: Why adjustment might fail

2. Can aggregate demand affect potential output?

- Prolonged unemployment reduces the labor force, decreasing potential output.
- Low investment during recessions implies slower productivity growth
- *Hysteresis* hypothesis*:* It can be potential output that adapts to actual output!

Problems: Why adjustment might fail

3. Can aggregate demand affect potential output?

- High interest rates can make debt (public & private) unsustainable and cause financial problems.
- High interest rates can create crises in emerging economies, which (besides bad in itself) will affect negatively also the domestic financial system.
- Low interest rates could induce too much risk taking in financial markets.