Session 11: Monetary Policy and the Phillips Curve

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Stanford GSB

Guest Speaker on Tuesday, May 10 at Noon-1pm

- **Jan Hatzius**
  - Chief Economist at Goldman Sachs
- Q&A session for all MgtEcon 300 sections
- Special Zoom link in Canvas module (you need to enter through Canvas)
- (No class on Monday May 9)

Outline: Monetary Policy and the Phillips Curve

- The IS-MP Diagram
- The Financial Crisis and “financial frictions”
- Inflation and the Phillips Curve
- Using the Short-Run Model
  - The Volcker Disinflation
  - Understanding the Great Inflation of the 1970s
- **Question:** Are we headed back to the 1970s?

The Federal Funds Rate

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- What is the Federal Funds Rate?

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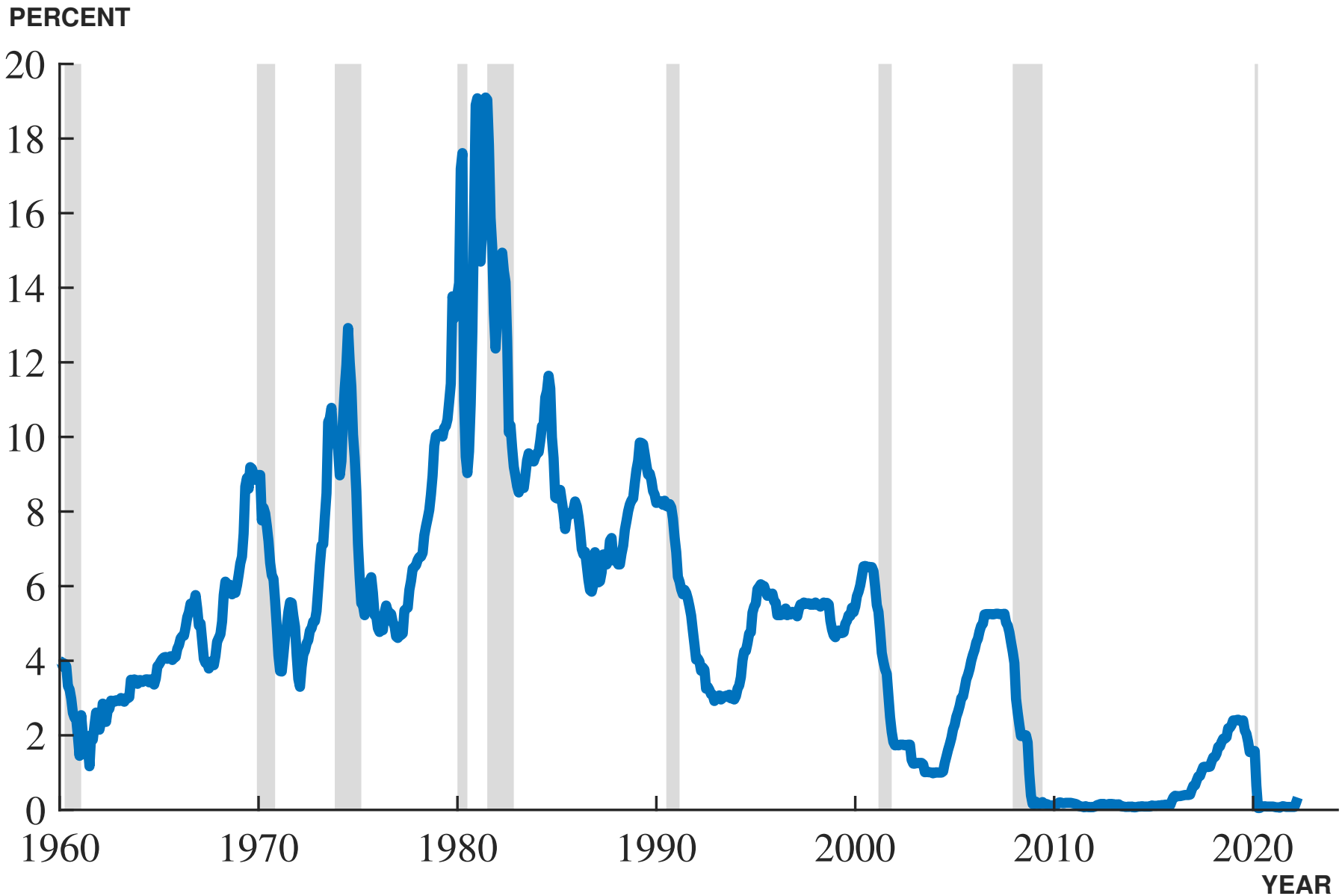
  The key policy rate of the U.S. central bank

  The interest rate at which banks lend to each other overnight.

The Federal Funds Rate



Monetary Policy

How does an overnight nominal interest rate used only between U.S. banks have the power to shake financial markets and move GDP in the largest economy in the world?

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- Term structure: keep overnight rate low/high for extended periods
- Influences all other interest rates (prime rate, 10-year bond rate)

How does the Fed control the fed funds rate?

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- Simple version: Announces it is willing to borrow and lend any amount at a specified rate.
  - Can a bank lend at a higher rate?
  - Can a bank lend at a lower rate?

- Details can be more complicated (e.g. “open market operations”)
  - Buy Treasuries to increase supply of money and drive FF rate down
  - Sell Treasuries to decrease supply of money and drive FF rate up

- Similar elsewhere, e.g. the European Central Bank

Nominal versus Real Interest Rates

- Why does the Fed setting a nominal interest rate allow the Fed to influence the real interest rate?

Nominal versus Real Interest Rates

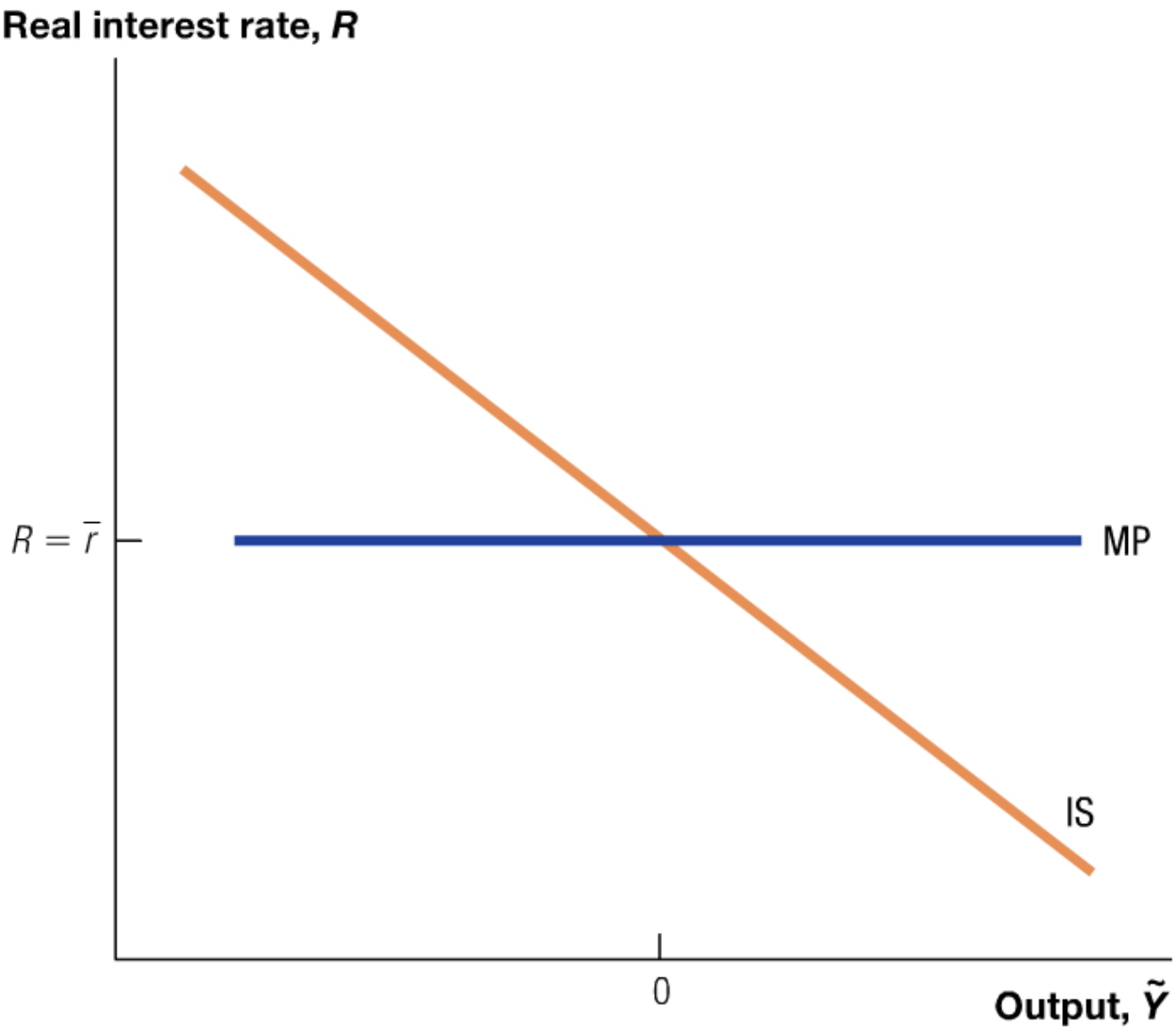
- Why does the Fed setting a nominal interest rate allow the Fed to influence the real interest rate?
- The Fisher equation

$$R_t = i_t - \pi_t$$

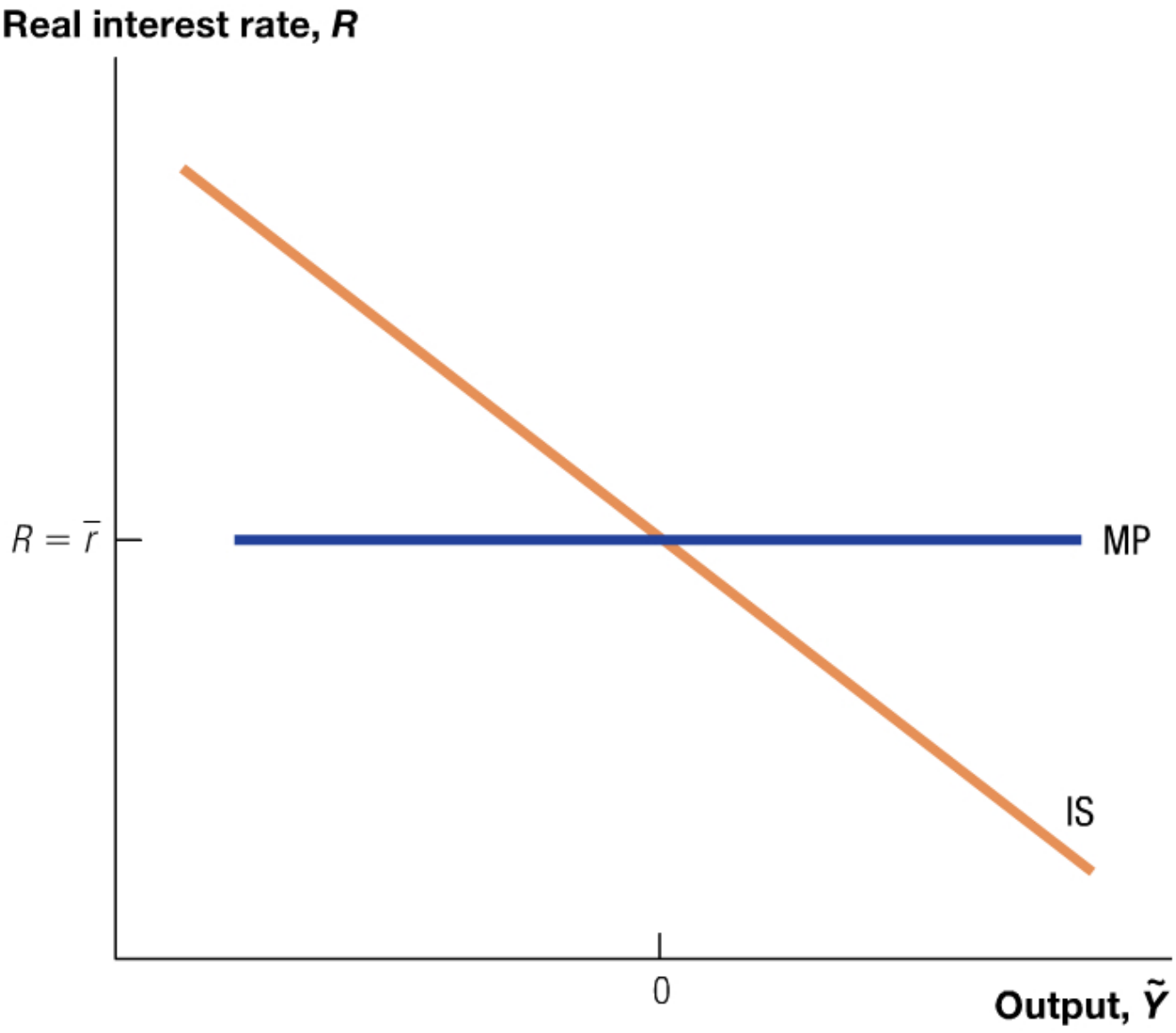
- Failure of the Classical Dichotomy: all prices do not adjust immediately in a coordinated way
- (Actual versus Expected inflation in the Fisher equation?)

The IS-MP Diagram

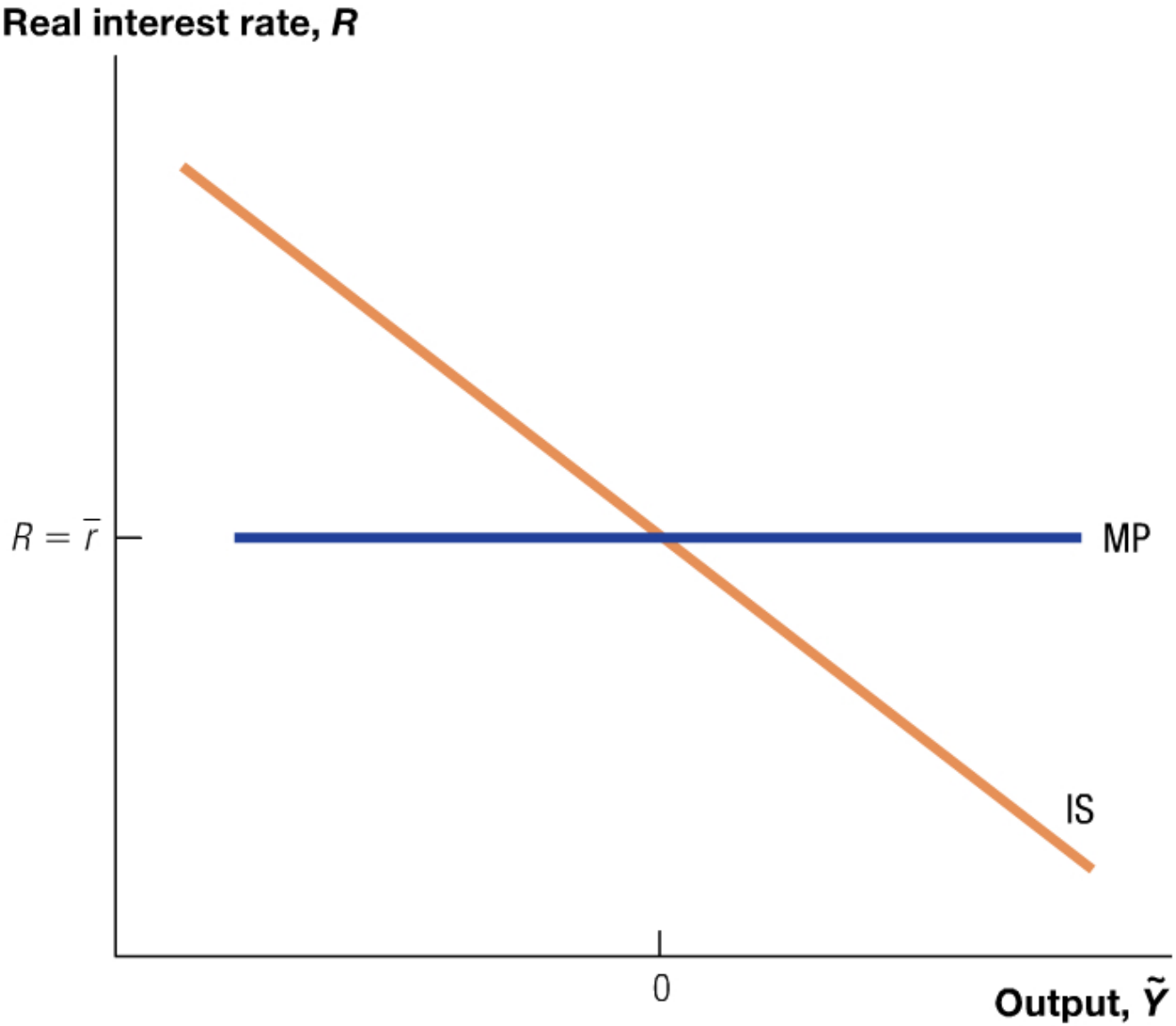
The IS-MP Diagram



What if the Fed raises the fed funds rate?



COVID-19 Shock and then the Fed's Response?



The 2008-2009 Financial Crisis in the IS-MP Diagram

The Fed Funds Rate versus Market Borrowing Rates

- Businesses are risky so they pay a premium:

$$R = R^{\text{ff}} + \bar{f}$$

- The financial friction: $\bar{f}$
  - Normal times = small (treat as zero)
  - Times of financial crisis = rises sharply

- What is the financial friction?
  - A wedge between the Fed Funds rate and the rate at which businesses and households can borrow

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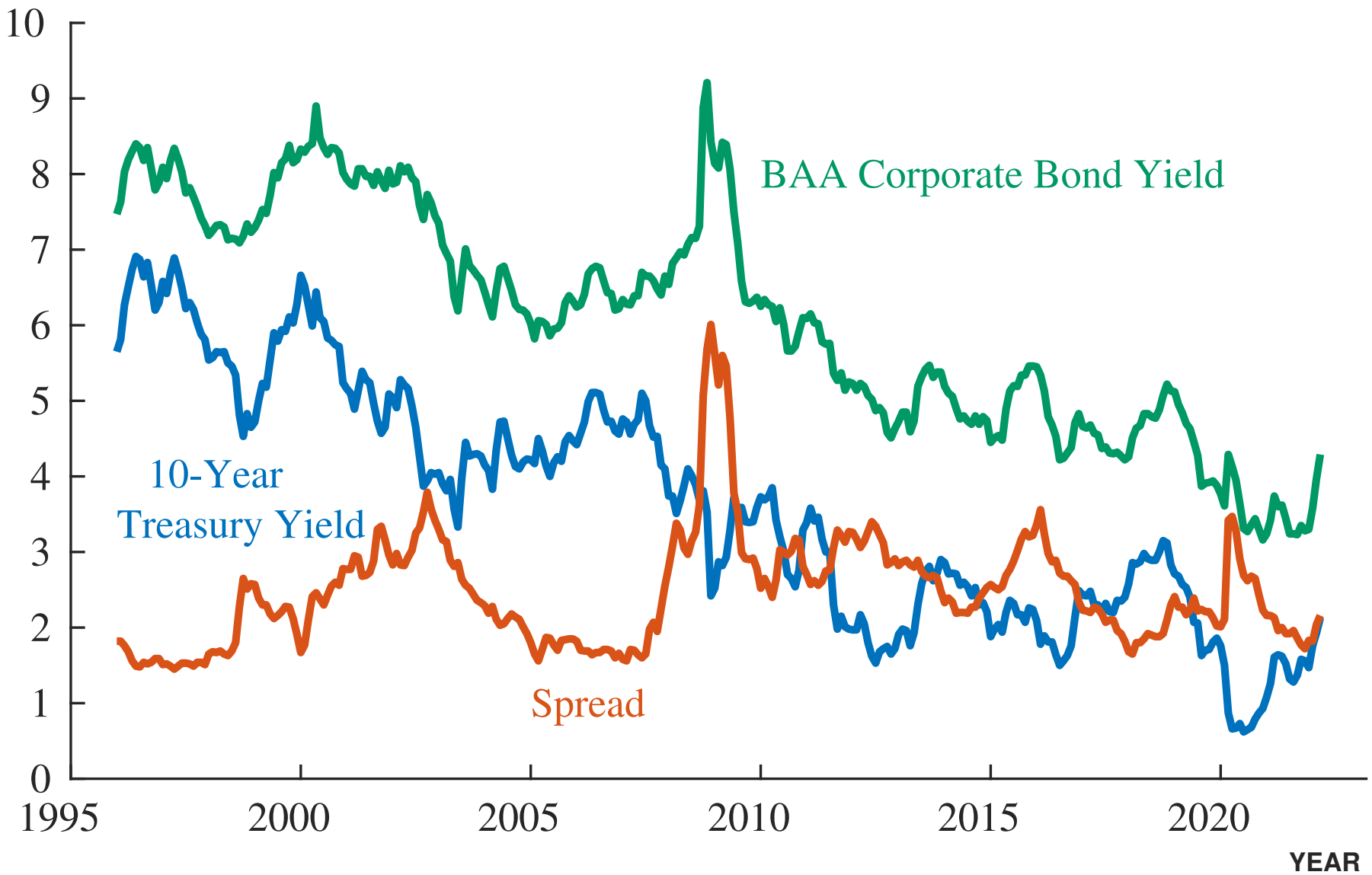
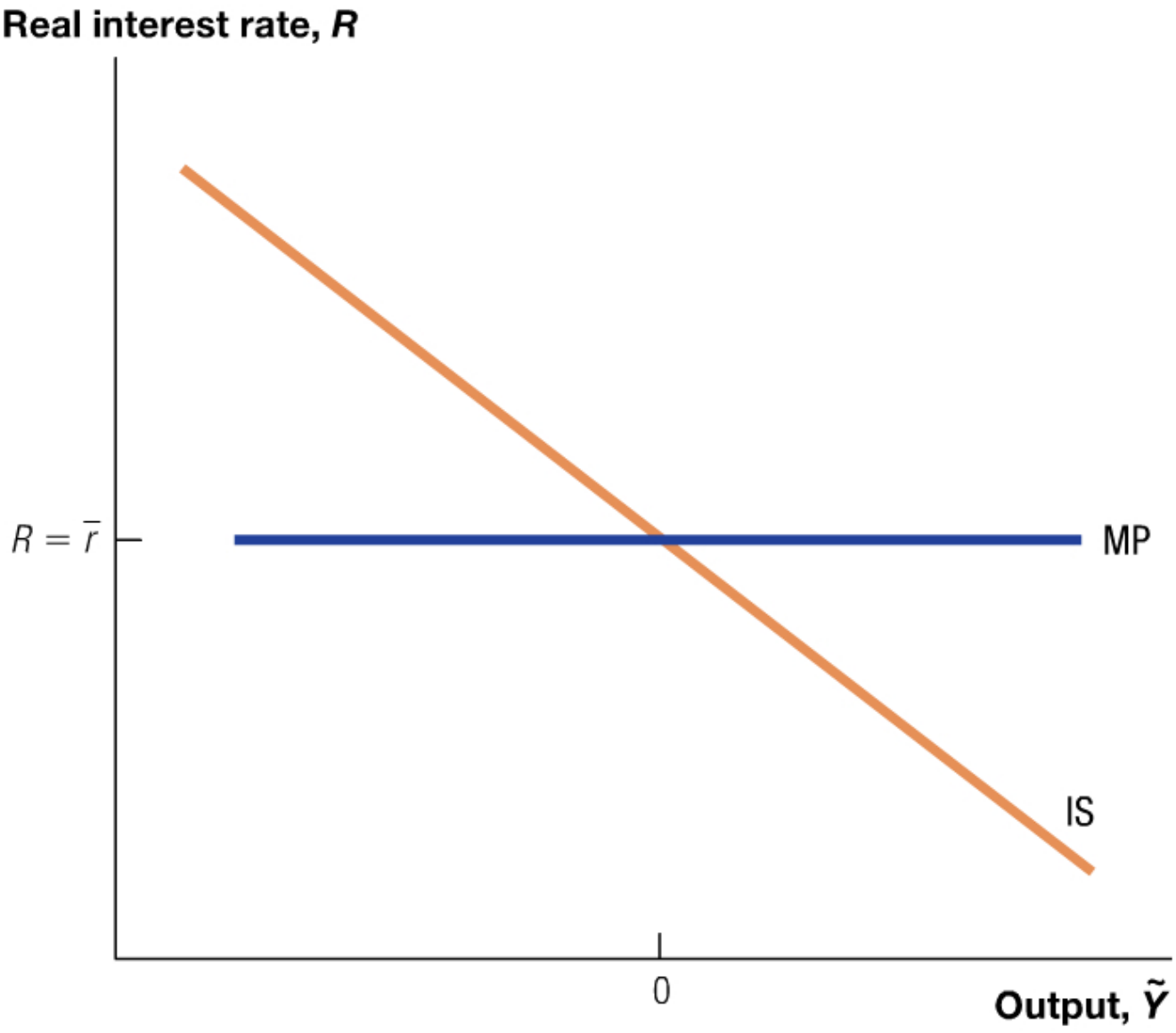
- What is the financial friction?
  - A wedge between the Fed Funds rate and the rate at which businesses and households can borrow
  - Liquidity problems: Assets that are more difficult to trade because of "thin markets"
  - Solvency problems: The fear that your trading partner may go bankrupt (or your trading partner's trading partner...)

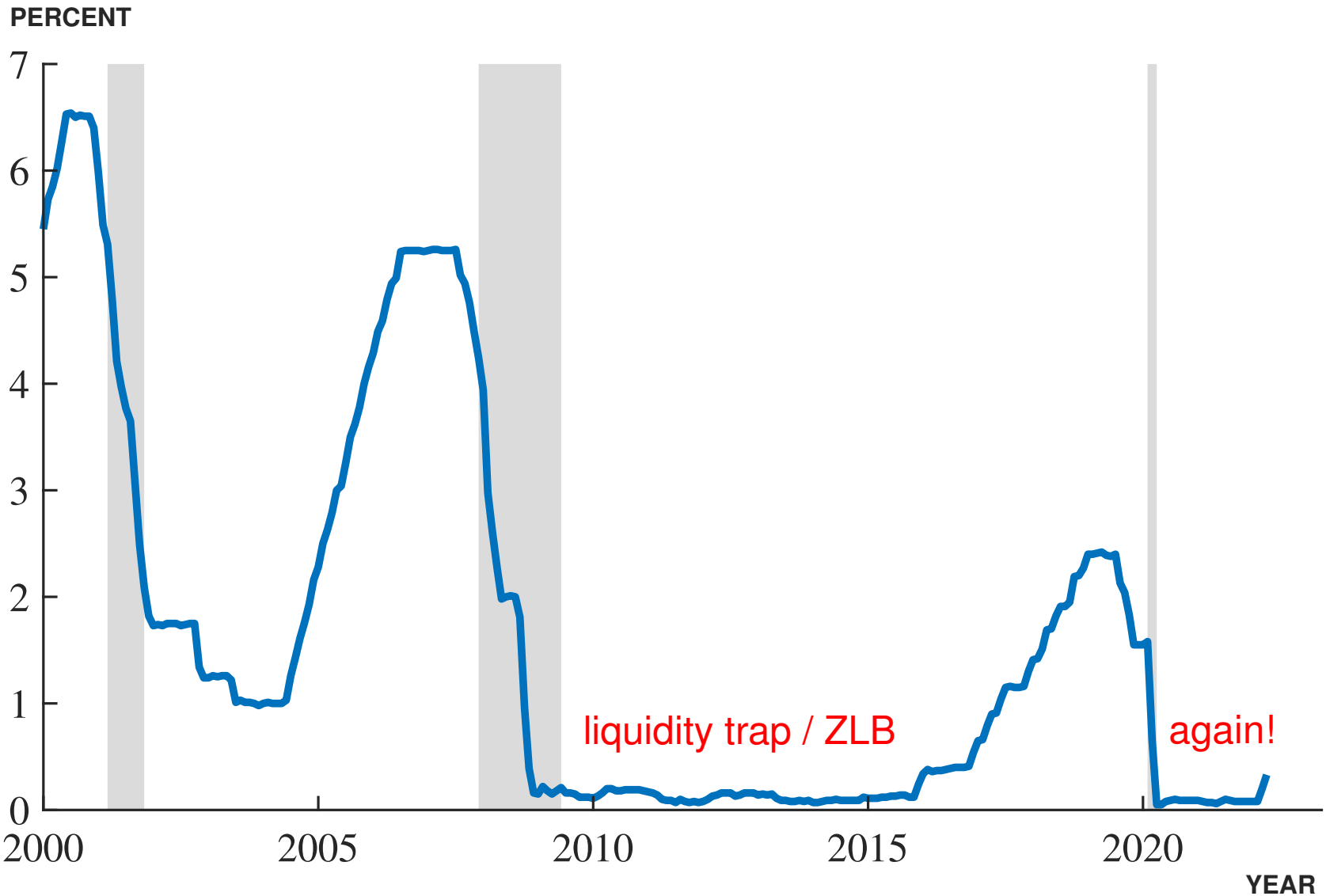
Financial Frictions



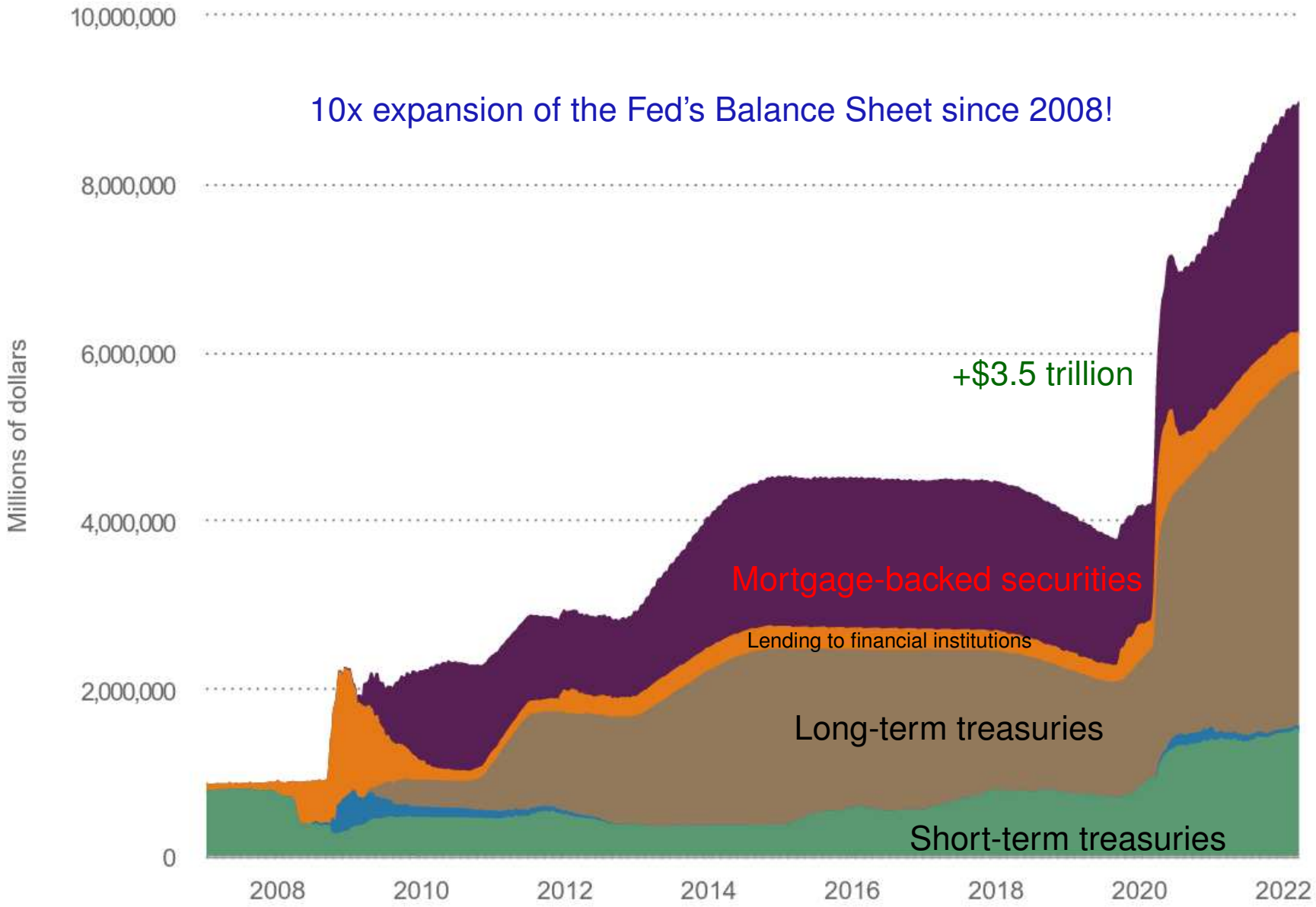
How do we think about the financial crisis?



The Zero Lower Bound: Fed Funds Rate 2000 - Present



Unconventional Monetary Policy: Quantitative Easing

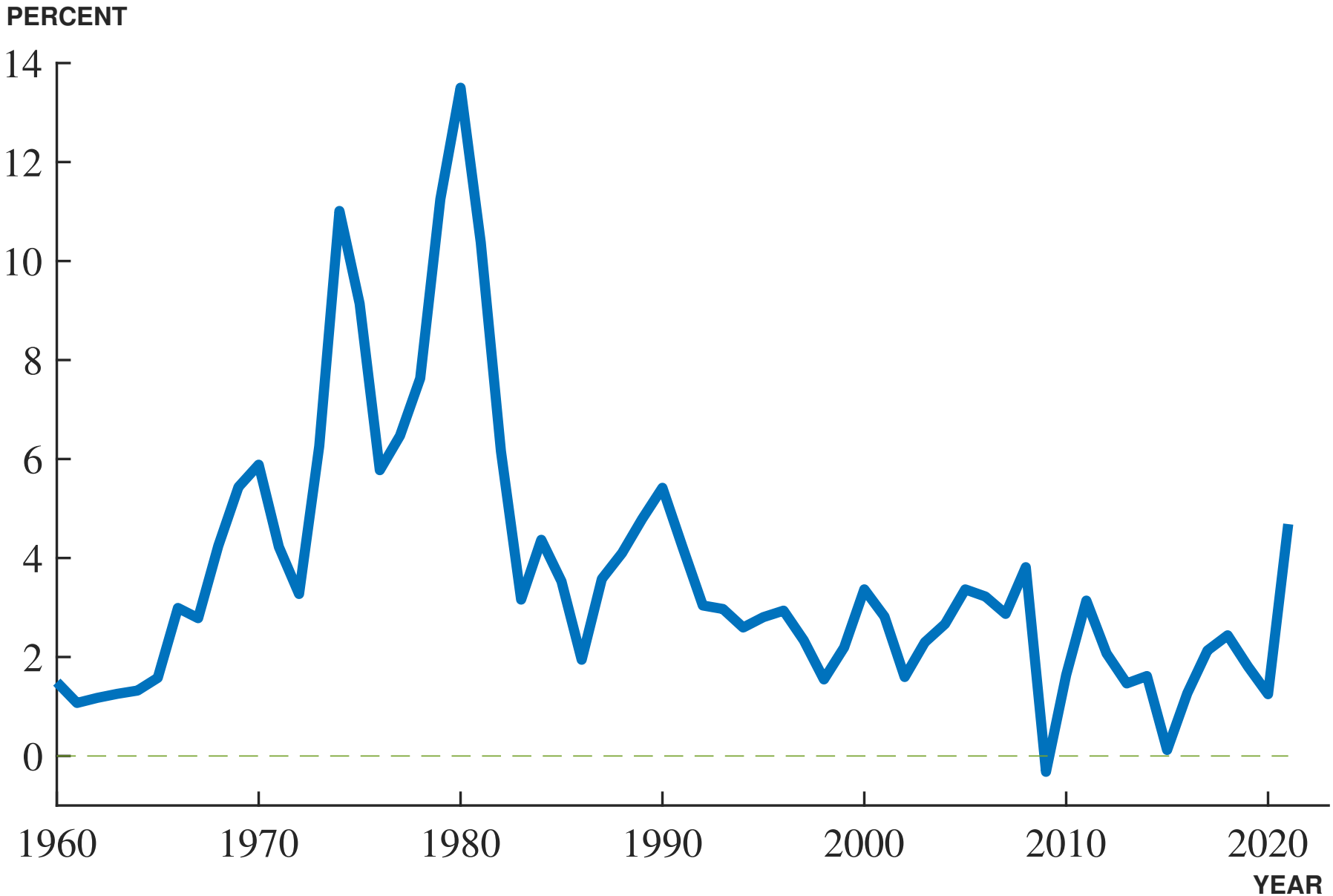


The Phillips Curve

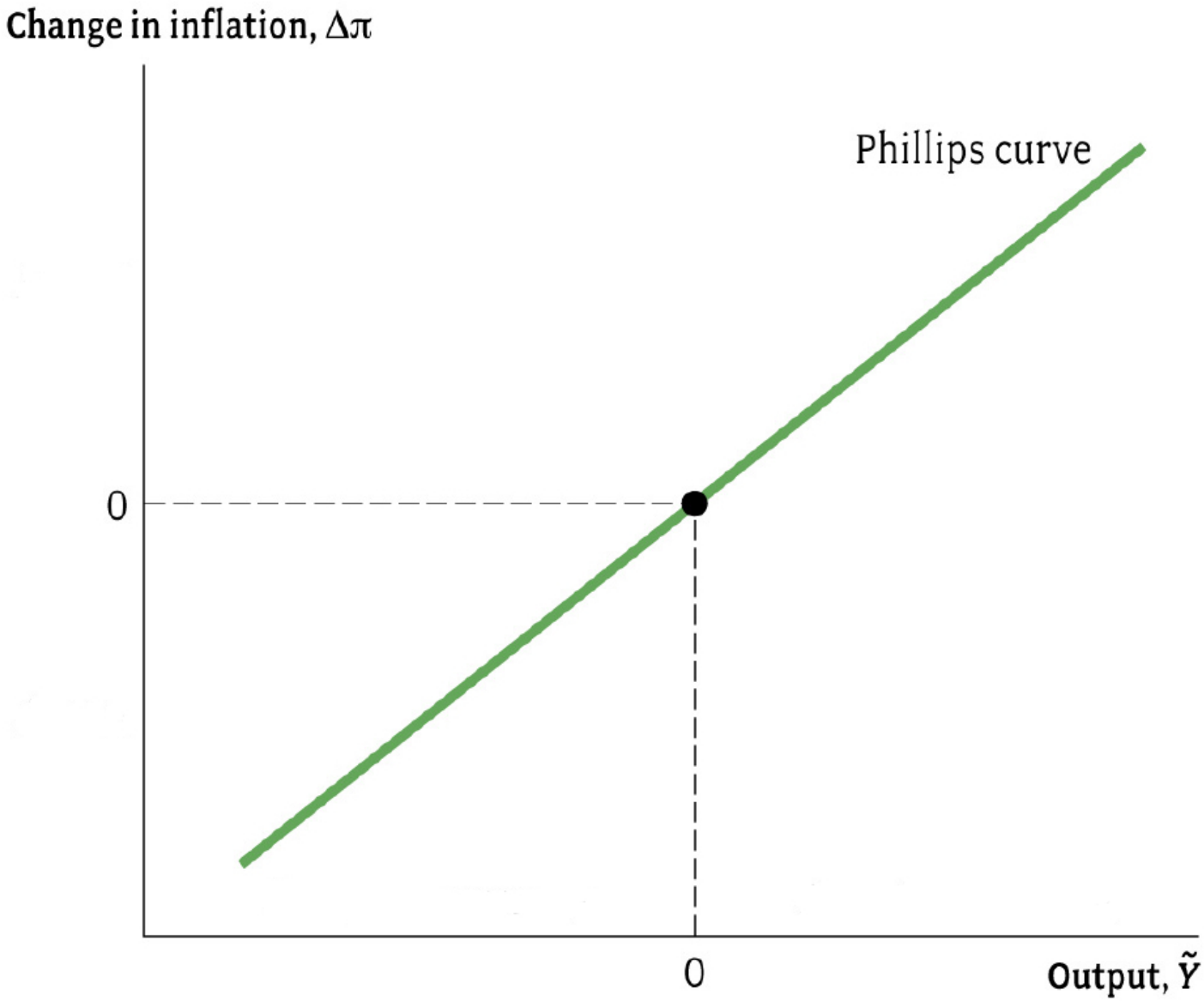
The Phillips Curve

- The IS-MP diagram captures aggregate demand
- Firms supply any amount demanded, above or below potential
  - Prices are sticky (underlies stickiness of inflation)
  - Firms have thousands of decisions to make; adjust prices infrequently when inflation is low
- The Phillips Curve links short-run output with inflation, responding to the gap between potential and demand

The U.S. Inflation Rate



The Phillips Curve



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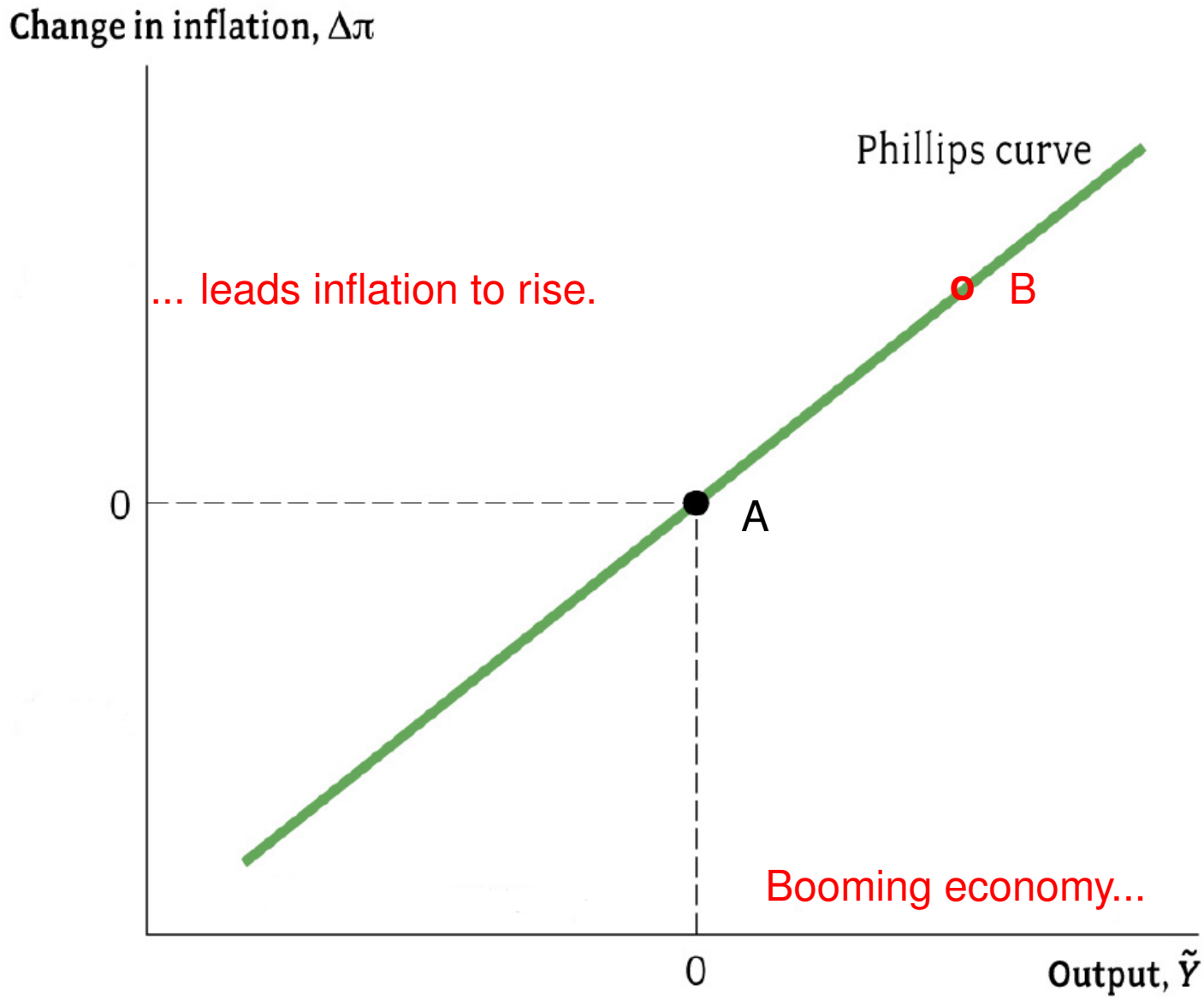


The Phillips Curve: Intuition

- Suppose you are a CEO and you are thinking about setting prices for your products
- You expect inflation to be 5%, so you also want to raise your prices by 5% to keep the relative price unchanged
- But this year demand for your products is low so you want to lower your relative price, to attract more demand...
- ... so you only raise prices by 3% to increase demand for your products
- If all other firms face the same problem, inflation will be 3% instead of 5%

The Phillips Curve

$$\pi_t = \pi_t^e + \bar{v}\,\tilde{Y}_t + \bar{o}$$

π_t	is the inflation rate
π_t^e	is the *expected* inflation rate
$\tilde{Y}_t$	is short-run output (demand)
$\bar{v}$	is the sensitivity of inflation to demand
$\bar{o}$	is a *cost shock* (supply)

The Phillips Curve: the role of expectations

$$\pi_t = \pi_t^e + \bar{v}\,\tilde{Y}_t + \bar{o}$$

- Where do inflation expectations π_t^e come from?
- Simplest assumption: adaptive expectations

$$\pi_t^e = \pi_{t-1}$$

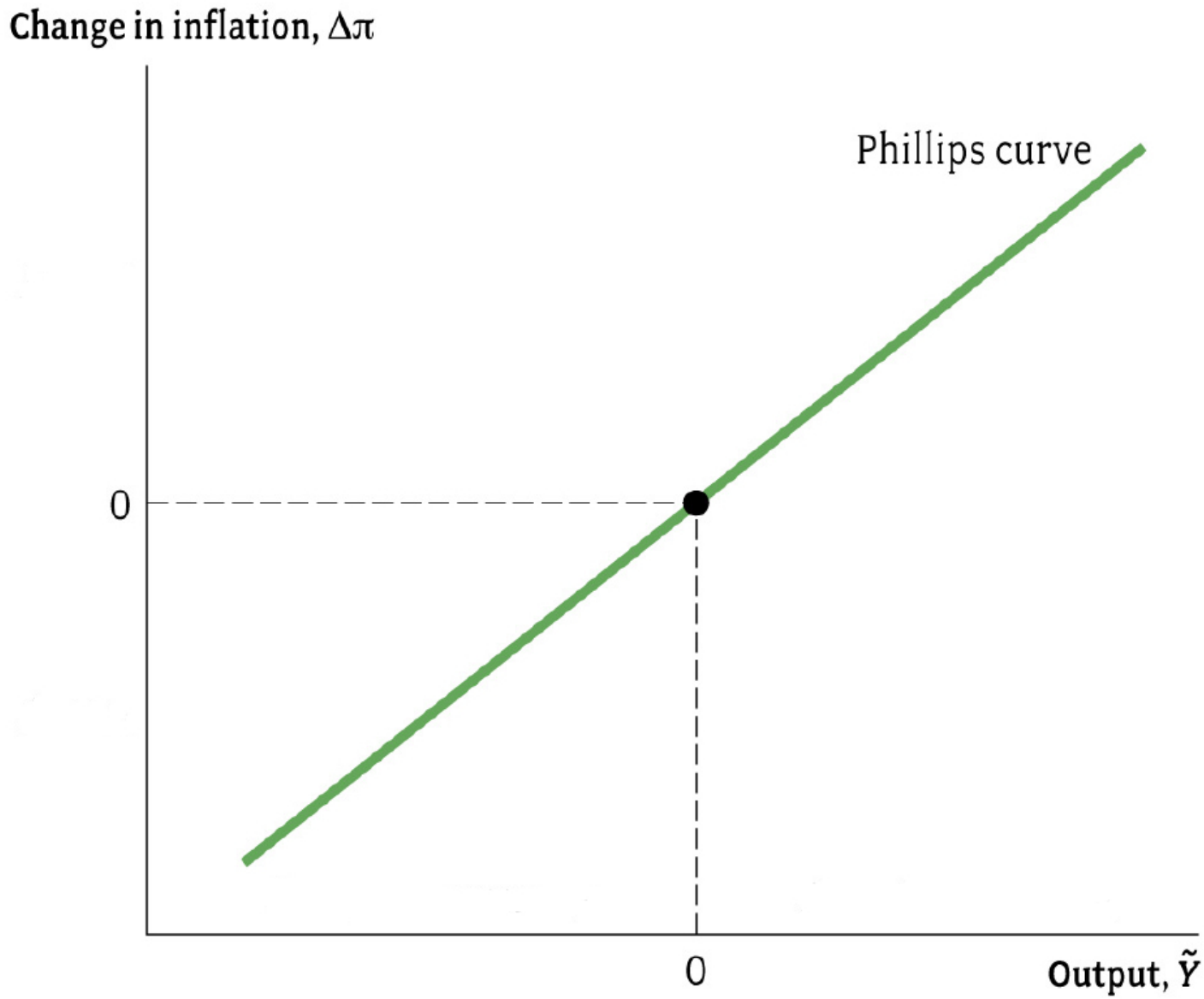
The Phillips Curve: inflation dynamics

$$\pi_t = \pi_{t-1} + \bar{v}\,\tilde{Y}_t + \bar{o}$$

Or in dynamic form:

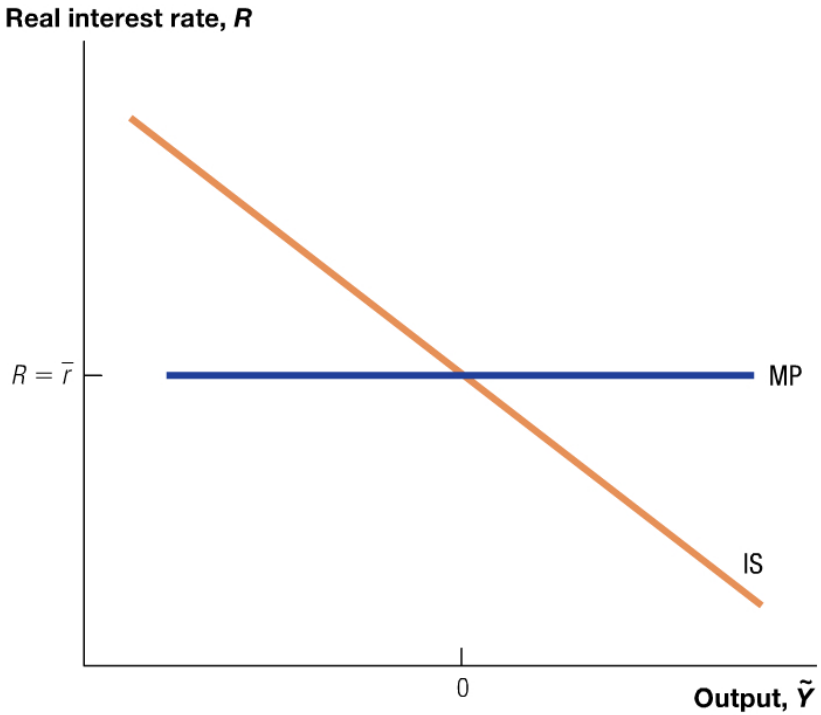
$$\Delta\pi_t = \bar{v}\,\tilde{Y}_t + \bar{o}$$

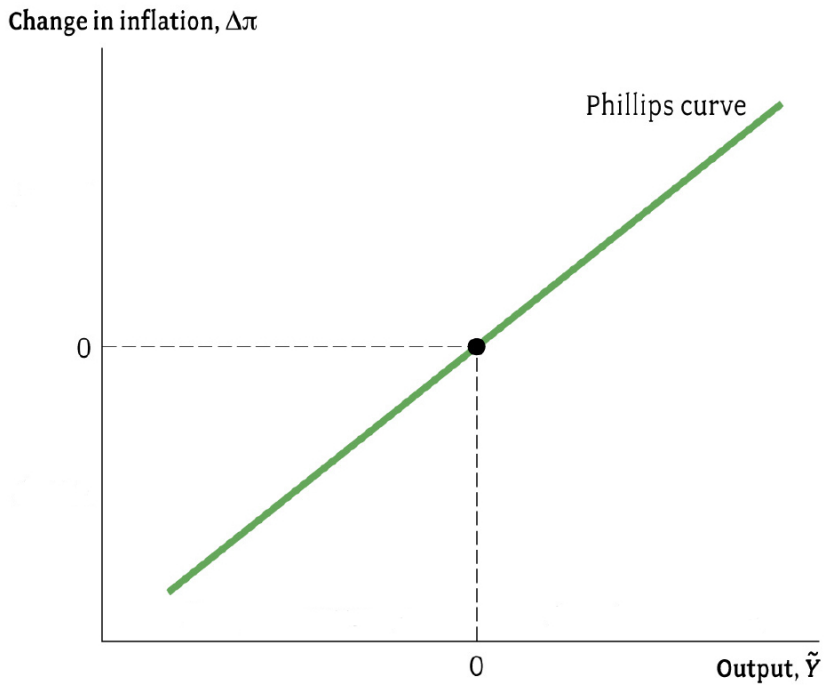
The Phillips Curve



Using the Short-Run Model

The Short-Run model: IS-MP + Phillips Curve

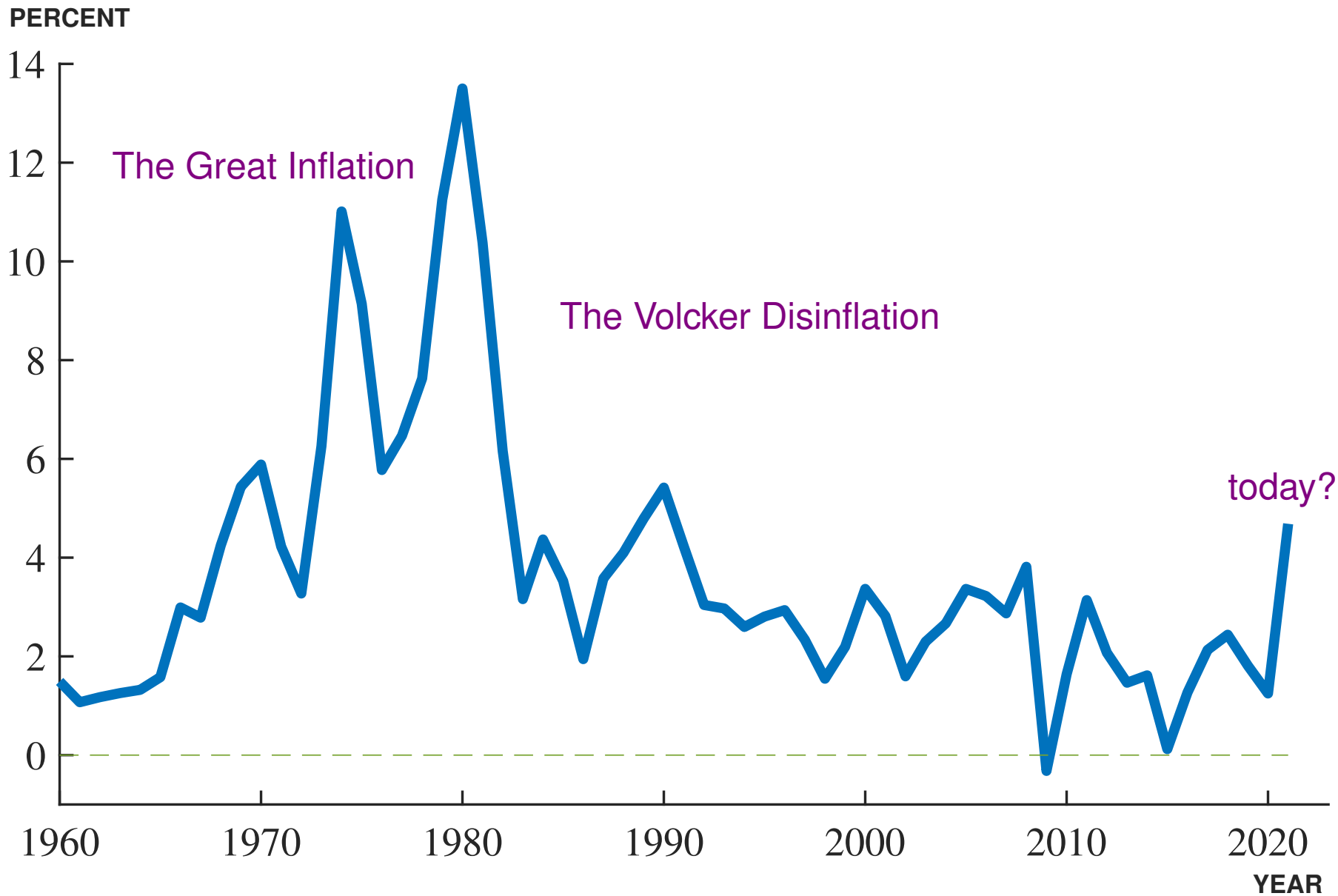




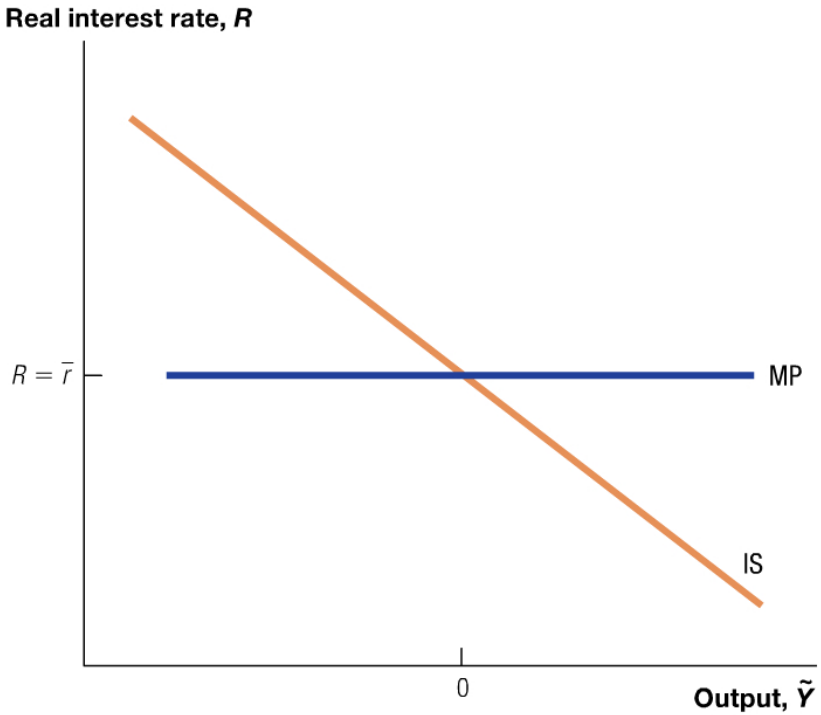
Demand Shocks + MP $\Longrightarrow$ $\tilde{Y}$

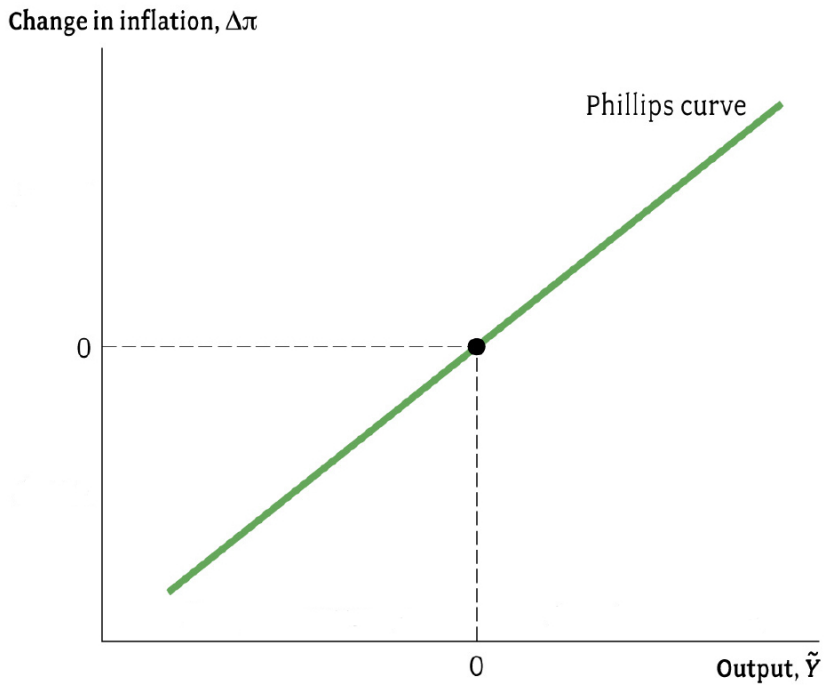
Expectations + $\tilde{Y} + \bar{o} \Longrightarrow \Delta\pi$

The U.S. Inflation Rate



The Volcker Disinflation: IS-MP + Phillips Curve





Understanding the Great Inflation

- How can we use the Short-Run Model to help us understand the Great Inflation of the 1970s?

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  - Oil shocks
  - Unexpected TFP slowdown

The Effect of an Oil Shock

- Raise oil prices permanently from \$25 to \$100 per barrel

Time:	0	1	2	3
$\bar{o}$	0	+5%	0	0
$\Delta\pi_t$	0	+5%	0	0

$\Longrightarrow$ the inflation rate increases by 5% permanently!

- Why?
  - Phillips curve: $\pi_t = \pi_t^e + \bar{v}\,\tilde{Y}_t + \bar{o}$
  - Inflation expectation: $\pi_t^e = \pi_{t-1}$
  - Oil shock raises inflation expectations $\rightarrow$ inflation
    - Workers build the increase into their wage contracts...

Oil Shocks and the Phillips Curve

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up back to normal

π_t 2%

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$\Delta\pi_t$	0	+5%	0	0
π_t	2%	7%	7%	7%

up

back to normal

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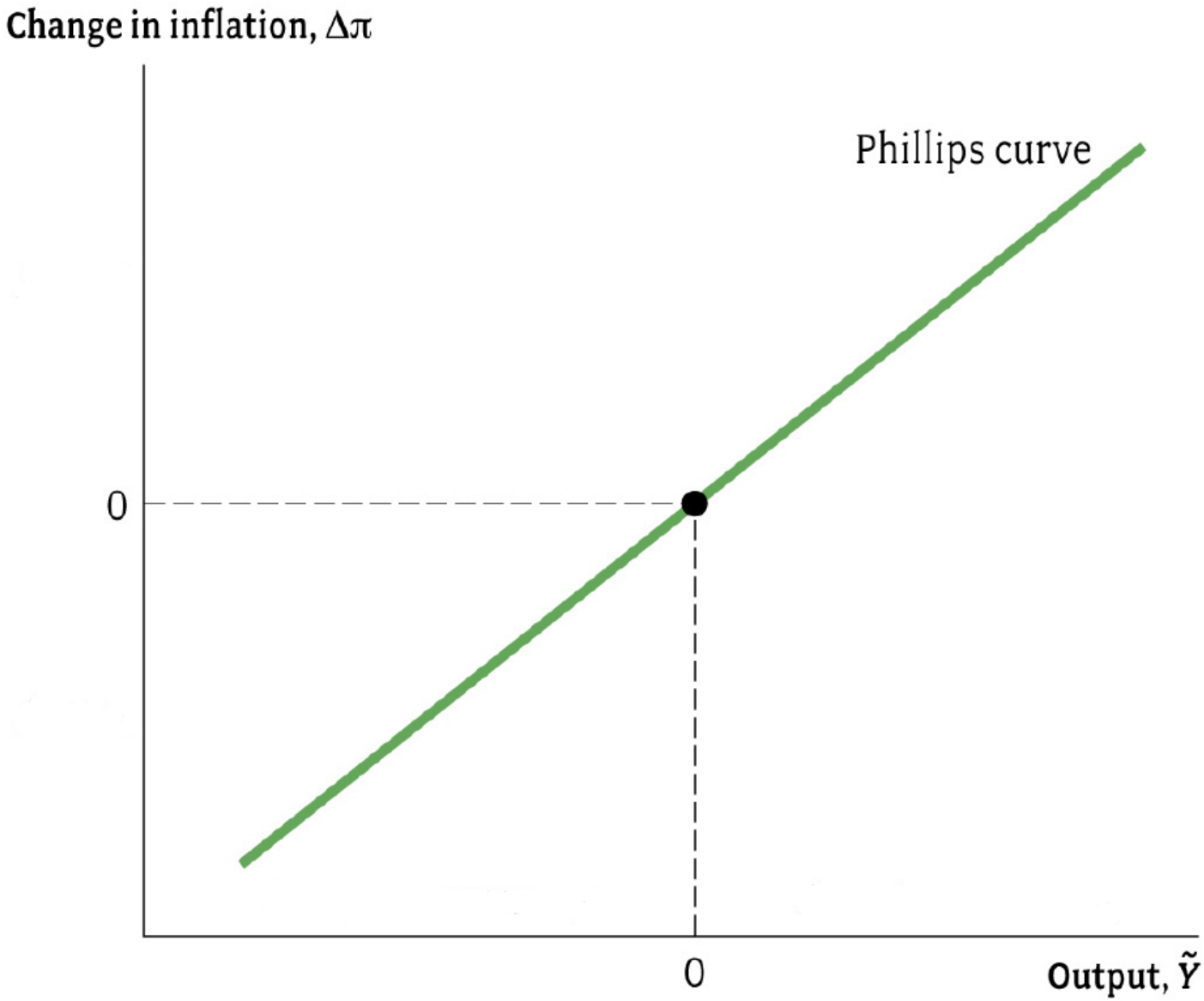
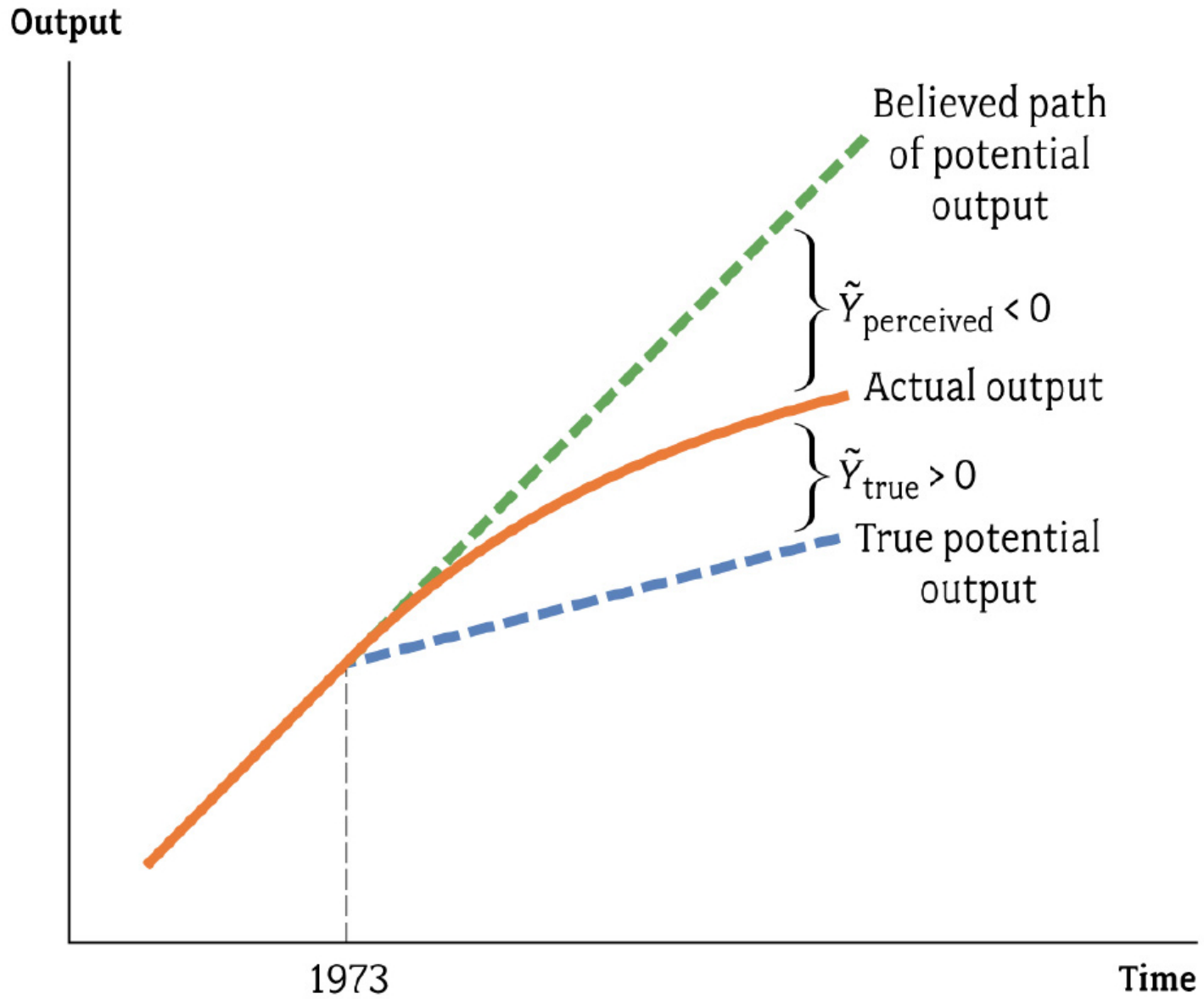
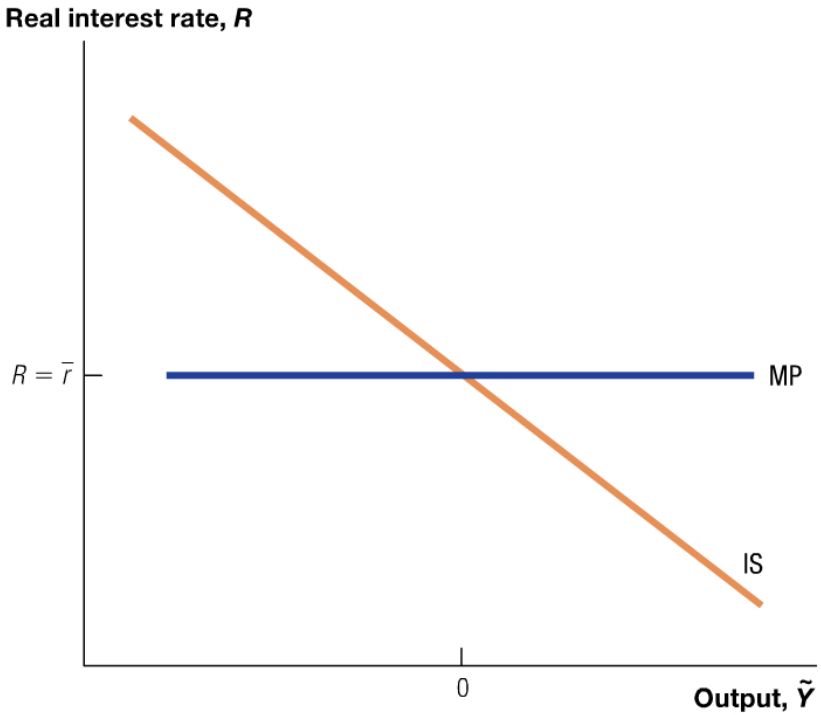
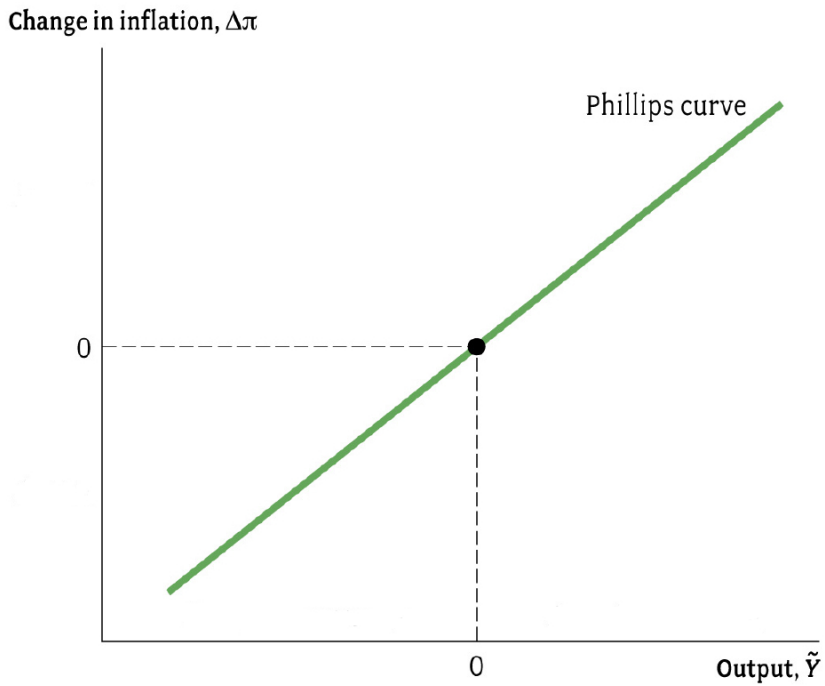



Output
Believed path of potential output
$\tilde{Y}_{perceived} < 0$
Actual output
$\tilde{Y}_{true} > 0$
True potential output
1973
Time

The Great Inflation: IS-MP + Phillips Curve





Inflation Risks in 2022

- **Reading:** Greg Ip, “Is Inflation a Microeconomic Problem?” (WSJ)
  - What did you learn from the reading?
  - Is it 1973 all over again?

Questions for Review

- Why do changes in the fed funds rate affect the real interest rate?
- What is a financial friction, and why/when is it important?
- Explain the terms in the Phillips curve equation.
- How does the Short-Run Model help us understand the Great Inflation of the 1970s and the Volcker disinflation of the 1980s?
    - And the inflation of 2021–2022 (more next class)