



# Session 11: Monetary Policy and the Phillips Curve

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## 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

## The Federal Funds Rate

- What is the Federal Funds Rate?

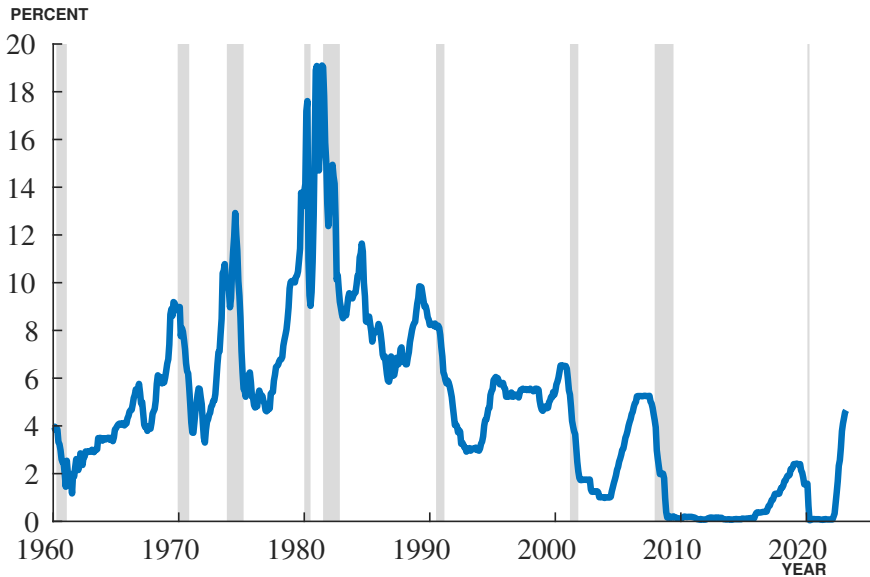
## The Federal Funds Rate

- What is the Federal Funds Rate?

*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

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

- The Fisher equation

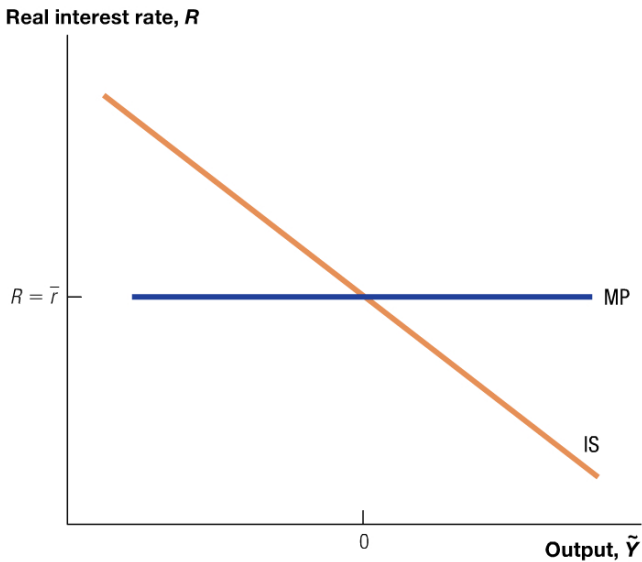
$$R_t = i_t - \pi_t$$

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

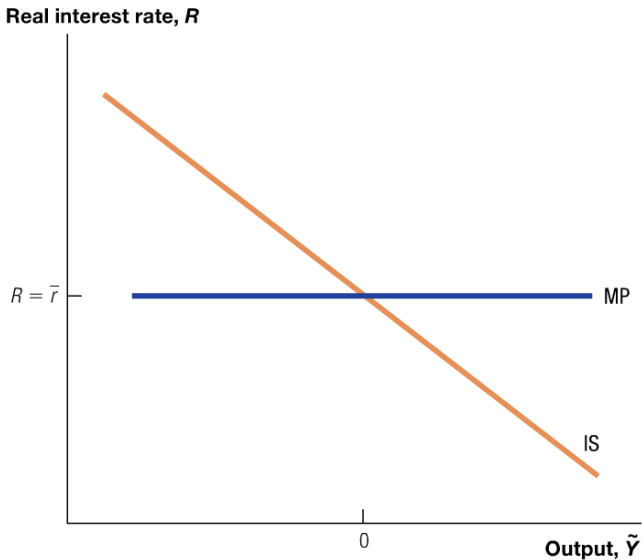


## The IS-MP Diagram

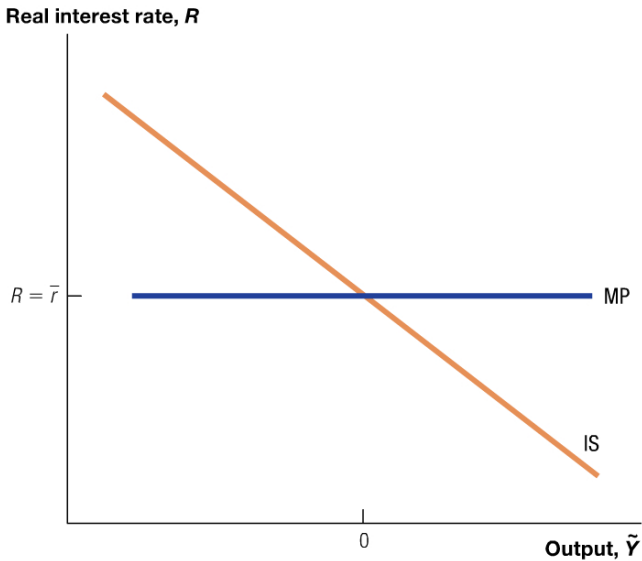
## The IS-MP Diagram



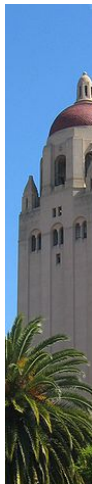
## What if the Fed raises the fed funds rate?



## 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

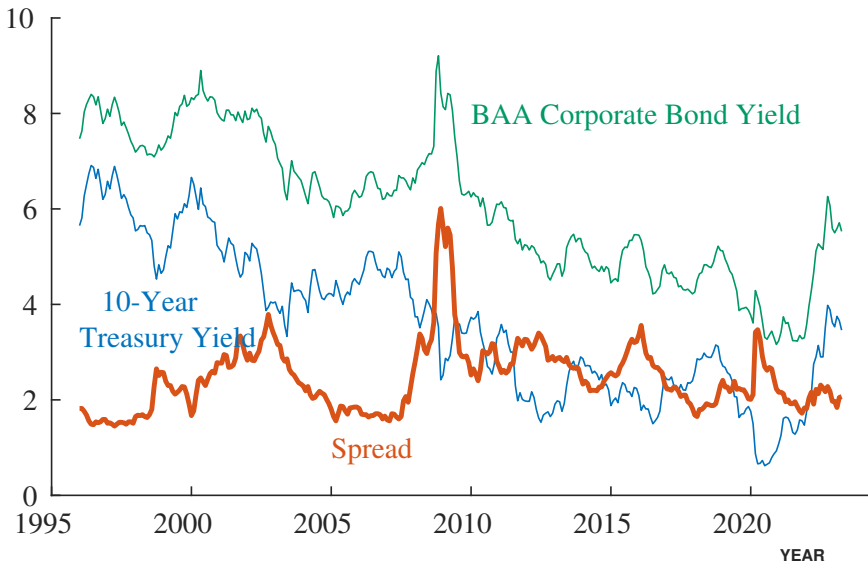
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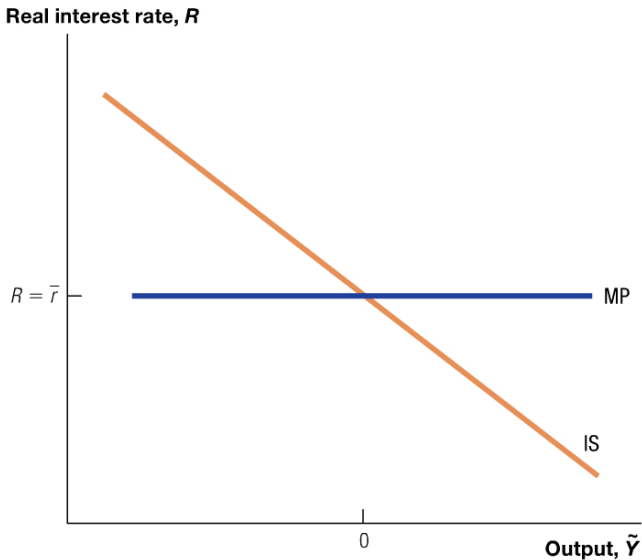
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  - **Liquidity problems**: Assets that are more difficult to trade because of “thin markets”
  - **Solvency problems**: The fear that your trading partner may go bankrupt (or your trading partner’s trading partner...)

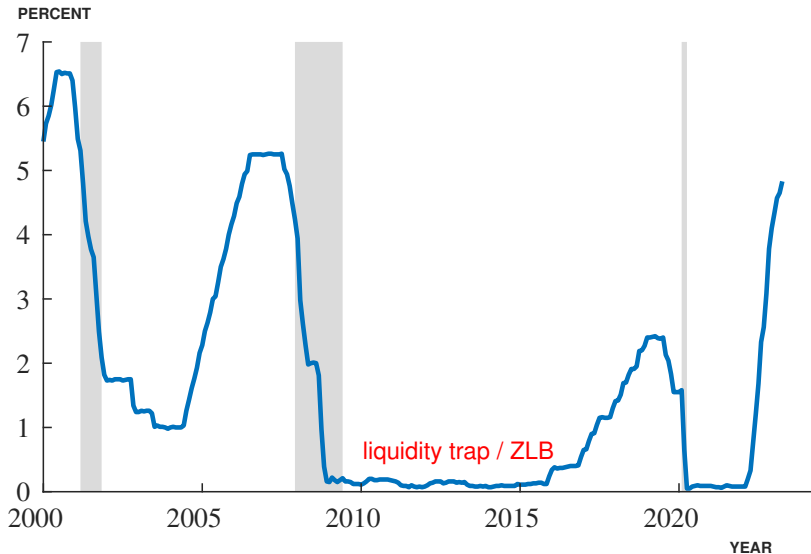
## Financial Frictions



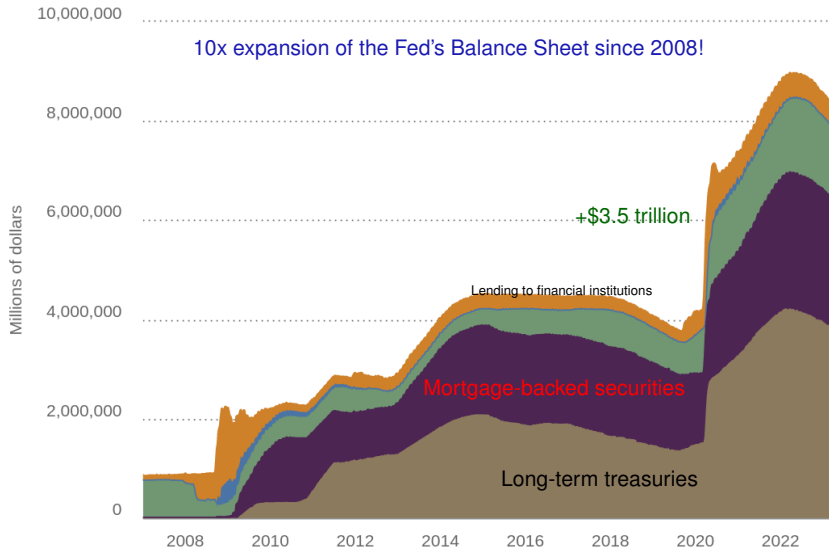
## How do we think about the financial crisis?



## The Zero Lower Bound: Fed Funds Rate 2000 - Present



## Unconventional Monetary Policy: Quantitative Easing





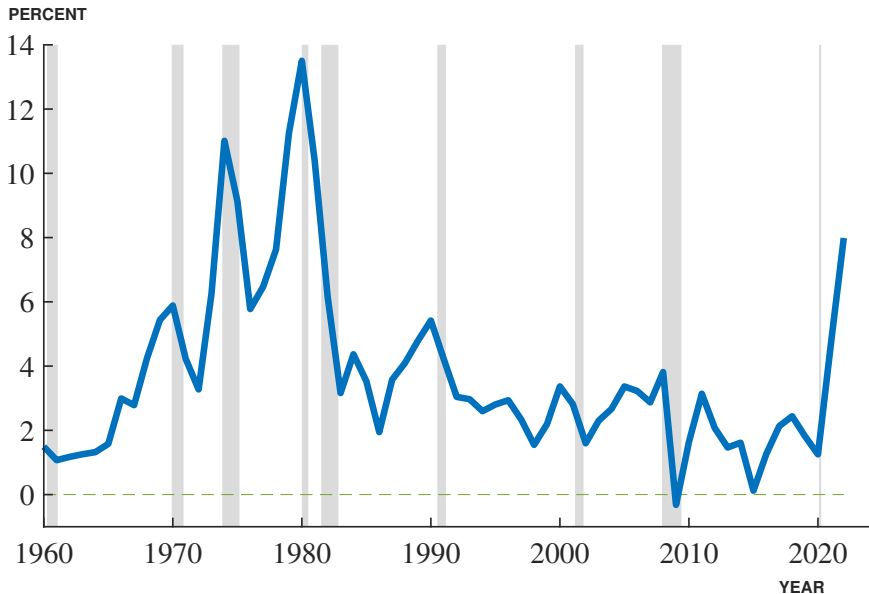
# The Phillips Curve



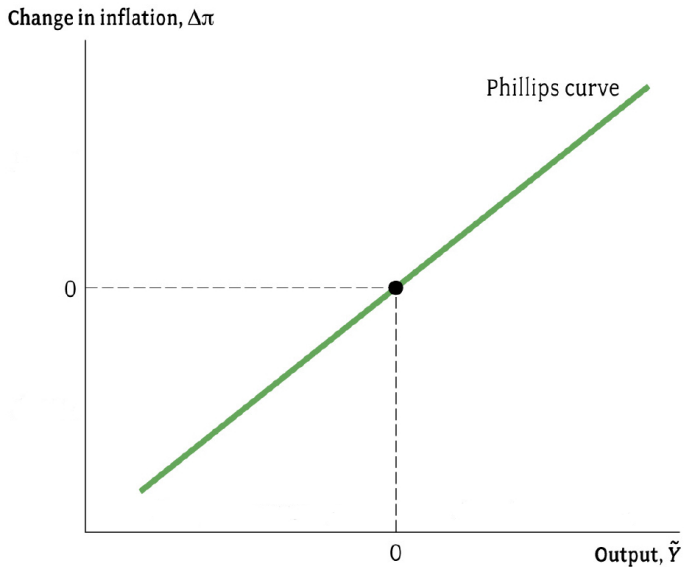
## The Phillips Curve

- 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

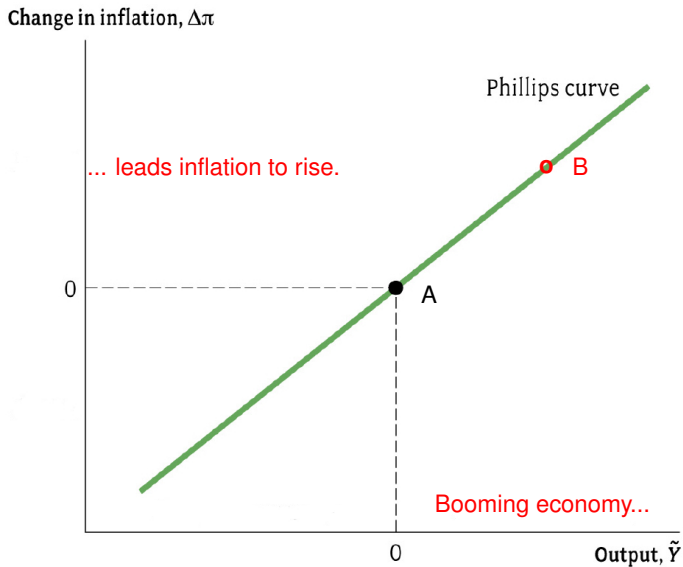
## The U.S. Inflation Rate



## The Phillips Curve



## The Phillips Curve



## 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

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

- $\pi_t$  is the inflation rate
- $\pi_t^e$  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  $\pi_t^e$  come from?
- Simplest assumption: **adaptive expectations**

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

## The Phillips Curve: inflation dynamics

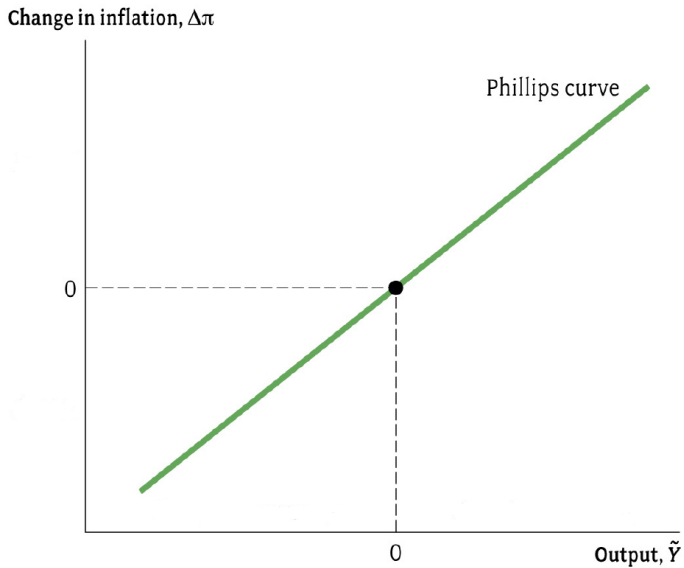
$$\pi_t = \pi_{t-1} + \bar{v} \tilde{Y}_t + \bar{o}$$

Or in dynamic form:

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



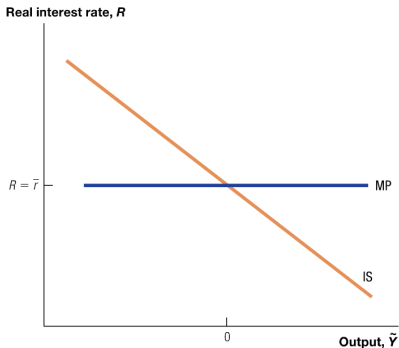
## The Phillips Curve



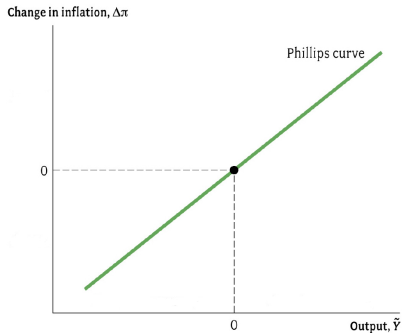


## Using the Short-Run Model

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

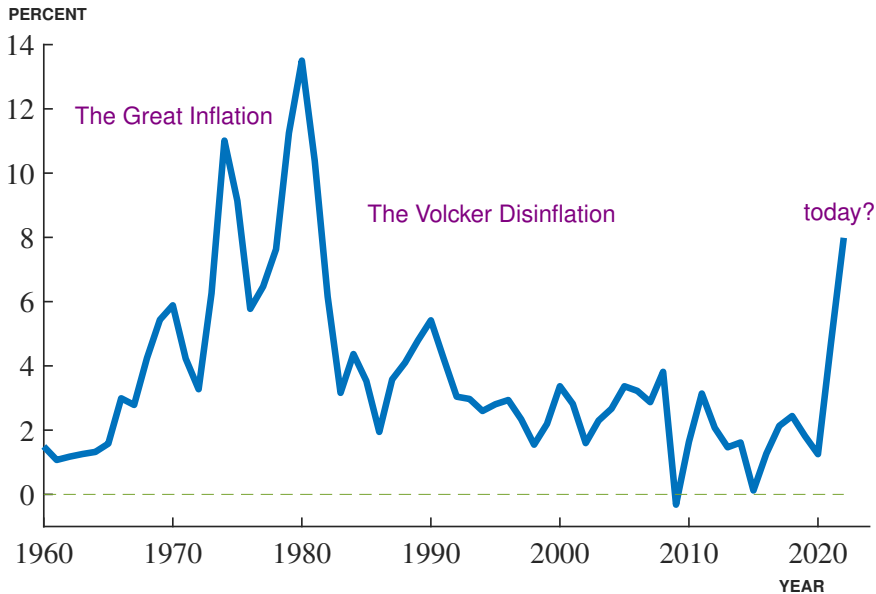


Demand Shocks + MP  $\Rightarrow \tilde{Y}$



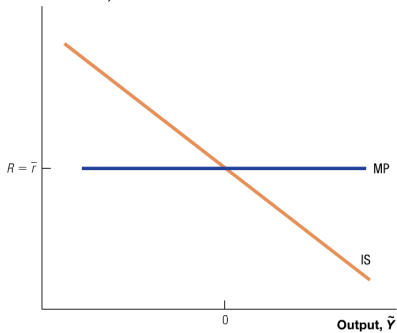
Expectations +  $\tilde{Y} + \bar{o} \Rightarrow \Delta\pi$

## The U.S. Inflation Rate

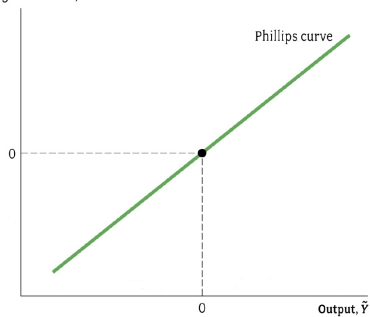


## The Volcker Disinflation: IS-MP + Phillips Curve

Real interest rate,  $R$



Change in inflation,  $\Delta\pi$



## Understanding the Great Inflation

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

## Understanding the Great Inflation

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

⇒ 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 → inflation
    - Workers build the increase into their wage contracts...



## Oil Shocks and the Phillips Curve

- 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
$\pi_t^e$	2%			

*Handwritten notes:* A green arrow labeled "up" points from time 0 to 1. A blue arrow labeled "back to normal" points from time 1 to 2.

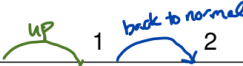
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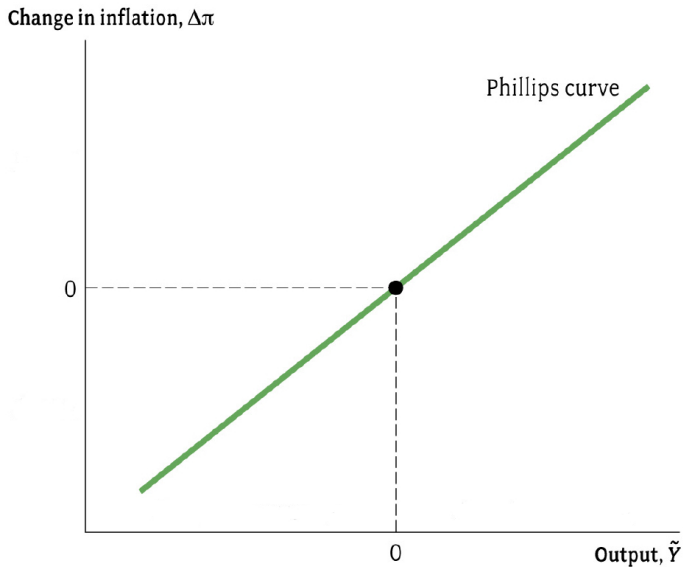
Time:	0	1	2	3
$\bar{o}$	0	+5%	0	0
$\Delta\pi_t$	0	+5%	0	0
$\pi_t$	2%	7%	7%	7%

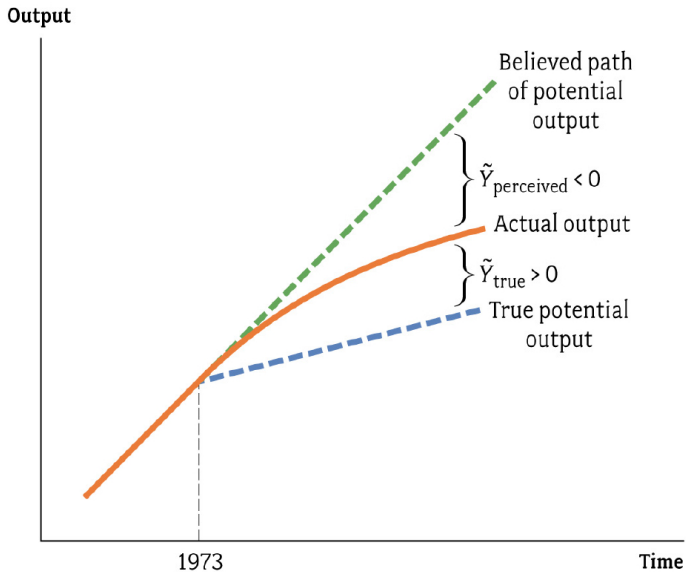
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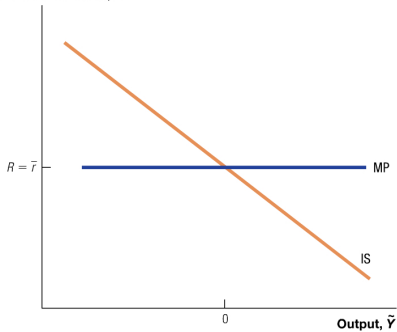
## Oil Shocks and the Phillips Curve



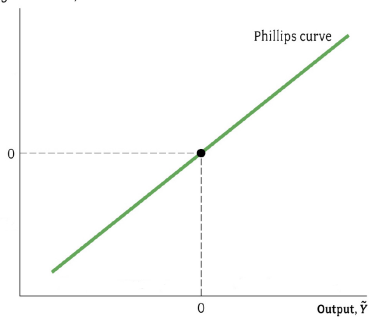


## The Great Inflation: IS-MP + Phillips Curve

Real interest rate,  $R$

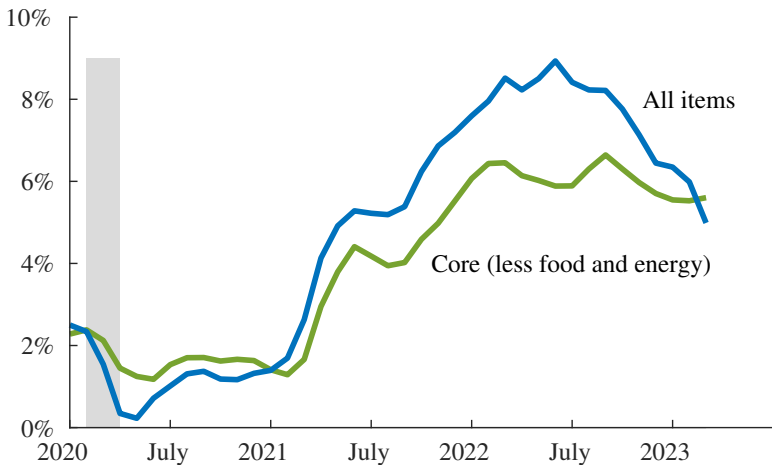


Change in inflation,  $\Delta\pi$



## Inflation: Is it 1973 all over again?

- **Reading:** Greg Ip, “Is Inflation a Microeconomic Problem?” (WSJ)



## 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 since 2021 (more next class)