



# Financial Institutions & the Economy I



Dr. R. Andrew Bauer  
The Federal Reserve Bank of Richmond—  
Baltimore Branch

## Financial Institutions and the Economy I

**Instructor:** Dr. R. Andrew Bauer (Andy)

**Course Description:** This course provides students with a basic understanding of the economy, how economic indicators are used to gauge the strength of the macroeconomic and regional economy, and current issues in the economy, financial markets, and the banking sector. In addition the course covers the structure of the Federal Reserve and the conduct of monetary policy.

**Time:**

Monday	4:15 p.m. – 5:45 p.m.
Tuesday	4:15 p.m. – 5:30 p.m.
Wednesday	1:00 p.m. – 3:00 p.m.

### Course Outline:

#### Monday/Tuesday

#### Assessing the U.S. and Maryland Economies

- I. Economic growth
  - a. Determinants of long-run (potential) growth
  - b. Estimates of potential growth
- II. U.S. Economy and the Business Cycle
  - a. Review of the business cycle
  - b. Following the economy: measuring output
    - i. Real GDP & its components
    - ii. Real-time measures (nowcasting & surveys)
    - iii. Industry sectors (consumer, manufacturing, business investment, housing, commercial real estate)
  - c. Following the economy: labor market
    - i. Role of labor market
    - ii. Importance of productivity
    - iii. Current labor market issues
    - iv. Principle sources for labor market information
  - d. Following the economy: financial markets
    - i. Impact on consumer sector and business investment
    - ii. Assessing household financial conditions
  - e. Following the economy: inflation
    - i. What causes inflation
    - ii. Measuring inflation

- iii. Inflation expectations
- f. Following the economy: forecasts
- g. Assessing the regional economy

## Tuesday/Wednesday

### Monetary policy

- I. Basics of monetary policy
  - a. Broad definition
  - b. Federal Reserve's dual mandate
- II. Inflation: why is it costly
  - a. High inflation leads to high nominal interest rates
  - b. Unanticipated costs and income redistribution
  - c. Negatively impacts long-term planning
- III. When is there a role for monetary policy?
  - a. Potential growth: determined by employment growth and productivity
  - b. An economy operating at potential
  - c. Output gaps
- IV. Tools of monetary policy
  - a. Understanding the equation of exchange
    - i. First important assumption: change in money supply does not change velocity
  - b. Impact of changes in the money supply in the short run
    - i. Second important assumption: prices are "sticky" in the short run
  - c. Open market operations
    - i. Change in monetary policy and impact on the economy (responding to output gaps)
  - d. Monetary policy in the long-run
  - e. Unconventional monetary policy
    - i. Interest paid on excess reserves
    - ii. Short-term rates close to zero
    - iii. Large scale asset purchases
    - iv. Forward guidance
  - f. Policy normalization
- V. Discussion: Outlook for monetary policy



# Financial Institutions and the Economy I

## Part I

Andy Bauer  
Vice President & Regional Executive

July 31, 2023



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# Goals & Objectives

## Year 1

- Learn about the economy – what drives long-run growth and become familiar with how the economy operates during the business cycle
- Understand key economic indicators & know how they are used to follow the economy
- Learn what monetary policy is, how it is conducted, and when it is appropriate

## Between Year 1 & Year 2

- Project: Section on the economy & monetary policy

## Year 2

- Using what was learned in year 1, evaluate the economy and put together a presentation that summarizes the economy, the risks to the outlook and give a monetary policy decision as if you were the FOMC





# Overview of the Economy

- Economic growth: long run vs. short run
- Following the economy
  - Economic output: Real GDP
  - Labor market
- Inflation
- Financial Markets
- Assessing the Regional Economy





# Economic Growth

- Long-run or potential growth
  - Depends on factors of production (land, labor, capital, technology)
  - Can decompose growth into labor & productivity
  - Productivity is key: determines growth in income & living standards
- Short-run Business cycle
  - Expansion → Recession → Recovery → Return to Expansion
  - GDP & employment vary considerably over the business cycle
  - Explaining the business cycle is difficult (no consensus)





# The economy in the long-run: potential growth

## How fast can labor can increase?

- Population – it only increases so fast
- Labor force participation – not everyone is willing or able to participate (retirees, disabled, unskilled, etc..)
- Economists generally think that labor force growth changes very slowly over time
- **Importantly, changes in the labor force are not influenced by monetary policy**





# The economy in the long-run: potential growth

## What determines productivity?

- Worker productivity is output per worker
- Factors that influence worker productivity include:
  - Technological innovations (e.g. computing, communications)
  - Industrial organization (e.g. structure of firms and markets)
  - Level of education of the workforce
  - Regulations
- Economists generally think that long-run (average) productivity cannot be influenced by monetary policy!





## The economy in the long-run: potential growth

- Real Output (Y) = Number of Employed x Worker Productivity
- Any change in the number of workers or productivity will change real output:

$$\% \Delta \text{ Output} = \% \Delta \text{ Employed} + \% \Delta \text{ Productivity}$$

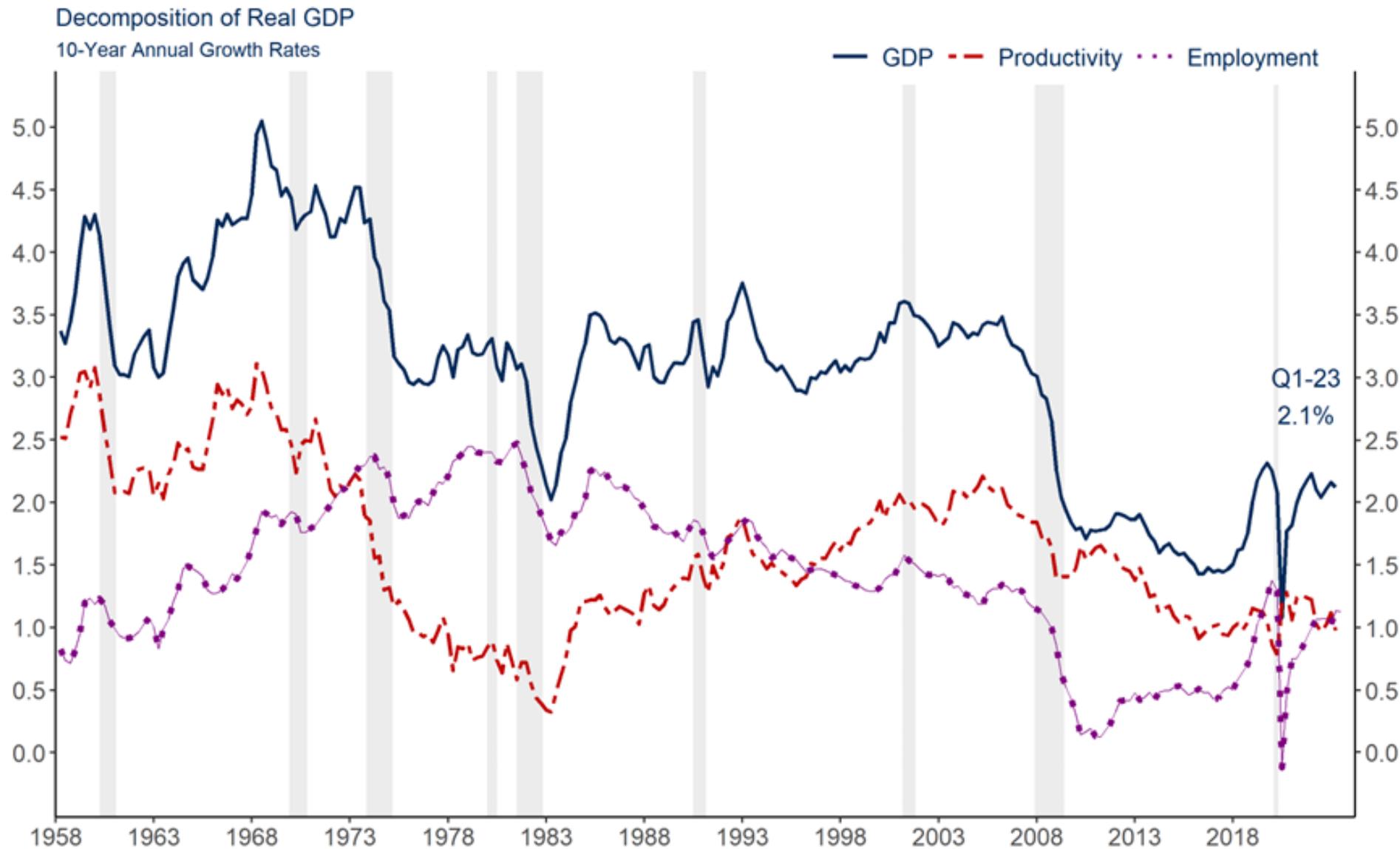
$$\% \Delta \text{ Output} = 1.2\% + 1.8\%$$

- \* In this example, the real economy's long run growth potential is 3.0%





# Decomposition of Real GDP



Note: Productivity is calculated as real GDP per employee, from the Household Survey.

Source: Bureau of Economic Analysis and Bureau of Labor Statistics via Haver Analytics

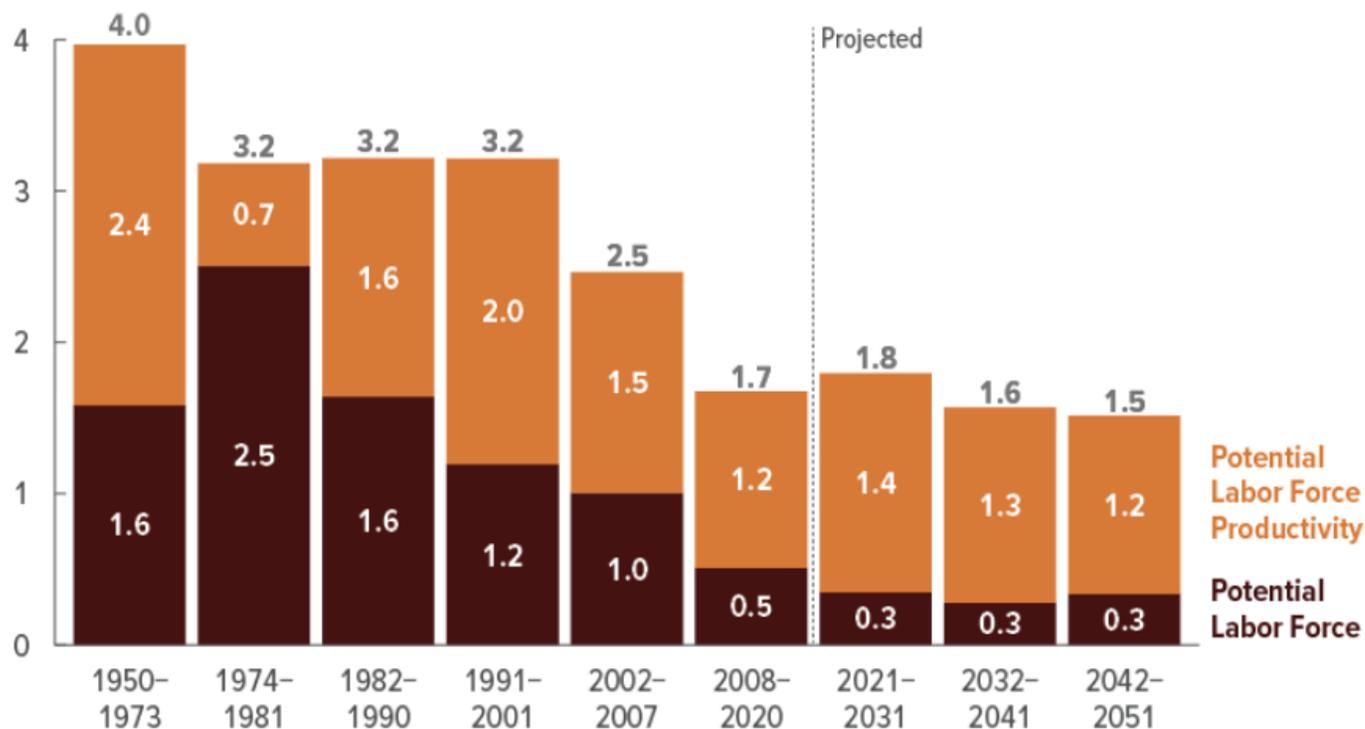




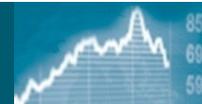
# Estimates of potential output

## Average Annual Growth of Real Potential GDP

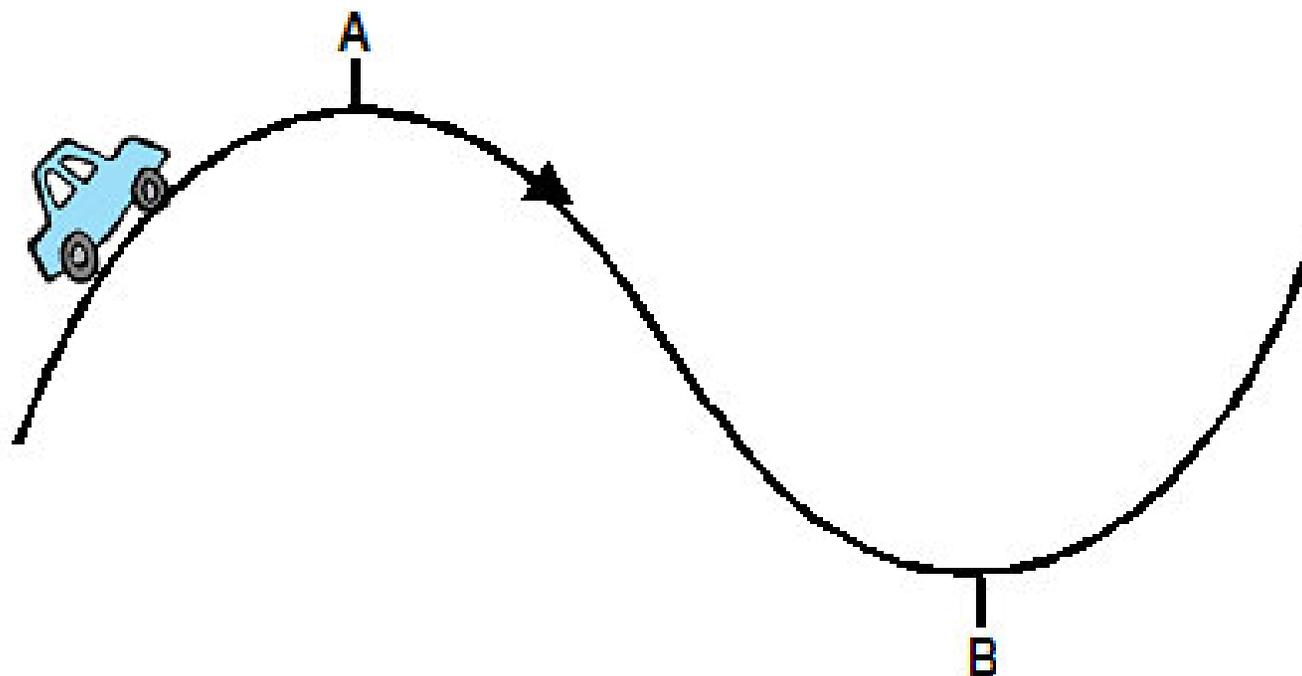
Percent



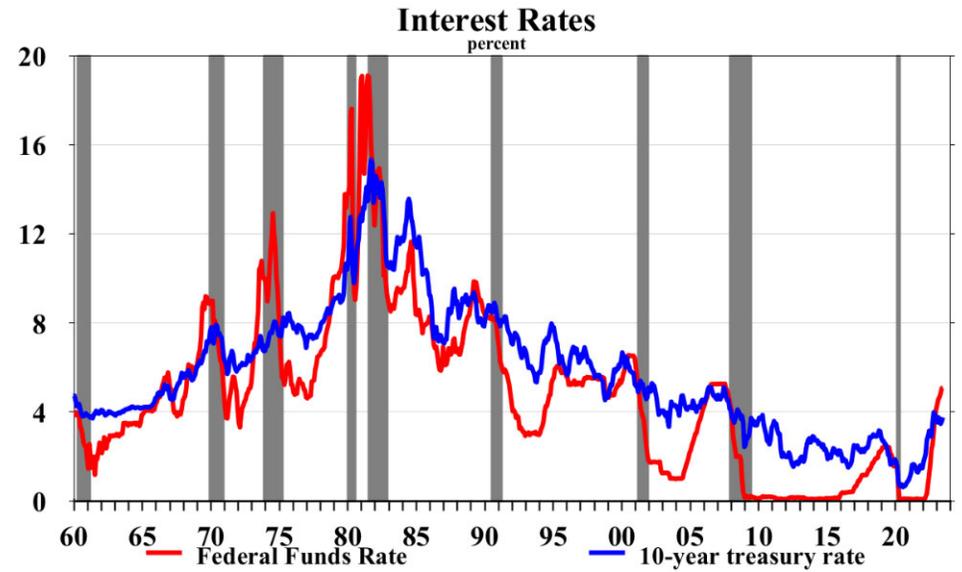
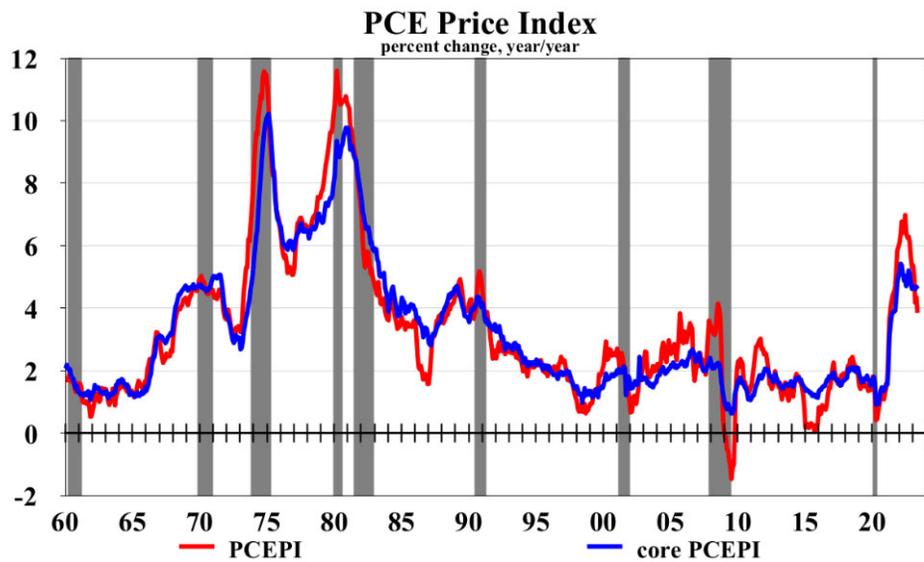
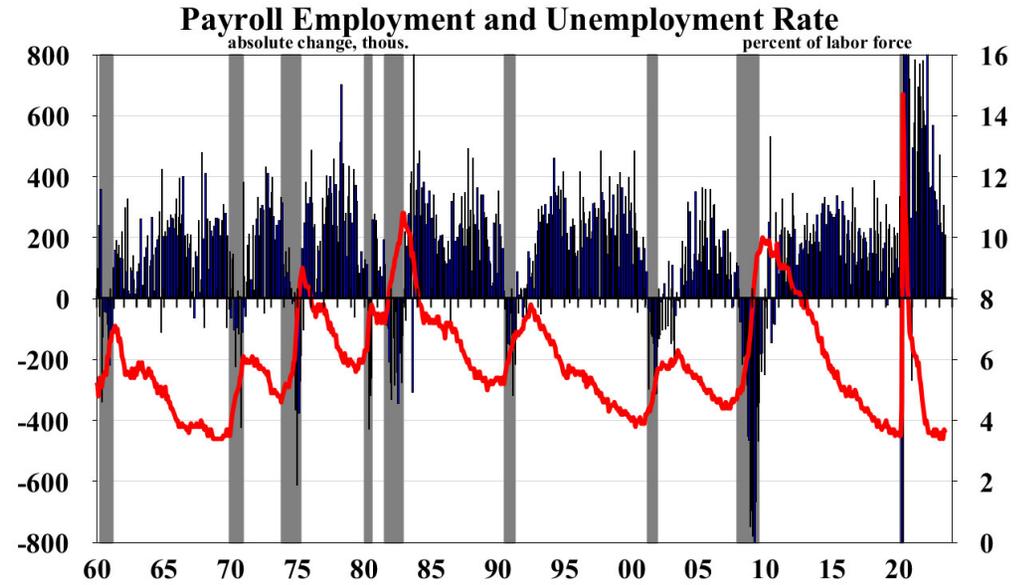
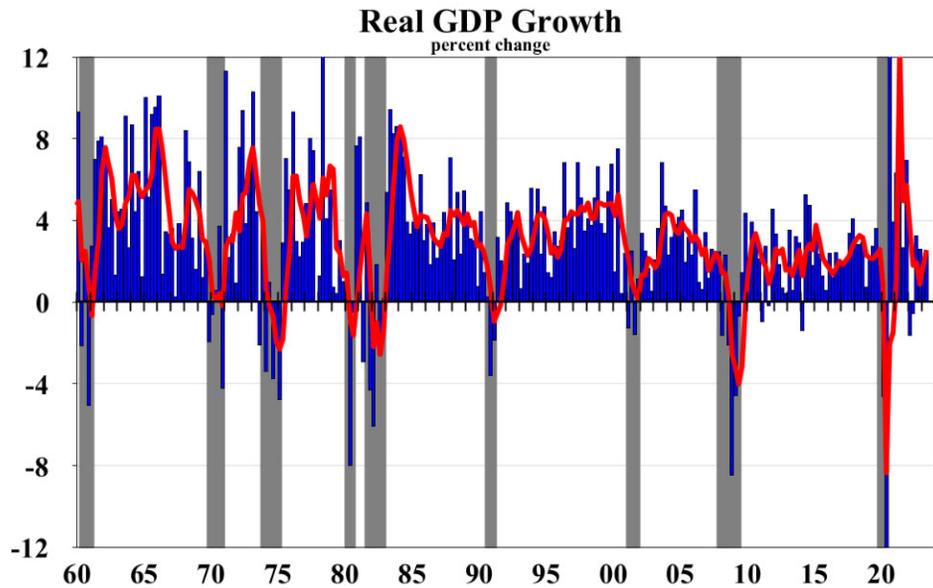
Growth in real potential GDP is projected to be slower than it has been in the past. That slowdown occurs mostly because the potential labor force is projected to grow at a slower pace.



# The business cycle...



# The business cycle...





# Following the economy – output

## Real GDP

- Is the value of all final goods & services produced within a country in a given period of time
- Measures total income of everyone in the economy
- Measures total expenditure on the economy's output of goods & services
- Real GDP =
  - Consumption (70%)
  - Investment
    - Fixed Investment (12%)
    - Change in Private Inventories (0.6%)
  - Government (21%)
  - Net exports [exports less imports] (-3.5%)

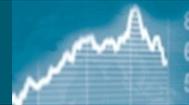




# Real Gross Domestic Product

	2022				2023
	Q1	Q2	Q3	Q4	Q1
<b>CHANGE FROM PREVIOUS QUARTER AT COMPOUND ANNUAL RATE [Percent]:</b>					
Gross Domestic Product	-1.6	-0.6	3.2	2.6	2.0
Personal Consumption Expenditures	1.3	2.0	2.3	1.0	4.2
Nonresidential Fixed Investment	7.9	0.1	6.2	4.0	0.6
Structures	-4.3	-12.7	-3.6	15.8	15.8
Equipment	11.4	-2.0	10.6	-3.5	-8.9
Intellectual Property	10.8	8.9	6.8	6.2	3.1
Residential Fixed Investment	-3.1	-17.8	-27.1	-25.1	-4.0
Exports of Goods & Services	-4.6	13.8	14.6	-3.7	7.8
Imports of Goods & Services	18.4	2.2	-7.3	-5.5	2.0
Government Consumption Expenditures & Gross Investment	-2.3	-1.6	3.7	3.8	5.0
Final Sales to Domestic Purchasers	1.3	0.2	1.5	0.7	3.5
<b>LEVEL IN QUARTER AT SEASONALLY ADJUSTED ANNUAL RATE [Billions of Chained (2012) Dollars]:</b>					
Change in Private Inventories	214.5	110.2	38.7	136.5	3.5
Net Exports of Goods & Services	-1488.7	-1430.5	-1268.8	-1238.6	-1208.4

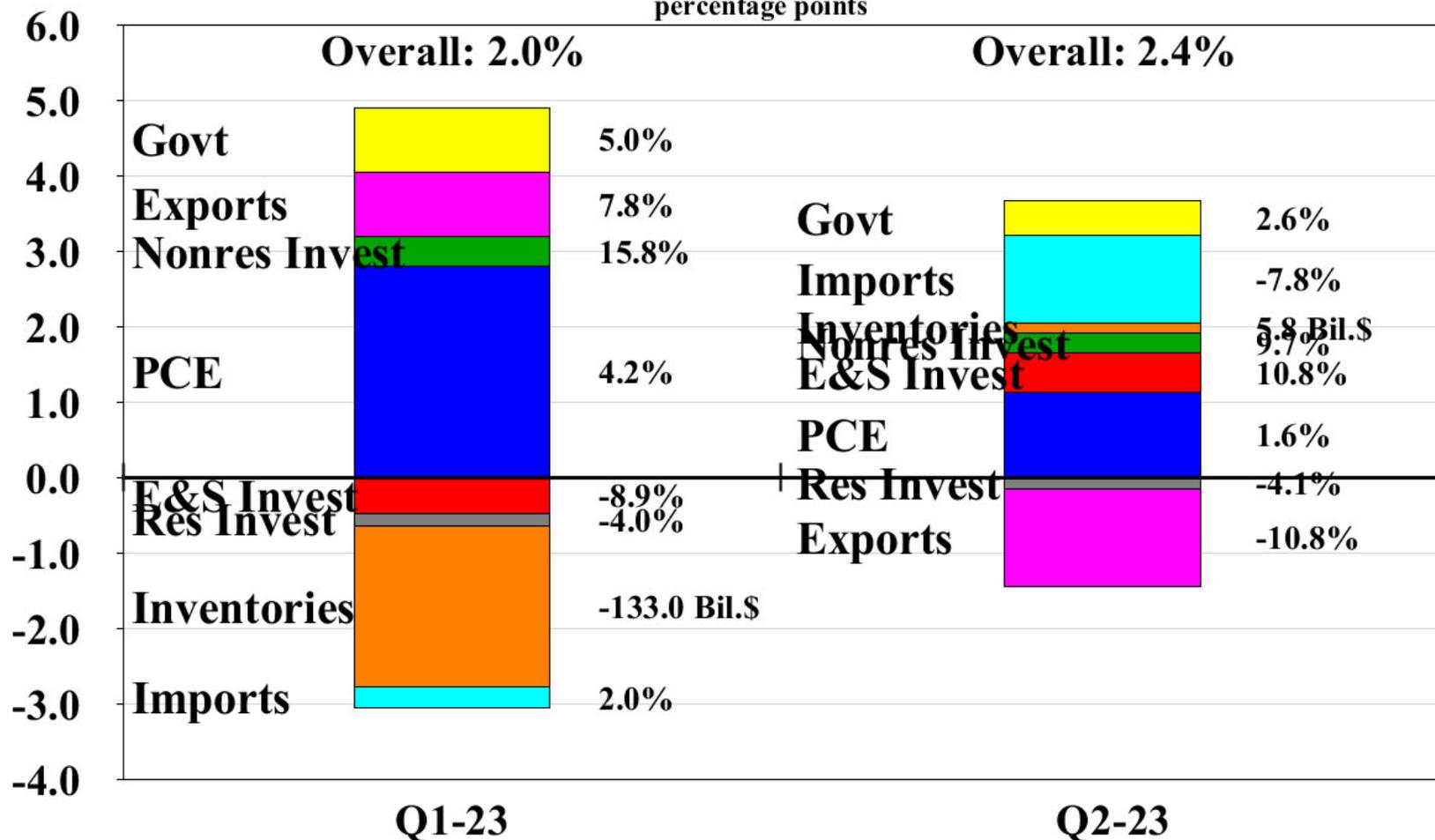




# Following the economy – Real GDP

## Contributions to Real GDP Growth

percentage points





## Following the economy – other indicators

- Unfortunately, real GDP comes out with a lag and is subject to revision? How to get a better sense of current economic conditions?
- Real-time real GDP measures:
  - Atlanta Fed “nowcasting”
- Surveys – Institute for Supply Management (ISM)
  - Federal Reserve surveys
    - Federal Reserve Bank Surveys of Economic Activity
    - Board Survey of Senior Loan Officers
  - Industry surveys: National Association of Homebuilders, Architecture Billings Index (AIA), NIFB Small Business Survey, Conference Board Survey of Consumer Confidence, University of Michigan Survey of Consumer Sentiment,...
- Anecdotal information





## Following the economy – other indicators

- Unfortunately, real GDP comes out with a lag and is subject to revision? How to get a better sense of current economic conditions?
- Data releases:
  - Consumer sector: retail sales, personal income & sales, light vehicle sales, consumer credit, household finances
  - Manufacturing: surveys, industrial production, orders & shipments, inventories
  - Housing: starts & permits, sales, home prices, inventories, delinquencies & foreclosures, household formation
  - Commercial real estate: property values, new construction, rental rates, vacancy rates, absorption rates,....
  - Labor market indicators: monthly labor report, initial claims, JOLTS, surveys
  - Inflation: CPI, PCEPI, PPI, commodity prices





# Following the economy...key sectors

## Consumer Spending

Factors supporting spending:

- Household income
- Changes in wealth
- Expectations of future income
- Changes in prices, taxes

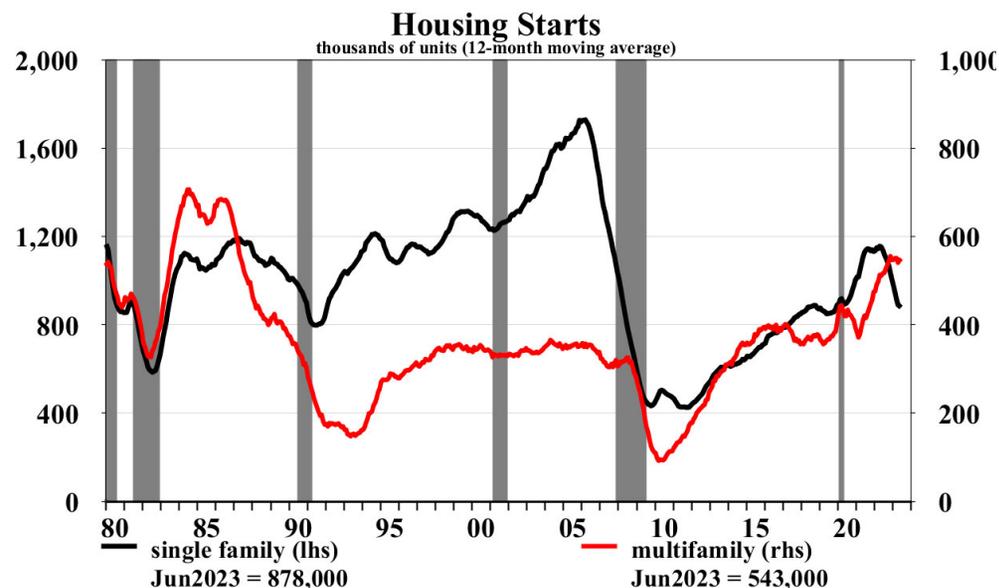
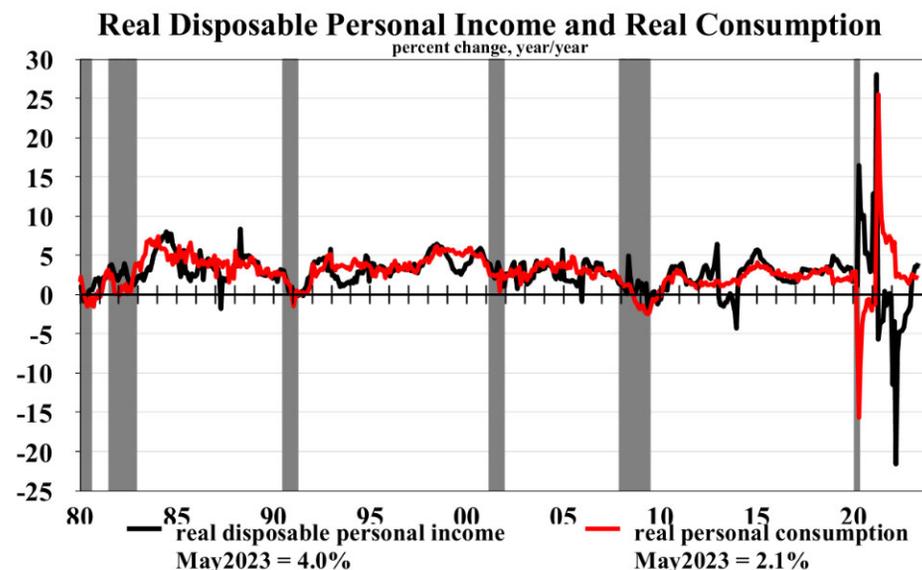
## Residential Investment

Factors supporting demand:

- Household income
- Changes in wealth
- Expectations of future income
- Changes in prices
- Household formation

Supply factors:

- Cost of land, labor, materials, finance
- Regulatory factors





# Following the economy...key sectors

## Business Investment

Factors affecting investment:

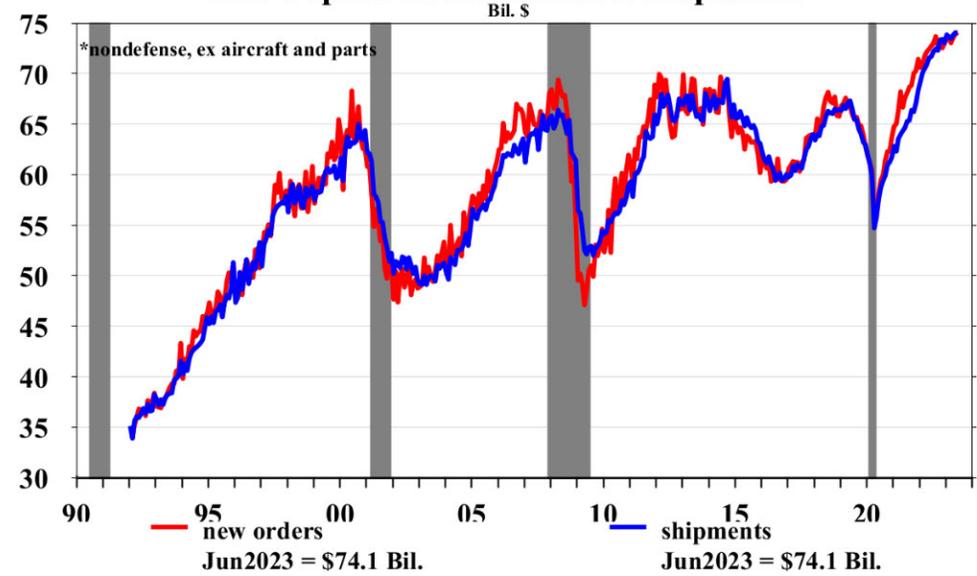
- Positive NPV (net present value)
  - Project costs
  - Expected cash flow
  - Discount rate
- Financing costs/Availability of capital
- Uncertainty
- Technology

## Manufacturing

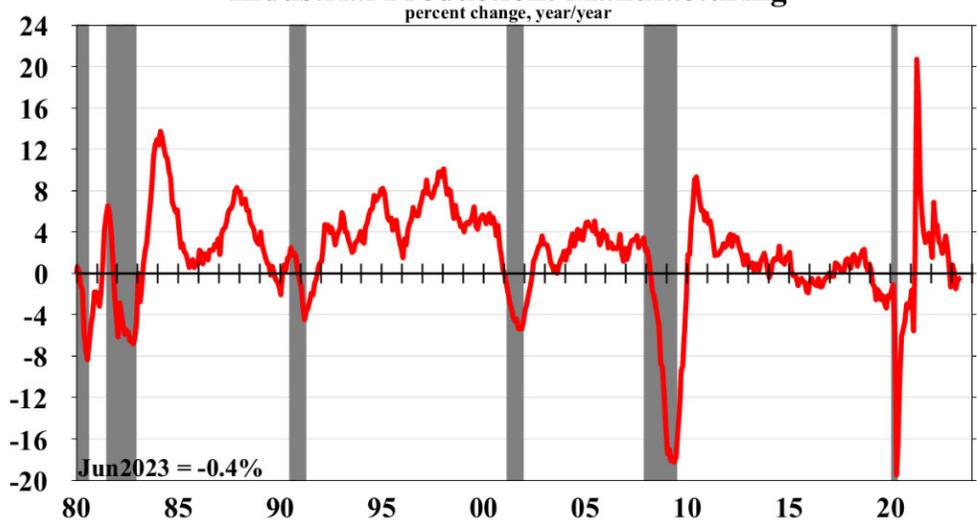
Factors affecting manufacturing:

- DD consumer goods
- Business investment – durable goods
  - machinery, computers & electror products, electrical equipment, transportation...
- Nondurable goods
  - food products, textiles, apparel, petroleum products, chemicals..

### Core Capital Goods Orders & Shipments\*



### Industrial Production: Manufacturing





# Following the economy...key sectors

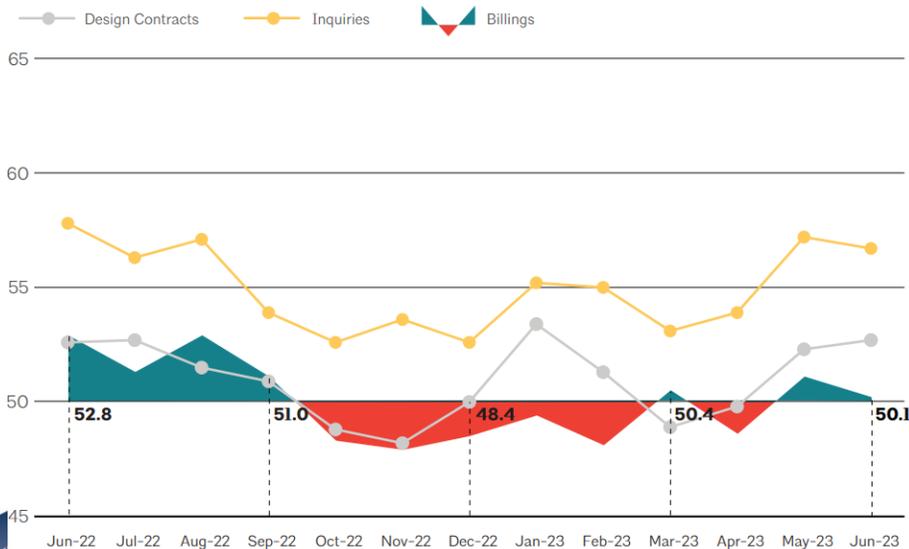
## Commercial Real Estate

- Office
- Industrial
- Retail
- Hotel
- Other

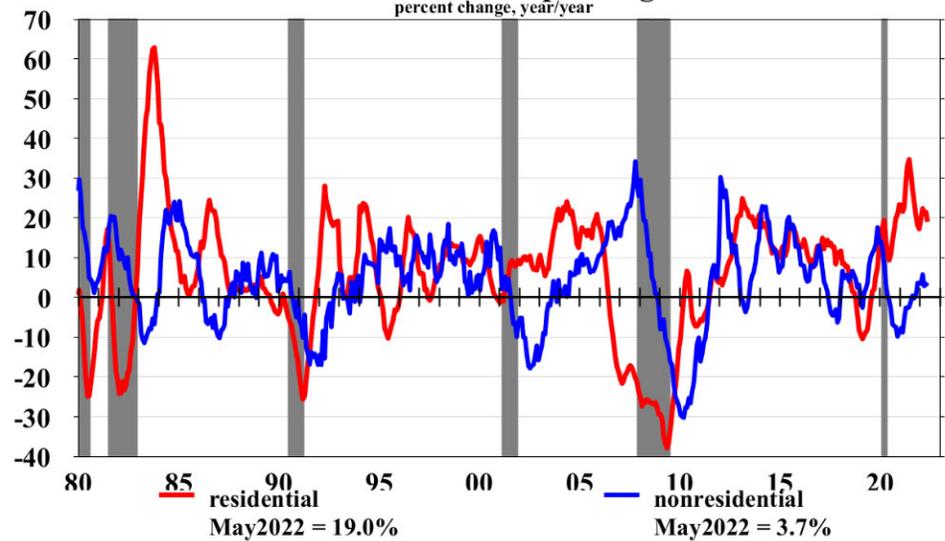
### National

Billings remain essentially flat at architecture firms in June

Graphs represent data from June 2022–June 2023.



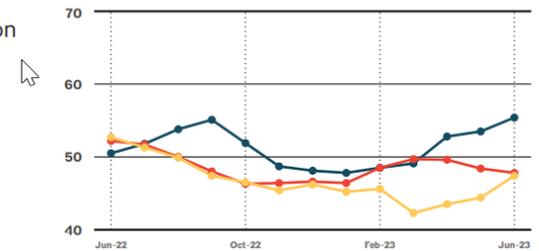
### Construction Spending



### Sector

Firms with an institutional specialization continue to report strong billings

Graphs represent data from June 2022–June 2023 across the three sectors. 50 represents the diffusion center. A score of 50 equals no change from the previous month. Above 50 shows increase; Below 50 shows decrease. 3-month moving average.





## Following the economy – the labor market

- Labor market indicators closely followed
  - Demand for labor is derived demand – reflects demand for final goods & services
  - Monthly payroll employment growth timely gauge for economic growth (used to determine recessions)
  - Unemployment rate also used as indication of health of overall economy (rising unemployment rate = weakness)
- Recall current economic income & expectations of future income are factors supporting consumer spending
  - Strong payroll employment (more workers = more income)
  - If tight labor market → rising wages = more income
  - Tight labor market may increase income expectations
- Labor productivity important for overall growth
  - Should determine real wage growth





# Following the economy – the labor market

- Principle sources for labor information
  - Establishment Survey
    - Payroll employment – jobs lost/gained
    - Weekly & Aggregate Hours || Average earnings
  - Household Survey
    - Unemployment rate
    - Number employed/unemployed & labor force
  - Unemployment Insurance Claims
    - Weekly indicator of initial & continuing claims for unemployment insurance
  - JOLTS – job openings and labor turnover survey
  - Other surveys (Federal Reserve, ISM, Business/Industry)

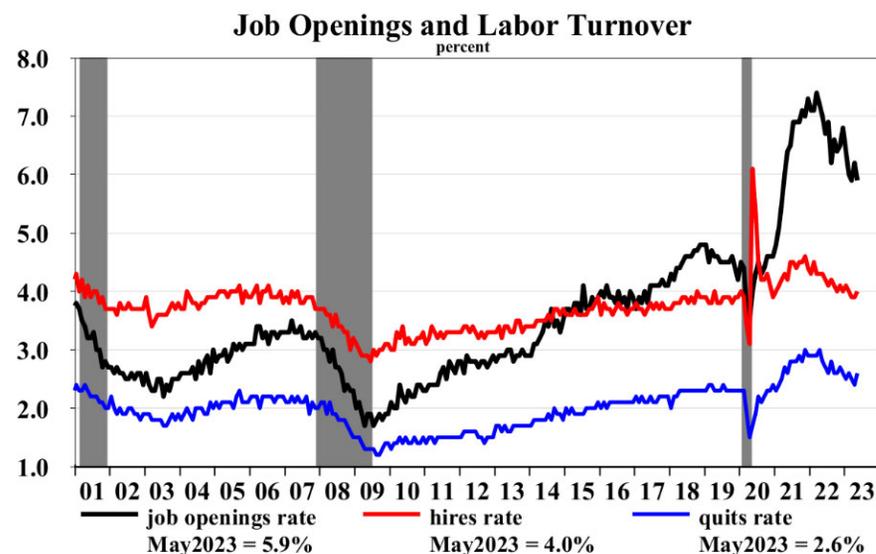
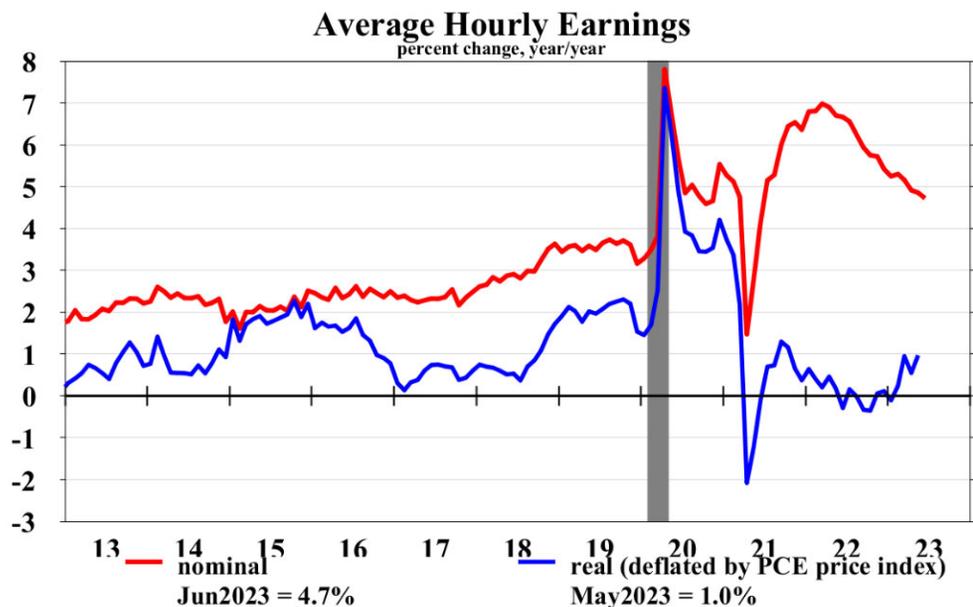
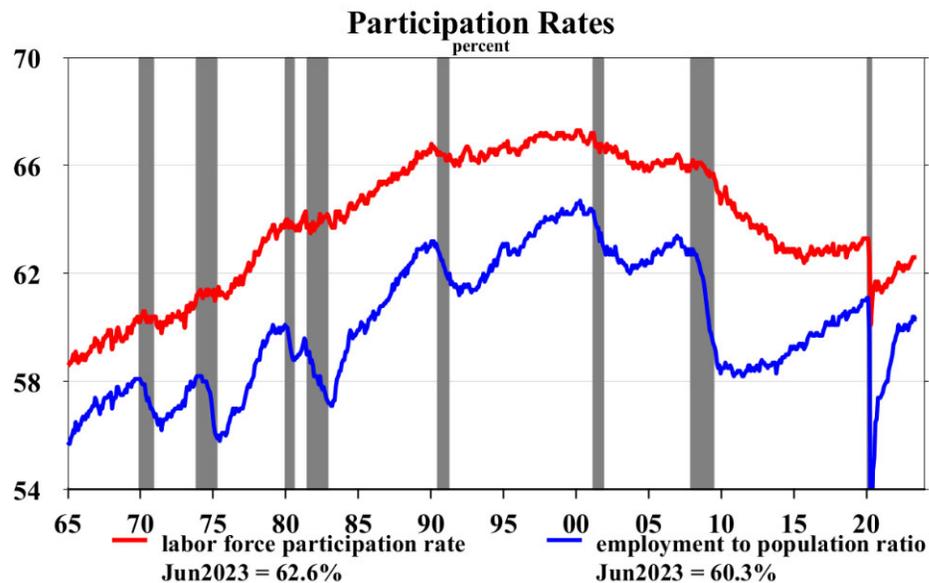




# Following the economy – the labor market

## Current labor market issues:

- Strong demand
- Labor force participation
  - Demographics
- Labor availability
  - Skills mismatch
- Rising wages
- Future of the office

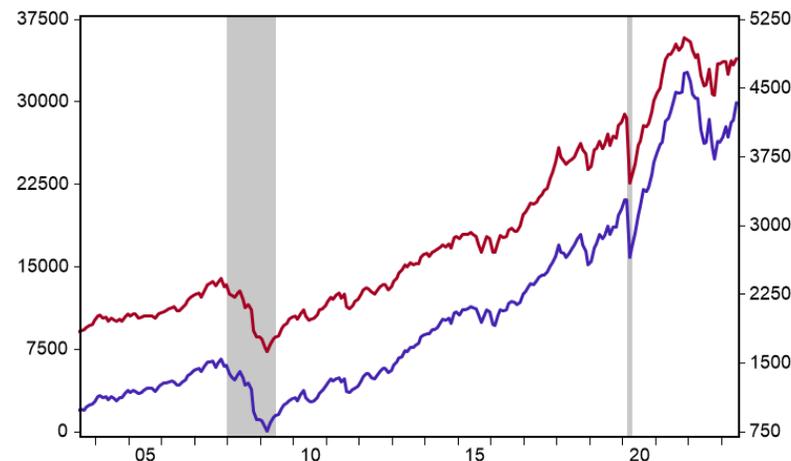


# Following the economy – financial markets

## Equity Markets:

- Changes in market values impact consumer wealth
  - Could lead to increases in current spending
- Higher company valuations improves credit worthiness
  - Could lead to greater borrowing

← Dow Jones: 30 Industrial Stocks: Average Price Close  
AVG, May-26-1896=40.94  
Stock Price Index: Standard & Poor's 500 Composite →  
1941-43=10

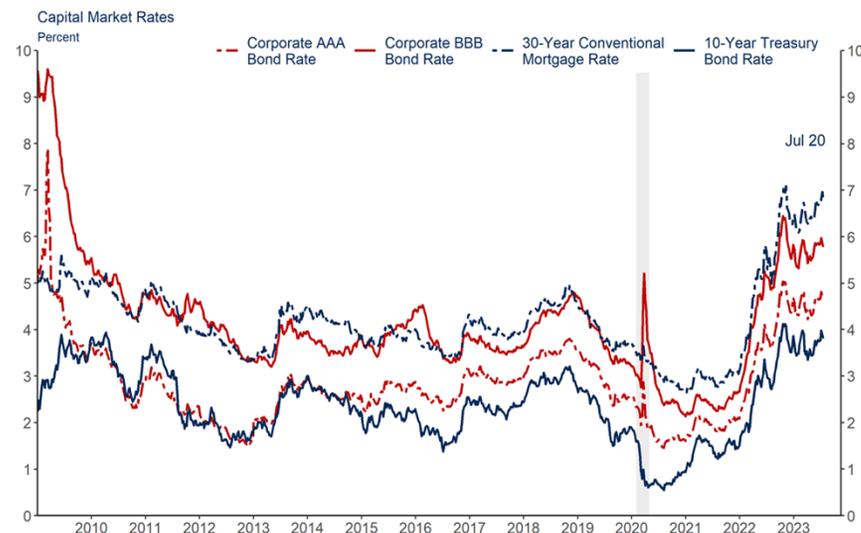


Sources: WSJ, S&P/Haver

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## Bond Markets:

- Changes in market rates impacts consumer/business desire to borrow & save
- Rising rates give signals to risk



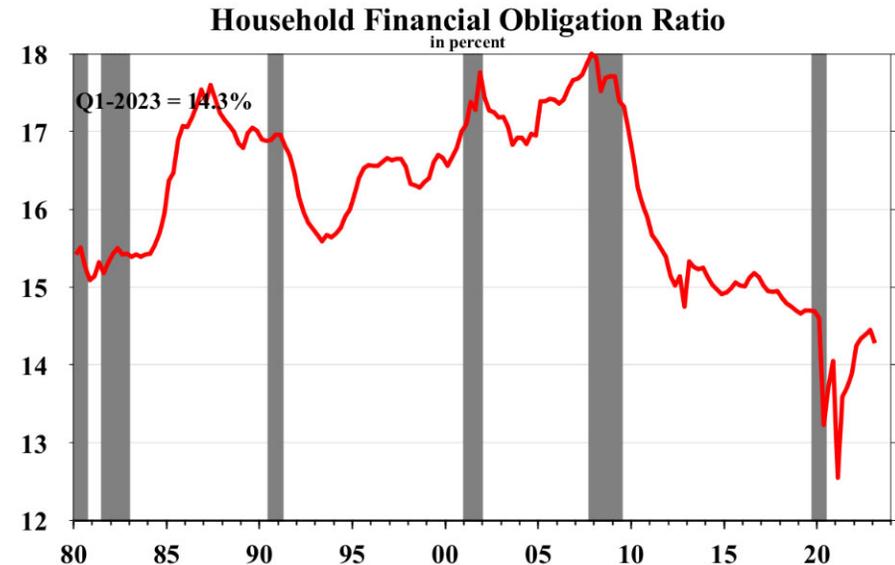
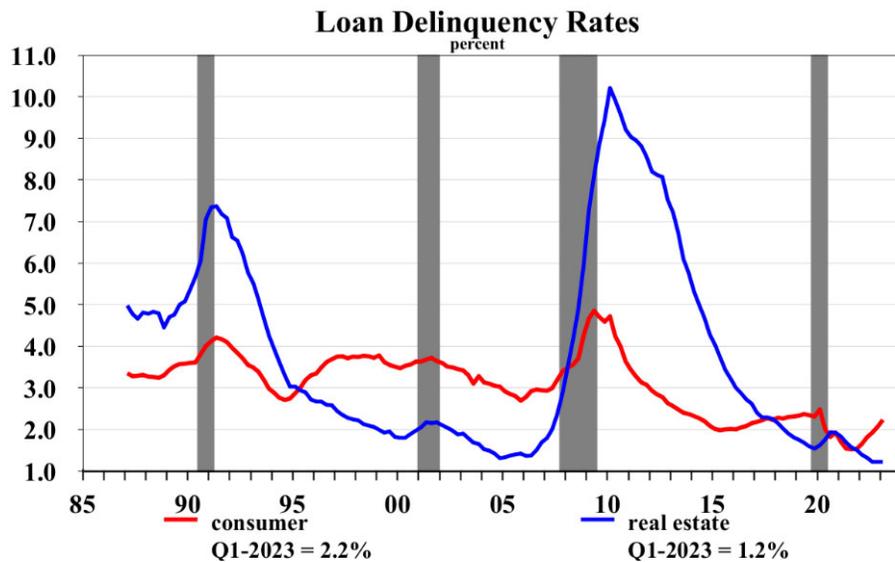
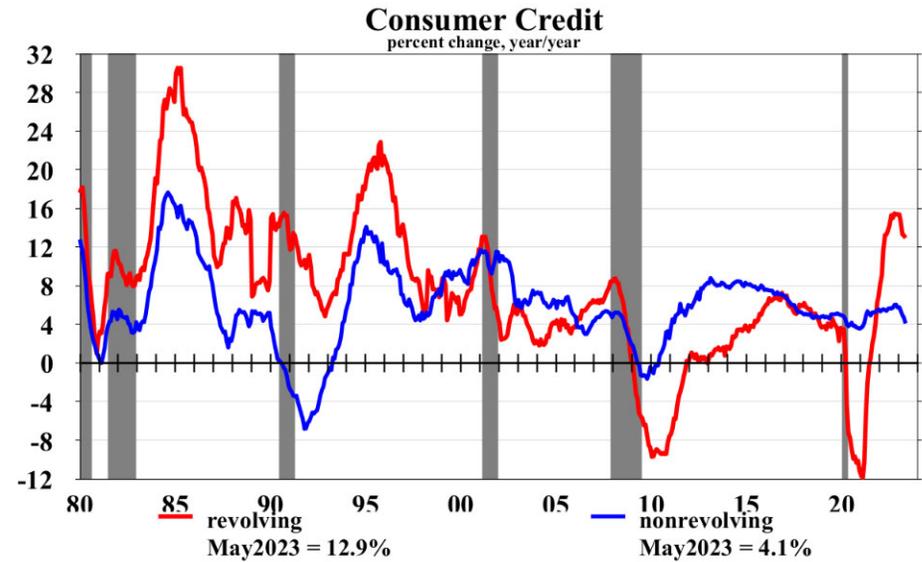
Source: Standard & Poor's, Federal Reserve, Wall Street Journal



# Following the economy – financial markets

## Household Credit Conditions:

- Strong credit demand is positive indicator for growth
  - Durable goods (light vehicles, furniture)
  - Housing
  - Consumer loans & credit card spending
- Weakness in credit also an indicator
  - Slowdown in demand for credit
  - Rising debt





## Following the economy – inflation

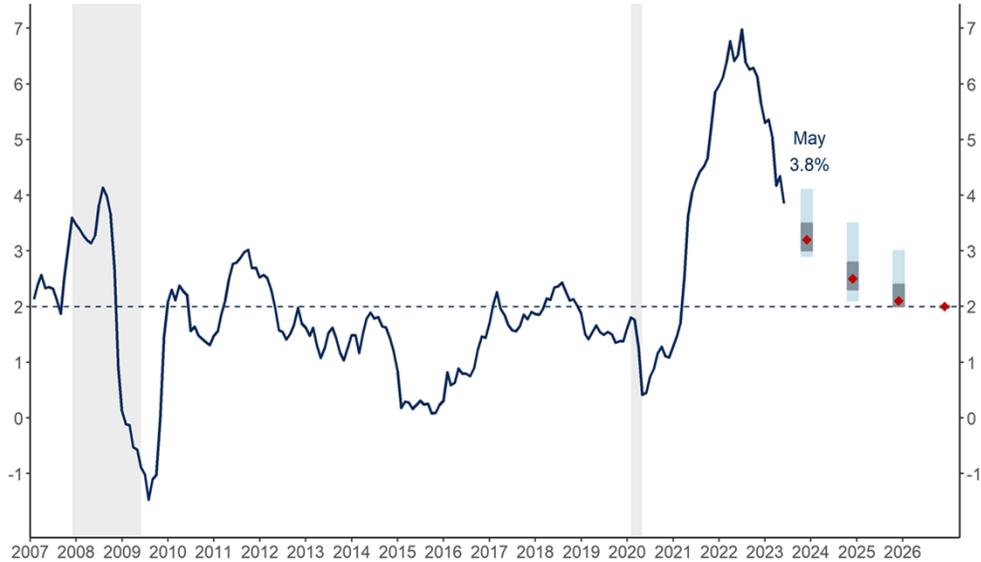
- What causes inflation?
  - Too much money chasing too few goods
- How do we measure inflation?
  - Consumer inflation measures (most common)
    - Consumer Price Index (CPI)
    - Personal Consumption Expenditure (PCE) Price Index
  - Also look at commodity prices, survey measures, producer-price index
- Inflation expectations are very important
  - Survey measures- Blue Chip/Survey of Professional Forecasters, University of Michigan
  - Financial markets – difference between nominal treasury securities and inflation-protection treasury securities



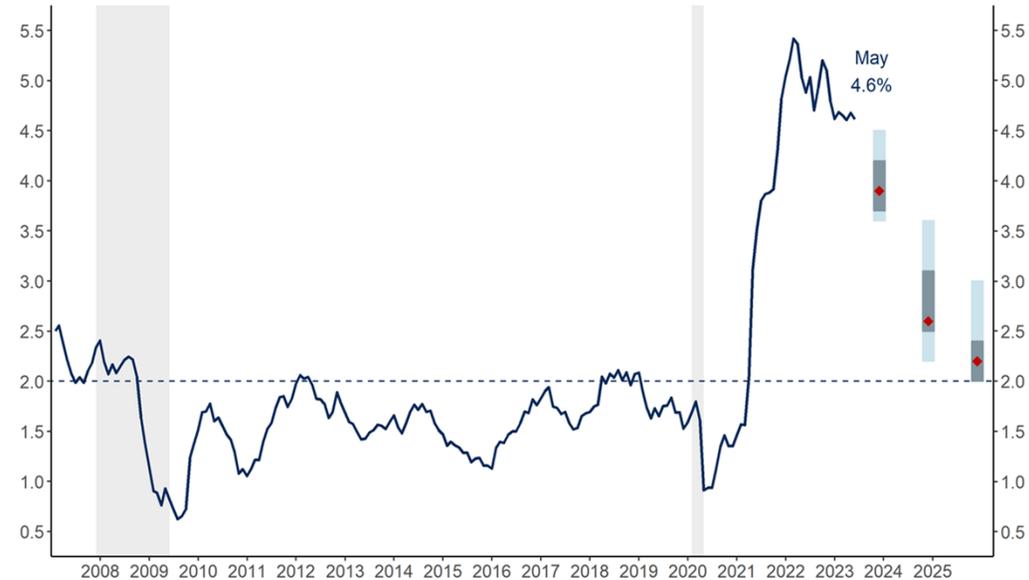


# Following the economy – inflation

Personal Consumption Expenditures Price Index  
12 Month Percent Change



Core Personal Consumption Expenditures Price Index  
12 Month Percent Change

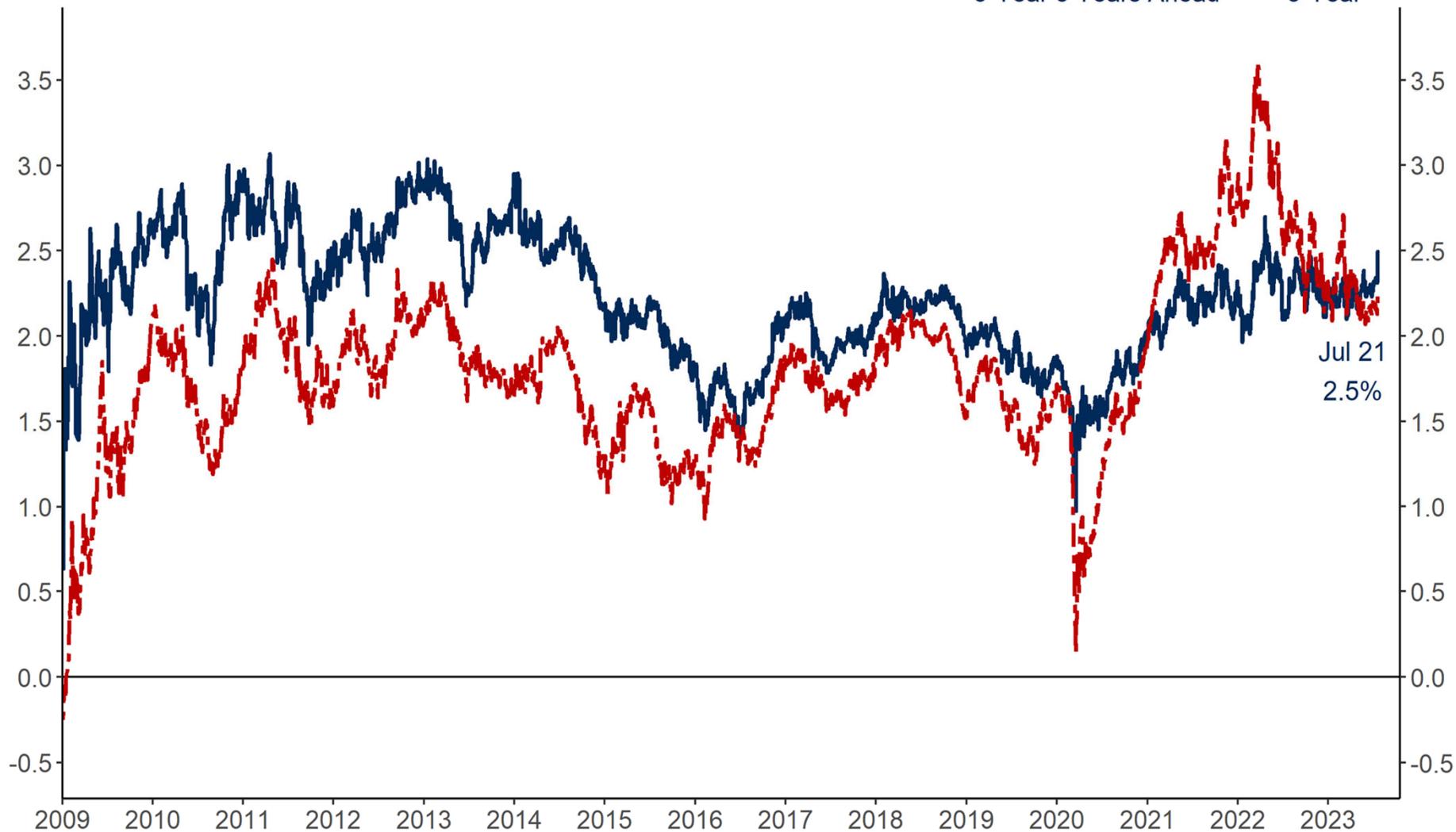




# TIPS Inflation Compensation

TIPS Inflation Compensation  
Percent

— 5-Year 5 Years Ahead - - 5-Year





## Following the economy – forecasts

- Should you need to get a forecast for the economy, there are a variety of places to go:
- Surveys of forecasters
  - Survey of Professional Forecasters – Philadelphia Fed
  - Blue Chip Economic/Financial Indicators
- FOMC forecasts
- Individual forecasts
  - Banks, trade associations (NAR, NAHB), Fannie
- Government – Congressional Budget Office





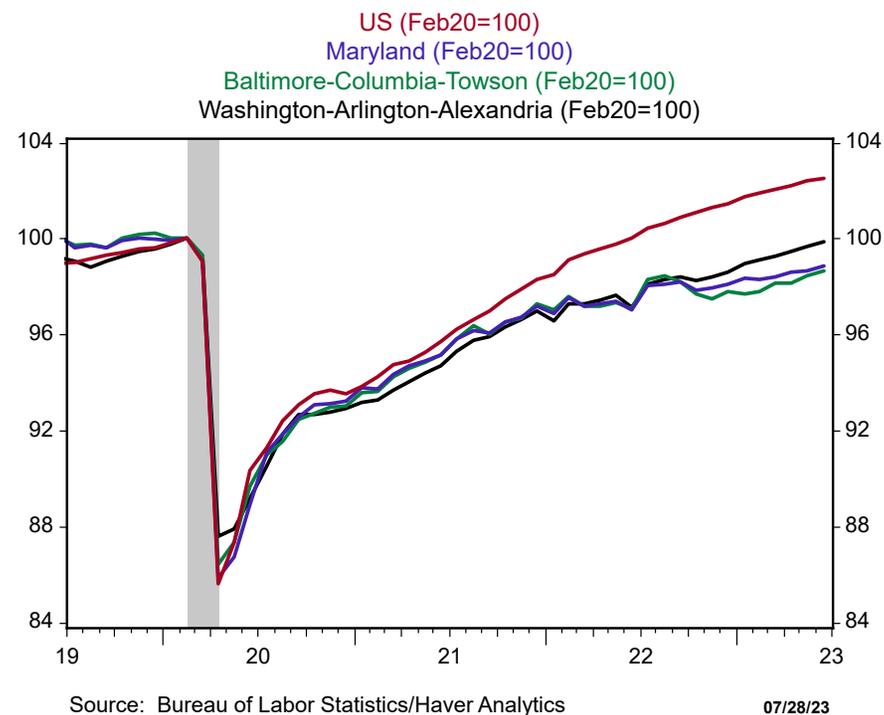
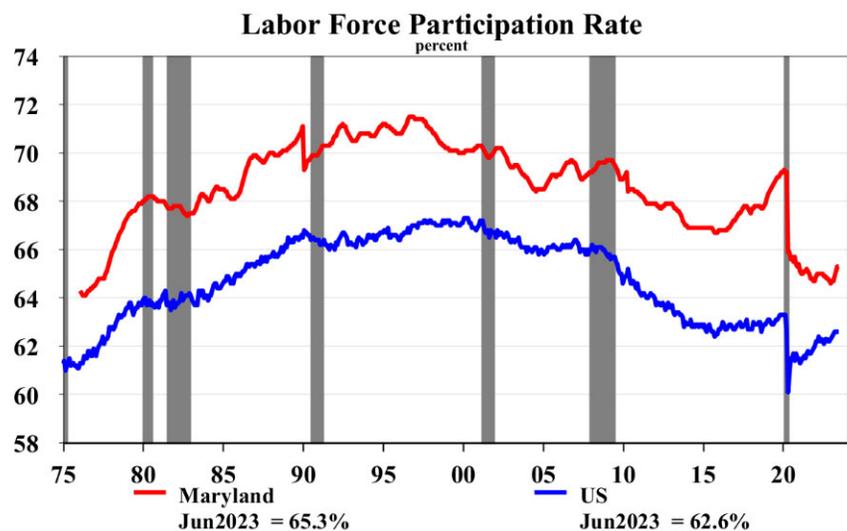
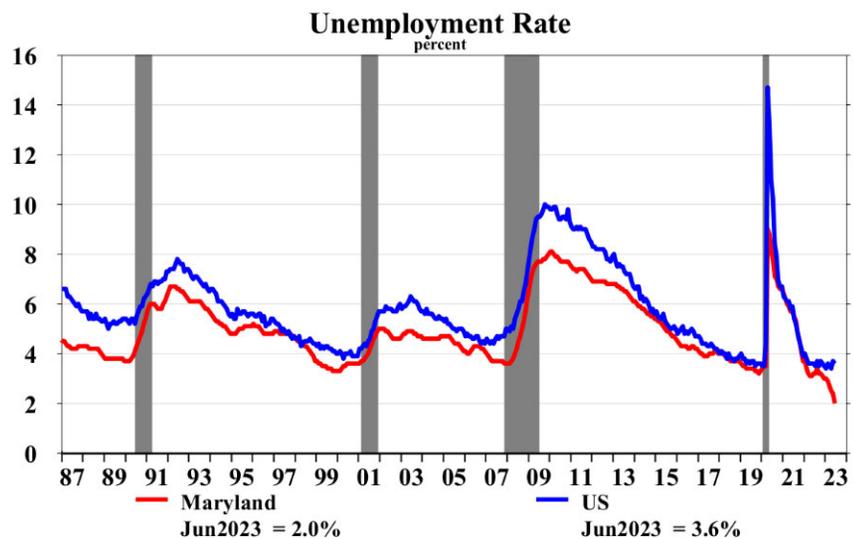
# Assessing the Regional Economy

- Data released with a greater lag & less comprehensive
- Less comprehensive
  - No quarterly GDP for state economies
  - No monthly income, consumption or manufacturing data
- Limited spending data (auto sales, sales tax collections)
- What data do we have?
  - Labor (state, metro, county)
  - Housing (permits, starts, sales, mortgage delinquencies)
  - Commercial real estate (rents, completions, absorption, usage)
  - Income (quarterly)
  - Business establishments (quarterly)
  - NYFED starting to put out household credit conditions
- Surveys & anecdotal information





# Assessing the Regional Economy – Labor Market





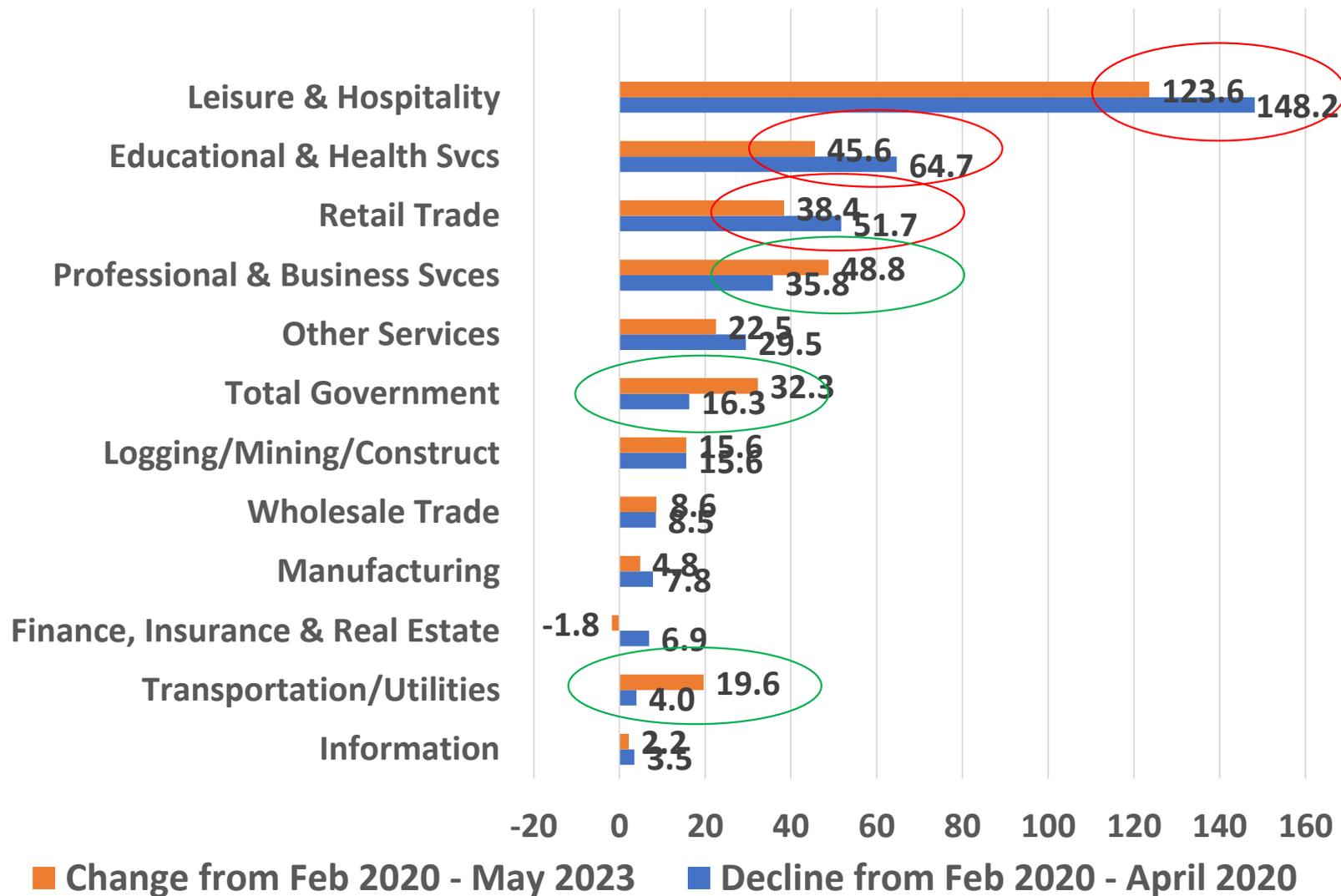
# Assessing the Regional Economy – Labor Market

		Unemployment Rate (% , NSA)		Labor Force ('000, NSA)		
		<u>May-23</u>	<u>y/y level ch.</u>	<u>May-23</u>	<u>y/y % ch.</u>	<u>May-19 to May-23 % ch.</u>
Capital Region	Frederick	2.0	-0.9	137.3	1.6	-1.6
	Montgomery	2.0	-0.8	554.3	1.3	-2.8
	Prince George's	2.3	-1.1	497.8	1.1	-4.4
Central Region	Anne Arundel	1.9	-0.8	315.2	1.1	-3.1
	Baltimore City	3.0	-1.0	273.9	1.0	-6.0
	Baltimore County	2.3	-0.9	445.9	1.0	-4.1
	Carroll	1.8	-0.7	95.2	0.8	-3.1
	Harford	2.1	-0.7	140.5	1.2	-3.5
	Howard	1.8	-0.8	188.7	1.1	-2.8
	Caroline	2.1	-0.8	17.9	3.1	-3.8
Eastern Shore	Cecil	2.2	-0.9	54.8	2.7	0.4
	Dorchester	2.4	-0.9	16.0	0.7	-2.2
	Kent	2.3	-0.9	10.0	1.0	-5.1
	Queen Anne's	1.9	-0.6	28.3	0.3	-1.6
	Somerset	3.2	-1.0	9.1	0.3	-3.0
	Talbot	2.1	-0.9	17.8	0.0	-10.1
	Wicomico	2.6	-1.0	52.1	1.4	-1.1
	Worcester	2.8	-1.2	25.4	0.6	-2.3
Southern Region	Calvert	2.0	-0.8	49.6	1.3	-3.5
	Charles	2.2	-1.0	86.7	1.4	-3.8
	Saint Mary's	2.1	-0.8	57.1	-1.2	-1.5
Western Region	Allegany	2.8	-0.9	31.6	0.9	-4.1
	Garrett	2.1	-0.9	15.1	0.3	-6.8
	Washington	2.4	-0.8	70.9	-1.4	-6.4



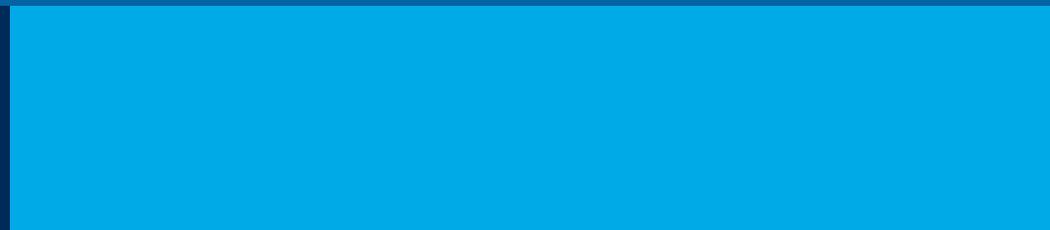
# Assessing the Regional Economy – Labor Market

## Employment by Sector



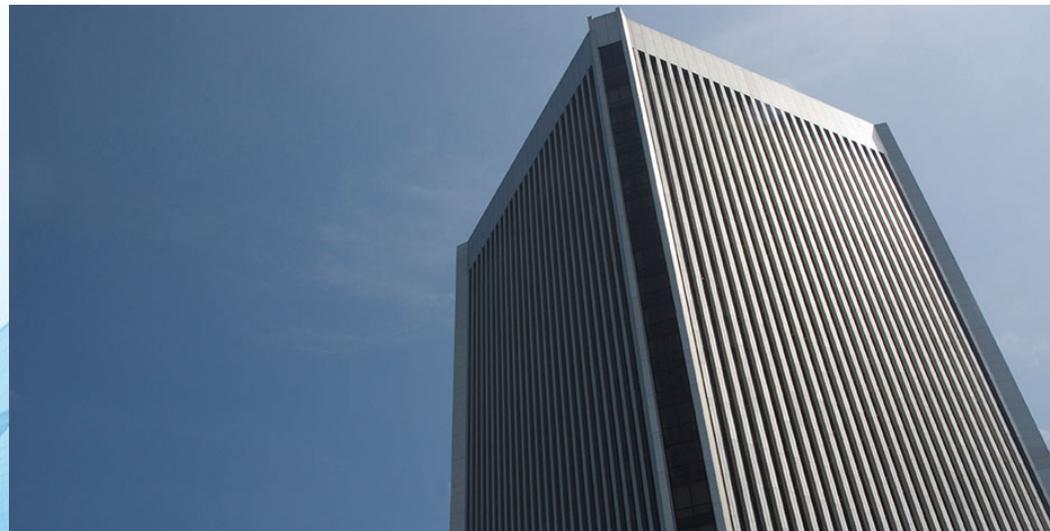


The views expressed here are those of the author, and do not necessarily represent those of the Federal Reserve Bank of Richmond or the Federal Reserve System.



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# Financial Institutions and the Economy I

Part II

Andy Bauer

Vice President & Regional Executive

August 1, 2023



Richmond • Baltimore • Charlotte

## Key Questions We Will Focus On

- What is monetary policy?
  - Actions taken by the central bank to influence interest rates in the economy
  - Goals of monetary policy: the dual mandate
- What is inflation and why is it costly?
  - A sustained increase in the general level of prices
  - Unanticipated costs, makes long-term planning difficult
- When is there a role for monetary policy?
  - “Real” economic output can only grow as fast as employment and productivity allow
  - Monetary policy can only boost growth in the short run; in the long run, monetary policy affects only inflation, not unemployment
- Tools of monetary policy
- Policy normalization & discuss outlook for 2016-2017

# The Definition of Monetary Policy

Actions taken by the central bank to influence interest rates in the economy

- Do this by changing size of our balance sheet:
  - Assets: Treasuries
  - Liabilities: Currency, Reserves

And monetary policy = changing the amount of Fed liabilities to hit a desired short-term interest rate

- Since 2008, monetary policy more complex (response to “zero lower bound”)

## The Goals of Monetary Policy – The “Dual Mandate”

In 1977, Congress amended the Federal Reserve Act to include the Dual Mandate:

"The Board of Governors of the Federal Reserve System and the Federal Open Market Committee shall maintain long run growth of the monetary and credit aggregates commensurate with the economy's long run potential to increase production, so as to promote effectively the goals of maximum employment, stable prices and moderate long-term interest rates."

The amendment left it up to the Fed to define these terms and how policy would achieve these goals

# The Goals of Monetary Policy – The “Dual Mandate”

## FOMC consensus statement: (January 2012)

### Price stability

- Inflation is determined primarily by monetary policy (an accepted idea since 1970s)
- Inflation goal: 2 percent average

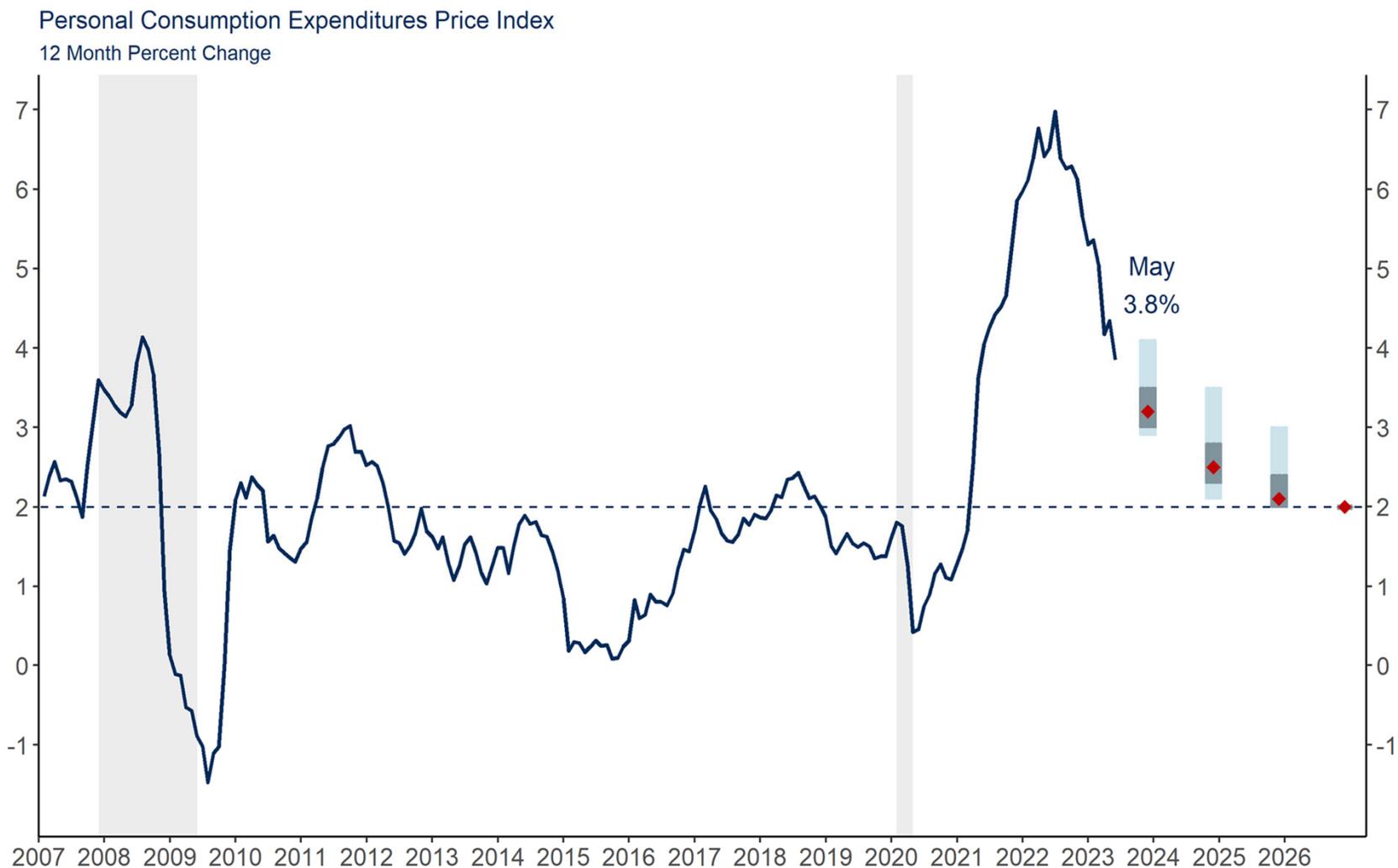
### Maximum employment

- In the long run, employment growth potential is determined by factors outside monetary policy
- Thus, there is no specific employment goal

# What is inflation and why is it costly?

- Inflation is a **sustained** increase in the **general** level of prices
- How is it measured?
  - Several different measures: CPI, GDP deflator, PCE Price Index
  - Basket of goods and services that represents what the average American household consumes on a regular basis:
    - Food and Beverages, Housing, Apparel, Transportation, Medical Care, Recreation, Education and Communication, Other Goods and Services
  - Weighted by percentage of total household spending

# Personal Consumption Expenditure Price Index



Notes: FOMC projection is the median, range, and central tendency for Q4/Q4 percent changes, from the March 2021 meeting. Red dots indicate median projections.

Source: Bureau of Economic Analysis & Board of Governors via Haver Analytics 7

## Why is it costly?

- **Cost 1:** A high inflation rate leads to a high nominal interest rate. Why?
  - Imagine you are the lender, what interest rate would you ask for if inflation was 2% (what about 6%)?
    - Lenders care about the “real” return on the loan—they take into consideration inflation
  - Makes for too little money use—wasted time and effort in making transactions

## Why is it costly?

- **Cost 2:** Surprise inflation imposes unanticipated costs and redistributes income and wealth
- Suppose inflation is 6%:
  - The monthly price increase for a basket of goods and services would be 0.5% while wages are fixed:

<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	...	<u>Dec.</u>
\$1,000	\$1,005	\$1,010	...	\$1,060
  - Inflation is a tax on consumption later in the year
- If inflation is a surprise and interest rate on savings don't adjust then real returns are less than anticipated
  - Inflation erodes wealth of savers, and gives gift to borrowers—redistributes income from savers to borrowers

## Effects of **variable** (unanticipated) inflation:

- If, in addition to being positive, inflation is variable, planning ahead becomes increasingly challenging
  - With more uncertain future prices, any long-term contract is more difficult to set-up (mortgages, business loans)
  - Fewer long-term projects are undertaken (roads and power plants, office buildings, research and development, defense contracts)
- To summarize: inflation leads to high nominal interest rates, acts as a tax on consumption, erodes savings and creates uncertainty. It is costly!
- For these reasons, price stability is a central focus of monetary policy

## Before we can discuss when there is a role for monetary policy, we need to recall a few things:

- The long-run growth (or potential) growth of an economy depends on:
  - Labor force growth (employment)
  - Productivity
- Real Output (Y) = # Employed x Worker Productivity
- Therefore, any change in the number of workers **and/or** productivity will change real output:

$$\% \Delta \text{ Output} = \% \Delta \text{ Employed} + \% \Delta \text{ Productivity}$$

$$\% \Delta \text{ Output} = 1.3\% + 1.8\%$$

- In this example, the real economy's long-run growth potential is 3.1%

# How does the real economy's potential growth relate to monetary policy?

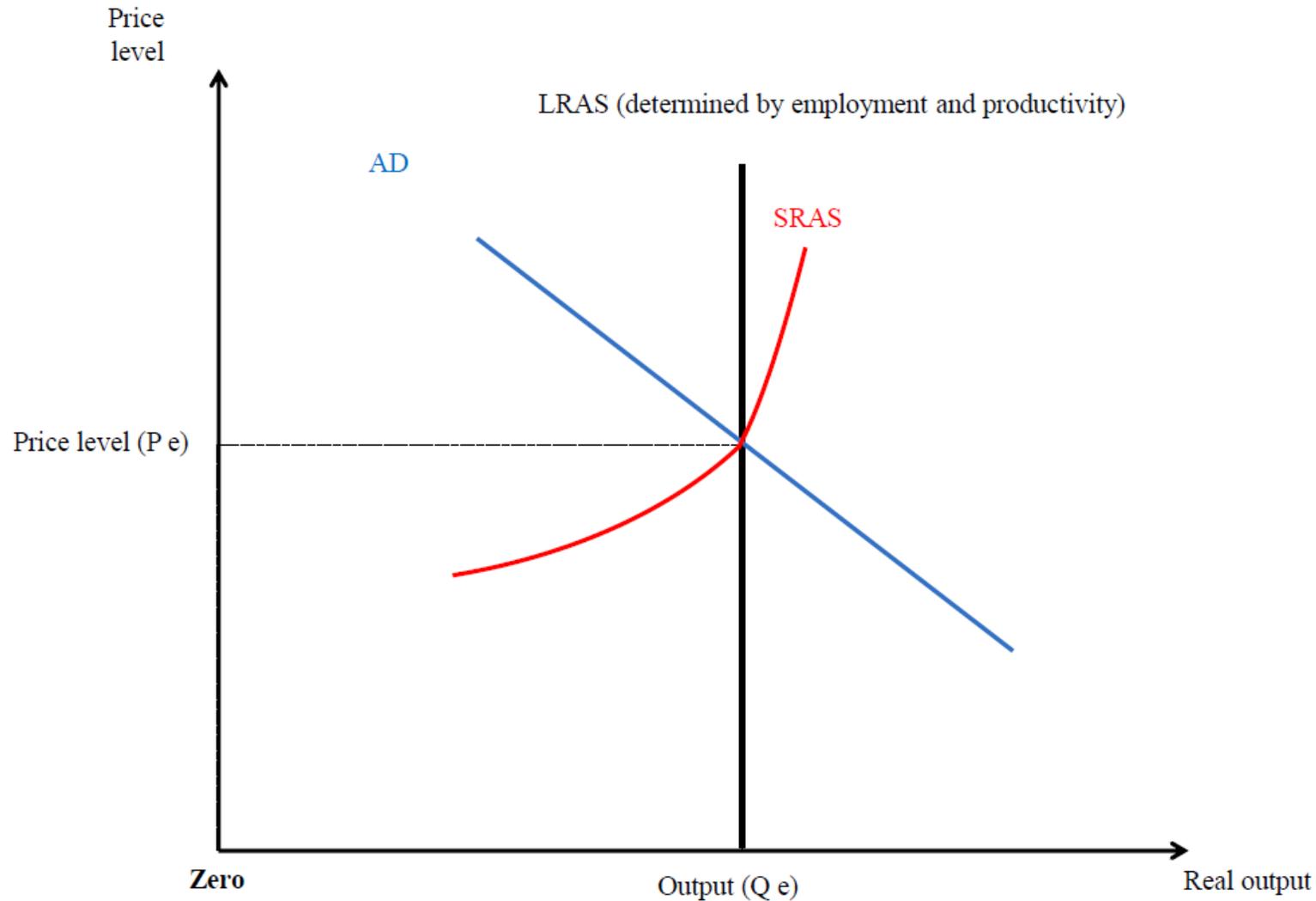
When the economy is operating at its potential, there is no imbalance between supply and demand:

- The amount of goods produced = amount of goods supplied
- The amount of labor produced = amount of labor supplied

## Importantly

- Inflation is stable
- Unemployment is at its "natural rate"
  - There will always be some unemployment due to labor market frictions and structural changes in the economy but in this case there is no cyclical unemployment

# An Economy at Potential



## How does the real economy's potential growth relate to monetary policy?

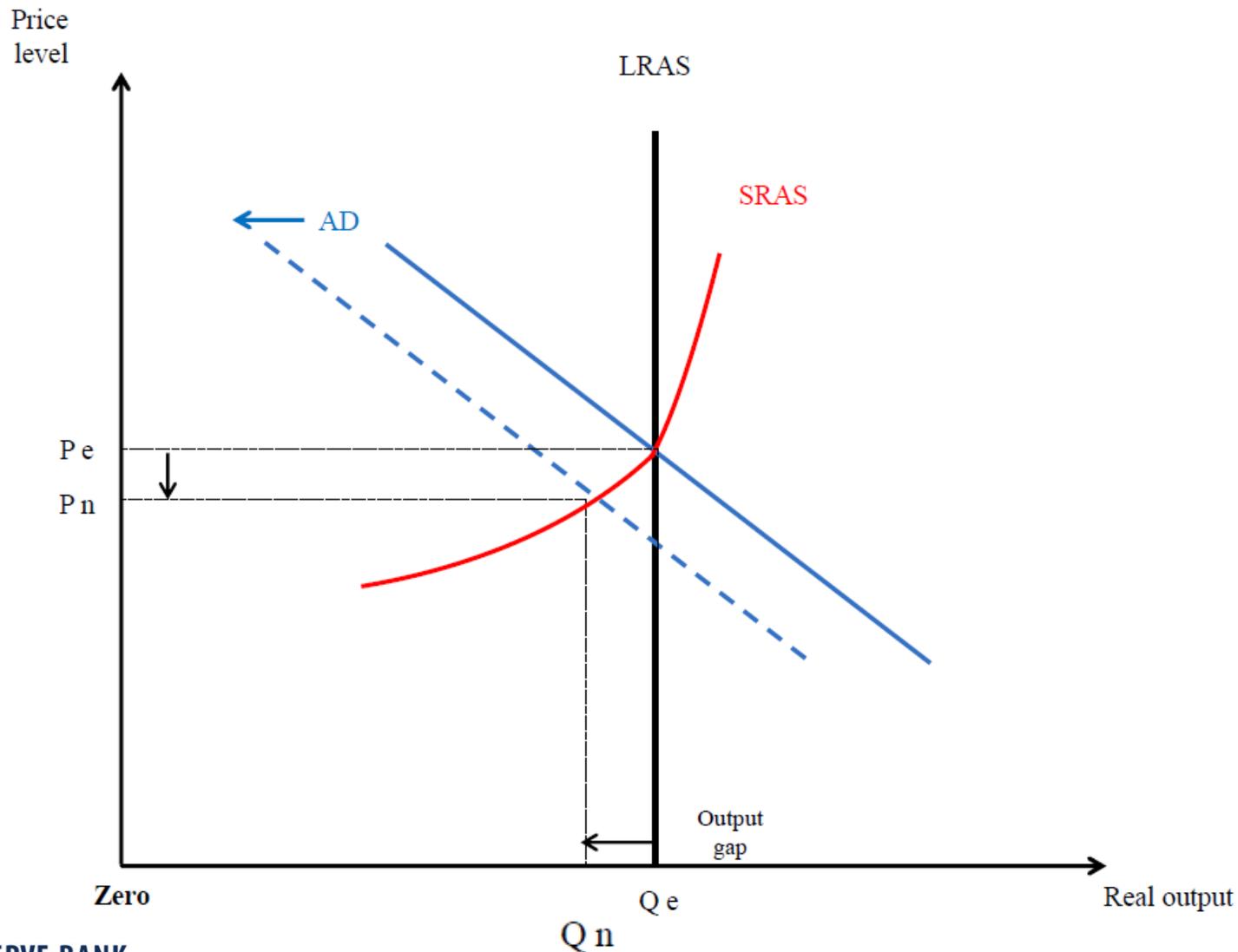
When the economy is operating below its long-run potential:

- Businesses/factories aren't producing as much (shorter workweeks/less shifts)
- Businesses use less labor (shorter workweeks/employ less workers)—the unemployment rate is higher (above the natural rate)
- Downward pressure on prices and wages

When the economy is operating above its long-run potential:

- Businesses/factories are producing more (longer workweeks/more shifts)
- Businesses use more labor (longer workweeks/employ more workers)—the unemployment rate is lower (below the natural rate)
- Upward pressure on prices and wages

# A Negative Output Gap (Recession)



# How does the real economy's potential growth relate to monetary policy?

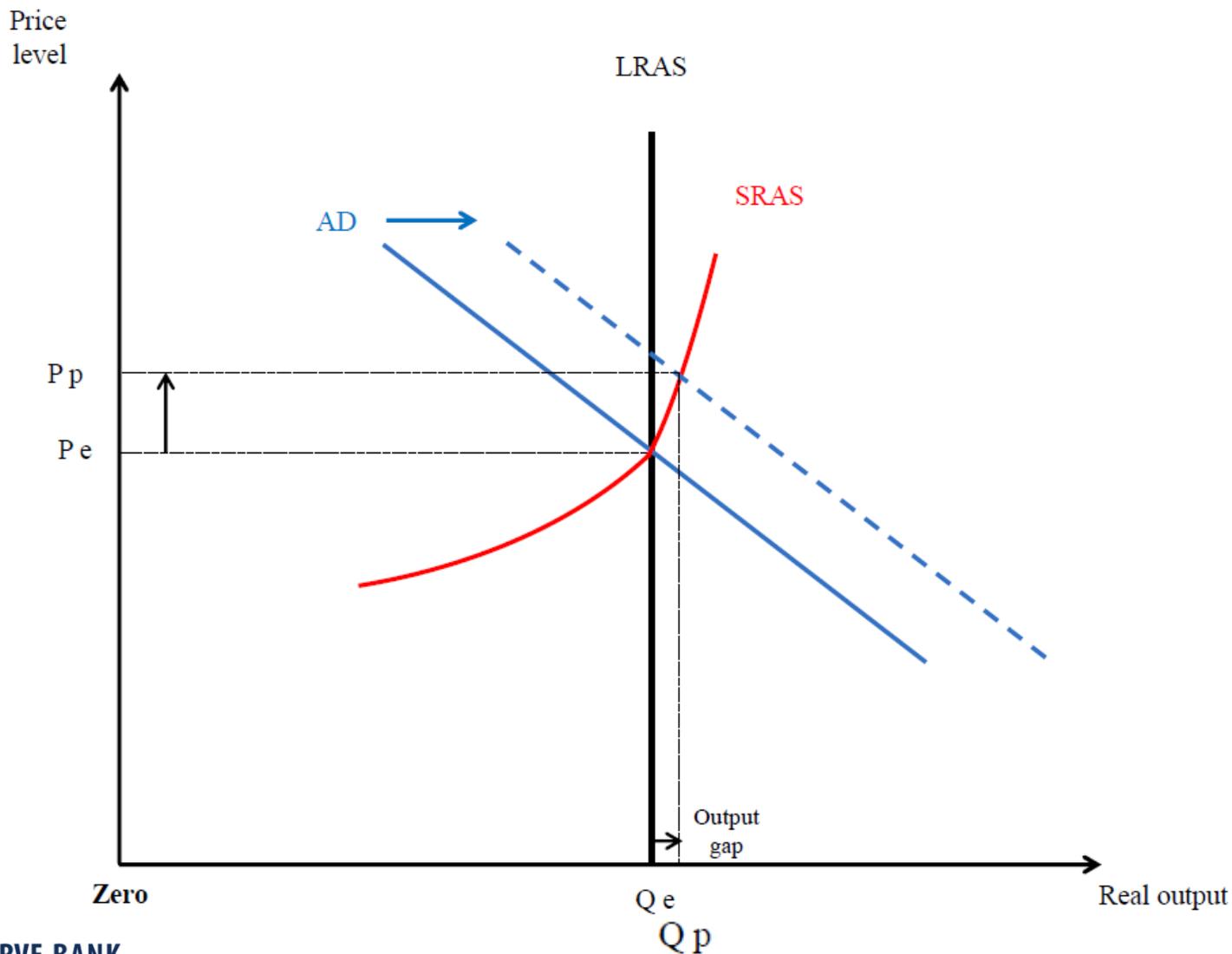
When the economy is operating below its long-run potential:

- Businesses/factories aren't producing as much (shorter workweeks/less shifts)
- Businesses use less labor (shorter workweeks/employ less workers)—the unemployment rate is higher (above the natural rate)
- Downward pressure on prices and wages

When the economy is operating above its long-run potential:

- Businesses/factories are producing more (longer workweeks/more shifts)
- Businesses use more labor (longer workweeks/employ more workers)—the unemployment rate is lower (below the natural rate)
- Upward pressure on prices and wages

# A Positive Output Gap



## How does the real economy's potential growth relate to monetary policy?

When the economy is operating below its long-run potential:

- Businesses/factories aren't producing as much (shorter workweeks/less shifts)
- Businesses use less labor (shorter workweeks/employ less workers)—the unemployment rate is higher (above the natural rate)
- Downward pressure on prices and wages

When the economy is operating above its long-run potential:

- Businesses/factories are producing more (longer workweeks/more shifts)
- Businesses use more labor (longer workweeks/employ more workers)—the unemployment rate is lower (below the natural rate)
- Upward pressure on prices and wages

Given the dual mandate there is a role for monetary policy

## To show the impact of monetary policy on the economy, we will use the equation of exchange:

- Shows the relationship between money, real output, and prices

$$\text{Money Supply} \times \text{Velocity} = \text{Real Output} \times \text{Prices}$$

- The equation of exchange states that nominal output is equal to the money supply multiplied by the avg. times that money is spent (velocity)

$$\text{Nominal output} = \text{Real output} \times \text{prices}$$

$$\begin{aligned} \text{Nominal output} = & 2 \text{ hot dogs} \times \$4.00 + \\ & 2 \text{ sodas} \times \$1.00 + \\ & 1 \text{ dry cleaning} \times \$10 + \dots \end{aligned}$$

# The equation of exchange: an illustration

$$\text{Money Supply} \times \text{Velocity} = \text{Real Output} \times \text{Prices}$$

- Suppose I buy 2 hot dogs and 2 sodas (real output) from a street vendor and give her a \$10 bill (price: \$4 & \$1 each)
- She then goes to the dry cleaners to pick up laundered clothes (real output) and pays with the \$10 bill (price: \$10)
- At this point the \$10 bill (money supply) was used twice (velocity) and was used to purchase \$10 of goods and \$10 of services (or \$20 of nominal output)
- Money Supply (\$10) x Velocity (2) = Nominal output (\$20)

## Two key assumptions about monetary policy

- First, a change in the money supply does not change velocity (velocity is constant)
- Looking at the percent change ( $\Delta$ ) in money, velocity, output and prices using the equation of exchange:  
$$\% \Delta \text{ Money Supply} + \% \Delta \text{ Velocity} = \% \Delta \text{ Real Output} + \% \Delta \text{ Price Level}$$
- With no change in velocity:  
$$\% \Delta \text{ Money Supply} = \% \Delta \text{ Real Output} + \% \Delta \text{ Price Level}$$
- *With velocity constant, a change in the supply of money will lead to a change in Nominal GDP!*

## Two key assumptions about monetary policy:

- Second: prices are “sticky” in the short run.
  - Why? Wages, menu costs, business need time to assess market conditions and don’t immediately respond to changes

$$\% \Delta \text{ Money Supply} = \% \Delta \text{ Real Output} + \% \Delta \text{ Price Level}$$

- With prices sticky in the short run, an increase in the supply of money will boost real output, at least temporarily.

$$\% \Delta \text{ Money Supply} = \% \Delta \text{ Real Output} + \% \Delta \text{ Price Level}$$



- But in the long-run prices will adjust

## So how does the Fed change the money supply?

- Traditional tools of monetary policy:
  - Required reserves
  - Discount rate
  - Open market operations
- New and unconventional tools of monetary policy
  - Interest paid on excess reserves (IOER)
  - Short term rates close to zero
  - Large scale asset purchases
  - Forward guidance

## Open market operations

- Typically, the FOMC's primary tool is open market operations
- Open market operations refer to the Fed's buying and selling of government securities in the market
- When the Fed buys or sells bonds in the market, it changes the supply available to other purchasers, influencing the price of the bonds and yields (interest rates)
- Interest rates are not mandated, they are set by the market
- Importantly, interest rates affect consumer demand for money

## Opportunity cost to holding money

- Think of money as the part of your wealth that is readily available to purchase goods and services
- Consumers do not keep all of their wealth readily available in the form of money for purchases. Why?
- There is an **opportunity cost** to holding money – the **nominal interest** it could earn elsewhere (CDs, mutual fund, etc.)
- Changes in interest rates changes this opportunity cost and how much money people will want to hold
  - Lower interest rates reduce the opportunity cost, so consumers hold more money
  - Higher interest rates increase the opportunity cost, so consumers hold less money

## Open market operations

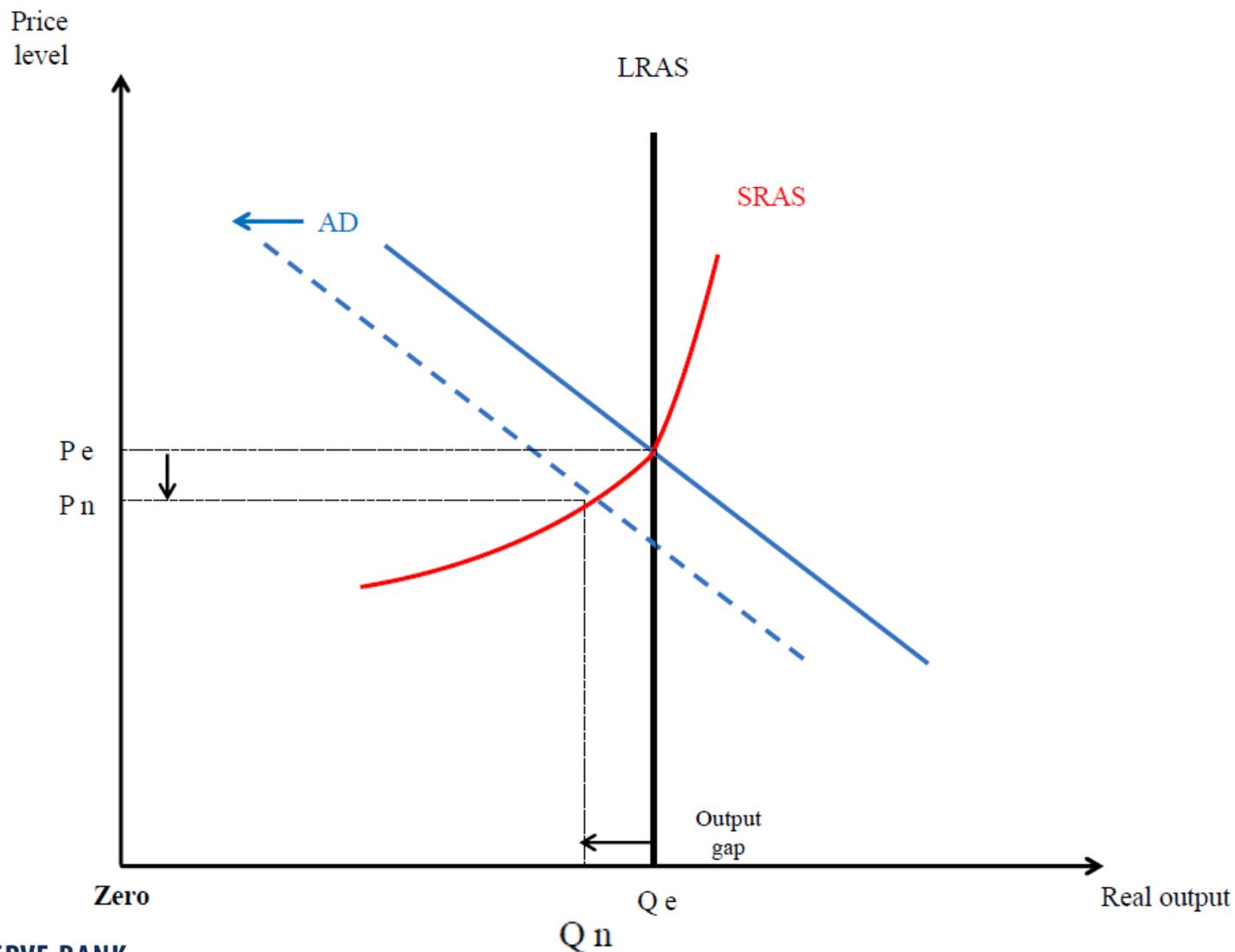
- When the Fed conducts expansionary monetary policy (loosens policy):
- Fed purchases bonds (Treasury securities)
- Banks receive money for selling their bonds in the form of bank reserves
- The increase in the supply of reserves reduces borrowing costs (interest rates) as banks have more money to lend
- “Opportunity cost” of holding money decreases
- Consumers and businesses increase borrowing
- Supply of money in the economy increases

## Open market operations

- So when economic output is below its potential due to weakness in the economy (weak consumer spending, business investment, government spending, net exports):
  - Expansionary monetary policy—bond purchases to lower interest rates and increase the supply of money
- $$\% \Delta \text{ Money Supply} = \% \Delta \text{ Output} + \% \Delta \text{ Price Level}$$

- When economic output is above its potential due to strong demand:
  - Contractionary monetary policy—bond sales to increase interest rates and decrease the supply of money

# A Negative Output Gap (Recession)



# Open market operations

Important question:

- What happens if there is no output gap (output is at its potential) and there is expansionary monetary policy?
- If no output gap exists, monetary policy only directly affects inflation in the long run, not unemployment.

## Suppose real GDP growth is at its long-run potential

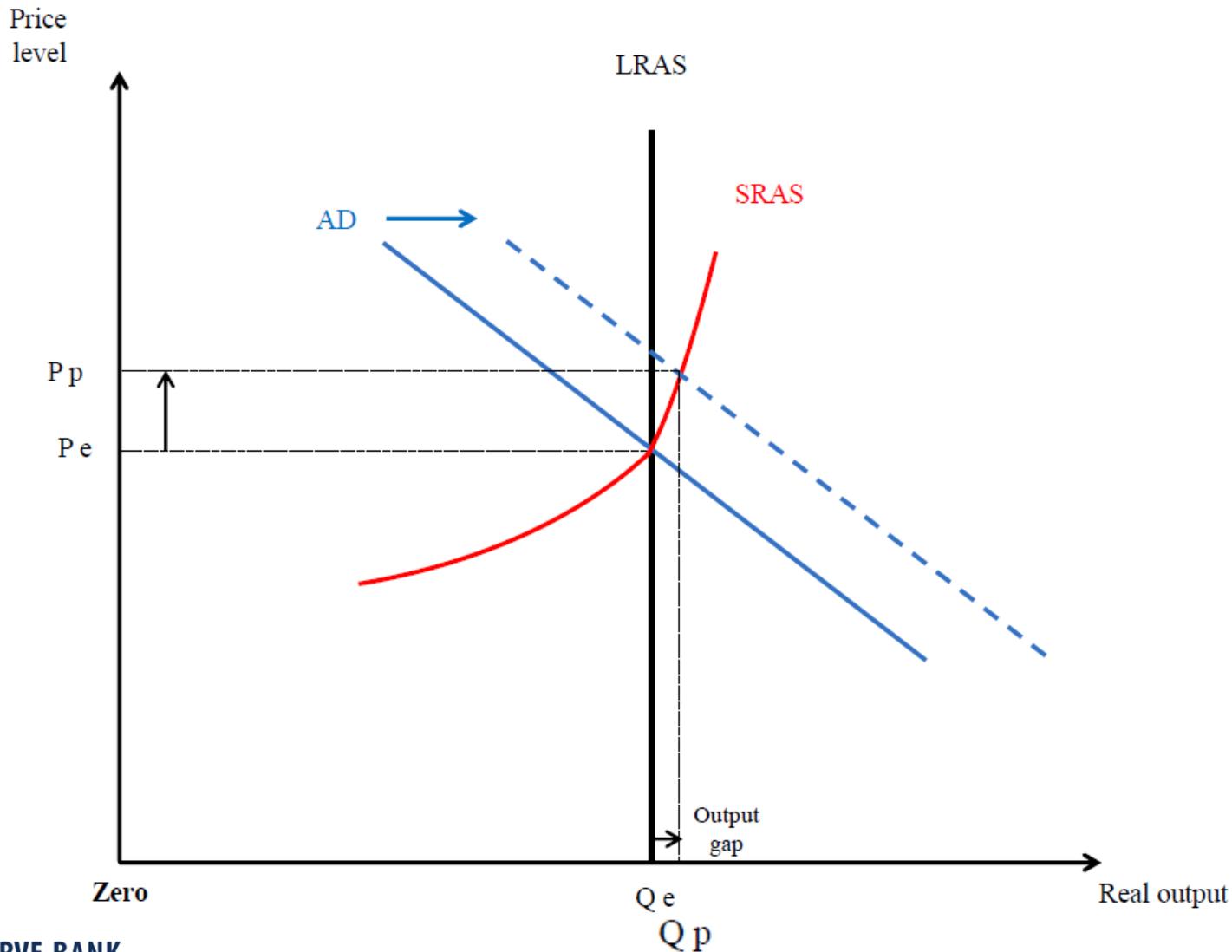
- What happens if there is an increase in the money supply?
  - In the **short run**, it may lift real output growth above its potential (because prices are sticky).

$$\% \Delta \text{ Money Supply} = \% \Delta \text{ Output} + \% \Delta \text{ Price Level}$$



- *In the short run, an increase in the supply of money can boost production above its potential because prices are sticky.*

# Expansionary monetary policy pushing economy above potential



## Suppose real GDP growth is at its long-run potential

- What happens if there is an increase in the money supply?
  - At some point prices will adjust (no longer “stuck”) and in the **long run** real output eventually returns to its potential rate and all we are left with is inflation.

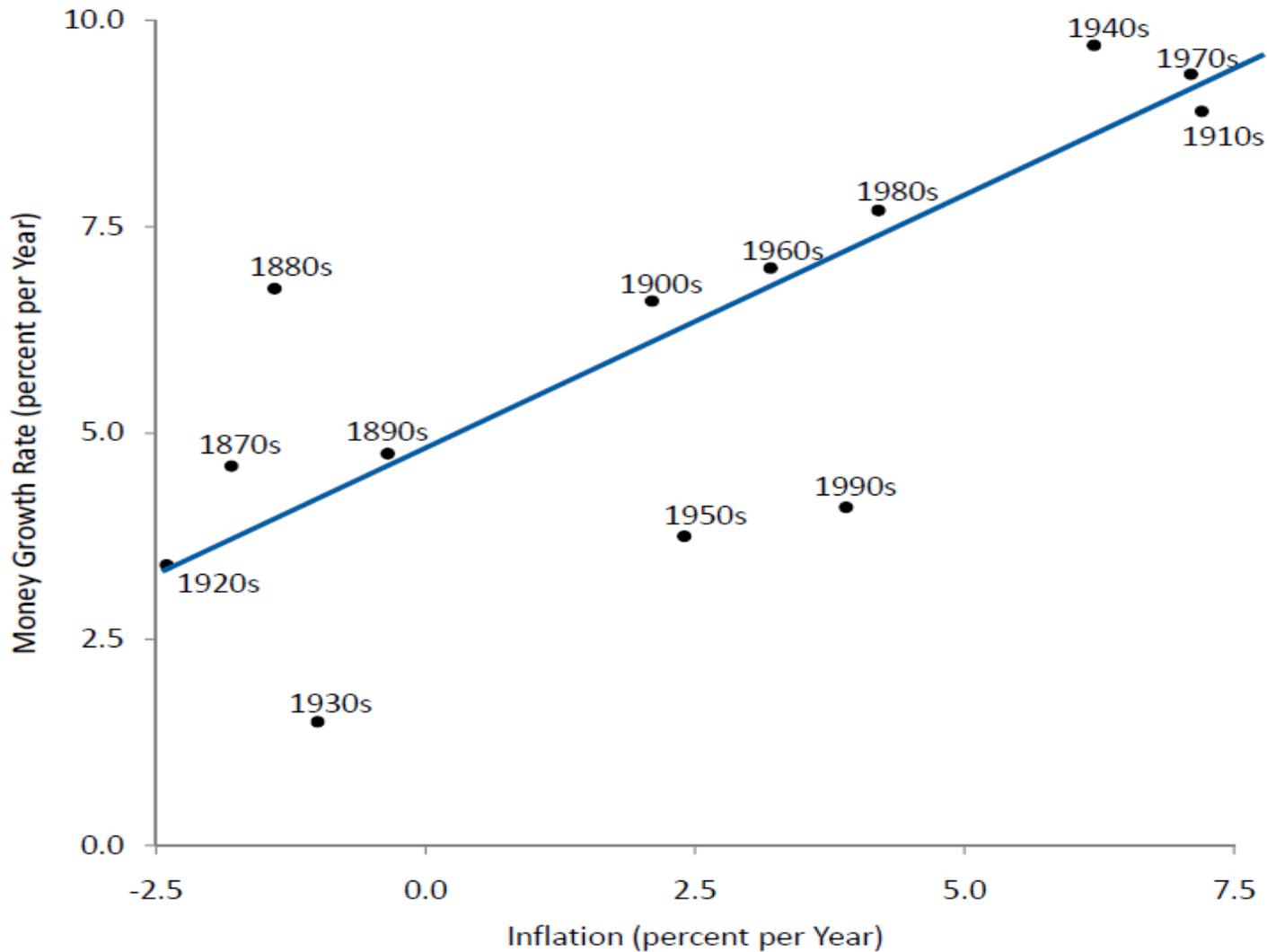
$$\begin{array}{ccccc} \% \Delta \text{ Money Supply} & = & \% \Delta \text{ Output} & + & \% \Delta \text{ Price Level} \\ \uparrow & & \longleftrightarrow & & \uparrow \end{array}$$

- *Long-run inflation is (always and everywhere) a monetary phenomenon!*

## Why would there be pressure to inflate?

- “Easy” monetary policy can spur economic growth above its sustainable level in the short run—this may be politically tempting
- But it can only lead to inflation in the long run—along with the associated costs discussed earlier
- Monetary policy decisions must set aside short-term gains and focus on larger longer-run objectives
- **Central Bank independence** is perceived as crucial for isolating monetary policy decision-making from short-term political influences

# Money and Inflation Growth by Decade



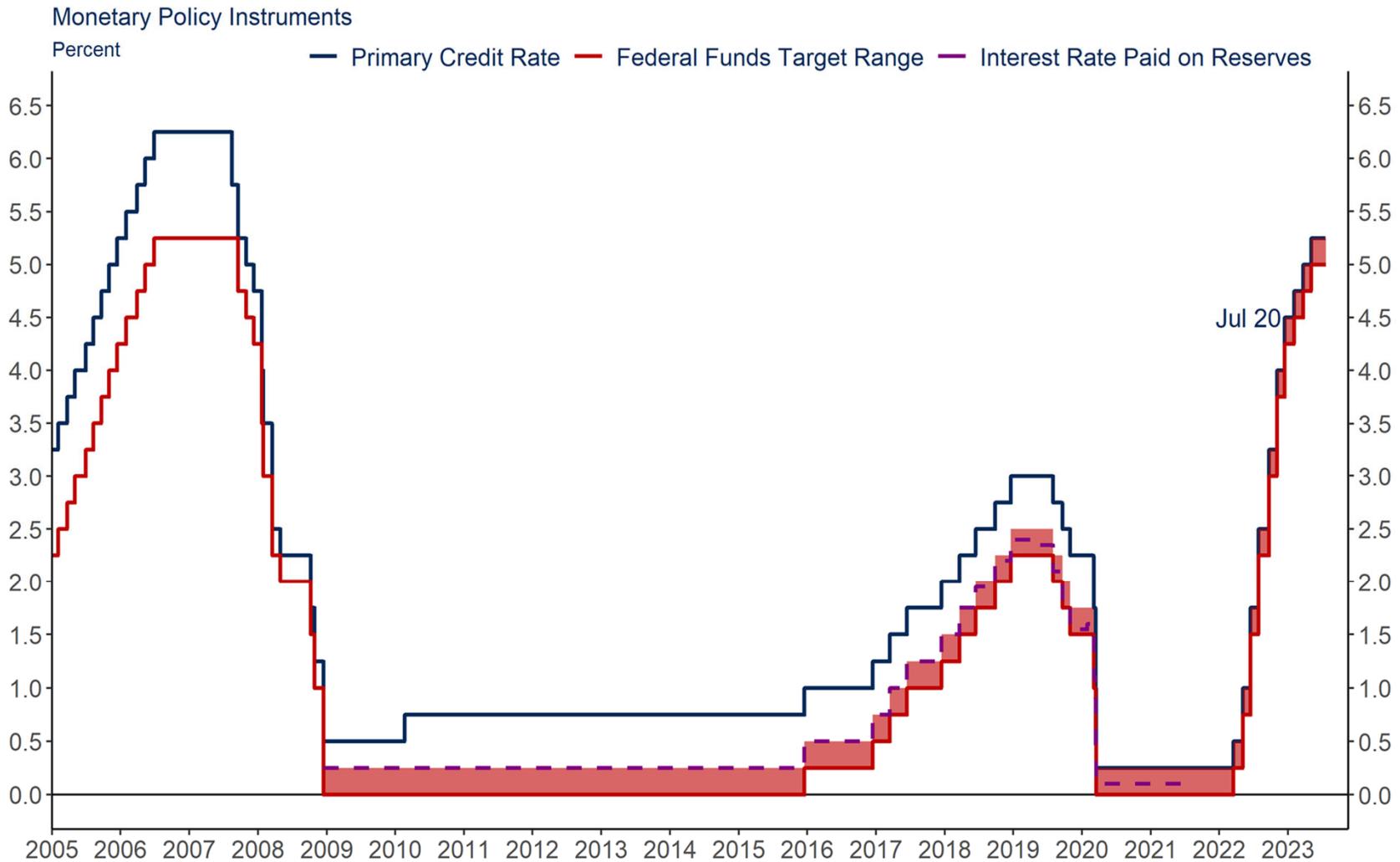
## What are some of the key policy challenges?

- Fed's monetary policy is not the only factor influencing economic activity
  - Fiscal policy, wars, natural disasters, monetary policy elsewhere, etc.
- Lack of timely information
- Data revisions
- Uncertain effects of policy
  
- Major European country decides to leave EU

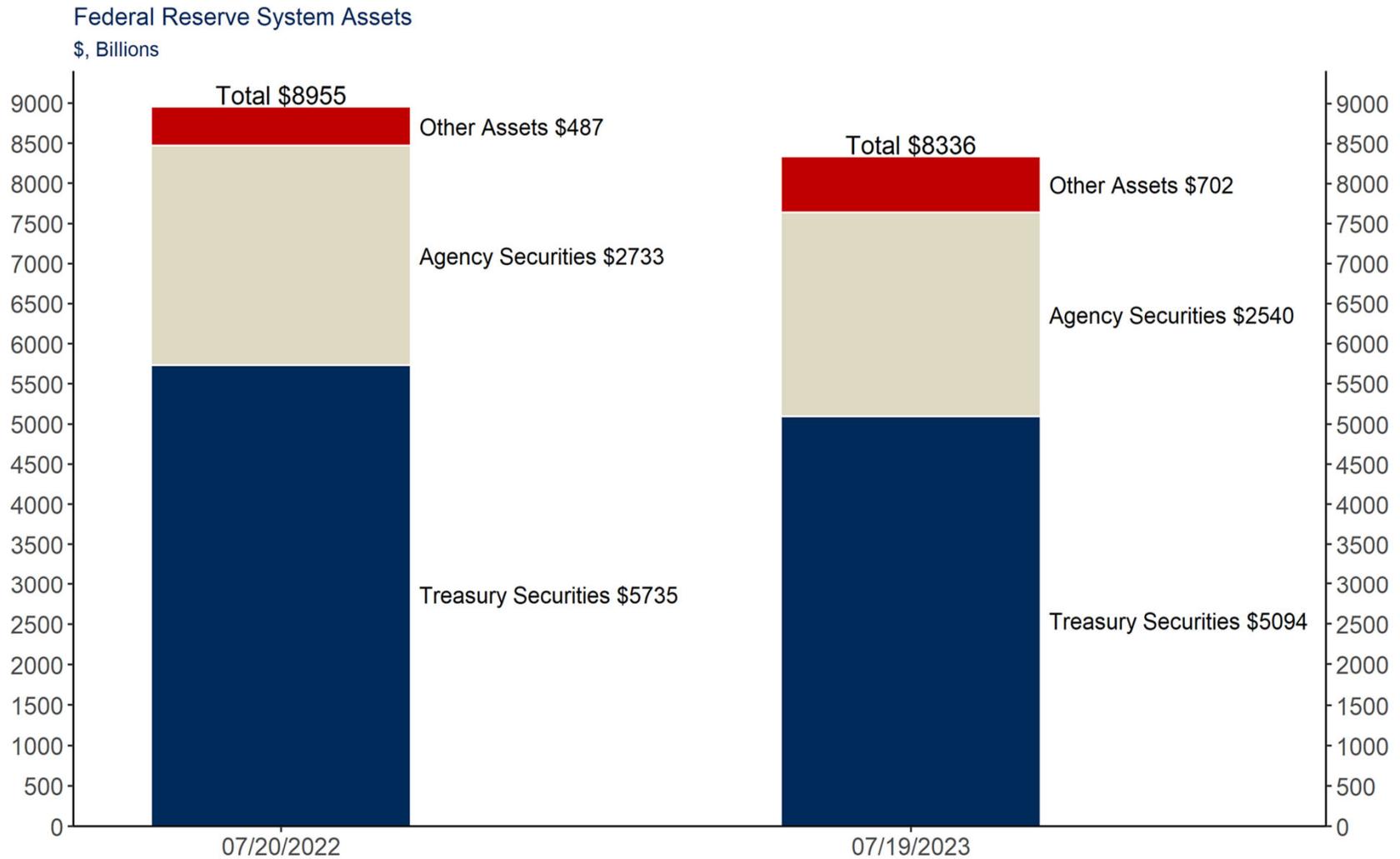
## What about unconventional monetary policy?

- Short term rates close to zero
- Balance sheet as policy: mainly large purchases of long-term Treasuries, MBS ("LSAPS" or "QE")
  - Size of Fed's balance sheet increased sharply: purchases of assets create reserves
  - Holding reserves not costly for banks: banks happy to hold huge quantity of reserves
- Communication as policy: "Forward guidance" about future behavior of interest rates

# Monetary Policy Instruments



# Federal Reserve System Assets



Note: Numbers may not add up due to rounding.

Source: Board of Governors via Haver Analytics 38

## Large-scale asset purchases

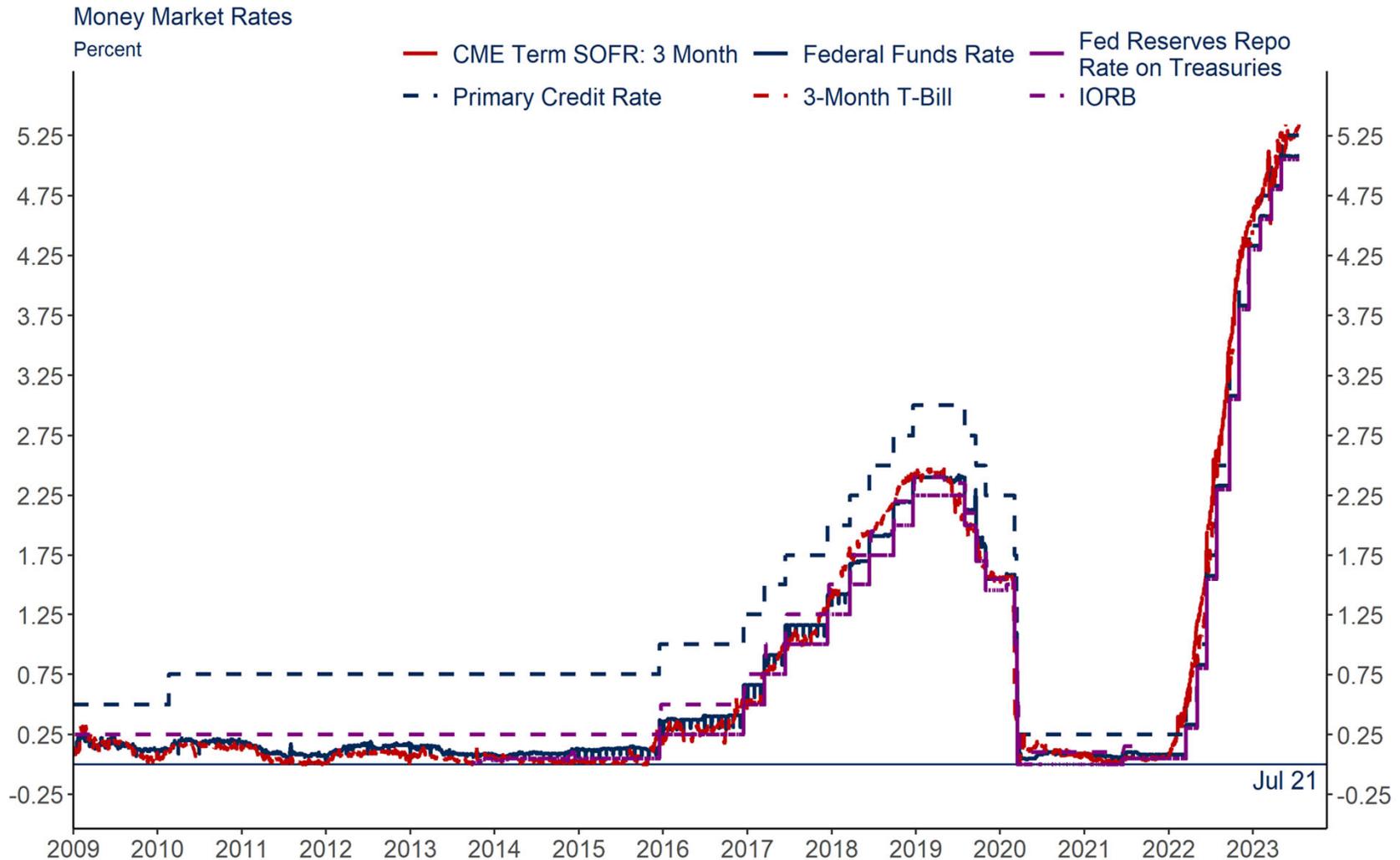
- Fed purchases bonds with longer maturities (treasury securities, mortgage-backed securities)
- The supply of bonds with longer maturities decreases—bond prices rise and longer-term yields decline
- Banks receive money for selling their bonds in the form of bank reserves
- Opportunity cost of holding money decreases
- Consumers and businesses increase borrowing
- Supply of money in the economy increases

# Forward guidance about rates

## Evolution of FOMC statement:

- December 2008: “...Committee anticipates that weak economic conditions are likely to warrant exceptionally low levels of the federal funds rate for some time...”
- March 2009: “... *for an extended period.*”
- August 2011: “... *at least through mid-2013.*”
- January 2012: “... *at least through late 2014.*”
- September 2012: “... *at least through mid-2015.*”
- December 2012: “...*at least as long as [unemployment rate > 6.5% etc.]...*”  
(move from date-based to state-based guidance)
- March 2014: “...Committee continues to anticipate... appropriate to maintain the current target range ...*for a considerable time after the asset purchase program ends...*”

# Money Market Rates



## Key takeaways:

- Monetary policy is the actions taken by the central bank to influence interest rates in the economy
- Inflation is costly, especially when unanticipated
- “Real” economic output can only grow as fast as employment and productivity
- In the long run, monetary policy affects only inflation, not unemployment

*Monetary policy is powerful but not a panacea*

So where is policy now?

# FOMC Statement

July 26, 2023

Recent indicators suggest that economic activity has been expanding at a moderate pace. Job gains have been robust in recent months, and the unemployment rate has remained low. Inflation remains elevated.

The U.S. banking system is sound and resilient. Tighter credit conditions for households and businesses are likely to weigh on economic activity, hiring, and inflation. The extent of these effects remains uncertain. The Committee remains highly attentive to inflation risks.

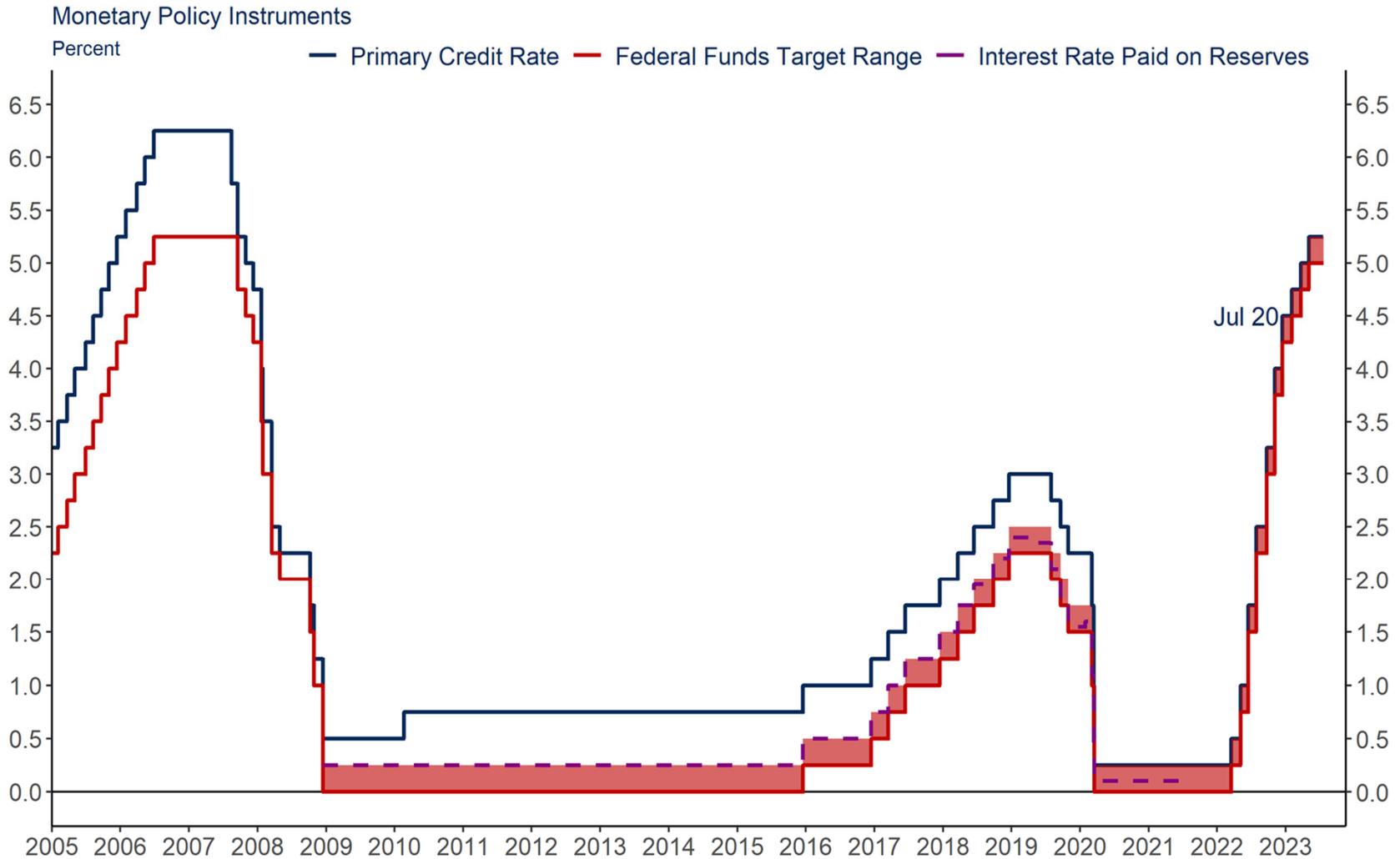
The Committee seeks to achieve maximum employment and inflation at the rate of 2 percent over the longer run. In support of these goals, ***the Committee decided to raise the target range for the federal funds rate to 5-1/4 to 5-1/2 percent.*** The Committee will continue to assess additional information and its implications for monetary policy. In determining the extent of additional policy firming that may be appropriate to return inflation to 2 percent over time, the Committee will take into account the cumulative tightening of monetary policy, the lags with which monetary policy affects economic activity and inflation, and economic and financial developments. In addition, the Committee will continue reducing its holdings of Treasury securities and agency debt and agency mortgage-backed securities, as described in its previously announced plans. The Committee is strongly committed to returning inflation to its 2 percent objective.

## Continued...

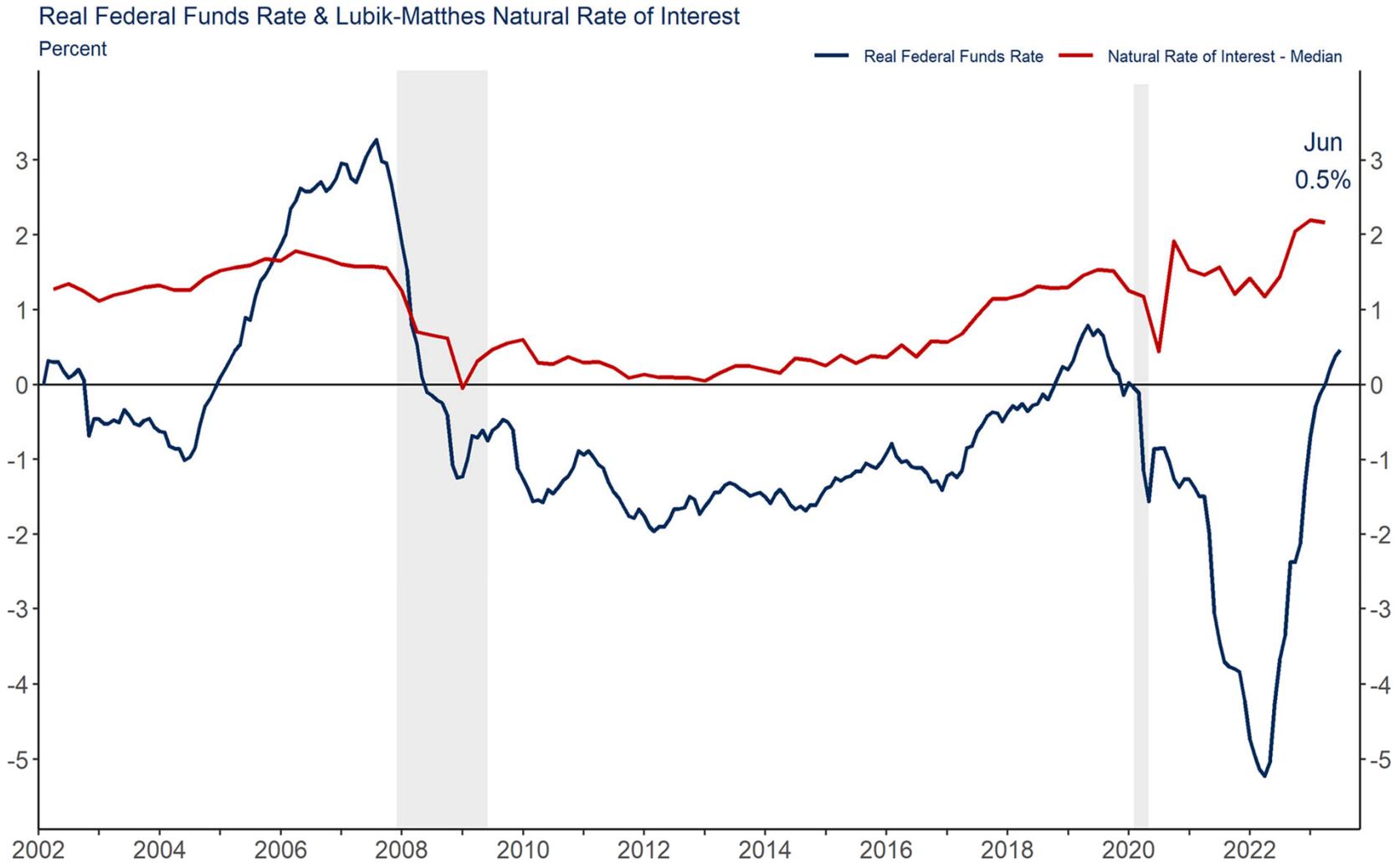
In assessing the appropriate stance of monetary policy, the Committee will continue to monitor the implications of incoming information for the economic outlook. The Committee would be prepared to adjust the stance of monetary policy as appropriate if risks emerge that could impede the attainment of the Committee's goals. The Committee's assessments will take into account a wide range of information, including readings on labor market conditions, inflation pressures and inflation expectations, and financial and international developments.

Voting for the monetary policy action were Jerome H. Powell, Chair; John C. Williams, Vice Chair; Michael S. Barr; Michelle W. Bowman; Lisa D. Cook; Austan D. Goolsbee; Patrick Harker; Philip N. Jefferson; Neel Kashkari; Lorie K. Logan; and Christopher J. Waller.

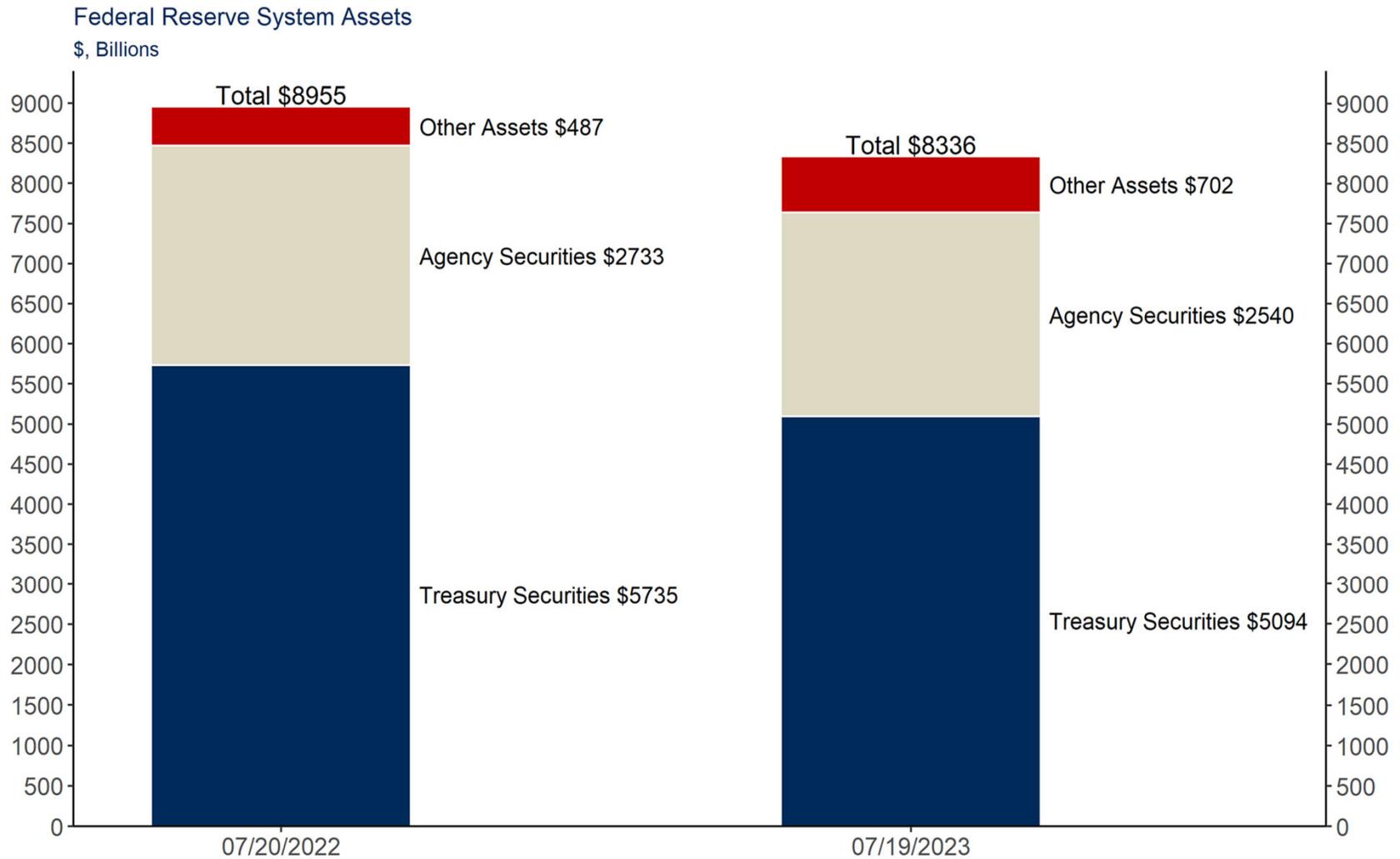
# Monetary Policy Instruments



# Monetary Policy Instruments



# Federal Reserve System Assets

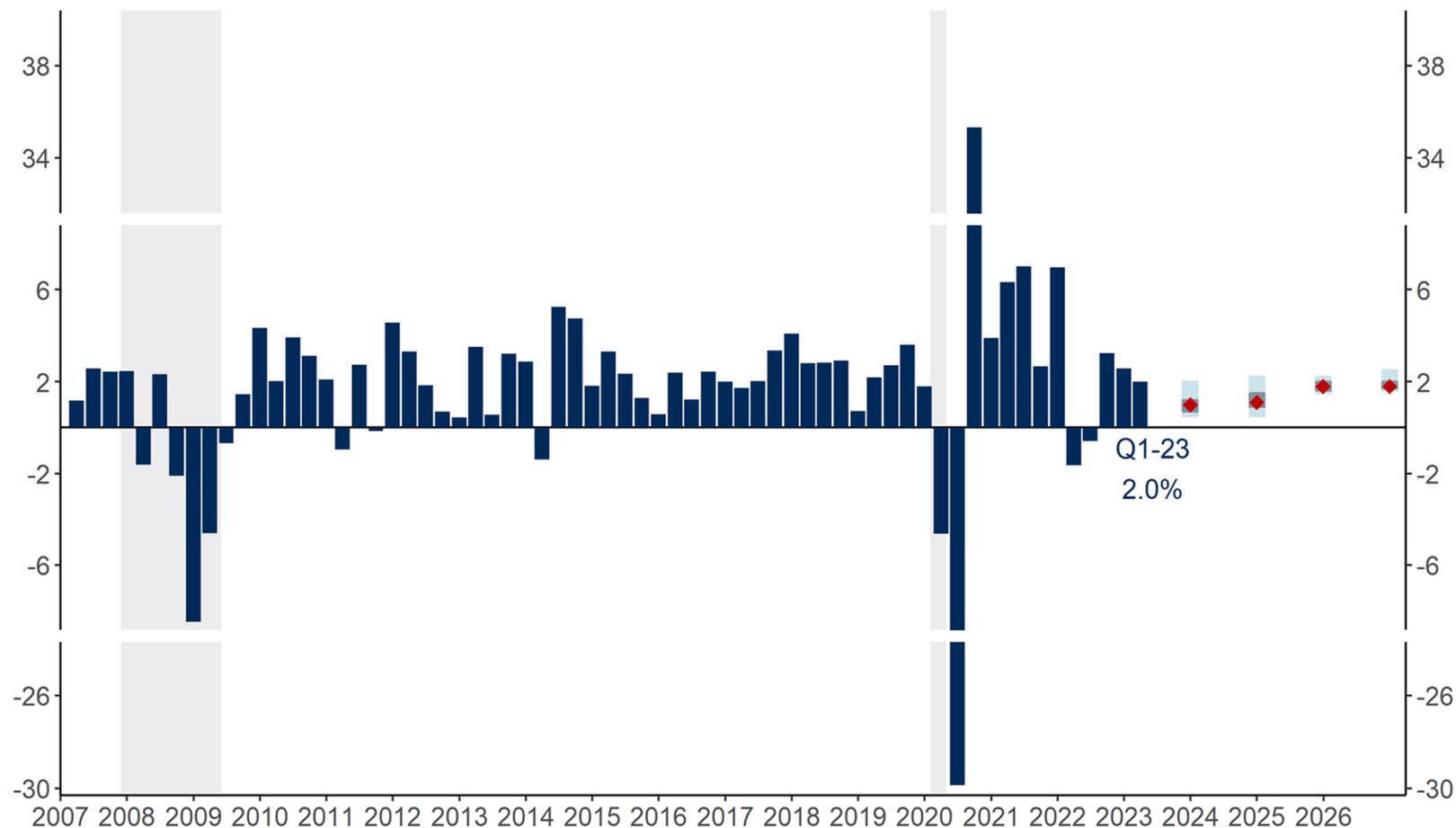


Note: Numbers may not add up due to rounding.

Source: Board of Governors via Haver Analytics 48

# Real Gross Domestic Product

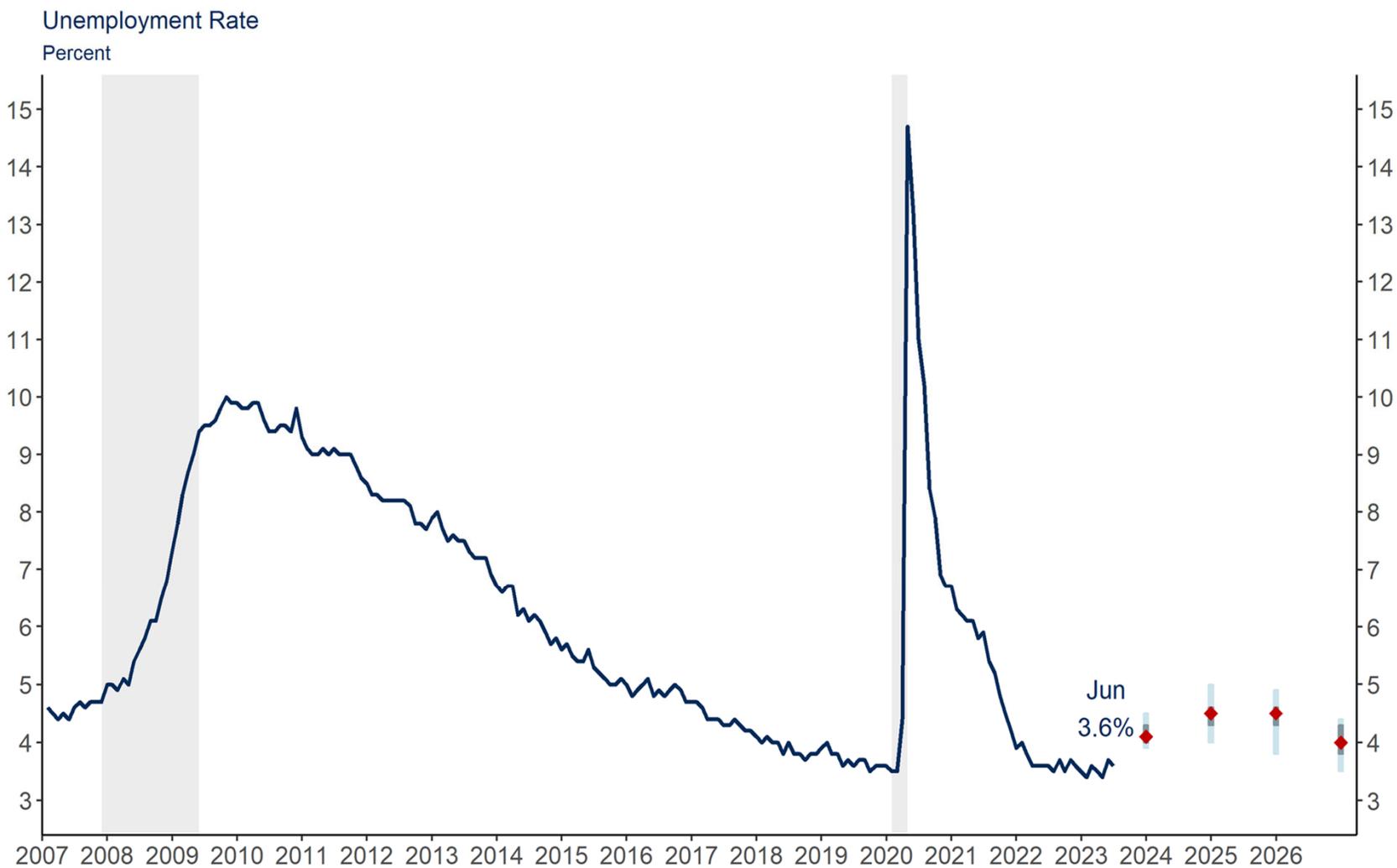
Real Gross Domestic Product  
Percent change from previous quarter at annual rate



Note: Projection is the median, central tendency, and range from the June 2023 Summary of Economic Projections. Red dots indicate median projections. Projections of change in real gross domestic product (GDP) are from the fourth quarter of the previous year to the fourth quarter of the year indicated.

Source: Bureau of Economic Analysis via Haver Analytics & Federal Reserve Board

# Unemployment Rate



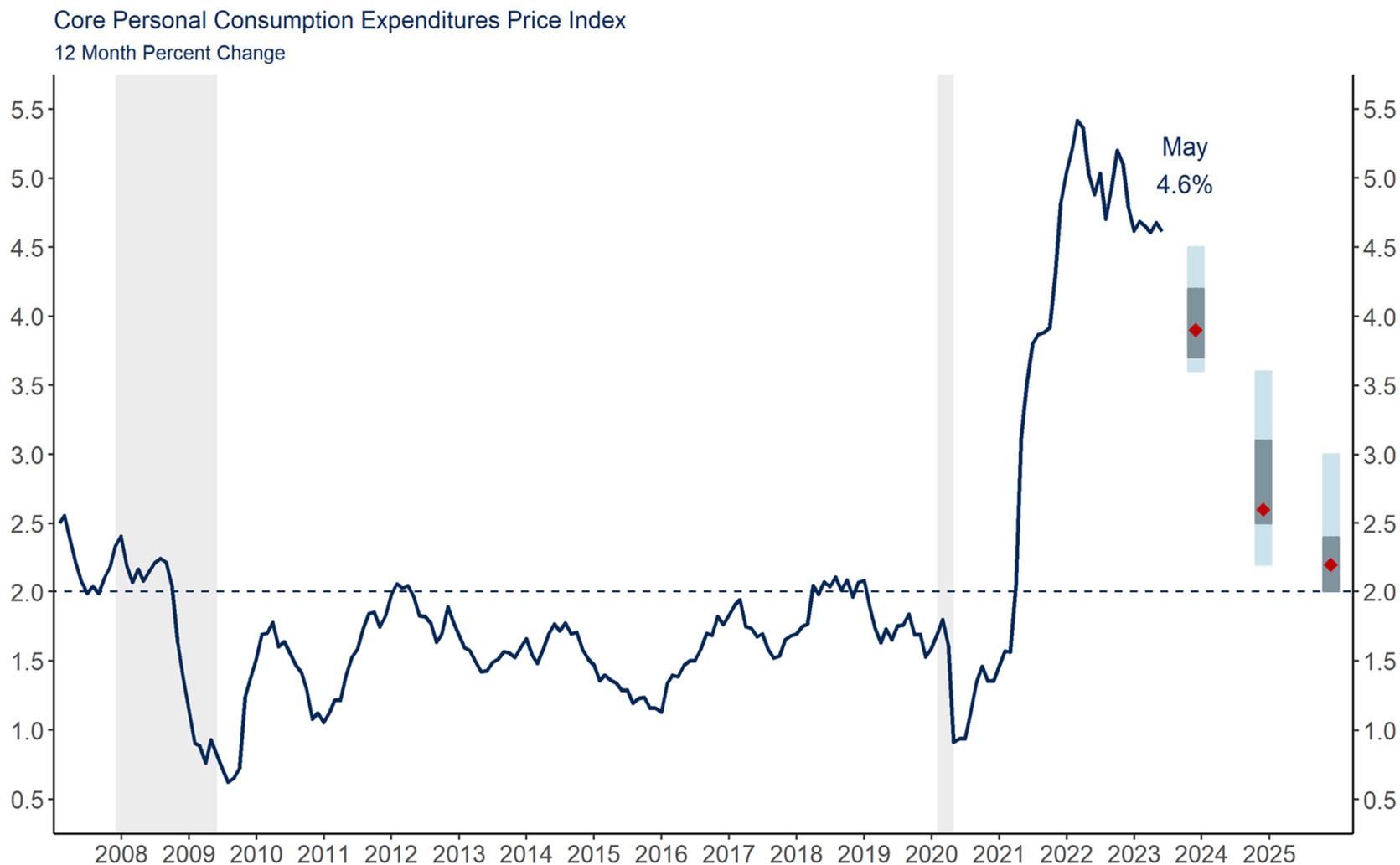
# Personal Consumption Expenditure Price Index



Notes: FOMC projection is the median, range, and central tendency for Q4/Q4 percent changes, from the March 2021 meeting. Red dots indicate median projections.

Source: Bureau of Economic Analysis & Board of Governors via Haver Analytics<sup>51</sup>

# Core Personal Consumption Expenditure Price Index

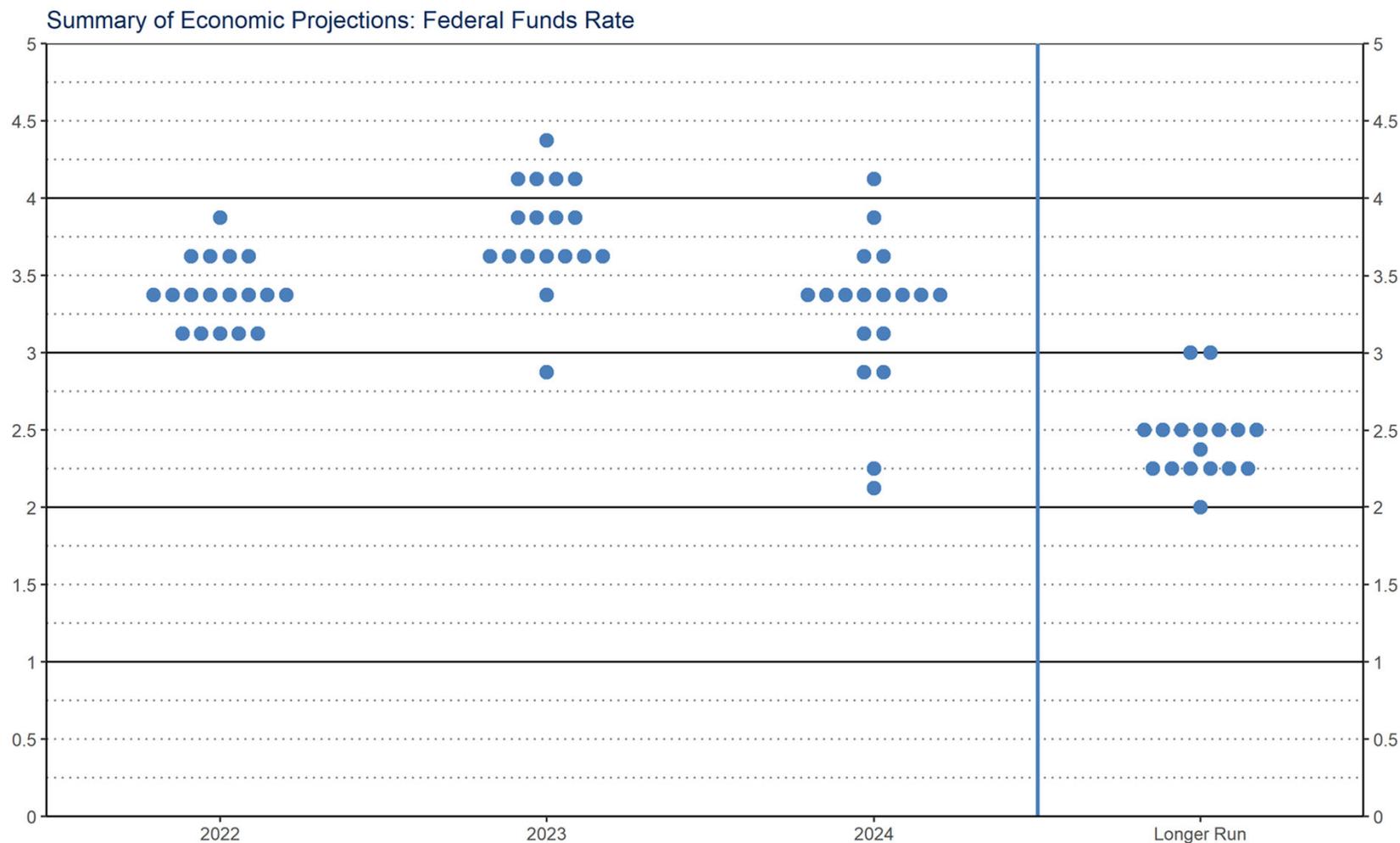


Notes: FOMC projection is the median, range, and central tendency for Q4/Q4 percent changes, from the March 2021 meeting. Red dots indicate median projections.

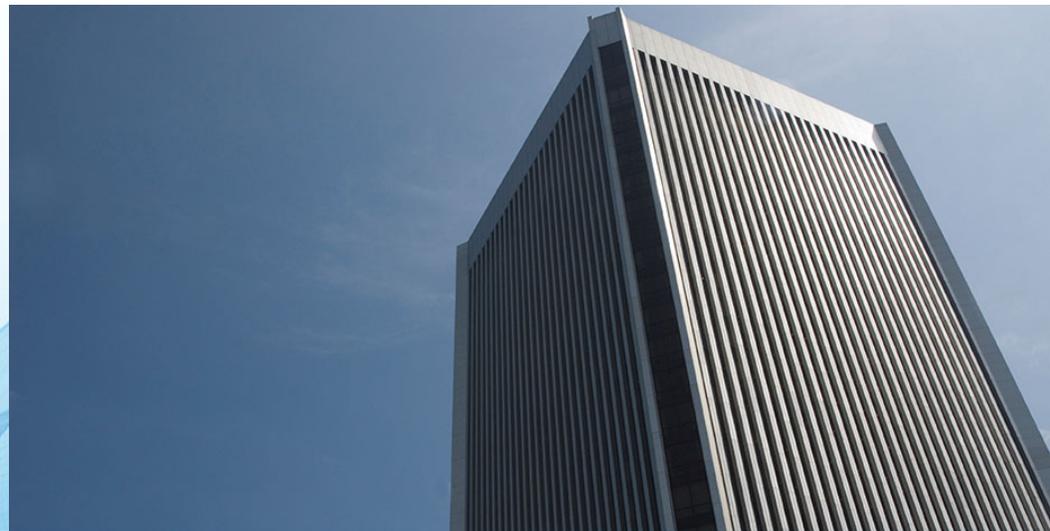
Source: Bureau of Economic Analysis & Board of Governors via Haver Analytics<sup>52</sup>



# Summary of Economic Projections: Federal Funds Rate



Note: Each dot in the chart represents the value of an FOMC participant's judgment of the midpoint of the appropriate target range (or the appropriate target level) for the federal funds rate at the end of the calendar year. Projections made for the June 2022 meeting.



The views expressed here are those of the author, and do not necessarily represent those of the Federal Reserve Bank of Richmond or the Federal Reserve System.