

# Lecture 2: Unemployment, Inflation, and Interest Rate

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**Course:** Macroeconomics 201

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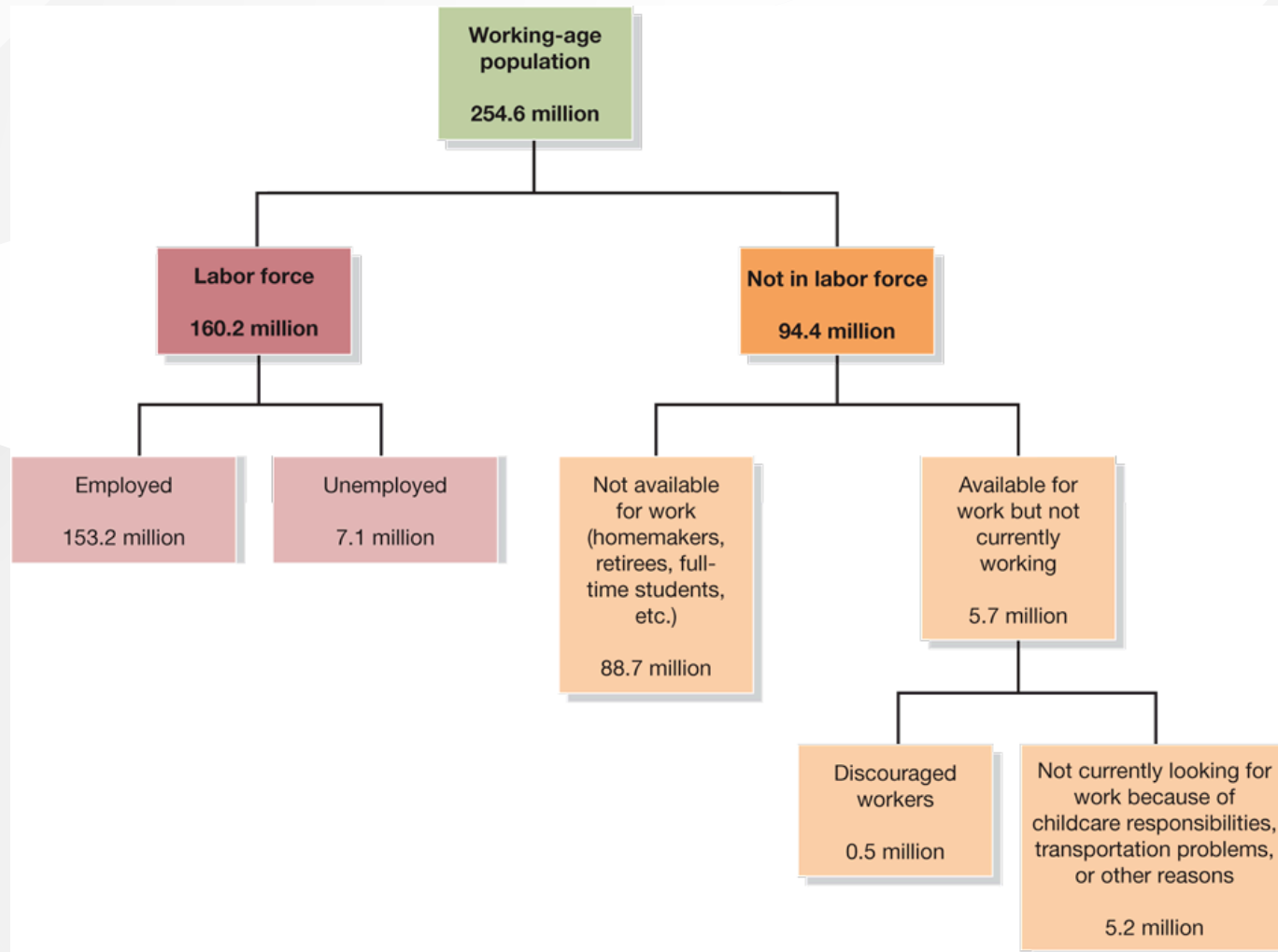
## The Road Ahead

1. Measuring Unemployment
2. Measuring Inflation
3. Real versus Nominal Interest Rates

## How to Measure Unemployment?

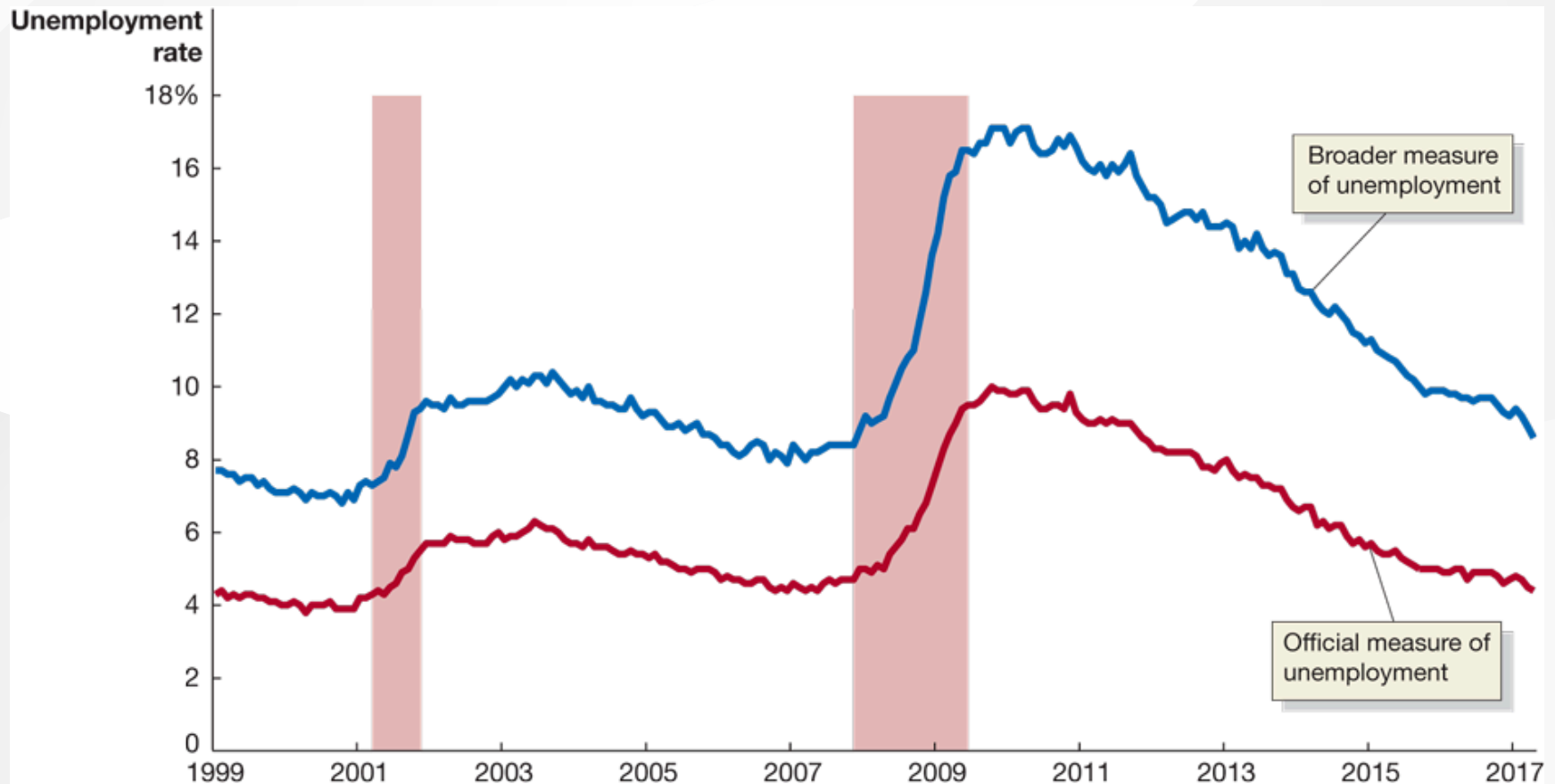
- Bureau of Census conducts Current Population Survey (CPS) to classify people as
  - **employed (N)**: people who have job
  - **unemployed (U)**: people who don't have job but are actively looking for one
  - **not in labor force**: neither, e.g. discouraged worker
- Bureau of Labor Statistics (BLS) uses CPS data to calculate
  - **labor force (L)** =  $N + U$
  - **unemployment rate (u)** =  $U / L \times 100\%$  (series U-3)
  - **participation rate** =  $L / \text{working-age population (civilian noninstitutional population)} \times 100\%$

## Working-Age Population



- Employment status, April 2017 (source: BLS)

## Broader Measure of Unemployment

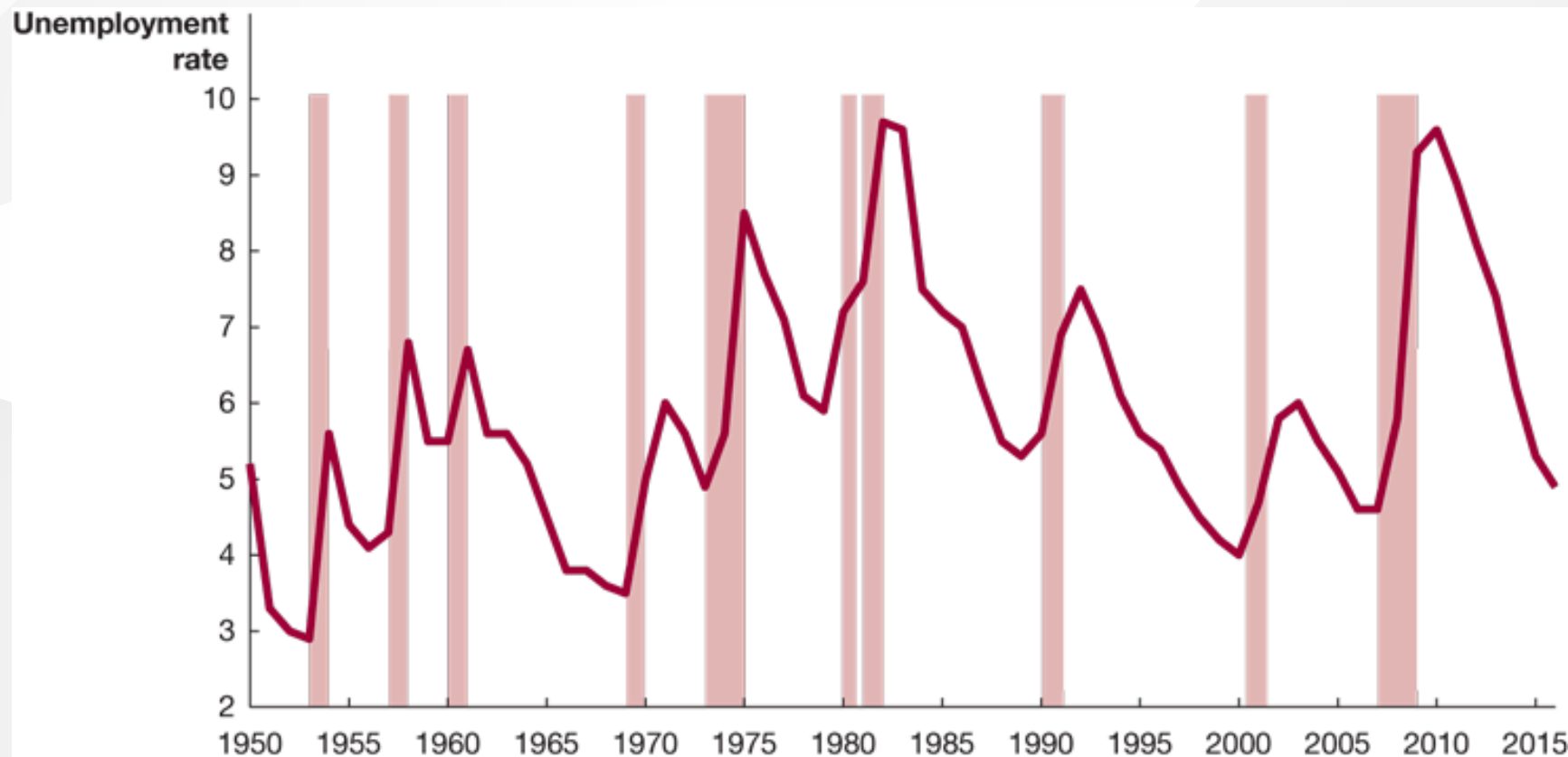


- Series U-6 = U-3 + discouraged + part-time (source: BLS)
- Official U-3 is not exact measure of joblessness

## Types of Unemployment

- We identify three types of unemployment
  - **frictional**: temporary unemployment due to process of matching workers with jobs
  - **structural**: longer unemployment due to mismatch b/w worker's skills/attributes and job requirements
  - **cyclical**: unemployment due to business cycle recession
- When cyclical unemployment drops to zero
  - economy is at full employment
  - natural rate of unemployment ( $u_n$ )
  - general consensus for U.S.: b/w 4% and 5%
- Why unemployment rate never falls to zero?

## U.S. Unemployment Rate



- U.S. unemployment rate, 1950-2016 (source: BLS)
- $u$  rises during recessions and falls during expansions

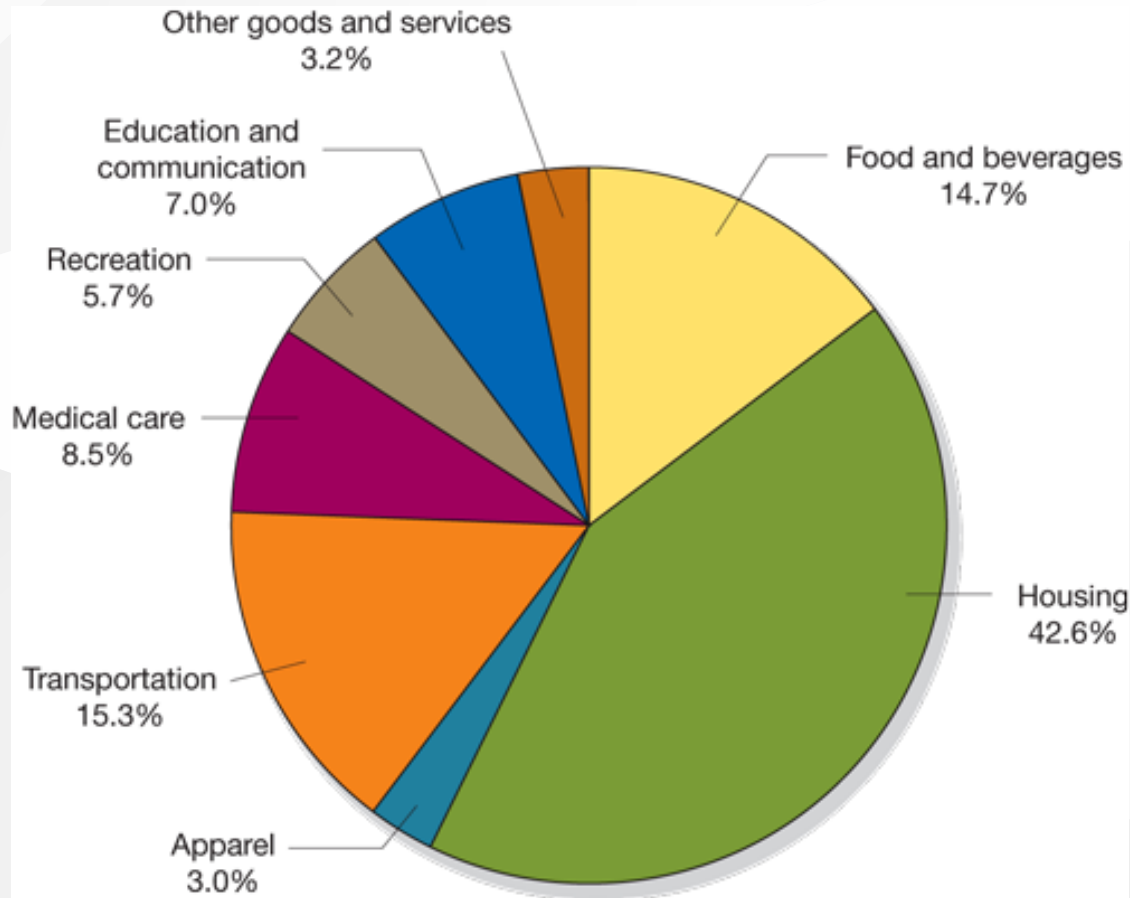
## How to Measure Inflation

- Three common measures of price level
  - **GDP deflator** (broadest)
  - **consumer price index (CPI)**: price of basket of goods and services purchased by consumer (cost of living)
  - **producer price index (PPI)**: price received by producers of goods and services at all stages of production
- Changes in PPI signifies future movements in CPI
- Inflation rate is percentage increase in price level

$$\pi_t = \frac{P_t - P_{t-1}}{P_{t-1}} \times 100\%$$



## CPI Market Basket



- CPI market basket, December 2016 (source: BLS)
- Housing, transportation, and food make up about 75%

## Calculating CPI

Product	1999 Quantity	1999 Price	2020 Price	2021 Price
Eye examinations	1	\$50	\$100	\$85
Pizzas	20	\$10	\$15	\$14
Books	20	\$25	\$25	\$27.5

- Assume base year is 1999
- Calculate CPI for year 2020 & 2021

$$\text{CPI} = \frac{\text{expenditures in current year}}{\text{expenditures in base year}} \times 100$$

$$\text{Answer: } P_{2020} = 120, \quad P_{2021} = 122$$

- 2021 inflation:  $\pi_{2021} = (122 - 120)/120 \times 100\% \approx 1.7\%$

## Purchasing Power

Year	Nominal Average Hourly Earnings	CPI (1982-1984=100)
2020	\$19.73	230
2021	\$20.14	233
2022	\$20.60	237

- Nominal variables are values in current-year dollars
- Calculate real values for years 2020-2022

$$\text{real variable} = \frac{\text{nominal variable}}{\text{current-year price index}} \times 100$$

Answer:  $W_{2020} = \$8.59$ ,  $W_{2021} = \$8.65$ ,  $W_{2022} = \$8.70$

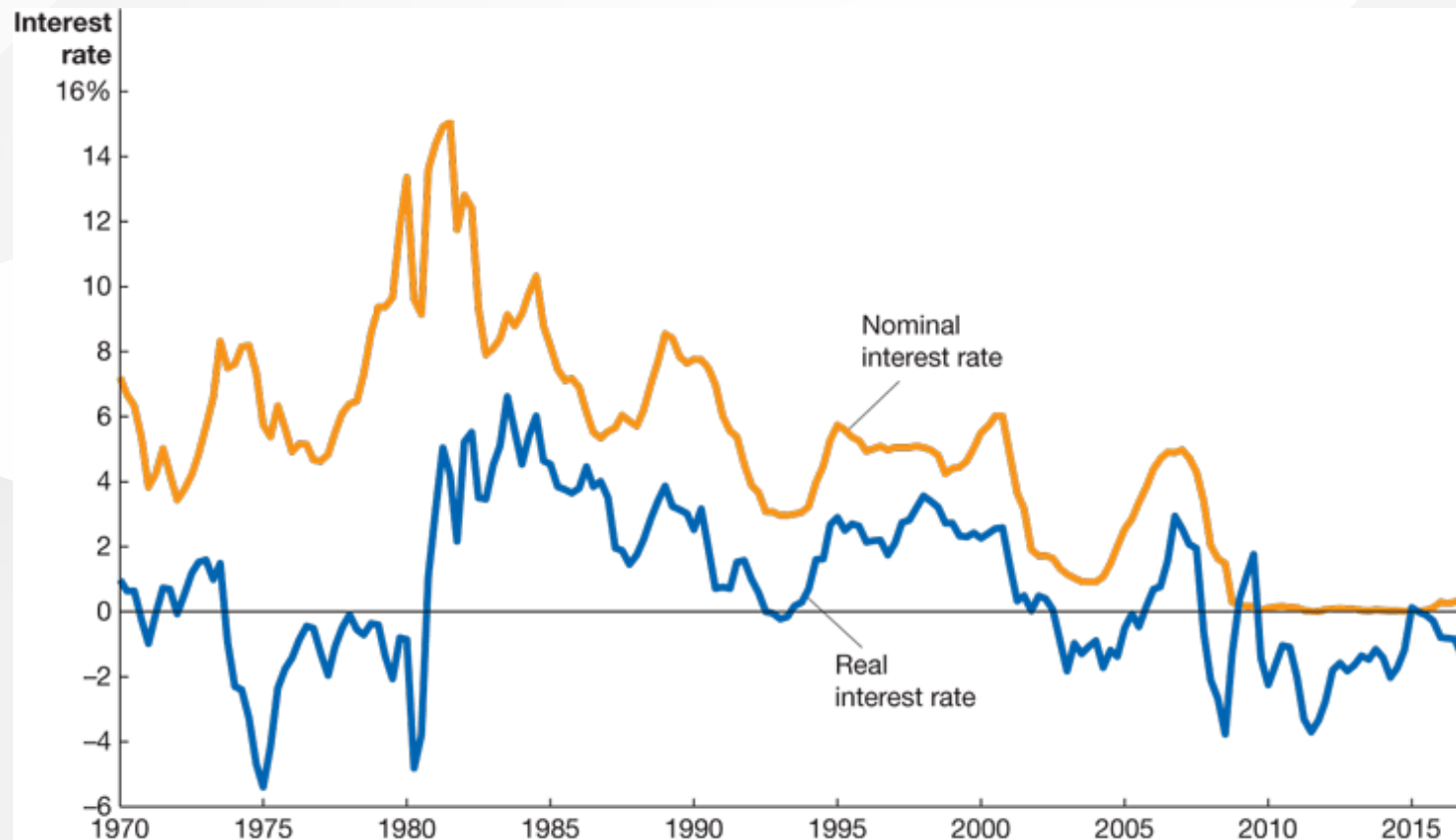
- Compare growth rates in nominal and real values

## Real versus Nominal Interest Rates

- Interest rate is cost of borrowing funds
  - **nominal interest rate ( $i$ )**: expressed in terms of units of **national currency**; borrowing \$1 this year requires repaying  $\$(1+i)$  next year  
→ this year's **price** of one dollar relative to next year
  - **real interest rate ( $r$ )**: expressed in terms of baskets of **goods**; borrowing one basket this year requires repaying  $(1 + r)$  baskets next year  
→ this year's **price** of one basket relative to next year
- Borrowers/lenders care about  $r$  rather than  $i$
- A useful (Fisher) relation

$$r_t \approx i_t - \pi_{t+1}^e \quad \text{for small } i_t \text{ and } \pi_{t+1}^e$$

## U.S. Interest Rates



- $i$  = interest rate on 3-month U.S. Treasury bills,  $\pi$  = percentage change in CPI (source: FRED)
- *ex-ante* versus *ex-post* real interest rates

## Readings & Exercises

- Readings
  - HO: chapter 9
  - BJ: lecture 1 (sec. 2, 3, 4), lecture 5 (sec. 1), 12 (sec. 1) (supplementary)
- Exercises
  - HO: problem 1.7, 3.2, 4.6, 5.5, 6.6, D9.2
  - Derive Fisher relation