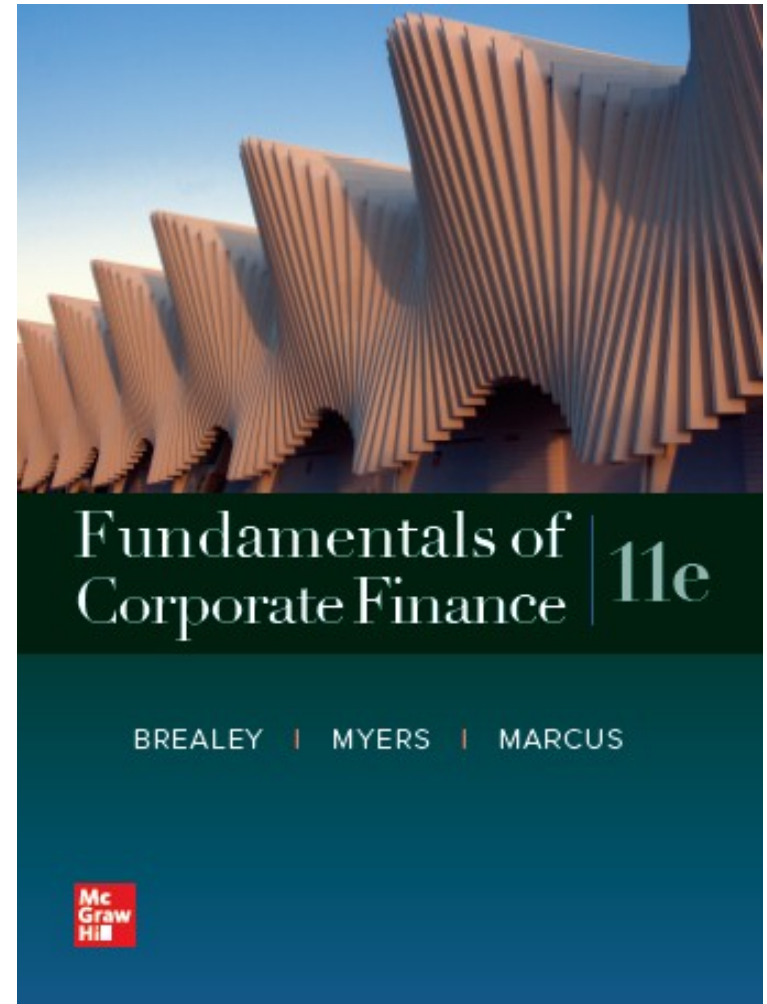


# Fundamentals of Corporate Finance, 11th Edition

CHAPTER 5: The Time Value Of Money

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# Effective Interest Rates (1 of 3)

- Effective Annual Interest Rate
  - Interest rate that is annualized using compound interest
- Annual Percentage Rate
  - Interest rate that is annualized using simple interest

# Effective Interest Rates (1 of 3)

- Effective Annual Interest Rate
  - “If the bank is charging me 12% per year, but I have to pay monthly, what rate I am effectively paying?”
  - “... what rate I am really paying?”

# Effective Interest Rates (2 of 3)

- Annual Percentage Rate (APR)

$$APR = MR \times 12$$

- Effective Annual Interest Rate (EAR)

$$EAR = (1 + MR)^{12} - 1$$

*\*where MR = monthly interest rate*

# Effective Interest Rates (3 of 3)

## **Example**

*Given an annual rate of 12%, what is the Effective Annual Rate(EAR)? (Monthly rate equals 1%)*

$$EAR = (1 + .01)^{12} - 1 = r$$

***You are effectively paying more than 12%***

# Effective Annual Rate

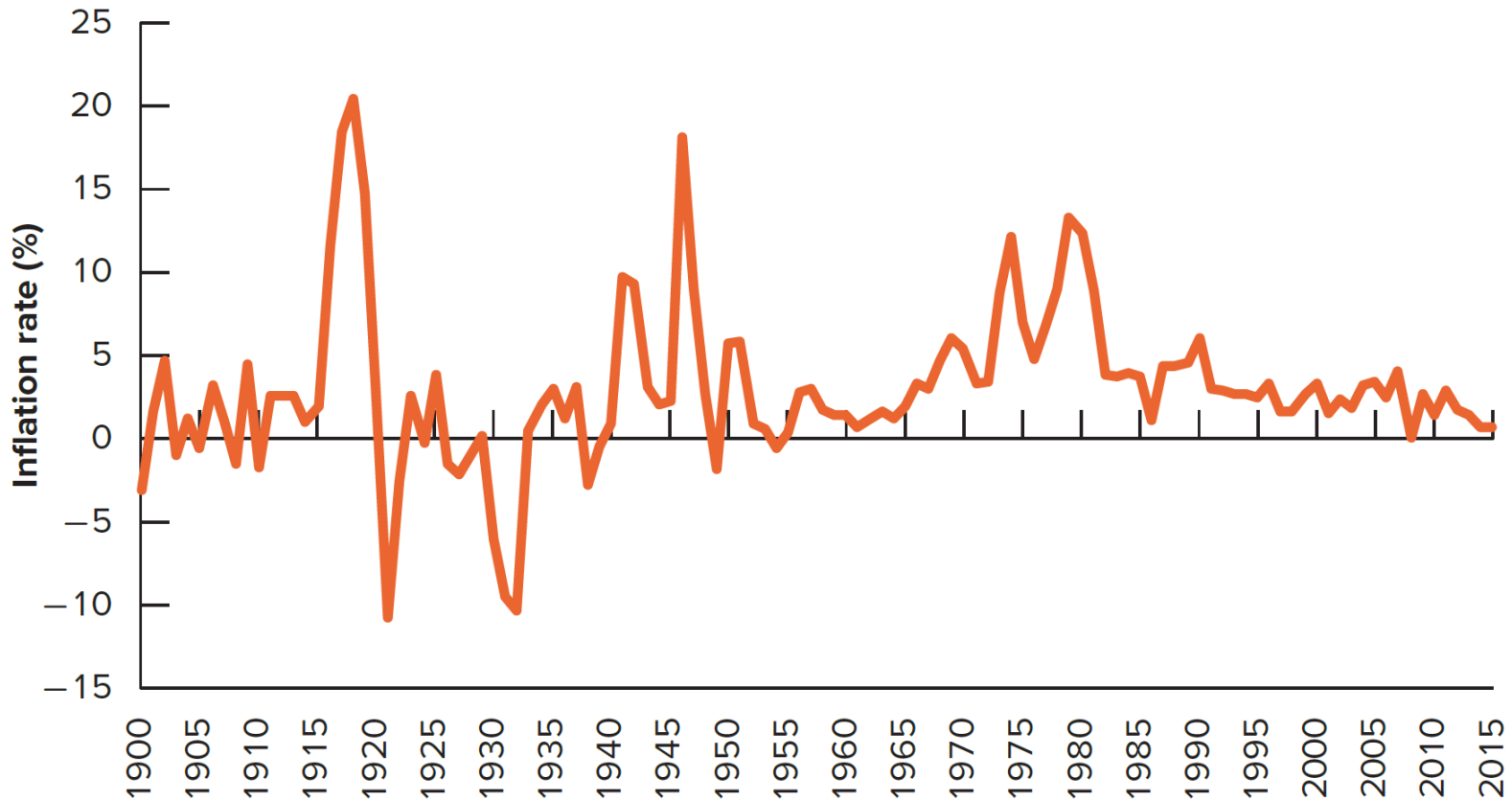
- Similar analysis for quarterly or semi-annual compounding
- **If annual compounding,  $\text{EAR} = \text{APR}$**

# Inflation (1 of 5)

- Inflation
  - Rate at which prices as a whole are increasing
- Nominal Interest Rate
  - Rate at which money invested grows
- Real Interest Rate
  - Rate at which the purchasing power of an investment increases

# Inflation (2 of 5)

## Annual U.S. Inflation Rates from 1900 - 2015





# Inflation (3 of 5)

## Often called Fisher Effect

- Approximation formula

$$\text{Real int. rate} \approx \text{nominal int. rate} - \text{inflation rate}$$

# Inflation (4 of 5)

## **Example**

*If the interest rate on one year govt. bonds is 6.0% and the inflation rate is 2.0%, what is the real interest rate?*

Approximation =  $.06 - .02 = .04$  or 4.0%

# Inflation (5 of 5)

- Remember:
  - Current (nominal) dollar cash flows must be discounted by the nominal interest rate
  - Real cash flows must be discounted by the real interest rate
- **I-Core Case**

# Discount Example, real and nominal

- You will receive a \$10,000 bonus in one year, but the inflation rate is expected to be 6%; assume the discount rate is 10%
- What is your bonus worth today?  $PV = FV/(1 + r)^t$
- Nominal:  $\$10,000/(1.10)^1 = \mathbf{\$9,090.91}$
- Real: Step One: what is bonus purchasing power?  $\$10,000/1.06 = \$9,433.96$
- Step Two: what is Real discount rate?  $1.10/1.06 - 1 = .037735849$
- Step Three:  $\$9,433.96/(1.037735849)^1 = \mathbf{\$9,090.91}$
- Nominal CF with Nominal rate; Real CF with Real rate

# What is next?

- Chapter 6: Valuing Bonds
- Go back to Lecture 2
- *You need a 6.5% annual return to justify the risks of the following financial contract: you will receive annual payments of \$50 for five years and one lump sum payment of \$1,000 in five years. What price should you pay for the contract?*
- That's a bond—we calculated the price to be \$937.66
- “i” vs. “r”