Financial Institutions and System

Week 5: The Risk and Term Structure of Interest Rates
The Stock Market, the Theory of Rational Expectations, and the Efficient Market Hypothesis

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Agenda

1. Risk and Term Structure of Interest Rates
2. Stock Market, Theory of Rational Expectations, and Efficient Market Hypothesis"
3. **Presentation Assignment Intro**
4. Class Activity: Mini-Debate – How Efficient Is the Stock Market?

1. Risk and Term Structure of Interest Rates

Risk Structure of Interest Rates

Risk structure of interest rates: Why do bonds with the same maturity have different interest rates?

- **Risk structure**: Relationship between interest rates and risk of default.
- **Term structure**: Relationship between interest rates and time to maturity.

Bonds with the same maturity have different interest rates due to:

- **Default risk** - the risk that the issuer will not make payments.
- **Liquidity** - the ease of converting an asset to cash.
- **Tax considerations** - tax treatment of interest payments.

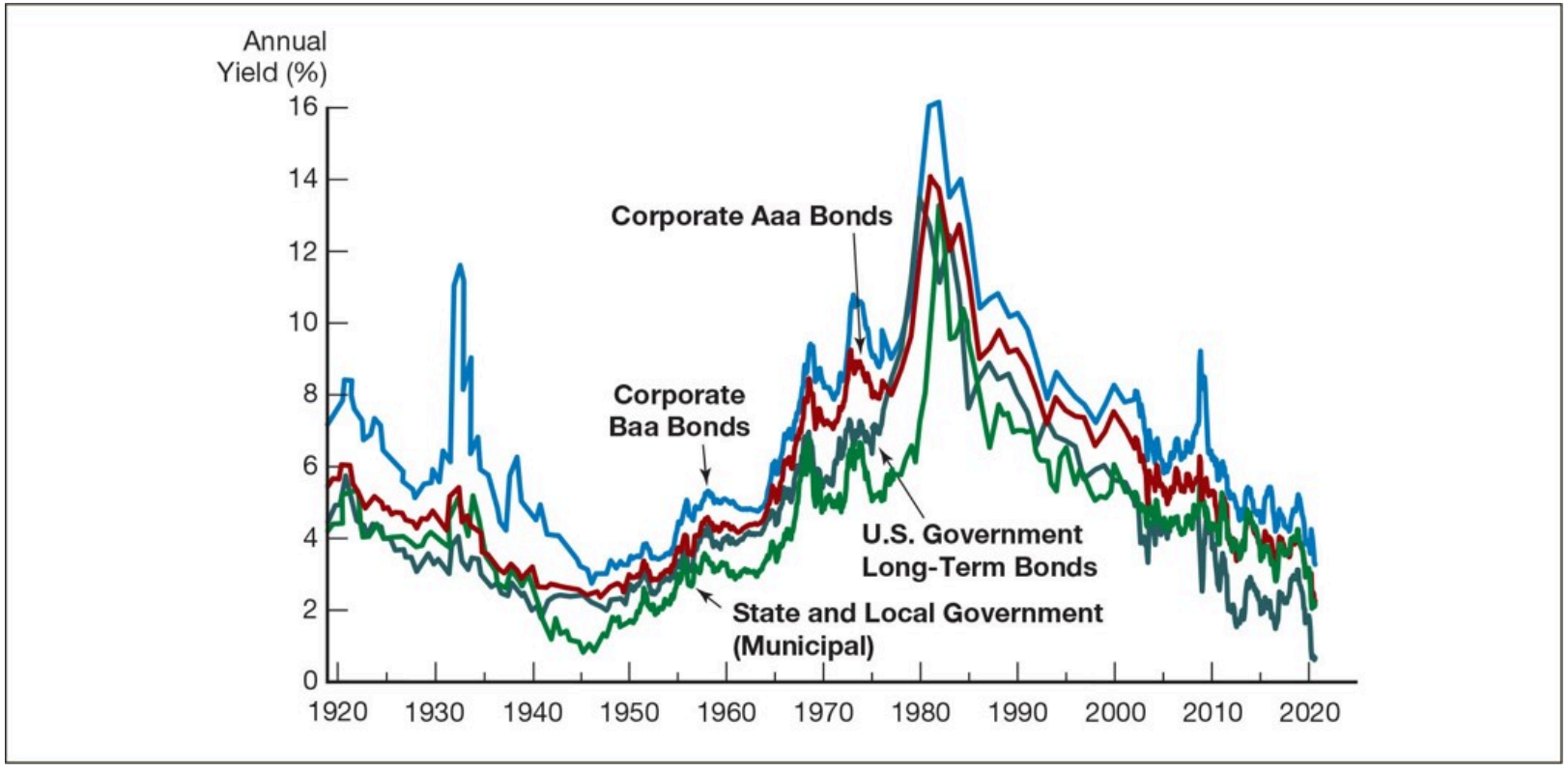


Figure 1 Long-Term Bond Yields, 1919–2020

Default Risk

- Probability that the issuer of the bond is unable or unwilling to make interest or principal payments.
- **U.S. Treasury bonds** are considered default-free (government can raise taxes).
- **Risk premium** = Spread between interest rates on risky bonds and Treasuries of the same maturity.
  - A bond with default risk will always have a **positive risk premium**.
  - If default risk increases, risk premium **widens**.

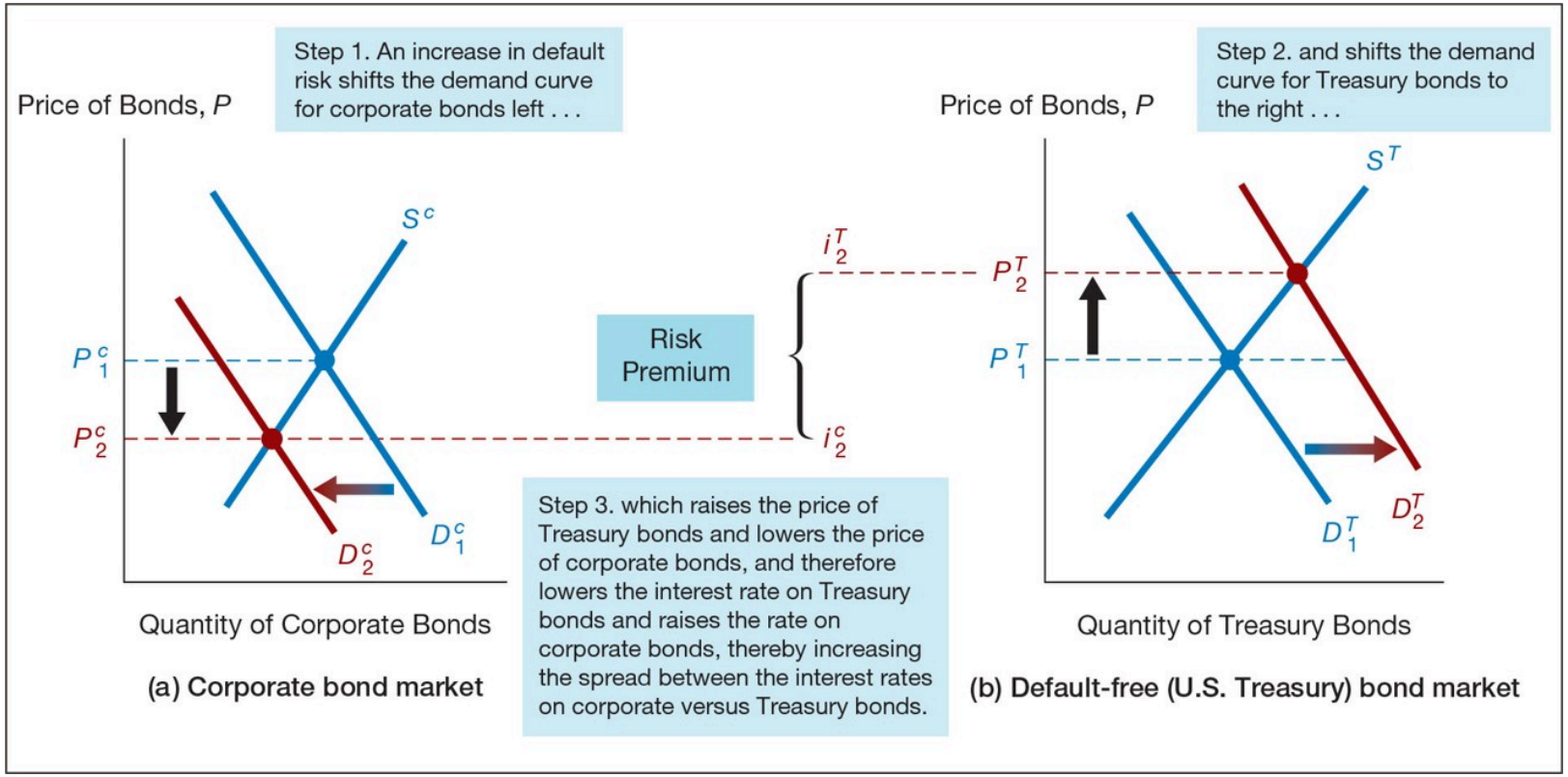


Figure 2 Response to an Increase in Default Risk on Corporate Bonds

Liquidity

- Ease of converting an asset to cash.
- Treasury bonds are more liquid (more buyers/sellers, lower transaction costs).
- Hence, **more liquid bonds have lower yields**.

Income Tax Considerations

- **Municipal bonds**: Interest is exempt from federal income tax.
- As a result, their **yields are lower**, despite sometimes having more risk.

Global Financial Crisis (2007–2009)

- Collapse of subprime market → Baa bonds perceived as riskier.
- Investors demanded higher premiums.

Coronavirus Pandemic (2020)

- Lockdowns → Economic freeze → Investors avoided low-rated bonds.
- Risk premium on Baa bonds surged again.

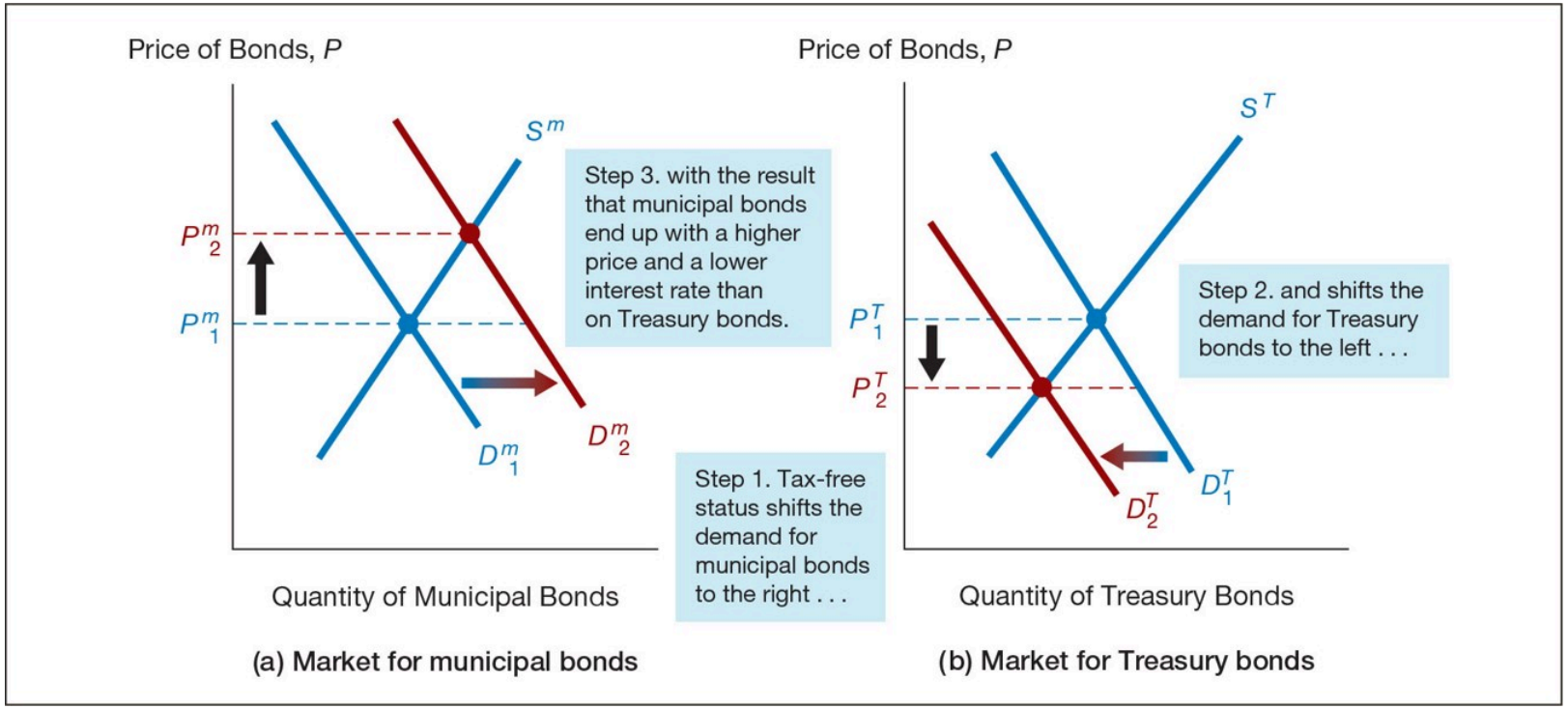


Figure 3 Interest Rates on Municipal and Treasury Bonds

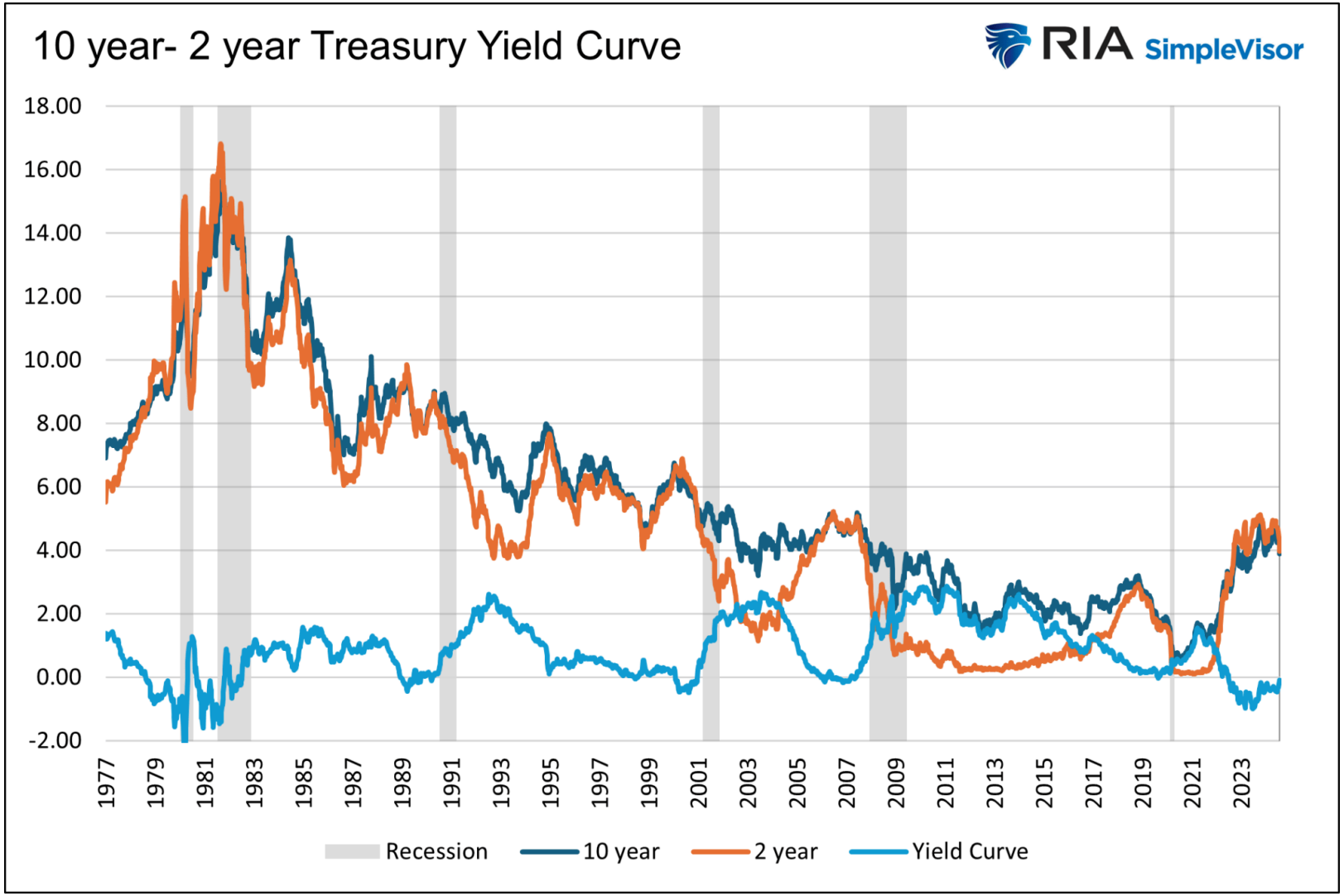
Trump Tax Cuts and Bond Markets

- 2017: Top marginal tax rate reduced from 39.6% → 37%.
- After-tax return on **municipal bonds** fell vs. Treasuries.
- Demand for municipals dropped → their yields rose.
- Demand for Treasuries rose → their yields dropped.

Term Structure of Interest Rates

Even with same risk/liquidity/tax, bond yields differ with **maturity**.

- **Yield curve**: Plot of yields across different maturities.
  - **Upward-sloping**: LT rates > ST rates (normal)
  - **Flat**: LT = ST
  - **Inverted**: LT < ST (often predicts recession)



RIA - Yield Curve Shifts Offer Signals For Stockholders

Term Structure Facts

1. Interest Rates on Different Maturities Move Together

- When **short-term (ST) interest rates** rise, **long-term (LT) rates** usually rise too — and vice versa.
- This is because LT rates reflect the **average of expected future ST rates**.
- **Example**:
  - 1-year rate today = 6%
  - Expected 1-year rate next year = 8%
  - Then, the 2-year bond rate ≈ **7%**

Term Structure Facts (continued)

2. ST Rates Influence the Yield Curve Slope

- When **ST rates are low**, yield curves usually **slope upward**.
  → Investors expect future ST rates to rise.
- When **ST rates are high**, yield curves often **invert (slope downward)**.
  → Investors expect ST rates to fall.
- **Examples**:
  - ST rate today = 2%, expected next year = 4% → 2-year rate = **3%** → upward slope
  - ST rate today = 6%, expected next year = 4% → 2-year rate = **5%** → downward slope

Term Structure Facts (continued)

3. Yield Curves Are Usually Upward-Sloping

- Investors prefer **short-term bonds** (less risk, more liquidity).
- To compensate for the **additional risk** of holding long-term bonds, investors require a **term/liquidity premium**.
- Even with no change in expected future ST rates, this preference causes LT rates to be higher.
- Result: Yield curves typically slope **upward**.

Three Theories

1. **Expectations Theory**: Explains facts 1 & 2
2. **Segmented Markets Theory**: Explains fact 3
3. **Liquidity Premium Theory**: Explains all three

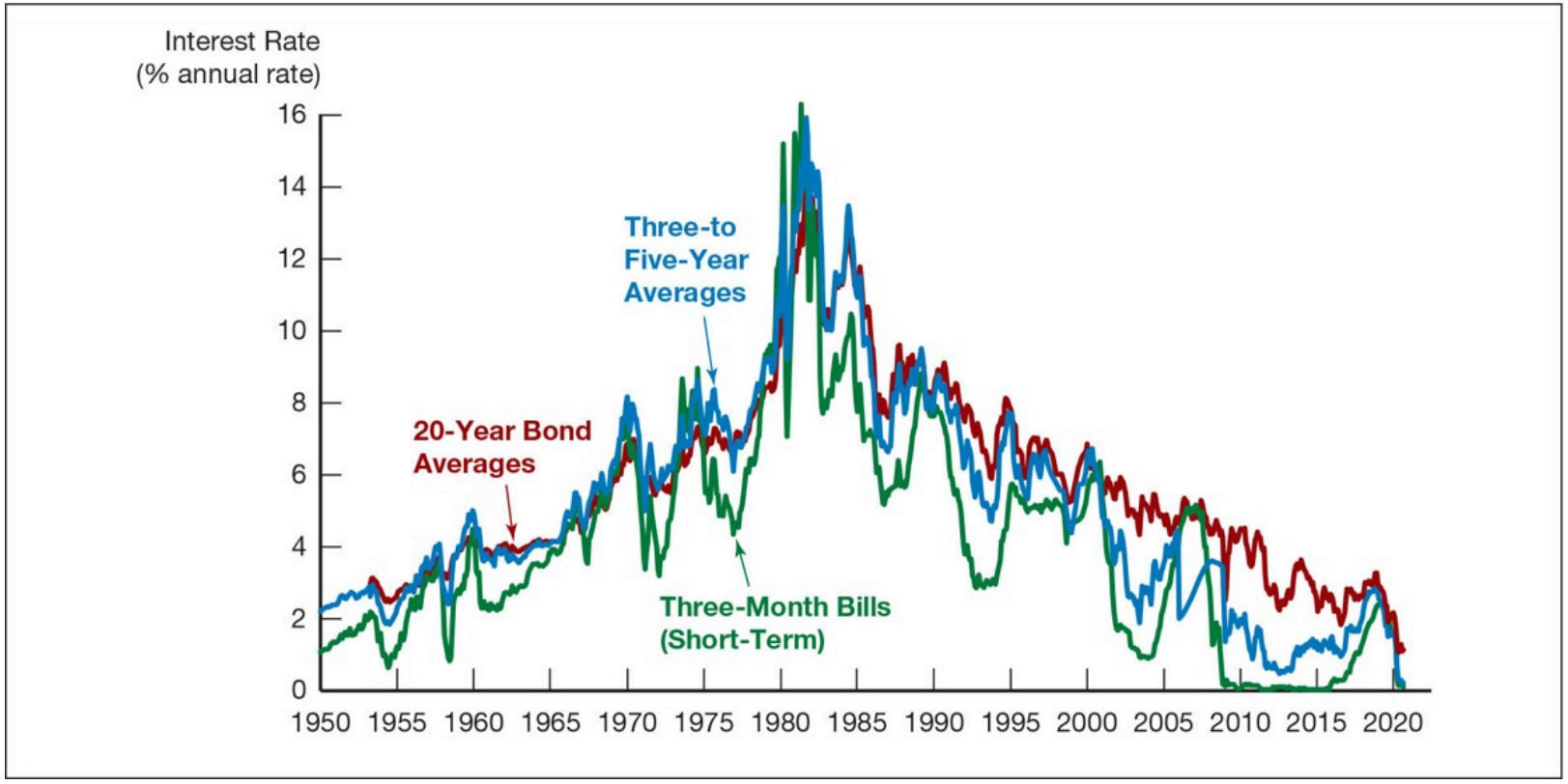


Figure 4 Movements Over Time of Interest Rates (U.S. Bonds)

Expectations Theory

- LT bond yield = average of expected ST rates over time.
- Investors view bonds of all maturities as **perfect substitutes**.
- If 1-year rate is 6% today, and expected to be 8% next year:

$$\text{2-year bond rate} = (6\% + 8\%)/2 = 7\%$$

Mathematical Expression

$$i_{nt} = \frac{i_t + i^e_{t+1} + \cdots + i^e_{t+n-1}}{n}$$

Limits of Expectations Theory

- Explains why yields **move together** and react to ST levels.
- **Does NOT** explain why curves usually **slope upward**.

Segmented Markets Theory

- Bonds of different maturities are **not substitutes**.
- Rates determined independently by supply and demand.
- Investors prefer **shorter maturities** (less risk).
- Explains persistent **upward slope** of yield curve.

Liquidity Premium Theory

- Bonds are **substitutes**, but not perfect ones.
- LT yields = average of expected ST rates + **liquidity premium**.
- Premium increases with maturity (compensates for risk).

$$i_{nt} = \frac{i_t + i^e_{t+1} + \cdots + i^e_{t+n-1}}{n} + l_{nt}$$

Preferred Habitat Theory

- Extension of liquidity premium.
- Investors prefer certain maturities ("habitats") but will shift if **compensated**.
- Explains why LT rates may be higher (need incentive).

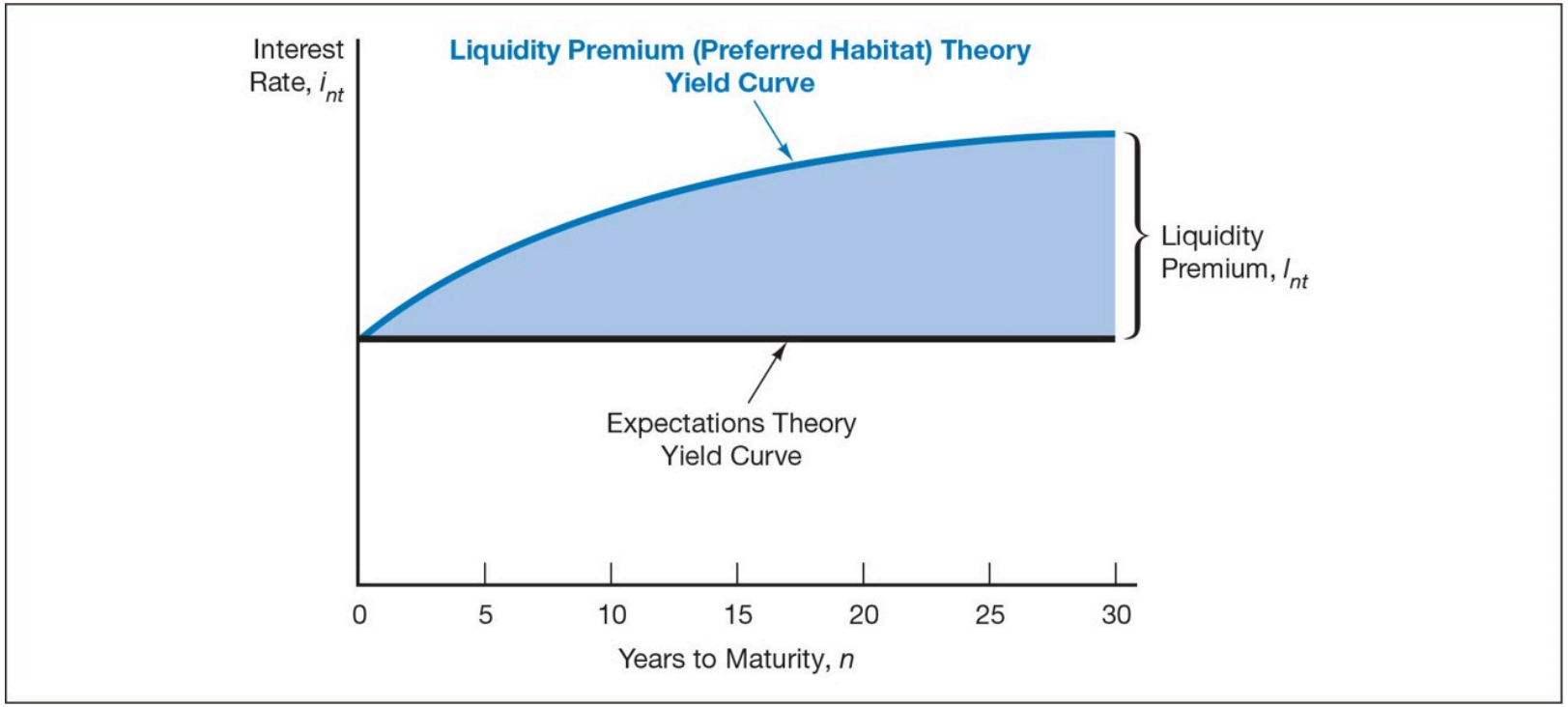


Figure 5 Liquidity Premium and Expectations Theory Combined

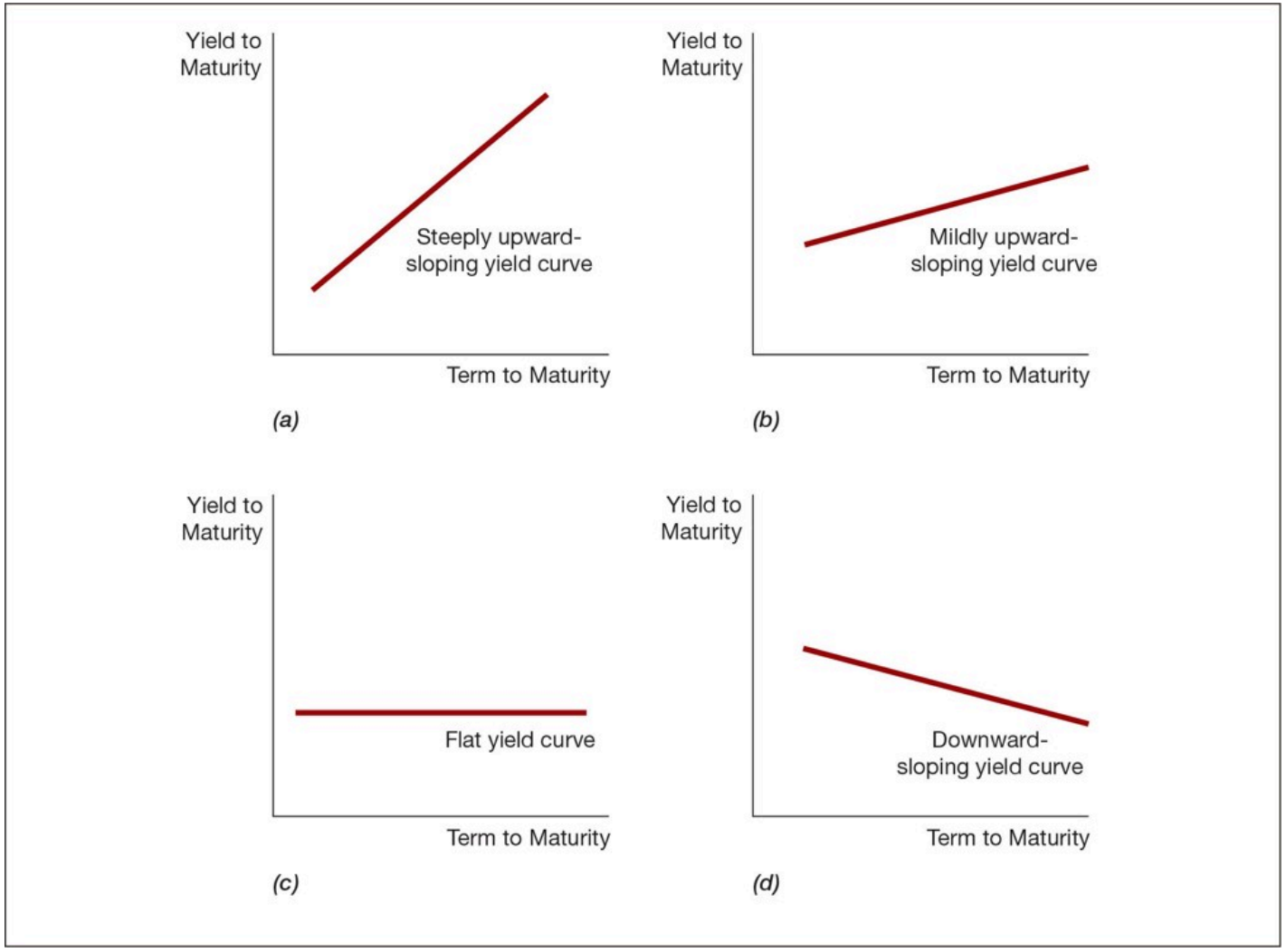


Figure 6 Yield Curves & Expectations Under Liquidity Premium Theory

Yield Curve as Forecasting Tool

- Contains info about **future rates, inflation, and GDP**.
- Rising curve → Boom
- Flat or inverted curve → **Recession warning**

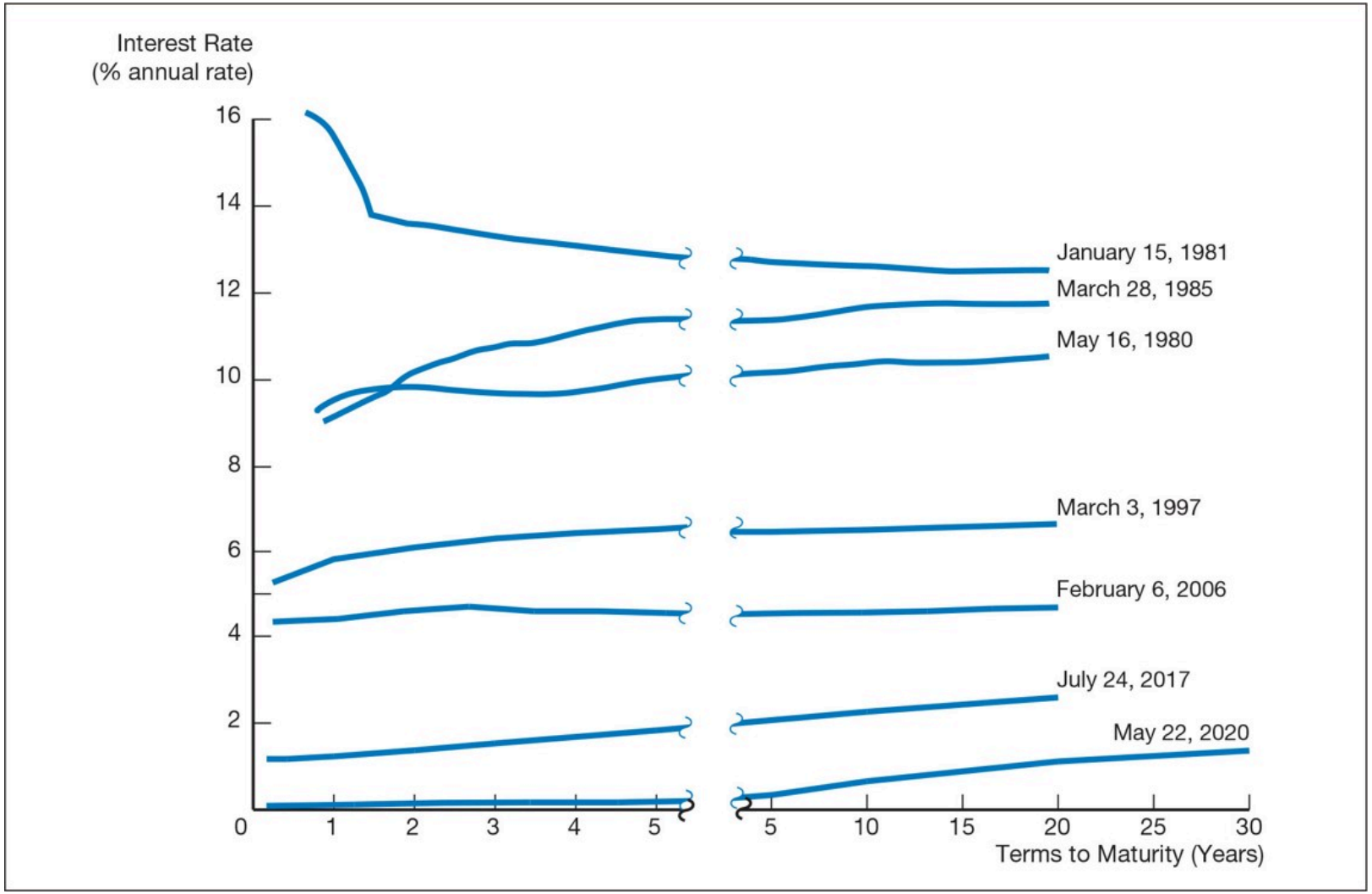


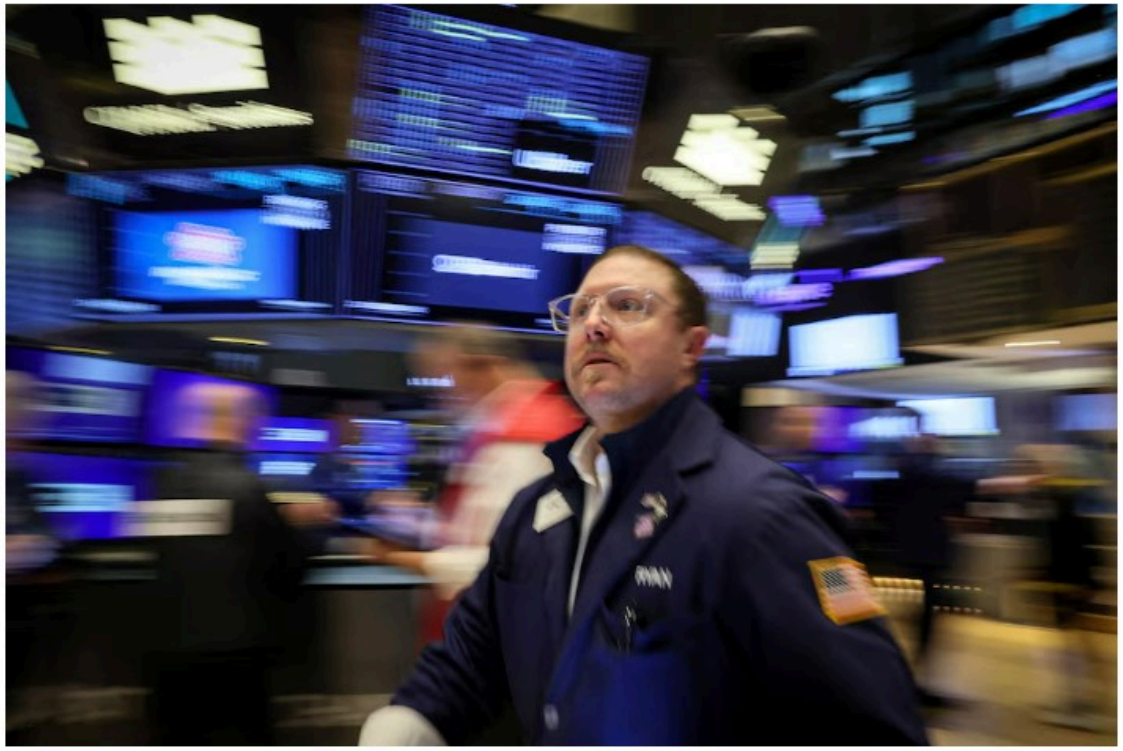
Figure 7 Yield Curves and Expectations of Short-Term Rates

U.S. Markets

Inverted yield curve no longer reliable recession flag, strategists say

By **Sarupya Ganguly**

March 12, 2024 11:01 PM GMT+9 · Updated 7 days ago



A trader works on the floor at the New York Stock Exchange (NYSE) in New York City, U.S., February 28, 2024. REUTERS/Brendan McDermid

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Yield Curve Inversion: What It Means

- **2y-10y inversion** has predicted most recessions since 1955.
- Today: curve inverted 20+ months, by ~46 bps.
- However, investors unsure if recession will occur:
  - Strong demand for long bonds
  - Fed keeps ST rates high due to strong economy

2. Stock Market, Theory of Rational Expectations, and Efficient Market Hypothesis

The Stock Market, Rational Expectations, and the Efficient Market Hypothesis

Computing the Price of Common Stock

- Stock value = Present value of all expected future cash flows (dividends and selling price)

One-Period Valuation Model

$$P_0 = \frac{Div_1}{(1+k_e)} + \frac{P_1}{(1+k_e)}$$

- P_0: Current stock price
- Div_1: Dividend next year
- P_1: Price next year
- k_e: Required return on equity

Example

- Intel stock = $50
- Dividend = $0.16
- Analyst forecast: price next year = $60
- Your required return = 12%

$$P_0 = \frac{0.16}{1.12} + \frac{60}{1.12} = \$53.71$$

Since $$53.71 > $50 → Buy the stock.

The Generalized Dividend Valuation Model

$$P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+k_e)^t}$$

- Future dividends determine stock value
- If a stock doesn't pay dividends → not valuable today

Gordon Growth Model

$$P_0 = \frac{D_1}{k_e - g} = \frac{D_0(1+g)}{k_e - g}$$

Where:

- D_0: Most recent dividend
- g: Constant dividend growth rate
- k_e: Required return

Assumptions:

- Dividends grow forever at constant g
- $g < k_e$

How the Market Sets Stock Prices

1. Price is set by the **highest bidder**.
2. Those with **better info** value assets more accurately.
3. Better info → **less perceived risk** → **higher value**.

Prices reflect changing information.

Application: Monetary Policy & Stock Prices

- Fed lowers interest rates → Bond returns ↓ → Stock becomes more attractive → k_e ↓
- Also boosts economy → Expected g ↑
- Both effects → Stock prices ↑ (via Gordon model)

Coronavirus Crash of 2020

- Dow dropped 37% (Feb–Mar 2020)
- Economic uncertainty → lower dividend growth g
- Risk ↑ → Required return k_e ↑

$$P_0 = \frac{D_1}{k_e - g} \downarrow$$

Rational Expectations Theory

- **Adaptive expectations**: Based only on past values
- **Rational expectations**:
  - Use all available information
  - May be inaccurate but unbiased

$$X^e = X^{of}$$

- X^e: Expected value
- X^{of}: Optimal forecast

Efficient Market Hypothesis (EMH)

- Prices **fully reflect** all available information.
- Expected return:

$$R^e = \frac{P^e_{t+1} - P_t + C}{P_t}$$

- In equilibrium:

$$R^e = R^{of} = R^*$$

EMH Logic

If $R^{of} > R^* \rightarrow P_t \uparrow \rightarrow R^{of} \downarrow$ until $R^{of} = R^*$
If $R^{of} < R^* \rightarrow P_t \downarrow \rightarrow R^{of} \uparrow$ until $R^{of} = R^*$

$\rightarrow$ Prices adjust quickly via **arbitrage**

Simply put, if you can make money by buying or selling a stock, the price will adjust until you can't.

Do Analysts Help?

- Most public information is **already priced in**.
- Reports and tips rarely beat the market.
- **Buy and hold** is often optimal for average investors.

Are Markets Always Efficient?

- **Market crashes** challenge “strong” efficiency view.
- EMH doesn’t claim prices are always correct — only **unpredictable**.
- Crashes may reflect psychology, not just fundamentals.

Behavioral Finance

- Explains inefficiencies with psychology & sociology:
  - **Loss aversion** → Avoiding short selling
  - **Overconfidence** → Excessive trading
  - **Herding / social contagion** → Bubbles

3. Presentation Assignment Intro

Presentation Assignment

- According to the course syllabus, this **individual presentation assignment** accounts for **20% of your final grade**.
- Each student will give a **15-minute presentation** followed by a **5-minute Q&A session**.
- **Presentation Date:** Week 15 (June 13)
- **Topic:** *Current Issues on Challenges and Risks in the Modern Financial System*

Tip: Choose a topic that you find genuinely interesting — this will make your research, preparation, and presentation more engaging and insightful!

Instructions & Requirements

Topic Selection

- Choose a topic from the **List of Suggested Topics** below.
- **No duplicate topics** will be allowed — topics are assigned on a **first come, first served** basis.
- You may also propose a custom topic (subject to instructor approval).

Suggested Topics

- The Rise of Shadow Banking: Risks Beyond the Regulators
- The Global Debt Crisis: Are Sovereign Defaults Inevitable?
- Bank Runs in the Digital Age: Lessons from SVB and Credit Suisse
- Climate Risk as a Financial Risk: The New Role of Central Banks
- FinTech Disruption: Balancing Innovation and Systemic Risk
- Cybersecurity in Finance: Are We Ready for the Next Digital Shock?
- CBDCs and the Future of Money: Stability Tool or Risk Amplifier?
- Inflation, Interest Rates, and Fragile Markets: A Perfect Storm?
- Geopolitical Risk and the Financial System: War, Sanctions, and Uncertainty
- Artificial Intelligence in Finance: Opportunity or Black Box Risk?
- Others at your proposal (requires prior approval by the instructor)

Instructions & Requirements (cont'd)

Presentation Delivery

- You must **submit the final version of your presentation slides** via Cyber Campus by **June 12 at 12:00 PM (noon)**.
- Prepare a presentation of **12–15 slides** (PowerPoint, PDF, or equivalent).
- You will have **15 minutes to present**, followed by a **5-minute Q&A**.
- **Active participation during other students' Q&A sessions** is encouraged and will contribute to your grade.
- **Full credit** will be awarded only if you both **present** and **engage in Q&A discussions**.

Summary Submission

- Submit a **1-page written summary** of your presentation.
- **Due date:** by class time on **June 6** via Cyber Campus.
- Format:
  - **Font:** 12 pt, **Spacing:** 1.5 lines
  - **Length:** maximum 1 page
  - **Content should include:**
  - Brief overview of your topic
  - Your key arguments and main findings
  - At least **3 academic references** (journal articles, policy papers, working papers)
  - **Citations and references** must follow **APA style**

Grading Criteria (20%)

- Topic clarity and structure (4%)
- Quality of analysis and arguments (6%)
- Slide design and presentation delivery (4%)
- Summary paper (3%)
- Engagement in Q&A sessions (3%)

4. Class Activity: Mini-Debate – How Efficient Is the Stock Market?

Any QUESTIONS?

Thank You!

Next Class

- (Apr 11)
  - **Chap 8.** An Economic Analysis of Financial Structure
  - **Chap 13.** Banking and the Management of Financial Institutions