15.415.1X

MIT MANAGEMENT SLOAN SCHOOL

Recitation 1
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MODULE 1:
FINANCIAL ASSETS

Financial Assets

(1) Bank deposits partially insured, typically there are no restrictions on withdrawals

(2) Certificates of deposit (CD) fixed term, fixed interest rate

(3) Commercial paper unsecured, short-term firm debt, rated by credit agencies

(4) Treasury securities: government sells securities in auctions after which they can be traded in secondary markets.

- *Treasury Bills, Notes, and Bonds*

< 1 year 2 - 10 years > 10 years

(5) Corporate bonds firm debt

(6) Stocks equity, represents the ownership of a fraction of a corporation.

(7) Derivative securities value is derived from an underlying assets, used to manage risks and make bets

MODULE 2:
FINANCIAL INSTITUTIONS

Financial Institutions

(1) Commercial banks deposits, loans, credit cards, investment products

(2) Savings and Loans (S&Ls) emphasis on the residential mortgage loans

(3) Investment banks
- helps firm/gov issue securities to raise capital by underwriting or acting as the clients
- helps firms involved in mergers and acquisitions by advising them and providing capital
- brokerage and asset management
- unlike commercial banks, investment banks do not take deposits. most large banks have both commercial and investment banking divisions.

(4) Insurance companies

(5) Investment funds

- *Mutual funds, Exchange-traded funds (ETFs), Hedge funds, Private equity funds*

limiting risk exposure

invests in private companies
engaged in buyouts of public companies

MODULE 3: GROSS AND NET RETURN

Definitions

- **Definition of Gross Return:**

$$\text{Gross Return} = \frac{\text{Future Value}}{\text{Current Value}}$$

- **Definition of Net Return:**

$$\text{Net Return} = \frac{\text{Future Value} - \text{Current Value}}{\text{Current Value}}$$

$$= \frac{\text{Future Value}}{\text{Current Value}} - 1 = \text{Gross Return} - 1$$

Example

- Purchased apartment for $200,000. Suppose the future value of this apartment is $300,000. What is the gross and net return on this purchase?

$$\text{Gross Return} = \frac{\$300,000}{\$200,000} = 150\%.$$

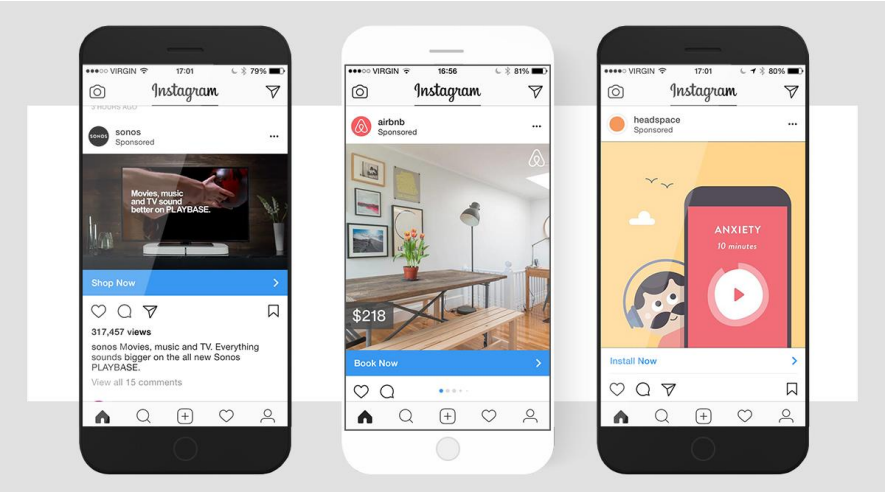
$$\text{Net Return} = \frac{\$300,000 - \$200,000}{\$200,000} = 50\%.$$

MODULE 4: TRADING MECHANICS

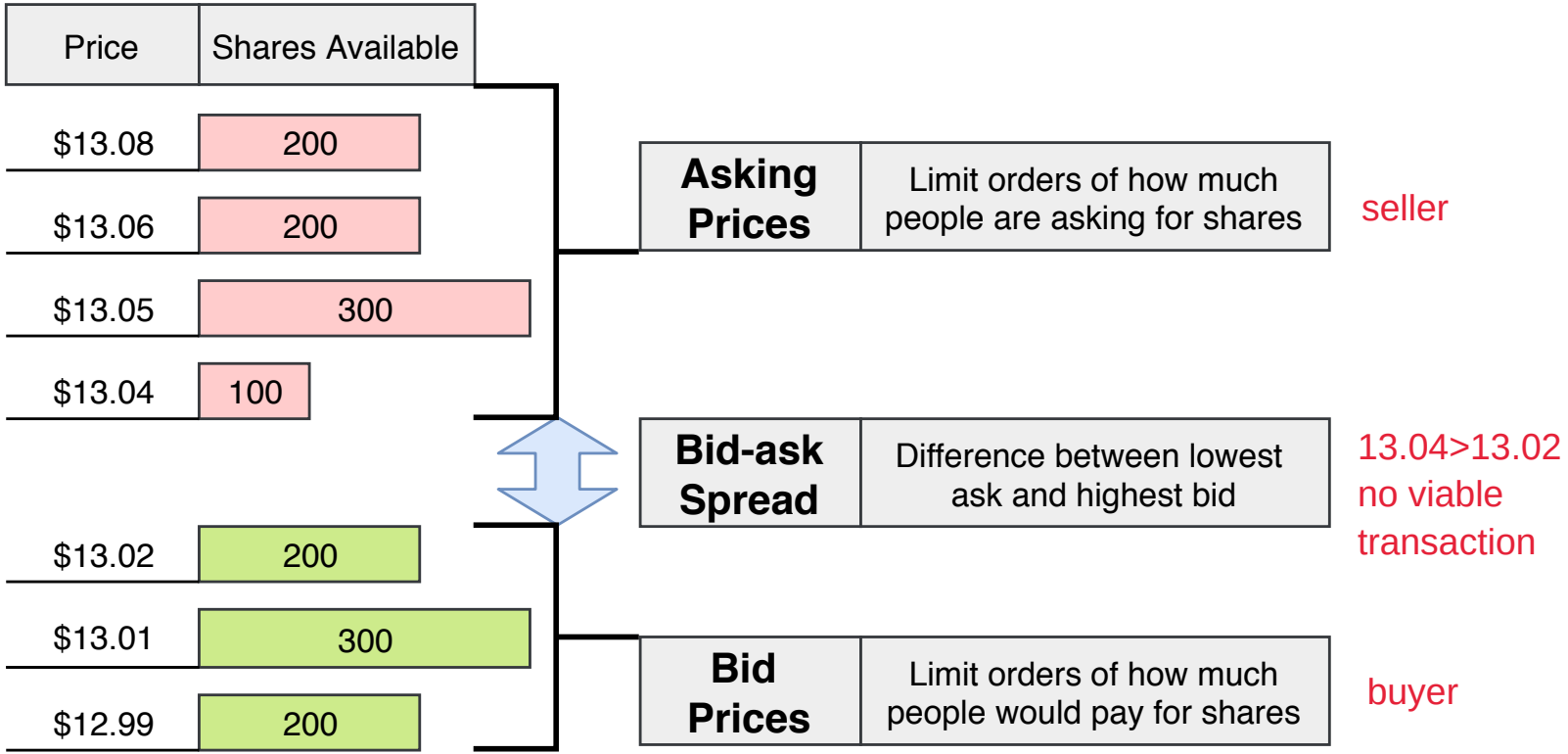
Trading Mechanics

- **Suppose you want to trade 100 shares of Uber**
- **Two ways of doing it:**

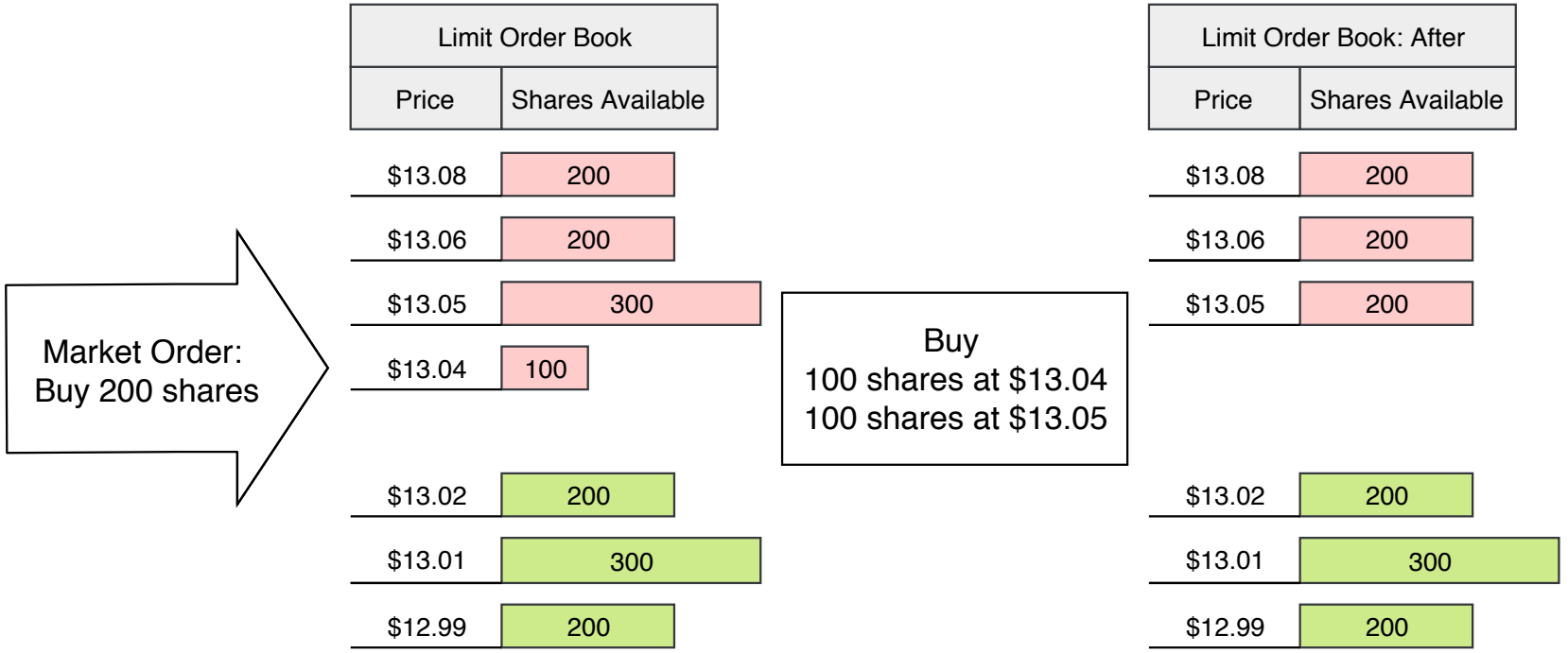
1. *Place an ad:*
   Limit order
2. *Respond to an ad:*
   Market order



Limit Order Book



Market Order

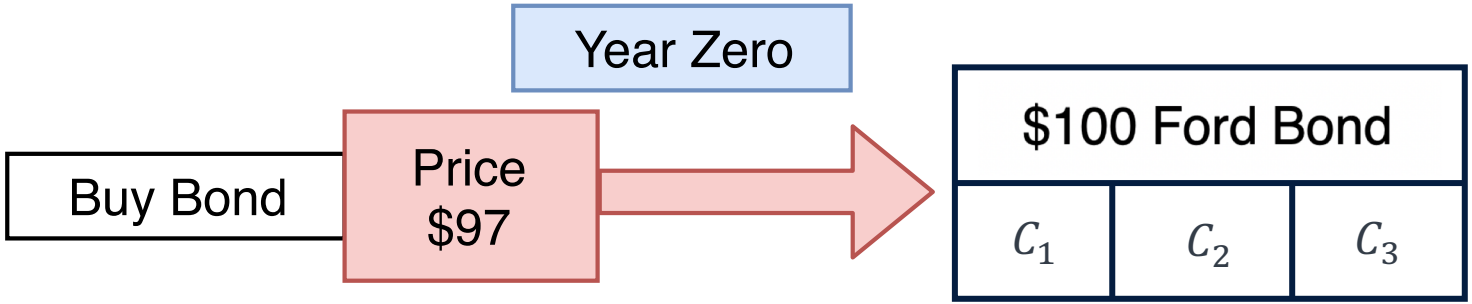


MODULE 5: BONDS

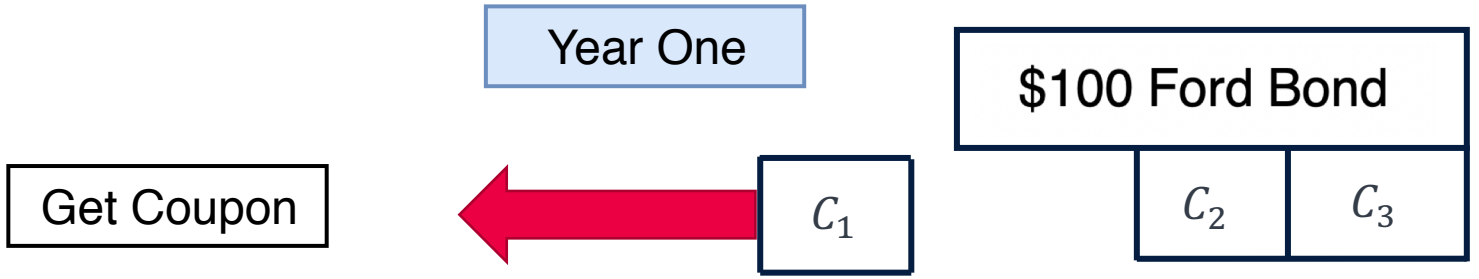
Bonds

- **A bond is a promise to pay a fixed amount of money**
- **Example: $100 Ford Bond**
  - *Current price: $97*
  - *Term: Three years*
  - *Coupon: Interest that the bond pays.*
    - *Assume interest is paid annually.*

Bonds



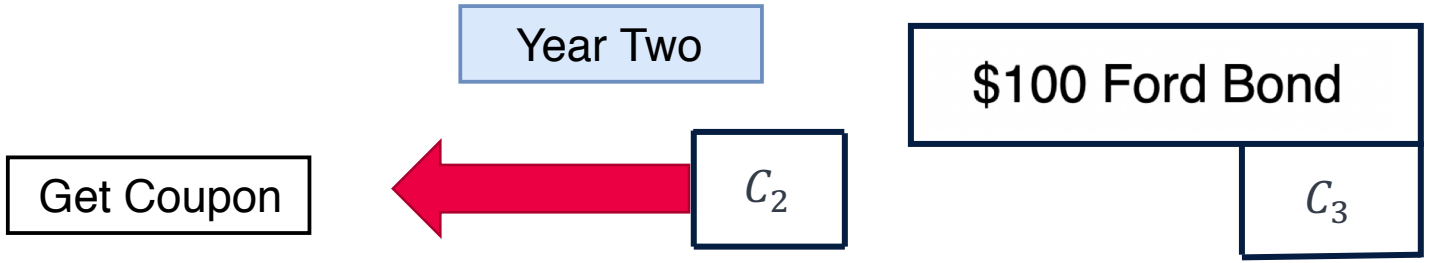
Bonds



If coupon rate is 1%, then

$$C_1 = 1\% \times FV = 1\% \times \$100 = \$1$$

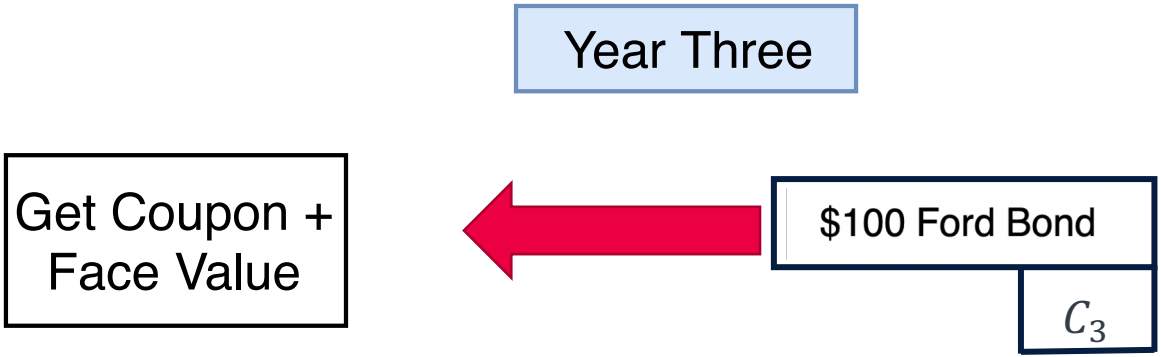
Bonds



If coupon rate is 1%, then

$$C_2 = 1\% \times FV = 1\% \times \$100 = \$1$$

Bonds



If coupon rate is 1%, then

$$C_3 = 1\% \times FV = 1\% \times \$100 = \$1$$

Last cash flow: $FV + C_3 = \$100 + \$1 = \$101$

MODULE 6: EXPECTED RETURN AND VOLATILITY

Expected Return and Volatility

- **Example: Nikola (NASDAQ: NKLA)**
  - *Current price: $32*
  - *Future price is a random variable. Suppose it has the following probability distribution in one year:*

Probability	Price in one year
10%	$150
60%	$20
30%	$2

Expected Return

1. **Compute net return in each state:**

Probability	Price in one year	Net return
10%	$150	(150-32)/32=368.75%
60%	$20	(20-32)/32=-37.5%
30%	$2	(2-32)/32=-93.75%

2. **Expected return by definition:**

$$10\%\times368.75\%+60\%\times(-37.5\%)+30\%\times(-93.75\%)=-13.75\%$$

Expected Return

- **An alternative approach to compute expected return:**

$$Expected\ price = 10\% \times \$150 + 60\% \times \$20 + 30\% \times \$2 = \$27.6$$

- **Expected net return:**

$$Expected\ return = \frac{Expected\ price\ - Current\ price}{Current\ Price}$$

$$= \frac{\$27.6 - \$32.0}{\$32.0} = -13.75\%$$

Volatility

- **Definition:**

$$Var[r] = E[(r - E(r))^2] = \sum p_i \left(r_i - E(r)\right)^2$$

- **Variance of returns for NKLA:**

$$Var[r] = \sum p_i \left(r_i - E(r)\right)^2 =$$
$$= 10\% \times (368.75\% - (-13.75\%))^2 +$$
$$+ 60\% \times (-37.5\% - (-13.75\%))^2 +$$
$$+ 30\% \times (-93.75\% - (-13.75\%))^2 =$$
$$= 1.69$$

Volatility

- **Standard deviation is a squared root of variance.**

$$\mathrm{SD}[r] = \sqrt{1.69} = 1.3 = 130\%.$$

- **Standard deviation is what we typically refer to as volatility of returns.**

- **For Nikola, volatility of returns over the next year is 130%.**