SMU COX
SCHOOL OF BUSINESS

Lecture 8: Stock Valuation

An Application of Time Value of Money

Presentation to Cox Business Students

FINA 3320: Financial Management

Purpose of This Lecture

- **Provide an application of time value of money to stock valuation**
  - (1) Understand basics of stocks
  - (2) Discuss stock valuation
  - (3) Discuss zero-, constant-, and supernormal-growth stocks
  - (4) Review valuing the entire corporation
  - (5) Discuss preferred stock

What is a Stock?

- Common stock: Ownership share in the firm
- Stockholder are the ***residual claimants***
  - Bad news: All other claimants get paid first (e.g., employees, government, creditors, preferred shareholders)
  - Good news: Stockholders are entitled to everything else (residual cash flows of the firm)

On Stock Prices

- How much is a stock worth?
  - Book value???: This is the value as recorded on the firm's balance sheet
  - Liquidation value???: This is the value of each share if the company sold off its assets and paid all its creditors
- In most cases, a firm's stock price exceeds both its book value and its liquidation value

On Stock Prices continued…

- Going-concern value: Difference between a stock's true market price and its book or liquidation value
  - Extra earning power: The firm is able to earn more than an adequate return on its assets
  - Intangible assets: Valuable assets such as reputation, successful R&D, or talented managers and employees that are not listed on the balance sheet
  - Future investments: The firm has the ability to make valuable future investments and investors price these opportunities into the stock

The Value of a Stock

- Firm's assets represent the ultimate source of cash flows for stockholders
- Two channels through which stockholders realize these cash flows
  - **Dividends**: Portion of the firm's earnings that are returned to investors (rather than retaining and reinvesting these earnings)
  - **Cash received from selling the stock** to another investor (effectively selling rights to future dividends)
- Like any other asset, a stock's value should be the present value of the cash flows generated for its owner

Stock Valuation Example

- You expect to receive a $3 dividend and then sell the stock for $81 in one year. What is the stock's value if the required rate of return (i.e., discount rate) is 12%?

$$PV_0 = \frac{\$3}{(1.12)^1} + \frac{\$81}{(1.12)^1} = \$75$$

Different Holding Periods

- In reality, different investors will have different holding periods
- Example: While you expect to hold the previous stock for 1 year, another investor may hold it for 2 years, collecting 2 dividends and selling the stock at the end of year 2
- The two of you will have different cash flow streams

Different Holding Periods continued…

- 1-year holding period: $\hat{P}_0^{\,1} = \frac{D_1}{(1+R)^1} + \frac{\hat{P}_1}{(1+R)^1}$
- 2-year holding period $\hat{P}_0^{\,2} = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \frac{\hat{P}_2}{(1+R)^2}$
- 3-year holding period $\hat{P}_0^{\,3} = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \frac{D_3}{(1+R)^3} + \frac{\hat{P}_3}{(1+R)^3}$
- Which value is correct?

A General Case

- For investor with holding period H:

$$\hat{P}_0^{\,H} = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \frac{D_3}{(1+R)^3} + \ldots + \frac{D_H}{(1+R)^H} + \frac{\hat{P}_H}{(1+R)^H}$$

- What happens to the PV of the terminal price (P_H) as H tends to infinity?

- The Dividend Discount Model (DDM): The price is the present value of all future dividends

$$\hat{P}_0 = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \frac{D_3}{(1+R)^3} + \ldots + \frac{D_\infty}{(1+R)^\infty}$$

$$\hat{P}_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+R)^t}$$

Special Cases

- The dividend discount model should hold in all cases
- For illustration, we will consider some very simple special cases
  - Expected future dividends are constant (i.e., zero-growth)
  - Expected future dividends grow at a constant rate (i.e., constant growth)
- Note: Special cases considered are admittedly unrealistic, but useful for pedagogical purposes

DDM with Zero-Growth

- Dividends are constant
- Earnings (EPS) are constant as well
  - There is no need to reinvest money in the firm
  - Pay out all earnings to investors (i.e., D = EPS)
- Stock becomes a perpetuity

$$\hat{P}_0 = \frac{D_1}{R} = \frac{EPS}{R}$$

- Example: Consider a firm that earns $25 per share, pays out everything to investors, and the required rate of return (i.e., discount rate) is 8%

DDM with Zero-Growth

- Example: Consider a firm that earns $25 per share, pays out everything to investors, and the required rate of return (i.e., discount rate) is 8%

$$\hat{P}_0 = \frac{D_1}{R} = \frac{EPS}{R} = \frac{\$25}{0.08} = \$312.50$$

Preferred Stock = Zero-Growth

- Hybrid: A little like bonds and a little like common stock
- Preferred dividend typically a fixed payment
  - Remember Cox Oil Company, Inc.'s preferred dividend of $5.83?!?
- So, preferred stock is a perpetuity

$$\hat{P}_0 = \frac{D_{pf}}{R_{pf}}$$

- But some preferred stocks have finite lives, with many of these types having a 50 year maturity
- No problem! Find the PV of a 50 year annuity!!

DDM with Constant Growth

- Suppose dividends grow at a constant rate (g)

$$\hat{P}_0 = \frac{D_1}{(1+R)^1} + \frac{D_1(1+g)^1}{(1+R)^2} + \frac{D_1(1+g)^2}{(1+R)^3} + \frac{D_1(1+g)^3}{(1+R)^4} + \ldots$$

- The above is a power series with

$$a = \frac{D_1}{(1+R)}$$

- and

$$x = \frac{(1+g)}{(1+R)}$$

Constant Growth (Gordon) Model

- The previous expression simplifies to:

$$\hat{P}_0 = \frac{D_0(1+g)}{(R-g)^1} = \frac{D_1}{(R-g)}$$

- Example: Suppose next year's dividend is \$3, the growth rate is 8%, and the required rate of return is 12%:

$$\hat{P}_0 = \frac{D_0(1+g)}{(R-g)^1} = \frac{D_1}{(R-g)} = \frac{\$3}{(0.12-0.08)} = \$75$$

The Growth Rate

- Basic idea: Firm retains some of its earnings and reinvests to ultimately generate higher future earnings

- Plowback ratio (pbr)
  - pbr = % of earnings that is reinvested
  - Or
  - pbr = 1-dividend ratio

  - Earnings growth = ROE x pbr
  - If dividends are a constant fraction of earnings, then the growth rate for dividends is the same as the growth rate for earnings

The Value of Growth Opportunities

- Break stock price into two components
  - (1) Value of a zero-growth stock: Firm is a perpetuity
    - $P_{zero\text{-}growth} = EPS/R$
  - (2) Growth opportunities:
    - $P - P_{zero\text{-}growth}$
- Note: Growth opportunities should also be reflected in the PE ratio

Expected Rate of Return on a Constant Growth Stock

- We can algebraically rearrange the constant growth equation as such:

$$\hat{P}_0 = \frac{D_1}{(R - g)}$$

- Becomes:

$$\hat{R} = \frac{D_1}{P_0} + g$$

- Which is the expected dividend yield plus growth

Expected Rate of Return on a Constant Growth Stock

- Expected Rate of Return is made up of two components
  - (1) D_1/P_0: Expected dividend yield
  - (2) g: Expected growth rate or expected capital gains yield

- Therefore, for a constant growth stock both of the following conditions must hold…
  - (1) The expected dividend yield is a constant
  - (2) Dividends are expected to grow at the constant rate, g ***forever***!

Temporary Supernormal Growth

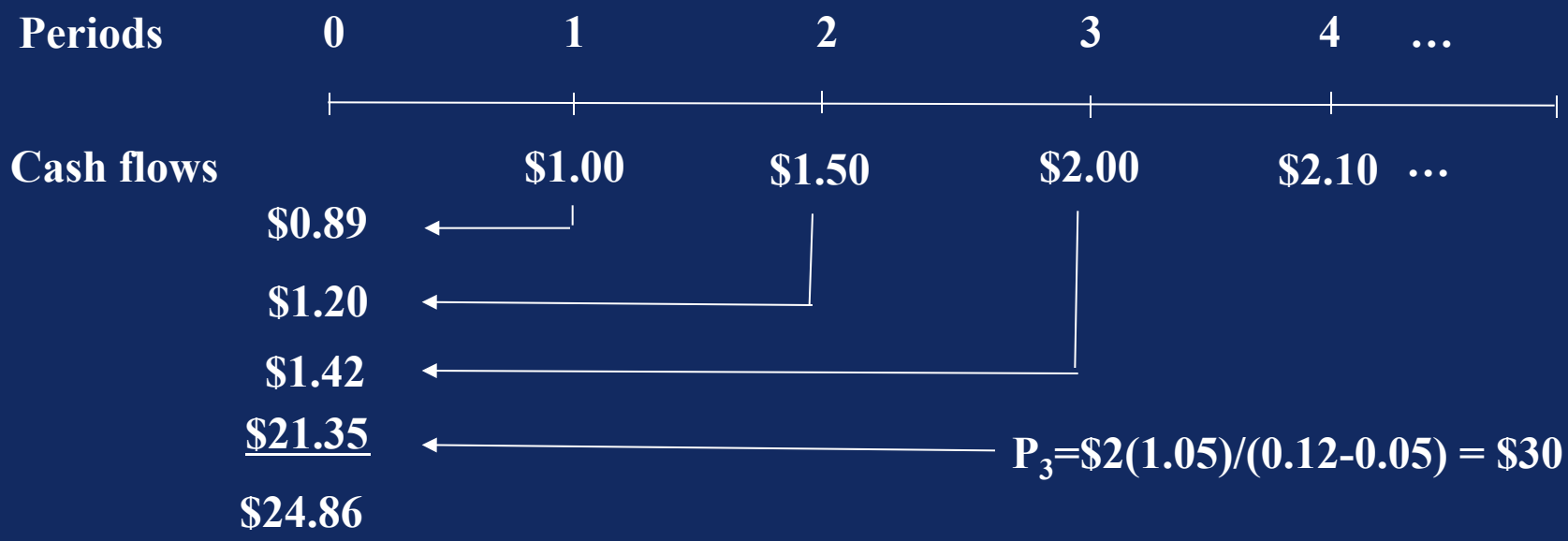
- If dividends grow at a supernormal rate for the first T years
  - (1) Find the PV of each dividend during the supernormal period
  - (2) Find the expected price of the stock at the end of the supernormal growth period by using the Gordon Growth model (i.e., also called DDM) and discount this price back to time 0
  - (3) Sum these two components
- Note: Two options for finding the price at time T
  - Option 1: Use a zero-growth or constant dividend growth formula
  - Option 2: Use a market multiple like a PE ratio

Temporary Supernormal Growth: Example

- Earnings are expected to be $2, $3, and $4 over the next 3 years
- Dividends are expected to be $1, $1.50, and $2 over the next 3 years
- Required rate of return is 12%
- Option 1: After 3 years, growth rate is expected to be constant at 5%
- Option 2: Expected PE ratio is 10

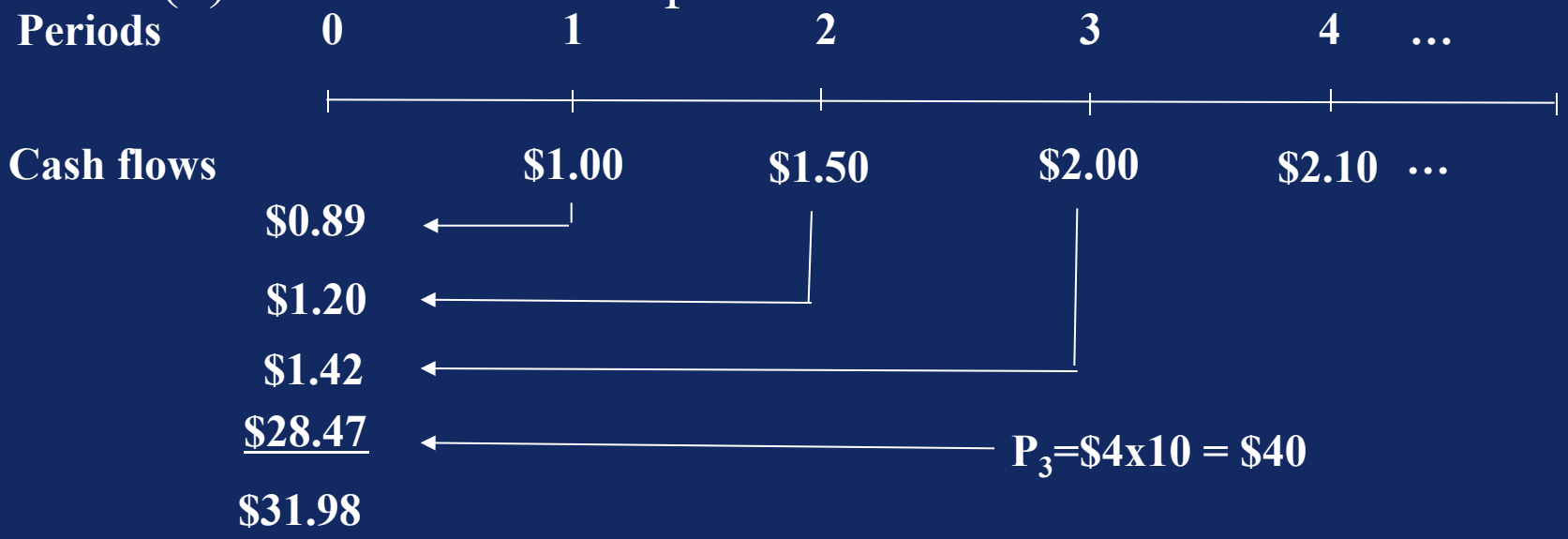
Temporary Supernormal Growth: Example

- **Option 1**
- (1) Find PV of dividends during supernormal growth period
- (2) Find expected stock price at end of supernormal growth period
- (3) Sum the two components



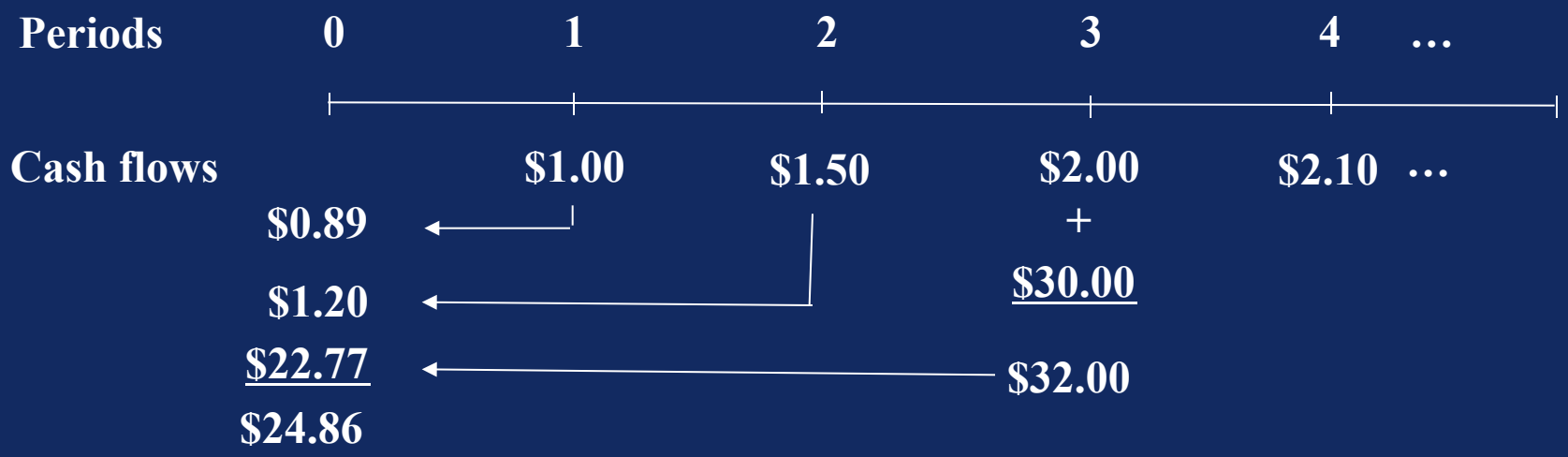
Temporary Supernormal Growth: Example

- **Option 2**
- (1) Find PV of dividends during supernormal growth period
- (2) Find PV of expected stock price at end of supernormal growth period
- (3) Sum the two components



Temporary Supernormal Growth: Example

- **Option 1**
- Alternatively, we can sum D_3 and P_3 together and discount this sum
- It saves us one time value step



What if a Firm Doesn't Currently Pay a Dividend?

- Question: How do we value the common stock?
- Answer: Estimate when the firm will begin paying dividends, the amount of these dividends, and when any supernormal growth period would end, and use the same procedure as before (i.e., find the PV of future CFs)

What if a Firm Doesn't Plan to *Ever* Pay a Dividend?

- Question: How do we value the common stock?
- Another Question: If a firm never plans to provide any cash flows to common stockholders, is there any value to the common stockholder?
- ***Discuss!***

What if a Firm Doesn't Plan to *Ever* Pay a Dividend?

- Question: How do we value the common stock?
- Alternatives to using dividends per share are using EPS or CF per share
- A third alternative is using the P/E Multiple approach

Valuing the Entire Corporation

- Some applications require us to value an entire firm instead of a share of stock (think mergers)
- Concepts are the same
  - Do the same analysis using total dividends instead of dividends per share
  - You could also value one share and multiply by the number of shares outstanding

Valuing Stocks in Reality

- All examples given here are very simple
  - Goal is not to provide a sure-fire way to value any stock
  - Rather, it is to provide intuition for how stocks should be valued

- Two reasons stocks are difficult to value
  - (1) In practice, it is very difficult to estimate all future cash flows
  - (2) It is also hard to determine an appropriate discount rate

Market Prices are Observable!

- If we take market prices as given, we can use expected future cash flows to solve for the discount rate
  - We can call this the expected rate of return since it's based on expected cash flows
  - We can call this the required rate of return since it's determined by investors

- Important note: Solving for r this way is different from determining what return investors ***should*** require!

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Thank You!

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