
Portfolio Management

Session 6

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Basic Valuation Models

Core Concepts

1. Apply dividend discount models (DDM) to equity valuation.
2. Apply relative valuation models to equity valuation (P/E, P/BV & P/CF)
3. Explain the components of an investor's required rate of return and the process for determining the inputs in the DDM including the required rate of return and expected dividend growth rate.

Estimating the Intrinsic Value

Most investment valuation involves:

Estimating the amount and timing of the cash flows

Interest, dividends, and capital gains

Estimating the growth rate of returns

common stock / Real estate
(Can grow over time)

Preferred Stock / Bonds
(fixed)

Applying an appropriate discount rate to the cash flows to estimate the investment's intrinsic value

The required return for the risk assumed Amount & timing of cash flow

Comparing the intrinsic value to the market price

If estimated intrinsic value > market price, then **BUY!**

Preferred Stock

Common Stock

Constant (Gordon) Growth DDM • $g \leq g_{\text{economy}}$

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$$CAPM = RF + \beta(MR - RF)$$

$$r > g$$

$$\text{Payout rate} = \frac{DIV_0}{EPS_0}$$

$$1 - \text{Payout} = \text{Retention}$$

Robert Tolson is valuing a preferred stock issued by XYZ Corporation. The preferred stock has a rating of “AA” and pays an annual 8% dividend on a \$25 par value. Robert estimates that the required return on a share of XYZ’s common stock is 14%. The 1-year Treasury bill is currently yielding 3%. Also, Robert has the following market information on otherwise equivalent preferred stock issuances:

Company	Rating	Yield
Pacific and Northern Inc.	AA	7.0%
Great Widgets Inc.	AA+	6.2%
Spacely Rockets Corp.	AA	6.5%
Amalgamated Combined Inc.	AAA	6.7%

Based on this information, Robert’s best estimate of the value of one share of the XYZ preferred stock to be:

- a. \$14.29
- b. \$30.77
- c. \$66.67
- d. \$25.00

Choice “b” is correct. Absent any other information such as information that call options or convertibility options are embedded in the preferred stock), this preferred stock can be valued as a perpetuity. A perpetuity is an instrument that pays a constant, regularly scheduled payment that continues forever. In this case, the regular payment is the annual dividend payment. The applicable formula for the value of a perpetuity is:

Where: DIV_1 is the annual dividend payment, and r_p is the required return on the preferred stock. The annual dividend payment is equal to the dividend rate multiplied by the par value, or:

$$DIV_1 = .08 \times \$25 = \$2.0$$

In this problem, the correct required return to use is the market yield on the most similar preferred stock, which in this case is the “AA” Spacely Rockets Corp. preferred stock with a yield in the market of 6.5%

Plugging in the values, the price is calculated as:

$$P = \frac{DIV_1}{r_p} = \frac{\$2}{0.065} = \$30.77$$

Marie Aparecida is valuing the stock of a mature company, XYZ corp. Maria has the following estimates and market information about XYZ corp:

Estimated Earnings per share at $t=1$	\$1.65
Estimated Dividend per share at $t=1$	\$0.95
Current Market Price per share	\$13.40
Required Return	12%
Estimated Dividend Growth rate	3.0%
Current risk free rate	3.5%

Using the Gordon constant growth dividend discount model, what value does Marie place on a share of XYZ stock.

- a. \$7.92
- b. \$13.40
- c. \$18.33
- d. \$10.55

Choice “d” is the correct. The constant growth model uses the simplifying assumption that dividends grow at a constant rate forever. The formula for the constant growth model is a compact way of calculating the present value today of all these future dividend payments that extend out of infinity. The formula is:

$$P_{CS} = \frac{DIV_1}{R_{CS} - G_{DIV}}$$

Where DIV_1 is the dividend the company is expected to pay in one year (t=1)
 R_{CE} is the required return on common equity
 g_{DIV} is the estimated sustainable dividend growth rate

$$P_{CS} = \frac{DIV_1}{R_{CS} - G_{DIV}} = \frac{\$0.95}{.12 - .03} = \$10.55$$

Choice “a” is incorrect. This result ignores the dividend growth rate and simply divides the expected dividend by the required return.

Choice “b” is incorrect. This is the market price of the stock. Note that Marie is using the constant growth model to make her own estimation of the value of the stock. Using the constant growth model, Marie has estimated the stock to be worth \$10.55 per share ; however, it is selling in the market at \$13.40. in this case, XYZ stock is “overvalued” in the market and Marie would not buy the security.

Choice “c’ is incorrect. This is the result if the expected earnings per share are used in the numerator. The expected dividend per share should be used because the dividends reflect the actual cash flows made to the shareholder.

Jane Wakeman is using the constant Growth Dividend Discount Model to value a share common stock issued by National Amalgamated Corp. She has made the following estimates regarding the stock and market rates;

Estimated Dividend Growth Rate:	3%
Expected Return on the Market	9%
Risk-free Rate	4%
Expected Dividend at $t=1$	\$1.75
Beta	1.2

If Jane changes the risk-free rate in her valuation calculations from 4% to 5% and the market risk premium expected to remain constant, then Jane's estimate of the value of National Amalgamated Corp. **will most likely**:

- a. Decrease by \$3.13
- b. Increase by \$0.74
- c. Decrease by \$0.75
- d. Stay the same

Choice “a” is correct. The first step is to find the value of the stock when the risk-free rate is 4%. Give the information provided, use the Security Market Line (SML) of the Capital Asset Pricing Model (CAPM) to determine the stock’s required of return. The basic equation for finding a stock’s required return, $E(R_i)$, using the SML is:

$$r_{CE} = R_F + \beta(R_M - R_F)$$

Where R_F is the risk-free rate

β_i is the stock’s beta

R_M is the expected return on the market

Plugging in the numbers to the SML equation, one gets:

$$\begin{aligned} r_{CE} &= R_F + \beta(R_M - R_F) \\ &= .04 + 1.2(.09 - .04) = 10\% \end{aligned}$$

Next, use the estimated required return of 10% (along with the other inputs) in the Gordon Growth Model to arrive to the value

$$P_{CS} = \frac{\$1.75}{.10 - .03} = \$25.00$$

The next step is to find the value of a share of National Amalgamated Corp. if the risk free rate shifts to 5%. However, the fact pattern in the problem indicates that the market risk premium remains constant. Therefore, **the return on the market must increase to 10% to keep $R_M - R_F$ constant at 5%.** Using a risk free rate of 5%, the required rate of return is now:

$$\begin{aligned} r_{CE} &= R_F + \beta(R_M - R_F) \\ &= .05 + 1.2(.10 - .05) = 11\% \end{aligned}$$

Next, use the revised estimated required return of 11% (along with the other inputs) in the Gordon Growth Model to arrive at a value of:

$$P_{CS} = \frac{\$1.75}{0.11 - .03} = \$21.875$$

Comparing the value of the stock when the risk-free rate is 4% (\$25.00) to the value when the risk-free rate is 5% (\$21.875), it is seen that the value has decreased by \$3.13.

Supernormal Growth

Two-Stage dividend Discount Model

Compute the dividends based on the growth rate during the supernormal growth period – ‘finite period’

Periods of
supernormal growth

$$\begin{cases} \text{DIV}_1 = \text{DIV}_0 (1+g_{\text{HIGH}}) \\ \text{DIV}_2 = \text{DIV}_1 (1+g_{\text{HIGH}}) \end{cases}$$

Compute the terminal value of the stock - GGM can be applied once constant growth has been reached

$$P_3 = \frac{\text{DIV}_4}{r_{CE} - g_{\text{LOW}}} = \text{DIV}_3(1+g_{\text{normal}})$$

= Normal/Sustainable/Infinite

Discount the cash flows to determine the current stock value

$$P_{CS} = \frac{DIV_1}{(1 + r_{CE})} + \frac{DIV_2}{(1 + r_{CE})^2} + \frac{DIV_3 + P_3}{(1 + r_{CE})^3}$$

Jason Cicatello is analysing the stock XYZ International. Jason estimates that XUZ International will experience a period of supernormal growth of 20% for the next two years. Thereafter, the growth rate will be the long-run growth rate. Jason has the following estimates and market information about XYZ International.

Current market price per share	\$16.75
Dividend per share at $t=0$	\$1.10
Historical 1-year return on equity (ROE)	15%
Estimated cost of equity capital	14%
Estimated supernormal dividend growth rate	20%
Current risk-free rate	4.0%
Estimated long-run dividend growth rate	3.5%

Using these estimates and the two stage dividend discount model. What is the value of a share of YZ international?

- a. \$14.40
- b. \$12.92
- c. \$13.13
- d. \$11.65

Step 1:

GGM can be applied after two years

Dividend per share at t=0 – **current dividend**

$$1.10 \times 1.20 = 1.32 \text{ DIV}_1$$

$$1.32 \times 1.20 = 1.584 \text{ DIV}_2$$

Estimated long-run dividend growth rate 3.5%

$$1.584 \times 1.035 = 1.64 \text{ DIV}_3$$

Step 2:

$$P_{CS2} = \frac{DIV_3}{r - g} \quad P_{CS2} = \frac{1.64}{14\% - 3.5\%} = \$15.62 \text{ Terminal Value}$$

Step 3:

$$\$1.32 \quad CF_1$$

$$\$1.584 + \$15.62 = \$17.20 \quad CF_2$$

Estimated cost of equity capital 14%

$$NPV = \$14.39$$

Relative Valuation Approaches

If the multiple is less than the mean for the peer group, stock appears relatively undervalued

Earnings Multiplier Approach

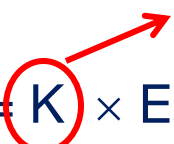
Based on the principle that dividends are paid out of earnings

$$\downarrow \frac{P_0}{E_1} \uparrow = \frac{\text{Net Income-Preferred Dividends}}{\# \text{ Common Shares Outstanding}} \uparrow \downarrow$$

Lower side of the peer group the stock is relatively undervalued

$$\text{DIV}_t = K \times E_t$$

Payout rate



$$P_{CS} = \frac{DIV_1}{r_{CE} - g_{DIV}} = \frac{K \circ E_1}{r_{CE} - g_E}$$

$$P / E_1 = \frac{K}{r_{CE} - g_E} = \text{justifiable / appropriate } P/E_1 \text{ multiple}$$

$P/E_1 \times EPS_1 = \text{intrinsic value}$

Limitations:

- Accounting Methods / non-recurring items
- Management Bias / Estimates
- Earnings tend to be Volatile / Negative

Other Multiples

Price-to-Cash Flow Harder for management to manipulate than earnings

$$\downarrow P / CF_i = \frac{P_t}{CF_{t+1}} \uparrow \text{Projected CF per Common Share}$$

Lower side of the peer group the stock is relatively undervalued

Price-to-Book Better for companies with liquid assets that reflect current values (e.g. Banks) – Less volatile & Can't be negative

$$\downarrow P / BV_i = \frac{P_t}{BV_{t+1}} = \frac{\text{Assets-Liabilities-Preferred Stock}}{\# \text{CSO}} \uparrow \text{Projected}$$

Price-to-Sales Sales are more stable than earnings and can be used to value early-stage companies not yet earning profits

$$\downarrow P / S_i = \frac{P_t}{\uparrow S_{t+1}} = \frac{\uparrow Sales_1}{\downarrow \# CSO_1}$$

Sales:

- Can't be negative
- Less management bias – general rule (everybody is using accrual basis)

Tony Fong is estimating the appropriate P/E ratio for Slate Quarry Inc, a mature, open-pit mining company. Tony has made the following estimates about Slate Quarry Inc:

Required return	14%
Past 1-year return on equity	16%
Dividend growth rate	3%
Earnings retention rate	30%
Current stock price / share	\$8.00

Based on this data and an applying the constant growth dividend discount model, an appropriate P/E ratio for the Slate Quarry is:

- a. 2.7
- b. 5.4
- c. 6.4
- d. 2.3

Choice “c” is the correct. The key to converting the constant growth model (CGM) to a P/E model is to recognize that the dividend at $t=1$ (DIV_1) will equal the dividend payout ratio K times the $t=1$ earnings. In general:

$$DIV_t = K \times E_t$$

Thus, assuming the dividend payout ratio is constant over time, $K \times E_1$ can be substituted for DIV_1 . The CGM is now rewritten as:

$$P_{CS} = \frac{DIV_1}{r_{CE} - g_E} = \frac{K \times E_1}{r_{CE} - g_E}$$

Next, to turn the formula into a P/E ratio, divide both sides by E_1

$$P / E_1 = \frac{K}{r_{CE} - g_E}$$

Note that this problem provides the retention ratio $(1-k)$ and not the payout ratio. The payout ratio is 70% $(1-30\%)$.

The formula can now be used for Slate Quarry:

$$P / E_1 = \frac{70\%}{0.14 - 0.03} = 6.4\%$$

Tony could then multiply this P/E estimate by his year 1 estimated earnings to arrive at a stock price today. This value will be the same number as if Tony simply computed the stock's value using the basic CGM and substituting his estimate of KE_1 for DIV_1 .

Choice “a” is incorrect. This answer incorrectly uses the retention rate in the numerator (instead of the dividend payout ratio).

Choice “b” is incorrect. This answer incorrectly uses the past 1-year ROE in the denominator (instead of the required return). The past ROE does not indicate the return investors will require on the stock going forward.

Choice “d” is incorrect. This answer incorrectly uses both the past 1-year ROE in the denominator (instead of the required return) and the retention rate in the numerator (instead of the dividend payout ratio).

Estimating the inputs to Valuation Models


Memorizing the models is easy, correctly estimating the inputs is more challenging.

- The discount rate is the nominal risk-free rate plus a risk premium

$$r_{CE} = (1 + R_F)(1 + r_{ERP}) - 1$$

Equity Risk Premium-Compensate for market risk and business risk, financial liquidity, country, currency, etc

- The growth rate is a function of ROE and earnings retention

$$g_E = ROE(1 - K) \quad \text{Payout rate} \quad \left(\frac{DIV_0}{EPS_0} \right)$$


Profit Margin + Asset Turnover + Financial Leverage (Dupont Model)

Janet Schoettinger is estimating the required return to use in valuing the stock of Flintrock Industries. Janet has the following estimates about the stock and the interest rates:

Flintrock's stock beta	0.8
Real risk-free rate	2%
Expected inflation rate	3%
Flintrock's equity risk premium	6%

Based on this information and using a build-up approach, the exact discount rate Janet should use for Flintrock Industries is:

- a. 9.18%
- b. 11.36%
- c. 9.86%
- d. 8.12%

Choice “b” is the correct. The stock’s required return will be based on the three components:

- Real risk-free rate
- Expected inflation rate
- Equity risk premium

In finding the required return for the stock, one can think of “building up’ from the base real risk-free rate. In this building up process, the real risk-free rate and the expected inflation rate are first combined to get the nominal risk-free rate. This is done as follows:

$$r_F = (1 + rr_F)[1 + E(INFL)] - 1$$

$$(1.02)(1.03) - 1$$

$$0.0506 = 5.06\%$$

Where r_F is the nominal interest rate, rr_F is the real risk-free rate $E(INFL)$ is the expected inflation rate.

Next, the nominal risk free rate and the equity risk premium (r_{ERP}) are then combined to arrive at r_{CE} , the required return (or, cost of common equity) for Flintrock stock:

$$\begin{aligned} r_{CE} &= (1 + r_F)(1 + r_{ERP}) - 1 \\ &= (1.0506)(1.06) - 1 \\ &= 0.1136 = 11.36\% \end{aligned}$$

Note that the approximate answer would simply be the sum of the three numbers:

$$\begin{aligned} r_{CE \text{ Approximate}} &= r_F + E(INFL) + r_{ERP} \\ &= .02 + .03 + .06 \\ &= .11 = 11\% \end{aligned}$$

Market and Industry Analysis

Core Concepts

- A. Explain the process of valuing a stock market using fundamental analysis
- B. Identify the investment opportunities associated with the business cycle stages.
- C. Discuss the impact of the industry life cycle, competitive structure and risk considerations on global industry analysis
- D. Explain the relationship between company analysis and stock selection.

Top/Down Approach

Summarize

1. Analyze macroeconomic data to identify favorable countries
2. Identify favorable markets and industry growth prospects
3. Select individual companies for investment

Analysing the Stock Market

Based on a broad market index like the S&P 500

The goal is to **forecast** the earnings for the index:

- Relate sales to a macroeconomic variable like GDP (IV)

$$\% \Delta \text{ Sales Index} = \alpha + \beta_1 (\% \Delta \text{ GDP})$$

- Regression analysis

$$\text{Sales}_0 \times (1 + \% \Delta \text{ Sales}) = \text{Sales}_1$$

Estimate **profitability** by relating margin (EBITDA) to macroeconomic profitability margins

- Capacity utilization, unit labor costs

Forecast the index's earnings based on the sales forecast, the margin forecast, and estimation of depreciation and interest expenses:

$$[\text{Sales}_1 \times \text{EBITDA margin}] - \text{Depr.} - \text{Interest} \times (1 - \text{tax rate})$$

Projected net Income

Divided by nr shares outstanding to have EPS

Finally, estimate a growth rate based on ROE and payouts ratios for the index:

$$g = \text{ROE}_{\text{INDEX}} (1 - K)$$

$$\text{Value Index} = \frac{\text{EPS}_1 \times \text{Payout}}{r - g}$$

Jae Kim, an equity strategist, is estimating the next year's average sales per share for a major stock market index. He has the following estimates including the results of index regression analysis (based on 20 years of annual data).

$$\% \Delta \text{ Sales Index} = \alpha + \beta_1 (\% \Delta \text{ GDP}_N)$$

$$\alpha = 3.2 \text{ and } \beta_1 = 1.25$$

Where GDP_N is the nominal gross domestic product

Average Index ROE (last five years)	13.5%
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Nominal 1-year GDP growth (estimate)	3%
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Average GDP growth (last five years)	2%
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Index current average sales per share	\$400
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Average Index Retention Rate	55%
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Based on Jae's regression analysis, what is the 1-year estimated average sales per share for the index?

a. \$422.60, b. \$427.80, c. \$429.70 or d. \$415.00

Choice “b” is correct. Jae’s approach first uses regression analysis and the historical data to estimate the relationship between GDP growth and sales growth for the index. Historically, the relationship between the percentage change in average sales brought about by the percentage change in GDP is:

$$\% \Delta \text{ Sales Index} = 3.2 + 1.25 (\% \Delta \text{ GDP}_N)$$

Note that the regression estimate should be based on data that cover between one and five complete business cycles.

Plugging in the estimate for nominal GDP growth (3%), the estimated percentage change in average sales is:

$$\% \Delta \text{ Sales Index} = 3.2 + 1.25 (3) = 6.95\%$$

With an expected growth rate in sales of 6.95%, the average sales for next year is estimated to be:

Estimated average sales next year = (current average sales) \times (1+ estimated growth rate)

$$\$400 \times (1 + 0.0695) = \$427.80$$

Choice “a’ is incorrect. This answer is found by using the average GDP growth rate over the last five years (instead of the estimate for next year’s GDP growth)

Choice “c” is incorrect. The provided answer is found by using the estimated growth earnings: $g = \text{retention rate} \times \text{ROE}$. This growth rate is not applicable to sales.

Choice ‘d” is incorrect. This answer omits the intercept in the regression equation.

Keith Miller, an equity market strategist, is attempting to estimate the expected P/E ratio of the Russel 2000. Keith's approach is to use the Gordon Growth model and the Capital Asset Pricing Model to estimate the earnings multiplier. Keith has made the following estimates.

Russel 2000: Projected average effective rate	20%
Long term treasury bond yield	10%
Russel 2000: Projected average ROE	15%
Russel 2000: expected Index market risk premium	5%
Russel 2000: Projected pretax earnings per share	\$100

Based on this information, the expected P/E ratio for Russel 2000 is *closest* to,

- a. 4.4
- b. 4.0
- c. 10.0
- d. 6.7

Choice 'd' is correct. For this problem, the constant growth dividend discount model is:

$$V_{R2000} = \frac{DIV_{R2000}}{r_{CE_{R2000}} - g}$$

The dividend at any period will be equal to:

$$DIV_t = K_t \times E_t$$

Given this, and assuming that the dividend payout ratio is constant over time $K \times E_{R2000}$ can be substituted for DIV_{R2000} and then the CGM model is rewritten as:

$$V_{R2000} = \frac{DIV_{R2000}}{r_{CE_{R2000}} - g} = \frac{K \times E_{R2000}}{r_{CE_{R2000}} - g}$$

To turn the formula into a P/E ratio, divide both sides by E_{R2000} :

$$V_{R2000} / E_{R2000} = P/E_{R2000} = \frac{K}{r_{CE_{R2000}} - g}$$

Next, to use the formula, the various inputs need to be calculated:
The average dividend payout ratio is 1 minus the average retention rate:

$$1 - 0.4 = 0.6$$

The required return on the Russel 2000 is computed using CAPM and recognizing that the beta estimate of the Russel 2000 is 1: Thus:

$$r_{CE_{R2000}} = r_f + \text{Beta}_{R2000} (\text{Market Premium}_{R2000}) = .10 + 1(.05) = 15\%$$

The estimated dividend growth rate will equal:

$$g_{R2000} = \text{ROE}_{R2000} \times \text{Retention Ratio}_{R2000} = .15 \times .4 = 6\%$$

Plugging in these numbers the estimated P/E ratio is:

$$P/E_{R2000} = \frac{K}{r_{CE_{R2000}} - g} = \frac{.6}{.15 - .06} = 6.7$$

Industry Life Cycle

Stage 1: Low Volume / No profits (Pioneering Development) – Price to sales

Stage 2: High Profits (Rapid Accelerating Growth)

Stage 3: More Competition (Mature Growth) – Profit Margin goes down

Stage 4: Small Margins (Stabilization an Market Maturity) - “Longest”
Gordon Growth Model Applies – $\text{growth} \leq \text{GDP}$

Stage 5: Consolidation (Deceleration of Growth and Decline)

- Economies of Scale – Large firms survive
- Small Firms – Liquidation Value – Small firms will worth more dead than alive (Price to book value)

Stages 2, 3 and 4 – 3 stage DDM

Competitive Structure

As number of competitors goes up, rivalry intensify goes up and profit margins goes down

N-Firm Concentration ratio

The sum of the n largest firms' percentage market shares

As ratio \uparrow rivalry \downarrow EBITDA margins \uparrow

Herfindhal Index (H) – The sum of the squares of the market shares of the firms that constitute the industry

$$H = \sum_{i=1}^n (M_i)^2$$

H \uparrow = more concentrated the industry, rivalry \downarrow PM \uparrow

Reciprocal of the index gives the equivalent number of firms within the industry if each had an equal share

$$\frac{1}{H} = \text{Equivalent \# of firms} \downarrow$$

Rivalry \downarrow PM \uparrow

Risk Considerations - Porter's 5 Forces

Threat of new entrants - Barriers to entry

- Pure competition – none
- Monopoly Competition – low
- Oligopoly / Monopoly - high

High profits attract new competitors

• Rivalry among firms within the industry

- Price wars – low concentration

• Availability of substitutes

- Price elasticity

$$\frac{\% \Delta Q_D}{\% \Delta P} = e \quad e > 1 \text{ elastic}$$

• Bargaining power to customers

- Pushes down prices – Thus, profit margins goes down

• Bargaining power of suppliers

- Pushes up costs - Thus, profit margins goes down

Affect Firm's Competitive structure

Company Analysis and Stock Selection

Is it already
priced in the
stock?

Good companies do not necessarily make
good stocks

i.e. undervalued

Sales ↑

Growth companies vs. Growth Stock

Stock Price ↑

Stable Earnings

Defensive company vs. Defensive stock

Stable Price
Low Beta

Earnings
correlated with
Business Cycle

Cyclical company vs. cyclical stock

Volatile Price
High Beta

What is the stock's *intrinsic value*?

- Forecast Sales $\text{Sales}_1 = \text{Sales}_0 \times (1 + \% \Delta \text{Sales})$
 $\% \Delta \text{Sales} = \alpha + \beta_1(X)$
- Forecast Profit Margin - **Competitive Structure**
- Forecast Earnings (EPS) $_1$ $\text{Sales}_1 \times [\text{EBITDA margin}] - \text{Depr.} - \text{Interest} \times (1 - \text{tax rate})$
- Estimate Multiplier $(P/E_1) \frac{K}{r - g}$
- Value the Stock

$$V = \text{EPS}_1 + P/E_1$$

If $V > P_{\text{market}} = \text{BUY}$
Plots “above” SML - **undervalued**

Bob Michaels, an equity analyst, has information on four different industries

Industry Average of:	Industry 1	Industry 2	Industry 3	Industry 4
R&D Expenses as a percentage of sales	1%	4%	1.5%	2%
Percentage of Industry market share held	8%	70%	65%	38%
Fixed expenses/Variable Expenses	5:1	4:1	2:1	1:1
Average Sales Growth over last four years	3%	12%	11%	8%

Based on this information and Porter's Five Forces, which industry should have *lowest* average EBITDA margin?

- a. One
- b. Two
- c. Three
- d. Four

Choice “a” is correct

Step 1: Thus - most competition / intense rivalry

R&D Expenses as a percentage of sales

Industry 1

R&D ↓ barriers to enter ↓ Competition ↑ lower margins

% ↓ competition ↓ lower margins

Fixed costs ↑ barriers to exit ↑ rivalry ↑ competition ↑ lower margins

Growth rate ↓ rivalry ↑ competition ↑ lower margins

Regina Flemming, a portfolio manager, is analyzing the stock of a large consumer durables manufacturer, XYZ Inc. Regina has summarized XYZ's business as follows:

XYZ manufactures a limited range of luxury consumer-durable goods. The company enjoys an excellent reputation for innovation and customer service. Historically, sales have been strongly correlated with fluctuations in the economy, as sales decline in economic downturns and increase in economic upturns. The firm's operations and finances continue to be among the strongest in the industry with minimal debt, high liquidity, low operating leverage, and a stock beta of 0.85. The long-run prospects for this company is very strong.

Based on this information, which of the following is true about XYZ company and XYZ stock?

- a. Cyclical; Cyclical
- b. Non-Cyclical; Cyclical
- c. Cyclical, Non-Cyclical
- d. Non-Cyclical; Non-Cyclical

Choice “c” is the correct. The key point is that the analyst needs to distinguish between the company and the stock. A cyclical company’s sales and earnings will rise and fall with the business cycle. As described, XYZ is clearly a cyclical company. Note that the extent of the cyclical nature of the company’s earnings will be affected by the extent of the company’s fixed costs (operating leverage) and the extent of its debt expenses (financial leverage).

As described, XYZ’s stock is not cyclical. A cyclical stock is one with changes in returns that are greater than the market’s changes in return. For instance, if the market is up 10%, a cyclical stock will be up more than 10%. Or, for example, if the market is down 12%, a cyclical stock will be down more than 12%. Given, that XYZ has a beta of 0.85 (less than one), XYZ is not considered a cyclical stock.

In summary, XYZ is a cyclical company but not a cyclical stock.

Alternative Investments

Core Concepts

A. Describe the characteristics of the following alternative investments

- Investment companies (include mutual funds)
- Exchange traded funds
- Real estate
- Venture capital
- Hedge funds (hot topic)
- Closely held companies (private companies)
- Distressed securities
- Commodities

Investment Companies

- **Open-end funds** issue and redeem shares whenever investors choose to invest/divest.
- **Closed-end funds** only issue shares once, which are then traded among investors in the secondary market.
- **Valuing mutual funds**

$$\text{NAV} = \frac{\text{Fund Assets @ Market} - \text{Fund Liabilities @ Book Value}}{\text{No. of Fund Shares Outstanding}}$$

↑
Net Asset Value

→ Only price once or twice per day

- **Open-end funds** are priced at their NAV per share.
- **Closed-end funds** can trade at a premium or discount to their NAV

Investment Companies Fees

- **Loads:** a percentage of the amount invested in the fund charged as commission
 - **Front-end loads** are charged at the time the investment is made.
 - **Back-end loads** are charged at the time the shares are redeemed.
- **Annual fees cover:**
 - Fund management operating expenses, administration and distribution (12b-1)

$$\text{Dollar Return} = \left[\text{Initial Investment} (1 - \text{front load}) (1 + \text{fund return}) (1 - \text{expense ratio})^n \right]^n (1 - \text{back load})$$

Jim Noel is considering an investment in a mutual fund that offers three different classes of shares. The expenses structures of each class are as follows:

Class A Front-end load 5%
Class B Back-end load starting at 5% declining by 1% per year.
Class C 1.0% annual distribution fee.

If Jim expects a 12% annual rate of return, which class of shares should he choose for a 1-year and 3-year time horizon, respectively?

	1-year Time Horizon	3-year Time Horizon
a.	Class B	Class A
b.	Class B	Class C
c.	Class C	Class B
d.	Class C	Class C

Choice “c” is correct. Calculations summary on a hypothetical \$1,000 investment for the different time horizons. Class C provides the highest return for the 1-year horizon while Class B provides the highest return for the 3-year time horizon. The lower the fees the better an investor does.

1-year horizon

Class A: $(\$1,000 - \$50) \times (1.12) = \$1,064$

Class B: $\$1,000 \times (1.12) \times (1 - 0.04) = \$1,075$

Class C: $\$1,000 \times (1.12) \times (1 - 0.01) = \$1,109$

3-year horizon

Class A: $(\$1,000 - \$50) \times (1.12)^3 = \$1,335$

Class B: $\$1,000 \times (1.12)^3 \times (1 - 0.02) = \$1,377$

Class C: $\$1,000 \times (1.12)^3 - (1 - 0.01)^3 = \$1,363$

Solution 1-year horizon (Class C) and 3-year horizon (Class B)

Exchanged Traded Funds

- Trade like stocks that are based in indexes.
 - S&P 500 = SPDRS
 - DJIA = DIAMONDS
 - NASDAQ-100 = QQQQ
- Advantages over mutual fund:
 - Ease to trading
 - Continuous pricing
 - Low cost for major indexes
 - Can be shorted
- Risks are basically the same as indexed funds (market risk and tracking error)

Colin Bash is an experienced investor who has accumulated a portfolio of \$30,000. Colin has serious concerns about the impact of fees on investment returns but is confident about the long-run prospects for the equity market. He is still quite young and expects to invest the money for a long period of time. Which of the following investments is *most* appropriated for Colin?

- a. Buy a broad market index exchange traded fund (ETF).
- b. Invest in an actively managed mutual fund.
- c. Direct investment in a portfolio.
- d. Buy bank CDs.

Choice “a” is correct. A broad index ETF will provide Collin with a low cost, diversified, portfolio that will grow in line with the overall equity market over a long period of time.

Choice “b” is incorrect. An actively managed mutual fund will have expenses that are significantly higher than an ETF. Given that Collin is concerned about the impact of fees, this is an inappropriate investment.

Choice “c” is incorrect. With only \$30,000 to invest, it will be difficult to cost effectively diversify his portfolio. For instance, a 30 stock portfolio would result in just \$1,000 per investment. The transaction costs would be too high for Colin to consider the investment.

Choice “d” is incorrect. By purchasing CDs Colin would forfeit all gain in the equity market. This is not consistent with Colin’s long-term view.

Forms of Real Estate Investment

- Unleveraged equity interest
- Leveraged equity interest
- Mortgages
 - Mortgage-backed securities
- Aggregation vehicles:
 - Limited partnerships (RELPs) – put together a general partner and a limited partner
 - Real estate investment trusts (REITs) – no taxes at the trust level, have to pay some dividends

Characteristics of Real Estate

- Immobile, indivisible, and unique (not fungible – not a perfect substitute)
- Lack comparability
- Illiquid (takes time to exit, might have to make price concession)
- Real estate markets are not homogeneous
- Transaction costs are high
- Information inefficiencies

Real Estate Valuation

Cost Approach: Estimate cost to construct the building (new), add value of land, and deduct depreciation on existing structure (least preferred –only used when other two can't be used)
Generally, where no ready market.

Comparative Sales Approach: Average recent sales of similar real estate in the area and adjust for unique features.

Hedonic model: uses a regression analysis to apply coefficients to variables like number of rooms, distance to school, a pool, etc.

Income Approach: Estimates the property value as a perpetuity of its expected net operating income (NOI).

$$V_{RE} = \frac{NOI}{R}$$

- NOI = EBIT + Depreciation
- R is the capitalization rate, which is inferred from the Average NOI/Price for similar properties

A Real Estate Investment firm has developed the following regression model that they use to determine the value of a property:

$$\text{Value}_{\text{RE}} = 12,000 + 2,550 X_{\text{Rooms}} + 100,000 X_{\text{SIZE}} - 10,000 X_{\text{SEPTIC}} - 7,500 X_{\text{SHOPPING}} + \varepsilon$$

Where:

X_{ROOMS} = Number of rooms

X_{SIZE} = Lot Size in Acres

X_{SEPTIC} = Installed Septic Tank

X_{SHOPPING} = Miles to Shopping

The firm is looking at a 12-room home on a 1.5 acre lot that is connected the city's sewage system. If the closest shopping mall is 3 miles away, what is the value of the property?

- a. \$97,050
- b. \$148,100
- c. \$160,100
- d. \$170,100

Choice “d” is correct. The value of the property is calculated as follows:

$$\text{Value}_{\text{RE}} = 12,000 + 2,550 X_{\text{Rooms}} + 100,000 X_{\text{SIZE}} - 10,000 X_{\text{SEPTIC}} - 7,500 X_{\text{SHOPPING}} + \varepsilon$$

$$\begin{aligned}\text{Value}_{\text{RE}} &= 12,000 + 2,550 \times 12 + 100,000 \times 1.5 - 10,000 \times 0 - 7,500 \times 3 + \varepsilon \\ &= \$170,100\end{aligned}$$

The values for each variable are inserted into the calculation. The septic tank variable takes on a value of 1 (has a septic tank) or 0 (no septic tank). Since no value was given, the error term is assumed to be zero. With these questions care must be taken to understand what each variable represents.

Choice “a” is incorrect. This answer is the result of simply summing the numbers together.

Choice “b” is incorrect. This answer is the result for a property with a septic tank and the constant term

Choice ‘c’ is incorrect. This answer is the result for a property with a septic tank (value 1)

M&M Real Estate Investment is examining a potential investment property. The owners have provided M&M with the following pro forma statement:

Gross Rental Income	\$500,000
Operating Expenses	129,000
Property Taxes	35,000
Management Fees	18,000
Depreciation	50,000
Mortgage Interest	<u>100,000</u>
Pre-Tax Income	\$168,000
Income Tax Expense	84,000
Net Income	<u>\$ 84,000</u>

A similar property in the neighborhood recently sold for \$1,200,000 and generates an annual net operating income of \$96,000. Using the income approach, the estimated value of the investment is *closest* to:

- | | |
|----------------|----------------|
| a. \$1,050,000 | b. \$2,100,000 |
| c. \$3,180,000 | d. \$3,975,000 |

Choice 'd' is correct. The first step is to find the NOI, which is calculated as follows:

Gross rental income	\$500,000
Less: Operating expenses	129,000
Property taxes	35,000
Management fees	<u>18,000</u>
Net operating income	\$318,000

Notice that in determining the NOI that the calculation includes all cash expenses. Interest expenses, depreciation, income tax expenses and capital gains taxes are excluded. Once the NOI has been calculated the next step is to calculate the market capitalization rate (Cap Rate). This is done using the formula:

$$\text{Cap Rate} = \frac{\text{NOI Similar Property Sales}}{\text{Sales Price of Similar Properties}}$$

In this example the comparable sale had a cap of $\$96,000 / \$1,200,000 = 8\%$
Finally calculate the value of the property using this formula:

$$V_{RE} = NOI / \text{Cap Rate} = \$318,000 / 0.08 = \underline{\underline{\$3,975,000}}$$

Choice “a” is incorrect. This result is calculated by dividing the after-tax income by 8% (the cap rate)

Choice “b” is incorrect. This result is calculated by dividing the pre-tax income by 8% (the cap rate).

Choice “c” is incorrect. This result is calculated by dividing the correct NOI by 10%.

Characteristics of Venture Capital

- Illiquid
- Long-term commitment
- Difficult to value
- Little historical risk and return data
- Limited information upon which to base estimates
- Entrepreneurs and VCs can clash
- Manager incentives can distort objectives
- Competitive structure is volatile or uncertain
- Vintage cycles create periods of excess VC funds and shortages
- VCs bring financial expertise and business experience to the venture

Valuation of Venture Capital

- Requires three assessments:
 - Exit value of the firm
 - Time until exit (IPO)
 - The probability of failure
- Compute an expected NPV based on the probability of success and the probability of failure.

$$E(NPV) = NPV_{\text{SUCCESS}} \times P(\text{SUCCESS}) + NPV_{\text{FAILURE}} \times P(\text{FAILURE})$$

$$P(\text{success}) + P(\text{failure}) = 1.0$$

National Investment Analysis (NIA) is determining the NPV of a venture capital investment with a 5-year horizon. If the project is successful the original \$10 million investment is expected to be worth \$100 million in an IPO. Based on its analysis, NIA has determined that the probability of failure starts at 25% and falls 5% per year (25% to start, 20% the next year, and so forth) for the entire period. For projects of this type, the cost of equity is typically 20%. What is the NPV of this venture?

- a. \$7.52 million
- b. \$12.66 million
- c. \$13.16 million
- d. \$30.19 million

Choice 'a' is correct. The first step in the calculation is to determine the probability that the venture will survive until the IPO.

	Probability of Failure	Probability of Success	Cumulative Probability
Year 1	25%	75%	75,00%
Year 2	20%	80%	60,00%
Year 3	15%	85%	51,00%
Year 4	10%	90%	45,90%
Year 5	5%	95%	43,61%

Based on the above table the venture has a 43,61% chance of success and a 56,39% chance of failure. The next step is to calculate the NPV on the investment if it survives to the IPO.

$$NPV_{\text{SUCCESS}} = \frac{\text{Final Cash Flow}}{(1+r)^t} - \text{Initial investment}$$

$$NPV_{\text{SUCCESS}} = \frac{\$100 \text{ million}}{(1 + 0.20)^5} - \$10 \text{ million} = \$30.19 \text{ million}$$

The final step is to calculate the expected value using the probabilities derived above. If the project succeeds, the payoff is \$30,19 million if the project fails the investor loses \$10 million:

$$E(NPV) = \$30,19 \text{ million} \times 43.61\% - \$10 \text{ million} \times 56.39\% = \$7.52 \text{ million}$$

Choice “b” is incorrect. This calculation reverses the probabilities.

Choice “c” is incorrect. This calculation ignores the probability of losing the original \$10 million.

Choice ‘d’ is incorrect. This calculation includes the present value of the IPO payoff. No allowance is made for the probabilities of success or failure.

Characteristics of Hedge Funds

- Diverse objectives – *don't necessarily hedge*
 - Some may actually hedge, but many employ leverage to exploit perceived opportunities
 - Largely unregulated
 - Limited number of investors allowed
 - Limited to high net worth investors
 - Restricted from advertising
 - High fee structures
 - Management fees
 - Incentive fees
- Total fee = % of assets (1-2%) + % profit (often 20%)

Classifications of Hedge Funds

- **Long/short:** Employ both long and short positions to take advantage of both undervalued and overvalued stocks.
- **Market-neutral:** Employ a long/short strategy to keep the portfolio's beta a zero (stock picking return with zero market risk, capture α return)
- **Global macro:** seek to exploit emerging macroeconomic trends in currencies, commodities, interest rates, etc.
- **Event driven:** seek to exploit special situations like mergers, bankruptcies, etc.

Funds of Funds

- Mutual funds that invest in hedge funds
- Benefits:
 - FOF managers have expertise in selecting funds.
 - FOF offer diversification advantages
- Disadvantages
 - High fees (fees on top of fees)
 - Future performance is questionable (past is not indicative of the future and you can diversify away the alpha)

Hedge of leverage magnifies gains and losses

- Use of leverage (**derivatives**) magnifies gains and losses.
- Many strategies rely on liquidity in specific markets.
- Complexity of strategies and volatility of positions (**in illiquid securities**) can cause wide bid-ask spreads
- Trades executed without a clearinghouse create counterparty credit and settlement risks.
- Short and/or financing squeezes can occur if the market moves against the fund's positions

Performance is self-reported and subject to biases (**Voluntary basis, Survivorship bias, Self-selection bias and incentive to take big risk**)

A pension fund has made an investment in ABC global hedge fund. The fund has a “2 and 20” fee structure. The two-part fee consists of a 2% management fee and a 20% share in any profits above the T-bill rate. If the fund’s absolute return is 15% and the current T-bill rate is 3% what is the investor’s net return?

- a. 10.00%
- b. 10.60%
- c. 11.00%
- d. 12.00%

Choice “b” is correct. The calculation is as follows:

Total fee = Management fee + Incentive Fee (Fund return – T-bill Return)

$$0.02 + 0.20 (0.15 - 0.03) = 4.40\%$$

Investors Net Return is:

$$15.0\% - 4.4\% = \underline{10.60\%}$$

Choice “a” is incorrect. This calculation includes the participation fee and the management fee however the participation fee hasn’t been netted of the T-bill. Only the excess over the T-bill is considered in calculating the participation fee.

Choice ‘c’ is incorrect. This calculation is based on subtracting both the management fee and the T-bill return from the fund’s return and then taking 20% to get the participation.

Choice “d” is incorrect. This calculation is the total return reduced by the 20% participation fee.

The TTT hedge fund invests in a portfolio of long equities and short equities. The fund's managers identify which stock will outperform in any particular sector and which stock in the same sector is the most overvalued. They buy the stocks expected to outperform and sell those expected to underperform. Every day they rebalance each of their sector pairs to ensure that the betas of the long portfolio are equal to the betas of the short portfolio.

Based on this information, how should this fund be classified?

- a. Long/short fund
- b. Market neutral fund
- c. Macro fund
- d. Event driven fund.

Choice “b” is correct. A market neutral fund tries to achieve returns by picking individual winners and losers while achieving a zero beta portfolio. In this case, the pairs are within each sector thereby reducing market exposure. In addition the managers try to ensure that the long portfolio beta is equivalent to the short portfolio beta resulting in a zero beta portfolio.

Choice “a’ is incorrect. Long/short funds take both long and short positions in the stocks, but are not necessarily market neutral. In this case, the TTT hedge fund actively ensures that it has a zero beta portfolio.

Choice “c” is incorrect. Macro funds bet on the direction of macroeconomic variables. Instead of being market neutral these funds often have large positions. The TTT portfolio managers have a track record in equity selection rather than macro forecasting and the fund attempts to minimize market exposure.

Choice “ d’ is incorrect. An event driven fund tends to bet on special situations as distressed securities or merger/acquisition arbitrage. These strategies are different from the strategies that TTT pursues.

Other Alternative Investments

- Closely held companies
 - Not actively traded
 - Valuation approaches
 - Cost (replacement cost of assets)
 - Comparables (relative valuation)
 - Income (discounted cash flow)
 - Marketability and control premiums/discounts (discount 40% for lack of marketability)
- Distressed debt
 - Purchase debt of bankrupt or nearly bankrupt firms at deep discounts
- Commodities
 - Futures contracts (agriculture, energy, metals)
 - Commodity-linked securities

Peter Pickett owns 25% of his family's packaging business with annual sales of \$5 million. His father owns 55% and his younger brother owns 20%. Recently a similar, but publicly traded and broadly held, company was valued at 2 times annual sales. Which of the following best describes the fair value for Peter's interest?

- a. \$2.5 million plus a control premium.
- b. \$2.5 million less an adjustment for the lack of liquidity
- c. \$2.5 million less and adjustment for minority position
- d. \$2.5 million less an adjustment for minority position and an adjustment for the lack of liquidity.

Choice “b” is correct. The company is not publicly traded: therefore, it lacks liquidity offered by actively traded shares and a discount for this lack of liquidity should be taken. Although Peter’s interest is a minority interest, the basis on which the valuation is made also reflects the perspective of a minority shareholder (broadly held). Therefore, no additional discount is required for the minority position.

Choice “a” is incorrect. Peter’s interest is a minority interest, which means no control premium should be added.

Choice “c” is incorrect. The adjustment for the minority interest adjusts the price downward to compensate the buyer for taking on a minority position, which is not necessarily in this case. Furthermore, the lack of liquidity is ignored in this calculation.

Choice “d” is incorrect. The adjustment for lack of liquidity adjusts the price downward to compensate the buyer for taking on the risk of an illiquid position. But, the minority position should be ignored in this calculation because the benchmark also reflects a minority position.

AM plastics (AMP) is a financially strong growing manufacturer of plastic garden products. Garden tools Inc. (GTI), a competitor, has found itself in financial difficulty because of a failed expansion plan that left GTI with a significant debt burden. It is expected that GTI will go bankrupt in the next 6 months. GTI's stock price is down 95% from its high and its bonds are selling at 9 ¼ flat. AMP would like to buy GTI, but GTI's management still controls most of the existing equity. What action is most appropriate for AMP's management?

- a. Do nothing and wait for GTI to go bankrupt.
- b. Buy GTI's stock.
- c. Buy GTI's outstanding bonds.
- d. Short GTI's stock.

Choice “c” is correct. In the event that GTI goes into bankruptcy it is likely that the debt holders will get control of GTI, because GTI will default on its obligations. In the event that GTI managed to turn the business around, AMP would receive a good return on its debt investment.

Choice “a” is incorrect. Although this choice involves no risk for AMP it does not achieve AMP’s goal of acquiring GTI.

Choice “b” is incorrect. It is unlikely that GTI’s management would sell its interest in the company. If GTI goes into bankruptcy the debt holders will likely gain control of the company.

Choice “d” is incorrect. If GTI goes bankrupt AMP will get a return on its investment, but this does not give them control. If GTI manages to rebound, then AMP is exposed to the risk of unlimited losses as the stock soars.