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# CFA二级培训项目

# Equity Investments


## Topic Weightings in CFA Level II

| Session NO. | Content | Weightings |
|---|---|---|
| Study Session 1-2 | Ethics & Professional Standards | 10-15 |
| Study Session 3 | Quantitative Methods | 5-10 |
| Study Session 4 | Economic Analysis | 5-10 |
| Study Session 5-7 | Financial Statement Analysis | 15-20 |
| Study Session 8-9 | Corporate Finance | 5-15 |
| Study Session 10-12 | Equity Analysis | 15-25 |
| Study Session 13 | Alternative Investments | 5-10 |
| Study Session 14-15 | Fixed Income Analysis | 10-20 |
| Study Session 16-17 | Derivative Investments | 5-15 |
| Study Session 18 | Portfolio Management and Wealth Planning | 5-10 |
| | Total: | 100 |



## Summary of Readings and Framework

**SS 10**

- R29 Equity Valuation: Applications and Processes
- R30 Return Concepts

**SS 11**

- R31 The Five Competitive Forces that Shape Strategy
- R32 Your Strategy Needs a Strategy
- R33 Industry and Company Analysis
- R34 Discounted Dividend Valuation

**SS 12**

- R35 Free Cash Flow Valuation
- R36 Market-Based Valuation: Price and Enterprise Value Multiples
- R37 Residual Income Valuation
- R38 Private Company Valuation

## Valuation and Intrinsic Value

- **Valuation** is the process of estimating the value of an asset by:
  - Using a model based on variables the analysis believes influence the fundamental value of the asset
  - Comparing it to the observable market value of "similar" assets
- ***General steps*** in the equity valuation process:
  - Understand the business.
  - Forecast company performance.
  - Select the appropriate valuation model.
  - Convert the forecasts into a valuation.
  - Apply the valuation conclusions.




## Different Kinds of Values & Valuation

- ***Intrinsic value (IV)***: the valuation of an asset or security by someone who has complete understanding of the characteristics of the asset or issuing firm.

$$IV_{analyst} - price = (IV_{actual} - price) + (IV_{analyst} - IV_{actual})$$

- ***Fair market value***: the price at which a hypothetical willing, informed, and able seller would trade an asset to a willing, informed, and able buyer.
- ***Investment value***: value of a stock to a particular buyer.
- ***Liquidation value***: value when company will not continue to operate.




## Applications of Equity Valuation

- ***Objectives***
  - **Stock selection**: to guide the purchase, holding, or sale of stocks.
  - **Reading the market**: current market prices implicitly contain investor's expectations about the future value of the variables that influence the stock's price.
  - **Projecting the value of corporate actions**: use valuation techniques to determine the value of proposed corporate mergers, acquisitions, divestitures, MBO, and recapitalization efforts.
  - **Fairness opinions**: to support professional opinions.
  - **Planning and consulting**: to evaluate the effects of proposed corporate strategies on the firm's stock price, pursuing only those that have the greatest value to share holders.
  - **Communication with analysts and investors**: valuation approach provides a common basis upon which to discuss and evaluate the company.
  - **Valuation of private business**: value of the firm or holdings in firms that are not publicly traded.

## Applications of Equity Valuation

- **Portfolio management**
  - ✓ planning, execution and feedback → 3 steps in the portfolio management process (valuation is most closely associated with the planning and execution steps).

1. **Planning**
   - ✓ identification and specification the investment objectives and constraints → writing detail on the investment strategy of securities selection
   - ✓ Valuation on individual security is not apply to Indexing strategy but active management.
2. **Execution**
   - ✓ Portfolio selection
   - ✓ Portfolio implementation
3. **Feedback**




## Valuation Process

➢ ***Valuation process***

1. **Understanding the business**
   - Elements of industry structure (Porter's five forces)
     - ✓ Threat of new entrants in the industry;
     - ✓ Threat of substitutes;
     - ✓ Bargaining power of buyers;
     - ✓ Bargaining power of suppliers;
     - ✓ Rivalry among existing competitors.
   - Three generic strategies:
     - ✓ Cost leadership;
     - ✓ Product differentiation;
     - ✓ Focus.
2. **Forecasting company performance**
   - Top-down forecasting approach
   - Bottom-up forecasting approach




## Valuation Process

- Detailed examination of the footnotes accompanying the financial reports:
  - ✓ Accelerating or premature recognition of income.
  - ✓ Reclassifying gains and non-operating income.
  - ✓ Expense recognition and losses.
  - ✓ Amortization, depreciation, and discount rates.
  - ✓ Off-balance-sheet issues.

3. **Selecting the appropriate valuation model**
   - Absolution valuation model;
     - ✓ DDM, FCFM, residual income approach, asset-based model
   - Relative valuation model.
     - ✓ Multiples, such as P/E, P/B, P/CF, etc.
4. **Converting forecasts to a valuation**
5. **Making the investment decision**

## Quantitative and Qualitative factors in valuation

- **Quantitative factors**
  - key source from company's accounting information and financial disclosures
  - Including: balance sheet, income statement, cash flow statement, as well as the footnotes
- **Qualitative factors**
  - Purpose: to measure industry performance, such as legal and regulatory environment
  - Including:
    - ✓ quality of the firm's management team;
    - ✓ the transparency of its performance;
    - ✓ the analyst's confidence in the firm's;
    - ✓ industry's accounting practices




## Quality of inputs

- **Quality of inputs**
  - Analysts can forecast firm's future economic value based on current facts
- **Requirement**
  - The financial factors must be disclosed in sufficient detail and accuracy
  - The investigation of issues relating to accuracy is often broadly referred to as quality of earnings analysis, namely the scrutiny of all financial statements




## Footnotes of accounting statements and other disclosures

- **Indicators of selected quality of earnings**

| Category | Observation | Example |
|---|---|---|
| **Revenues and gains** | ▪ Recognizing revenue early | ▪ Accelerating or premature recognition of income<br>▪ Reclassifying gains and non-operating income |
| **Expenses and Losses** | ▪ Delay of Recognition of Expenses | ▪ Expense recognition and losses<br>▪ Amortization, depreciation, and discount rates |
| **Balance Sheet Issues** | ▪ Off-balance-sheet issues | ▪ SPEs |

## Intrinsic Value and Alpha

- ***Intrinsic value*** is the value of an asset give a hypothetically complete understanding of the assets' investment characteristics. Valuation is a part of the active manager's attempt to production positive excess return
  - **Alpha**, an excess risk-adjusted return, also called an abnormal return
- **Formula:**
  - **ex ante alpha** = expected holding period return – required return
  - **ex post alpha** = actual holding period return – contemporaneous required return
- the difference between intrinsic value (V) and market value (P) → perceive mispricing → becomes part of the manager's forecast of expected return → influence the total return on the asset → namely influence alpha



## Going Concern Assumption

- A company has one value if it is immediately dissolved, and another value if it continues in operation.
- **Going-concern assumption**
  - It is based on the assumption that the company will maintain its business activities into the foreseeable future.
  - going-concern value of the company is the value under a going-concern assumption
- **Non-going-concern assumption**
  - Non-going-concern value is based on the assumption that the company will finish operating and all assets will be sold out.
  - Also called liquidation value due to liquidation should be concerned in this assumption
- **going-concern value ＞ liquidation value**



## Types of valuation models

- The two board types of ***going-concern models*** of valuation are:
  - Absolute valuation models
  - Relative valuation models
- ***Absolute valuation models***
  - the model that specifies an asset's intrinsic value which is in order to be compared with the asset's market price (does not need consider about the value of other firms).
  - Two types:
    - ✓ Present value model or discounted cash flow model
      - ◆ ***DDM***
      - ◆ ***FCF model***
      - ◆ ***Residual income model***
    - ✓ ***Asset-based model***: sometime is used to value the company that own or control natural resources, such as oilfields, coal deposits and other mineral claims

## Types of valuation models

- ***Relative valuation models (method of comparable)***
  - the model that specifies an asset's value relative to that of another asset
  - It is typically implemented using *price multiples*
  - For example: P/E firm < P/E market → stock is relatively undervalued



## Sum-of-the-parts valuation & conglomerate discount

- ***Sum-of-the-parts valuation***
  - Sum-of-the-parts valuation (break-up value or private market value): an analyst can value individual parts of the firm and add them up to determine the value for the company as a whole.
- ***Conglomerate discount***
  - Investors apply a **markdown** to the value of a company that operates in multiple unrelated industries, compared to the value a company that has a single industry focus. It is the amount by which market value under-represents sum-of-the-parts value.
  - Three explanations for conglomerate discounts are:
    - ✓ ***Internal capital inefficiency***: allocation of capital not based on sound decisions.
    - ✓ ***Endogenous (internal) factors***: pursued unrelated business acquisitions to hide poor operating performance.
    - ✓ ***Research measurement errors***: conglomerate discounts are a result of incorrect measurement.



## Broad Criteria for Choosing Appropriate Approach

- When selecting an approach for valuing a given company, an analyst should ***consider whether the model***:
  - ***Fits*** the characteristics of the company.
  - Is appropriate based on the ***quality and availability of input data***.
  - Is suitable given the ***purpose of the analysis***.

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## 1. Return concepts

➢ ***Holding period return***

- Holding period return is the return earned from investing an asset over a specified time period.
- The formula:

$$r = \frac{P_1 - P_0 + D_1}{P_0} = \frac{D_1 + P_1}{P_0} - 1 = \text{dividend yield} + \text{price appreciation return}$$

- **Annualized HPR.**
  - ✓ For example: if the return for one month is 1% then the annualized HPR is $(1+0.01)^{12}-1=12.68\%$

➢ ***Realized & expected return***

- ***Realized return***: is the same with HPR. It is backward-looking context.
- ***Expected return***: In forward-looking, an investor can form an expectation concerning the dividend and selling price.



## 1. Return concepts

➢ ***Required return (opportunity cost)***

- the minimum level of expected return that an investor requires in order to invest in the asset over a specific time period, given the assets' riskiness.
- It represents:
  - ✓A threshold value for being fairly compensated for the risk of the asset.
  - ✓If investor's expected return > required return, the asset is undervalued; and vice versa.

## 1. Return concepts

➢ ***Expected return***

- When a asset is mispriced, price of assets converges to its intrinsic value in a period time.
- The investor's expected rate of return comprises:
  - ✓Required return; and
  - ✓A return from convergence of price to value.

$$E(R) \approx r_T + \frac{V_0 - P_0}{P_0}$$

Where,

$V_0$, there intrinsic value of the stock;

$P_0$, the current price of the stock

$r_T$, required return during the convergence time period



## 1. Return concepts

➢ ***Discount rate***

- It is a rate used in finding the PV of future cash flows;
- Used to determine the intrinsic value depends on the characteristics of the investment rather than that of purchaser;

➢ ***Internal rate of return (IRR)***

- IRR is a market-determined rate. It is the rate that equates the value of the discounted cash flows the ***current price*** of the security.
- If the ***markets are efficient***, then the ***IRR represents the required return***.



## 2. Equity risk premium

➢ The equity risk premium is the ***incremental return (premium)*** that investors require for holding equities rather than a risk-free asset.

- Equity risk premium = Required return on equity index – risk-free rate

➢ **CAPM**

- Required return on share $_i$ = Current expected risk-free return + $\beta_i$ (***Equity risk premium***)

➢ ***Build-up Method***

- Required return on share $_i$ = Current expected risk-free return
  + ***Equity risk premium***
  ±Other risk premium/discounts

## 2. Equity risk premium

- ***Historical estimate***
  - ***Equity risk premium***: consists of the difference between the historical mean return for a ***broad-based equity-market index*** and a ***risk –free rate*** over a given time period.
  - Issues in historical estimate
    - ✓ *Select an appropriate index*. An index is frequently adjusted. In driving the return, it should be stationary.
    - ✓ *Time period*. The longer the period used, the more precise the estimate.
    - ✓ *Arithmetic mean or geometric mean* (lower) in estimating the return;
    - ✓ *Long term bond or short term bill* is a *proxy for the risk-free assets*.
  - Issues
    - ✓ ***Survivorship bias***. That results the over-estimate return on index and the ERP. Downward adjustment is used to offset the bias.
    - ✓ Risk premium will be ***lower*** when geometric mean is used or used of longer-term bonds rather than shorter-term bonds to estimate the risk-free rate.



## 2. Equity risk premium

- ***Forward-looking (Ex ante) estimate – conceptual framework***
  - ERP is based on expectations for economic and financial variables from the present going forward. It is logical to estimate ERP directly based *on current information and expectation*.
  - It is not subject to the issues such as non-stationary or data series in historical estimate. But it is subject to potential errors related to ***models and behavioral bias***.
  - 3 approaches
    - ✓ Gordon growth model (GGM) estimate;
    - ✓ Macroeconomics model estimate; and
    - ✓ Survey estimate.



## 2. Equity risk premium

- **GGM**
  - GGM equity risk premium estimate = ***Dividend yield*** on the index based on year-ahead aggregate forecasted dividends and aggregate market value + *Consensus long-term earnings* ***growth rate*** *– Current long-term government* ***bond yield***
  - A simple way to understand the equation:

$$ERP = r - RFR = \frac{D_1}{P_0} + g - RFR$$

  - The above equation assumes ***growth rate is constant***.
  - An analyst may make ***adjustment to reflect P/E boom or bust***.
  - Another method to solve these problems:

$$\text{Equity Index Price} = PV_{rapid}(r) + PV_{transition}(r) + PV_{mature}(r)$$

## 2. Equity risk premium

➢ **Supply-Side Estimates (Macroeconomic Model)**

$$ERP = [1+\hat{i}]\times[1+\hat{rEg}]\times[1+\hat{PEg}]-1+\hat{Y}-\hat{RF}$$

- $\hat{RF}$: Expected risk-free rate
- $\hat{PEg}$: Expected changes in the P/E ratio
- $\hat{rEg}$: Expected real growth in GDP
- $\hat{i}$: Expected inflation
- $\hat{Y}$: Expected yield on the index

- Expected inflation: $\hat{i}$ = (YTM of 20-year T-bonds)-(YTM of 20-year TIPS)
  TIPS: Treasury Inflation Protected Securities
- Expected real growth in GDP:
  $\hat{rEG}$=real GDP growth
  $\hat{rEG}$=labor productivity growth rate + labor supply growth rate

➢ **Forward-looking (Ex ante) estimate – survey**

- Use the consensus of the opinions from a sample of people.




## 2. Equity risk premium

➢ **Comparison**

| Estimates | Strength | Weakness |
|---|---|---|
| **Historical Estimates** | ▪ a ***familiar and popular choice*** (if reliable long-term records are available)<br>▪ unbiased estimate (if no systematic errors has been made)<br>▪ objective quality (grounded in data) | ▪ precision issues (due to the reduced/divided length of data)<br>▪ difficult-to-maintain stationary ***assumption*** (if the series starting point extended to the distant past)<br>▪ empirically countercyclical expected equity risk premium<br>▪ ***survivorship bias and positive/negative surprises*** |
| **Forward-looking Estimates** | ▪ available (direct based on current info. and expectations concerning such variables)<br>▪ not subject to the issue of ***non-stationarity or data biases*** | ▪ often subject to other potential errors related to financial/economic ***models*** and ***behavioral biases*** in forecasting.<br>▪ subjective |




## 2. Equity risk premium

➢ **Comparison**

| Estimates | Strength | Weakness |
|---|---|---|
| **GGM** | ▪ ***Popular*** method;<br>▪ ***Reasonable*** when applied to developed economies and markets;<br>▪ ***Typically sample sources***. | ▪ ***Change*** through time and need to be updated;<br>▪ Assumption of a ***stable growth rate***. |
| **Supply-Side Estimates** | ▪ ***Proven models;***<br>▪ ***Current information;*** | ▪ Only appropriate for ***developed countries;*** |
| **Survey Estimates** | ▪ ***Easy to obtain*** | ▪ ***Wide disparity*** from different groups |

## 3. Required return on equity

- **In estimating the required return on equity, the analyst can choose following models:**
  - CAPM;
  - Multifactor models;
    - ✓ Fama-French Model (FFM);
    - ✓ Pastor-Stambaugh model (PSM);
    - ✓ Macroeconomic Multifactor models;
  - Build-up method
    - ✓ Bond Yield Plus Risk Premium Method



## 3. Required return on equity

***CAPM model***

**Required return on share i = Current expected risk-free return**
**+ $\beta_i$ (Equity risk premium)**

- It's an equilibrium model based on ***key assumptions***:
  - Investors are risk aversion;
  - Investors make investment decision base on the mean return and variance of return of their portfolio.



## 3. Required return on equity

***CAPM model—Beta Estimates for Public Companies***

- Estimating Beta for ***public company***
  - ***The choice of index***: the S&P 500 and the NYSE composite.
  - The ***length*** and ***frequency*** of sample data:
    - ✓most common choice is ***5 years of monthly data***;
    - ✓***Two years of weekly data*** for fast grow market.
- ***Adjusted Beta*** for Public Companies
  - Adjusted beta = (2/3) (Unadjusted beta) + (1/3) (1.0)
  - ***Beta drift*** refers to the observed tendency of an estimated beta to revert to a value of 1.0 over time.

## 3. Required return on equity

***Estimating Beta for tiny traded stock or nonpublic companies:***

- Step 1: Selecting ***benchmark company***(comparable)
  - ✓ Use the public companies' information in the same industry;
- Step 2: Estimate the ***benchmark's beta*** (similar with previous section);
- Step 3: ***Unlevered*** benchmark's beta:

$$\beta_U \approx \left[\frac{1}{1+(D/E)}\right]\beta_E$$

- Step 4: ***lever up*** the unlevered beta for tiny traded stock or nonpublic companies:

$$\beta_E' \approx \left[1+(D'/E')\right]\beta_U$$



## 3. Required return on equity

***Multifactor model***

- The beta in CAPM does not describe the risk completely. Multifactor models are develop to account for the risks more completely.

$$\text{Required Return}=\text{RF}+\text{RP}_1+\text{RP}_2+\cdots+\text{RP}_n$$
$$RP_i = factor\ sensitivity_i \times factor\ risk\ premium_i$$

- Factor sensitivity is also called the ***factor beta***, it is the asset's ***sensitivity to a particular factor***, and ***zero sensitivity to all other factors***.



## 3. Required return on equity

***Multifactor model***

- ***Fama-French Model*** **Vs.** ***Pastor - Stambaugh model*** **(PSM)**

$$\text{Required Return} = \text{RF} + \beta_{\text{mkt,j}} \times (R_{mkt} - RF)$$
$$+ \beta_{\text{SMB,j}} \times (R_{small} - R_{big})$$
$$+ \beta_{\text{HML,j}} \times (R_{HBM} - R_{LBM})$$
$$+ \beta_i^{\text{liq}} (\text{R}_{\text{LL}}\text{-R}_{\text{HL}})$$

*Small/large cap*
*High/low book-to-market*

FFM

PSM

$$\beta_{\text{SMB,j}} > 0,\ \text{small-cap}$$
$$\beta_{\text{HML,j}} > 0,\ \text{value-oriented}$$

## Example: Fama-French Model

The estimated factor sensitivities of TerraNova Energy to Fama—French factors and the risk premium associated with those factors are given in the table below:

| | Factor Sensitivity | Risk Premium(%) |
|---|---|---|
| Market Factor | 1.20 | 4.5 |
| Size Factor | -0.50 | 2.7 |
| Value Factor | -0.15 | -4.3 |

A. Based on the Fama-french model, calculate the required return for TerraNova Energy using theses estimates. Assume that the Treasure bill rate is 4.7 percent.

B. Describe the expected style characteristics of TerraNova based on its factor sensitivities.

**Answer:**

A. r = 4.7%+(1.20x4.5%)+(-0.50x2.7%)+(0.15x4.3%) = 4.7% + 5.4% - 1.35% - 0.645% = 9.4%

B. TerraNova Energy appears to be a large-cap, growth-oriented, high market risk stock as indicated by its negative size beta, negative value beta, and market beta above 1.0.




## 3. Required return on equity

### *Macroeconomic Multi-factor models*

- Macroeconomic Multifactor models use factors associated with economic variables.

***Burmerster, Roll, and Ross model*** incorporates the following five factors:

- ✓**Confidence risk**: unexpected change in the difference between return of risky corporate bonds and government bonds.
- ✓**Time horizon risk**: unexpected change in the difference between the return of long-term government bonds and treasury bills.
- ✓**Inflation risk**: unexpected change in the inflation rate.
- ✓**Business-cycle risk**: unexpected change in the level of real business activity.
- ✓**Market timing risk**: the equity market return that is not explained by the other four factors.




## 3. Required return on equity

### *Build-up method*

- The basic idea for the required return on equity is

$r_i$ = Risk-free rate + Equity risk premium ± One or more premium (discounts)

- For private business valuation

$r_i$ = Risk-free rate + Equity risk premium + Size premium

+ Specific-company premium

- ***Bond Yield Plus Risk Premium Method***

BYPRP cost of equity = YTM on the company's long-term debt + Risk premium

- ***Tips***: Paying careful attention to whether there is a ***positive or negative sign*** attached to the component----and work through it logically.

## 3. Required return on equity

*Comparison of the methods*

| Methods | Strength | Weakness |
|---|---|---|
| **CAPM** | ▪ ***Very simple*** in that it uses only ***one factor*** | ▪ ***Choosing the appropriate factor***.<br>▪ ***low explanatory power in some cases*** |
| **Multifactor** | ▪ ***higher explanatory power*** (not assured) | ▪ ***more complexity and expensive*** |
| **Build-up** | ▪ ***Simple***<br>▪ Can ***apply to closely held companies***. | ▪ ***Historical values*** may not be relevant to current market conditions |



## 3. Required return on equity

*Summary of calculations:*

- **Calculate ERP (Equity Risk Premium)**
  - Historical estimate
  - Forward-looking estimate
    - ✓ GGM estimate
    - ✓ Macroeconomic model estimate
    - ✓ Survey estimate



## 3. Required return on equity

*Summary of calculations:*

- **Calculate required rate of return**
  - CAPM
    - ✓ Actively traded public company
    - ✓ Adjusted Beta
    - ✓ Tiny traded or nonpublic company
  - Multifactor model
    - ✓ Fama-French model (FFM)
    - ✓ Pastor-Stambaugh model (PSM)
    - ✓ Macroeconomic Multifactor models
  - Build-up method
    - ✓ Bond Yield + Risk Premium

# 4. International Consideration

***International Consideration***

- ***Exchange rate risk***
  - The volatility of exchange rate influences the return on foreign investment in term of home currency;

    Equity risk premium = Equity risk premium for a developed market + Country premium
  - ***Country Spread Model***: use a corresponding developed market as a benchmark and add a premium for the emerging market.
    - ✓ One premium is the difference between the yield on bonds
  - ***Country Risk Rating Model***: risk ratings (published by Institutional Investor) for those countries as the independent variable.
- ***Data and model*** issues in emerging markets



# 5. WACC

- The cost of capital is most commonly estimated using the company's after-tax weighted average cost of capital, or *weighted average cost of capital (WACC)* for short.
  - A weighted average of required rates of return for the component sources of capital

$$\text{WACC} = \frac{\text{MVD}}{\text{MVD}+\text{MVCE}} r_d (1 - \text{Tax rate}) + \frac{\text{MVCE}}{\text{MVD}+\text{MVCE}} r_{ce}$$

- The changes in capital structure results in changes in WACC. Eliminate the impact from frequent changes of capital structure in estimating WACC, the target capital structure is used to estimate the WACC.



# 6. Discount rate selection in relation to cash flow

- Being used as discount rates in valuation, required returns need to be defined appropriately relative to the cash flows to be discounted.
  - Cash flow to equity → the required return on equity
  - Cash flow to the firm → the firm's cost of capital (after-tax weighted average cost of capital )
- When cash flows are stated in real terms, amounts reflect offsets made for actual or anticipated changes in the purchasing power of money
  - Nominal cash flows → Nominal discount rates
  - Real cash flows → Real discount rates

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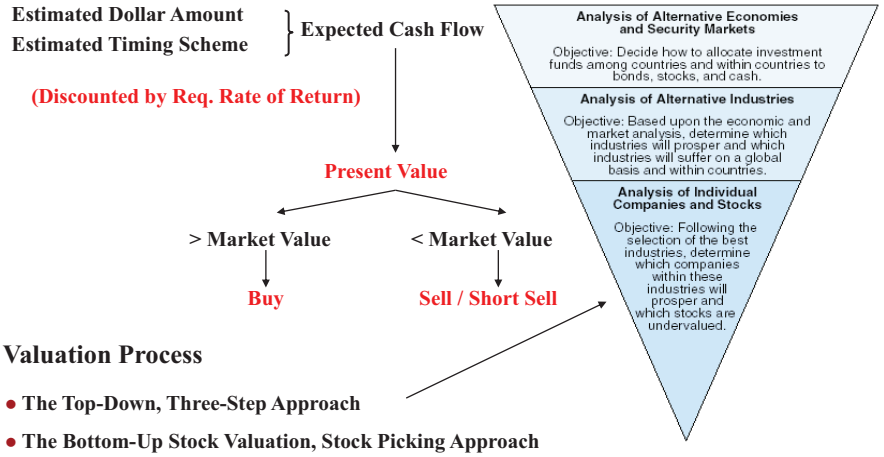
## Equity Valuation: The framework

- **Security Valuation and Investment Decision**




- **Valuation Process**
  - **The Top-Down, Three-Step Approach**
  - **The Bottom-Up Stock Valuation, Stock Picking Approach**



# Step 1: Global & Country Analysis

# Step 2: Industry Analysis

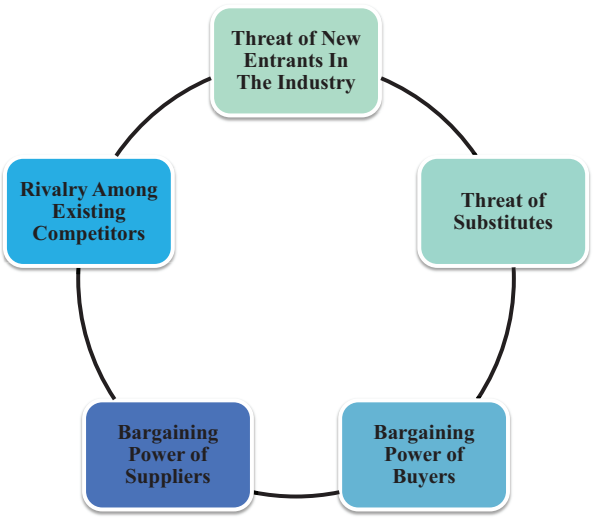



## Industry Analysis

- Two central questions provide the basis for the firm's choice of a competitive strategy:
  - ***Industry attractiveness***: is the industry attractive in the terms of long-term profit potential?
  - ***Competitive advantage***: How does the firm create value for buyers (in excess of the cost of creating it), relative to other players in the industry.




## Industry Analysis: Porter's Five-Forces



## Industry Analysis: Porter's Five-Forces

➢ **1.Threat of new entrants in the industry**

① Economies of scale
② Product differences and brand identity
③ Switching costs
④ Capital requirements
⑤ Access to distribution channels
⑥ Government policy
⑦ Cost and/or quality advantages





## Industry Analysis: Porter's Five-Forces

➢ **2.The threat of Substitute Products:**

① The relative price performance of substitutes;
② Buyer propensity to substitute;
③ Switching costs


➢**Differentiated industry products that are valued by customers reduce this threat.**




## Industry Analysis: Porter's Five-Forces

➢ **3. Bargaining Power of Buyer:**

①Bargaining leverage: relates closely to factors affecting the other forces, such as low switching costs and readily available substitutes enhance the bargaining power of buyers.

②The buyer's price sensitivity depends upon qualitative factors.

## Industry Analysis: Porter's Five-Forces

➢ **4. Bargaining Power of Supplier:**

①Differentiation of inputs that are acceptable to the industry;

②Presence of substitute inputs is closely related to the differentiation of inputs.

③Supplier concentration.

④Importance of volume to the supplier.

⑤The threat of forward integration.

⑥Switching costs.





## Industry Analysis: Porter's Five-Forces

➢ **5. The Degree of Rivalry Among Existing Competitors**

①Number of competitors.

②Industry growth.

③A high degree of operating or financial leverage.

④Participant's commitment.

⑤Product differences.

⑥Product shelf life.

⑦The existence of exit barriers.

⑧The amount of informational complexity.





## Factors Affect an Industry on Temporary Basis

➢ Various factors may affect an industry on a ***temporary basis*** but ***not*** determine industry profitability and structure ***in the long term***:

- ***Industry Growth Rate***, a common mistake is to assume that fast-growing industries are always attractive.
- ***Technology and Innovation***, improved technology does not improve profits if it attracts competitors.
- ***Government***, these can be good or bad and are prone to change through time.
- ***Complementary Products***, these are products that are used in conjunction with the firm's products (like hot dogs and buns), and these can have a positive or negative effect. Some complements can create or increase barriers to entry and reduce the treat of substitutes.

## Changes in Industry Structure on Long-Term

- Five forces drive an industry's structural ***attractiveness*** and ***long-term profitability***.
  - Changes in Threat of New Entrants
  - Changes in Power of Suppliers and Buyers
  - Changes in Threat from Substitutes
  - Changes in Rivalry
  - ***Strategic Alternatives***
    - ✓***Alert for fundamental changes*** that can affect the strength or weakness of the five forces.



## Positioning a company

- Altering the Firm's Existing Position
  - Customer power.
  - Supplier power.
  - Substitutes.
  - Threat of entry.
  - Rivalry.
- Capitalizing on Changes in the Industry
  - Forward or backward integration
  - External forces
  - Sudden and dramatic change
- Creating Changes in the Industry Structure
  - Value-added overall
  - Redistribution the value-added in favor of industry participants
  - A firm can move the entire industry in directions that improve industry attractiveness, it should try to move the industry.



## Positioning a company

- Steps in Using the Forces in an Industry
  - *Step 1:* Define the industry
  - *Step 2:* Identify the participants
  - *Step 3:* Determine strength or weakness of each force
  - *Step 4:* Determine industry structure
  - *Step 5:* Assess current and potential shifts in each force
  - *Step* 6: Decide which will affect the value of the industry or firm

## Example: Analyzing the Competitive Forces for WAL-Mart

- **Synopsis**

Wal-Mart is the world's largest retailer, selling a wide range of products targeted to consumers and small businesses. The firm serves approximately 150 million customers per week in the Americas, Asia, and the United Kingdom.

Wal-Mart is widely viewed as having the lowest prices on a broad variety of frequently-purchased consumer products.

Principal competitors include other broad-based discount stores, grocery stores, as well as small retailers operating in its geographic region. The smaller specialty retailers and single-location boutiques compete with Wal-Mart in limited product lines.

Wal-Mart has a reputation as a formidable competitor, and many retailers have been forced to change their business models in order to stay profitable once Wal-Mart enters their markets.

A major development in recent years at Wal-Mart has been the deterioration in its market image because of accusations of unfair labor practices. The firm is currently defending several lawsuits involving its employment practices, and these have generated significant and damaging press coverage.




## Example: Analyzing the Competitive Forces for WAL-Mart

- **Competitive Forces and Wal-Mart**
  - Threat of new entrants.
  - Threat of substitutes.
  - Bargaining power of buyers.
  - Bargaining power of suppliers.
  - Rivalry among existing competitors.
- **Conclusion**

Wal-Mart drives its competitive strategy through its enormous scale, which provides significant barriers to entry, low supplier bargaining power, and low buyer bargaining power. Substitutes are available for all products Wal-Mart sells but usually at higher prices. Wal-Mart's scale has historically enabled it to enjoy high profits for its industry.

A principal threat to Wal-Mart's long-term profitability is the increase in supplier power in the form of the influence of its suppliers of labor on the court system, the press, and public opinion. Wal-Mart should take action to reduce the impact of these labor difficulties on the firm. In fact, it has made steps to improve its public relations through actions such as increased and more visible charitable giving.




# Step 3: Stock Analysis

# Equity Valuation: Quantitative Methods

- General Methods:
  - Absolute methods:
    - ✓Discounted Dividend Valuation
    - ✓Free Cash Flow Valuation
    - ✓Residual Income Valuation
  - Relative methods
    - ✓Market-Based Valuation: Price Multiple
- Special cases
  - Private Company Valuation




# Compare: dividends, free cash flow, and residual income

| | Advantages | Disadvantages | Suitability |
|---|---|---|---|
| **Dividends** | • theoretically justified<br>• less volatile than other measures | • difficult for firms don't currently pay dividends<br>• perspective of minority | • The company has a *history of dividend payments*.<br>• The *dividend policy* is clear and related to the earnings of the firm.<br>• The perspective is that of a *minority shareholder*. |
| **Free Cash Flow** | • regardless of dividend policies or capital structures | • very difficult | • Firms that do *not have dividend histories or have a dividend payment history that is not clearly and appropriately related to earnings*.<br>• For firms with free cash flow that *corresponds* with their profitability.<br>• When the valuation perspective is that of a *controlling shareholder*. |
| **Residual income** | • firms with negative free cash flow and to dividend- and non-dividend-paying | • more difficult to apply | • Firms that do not have *dividend histories*.<br>• Firms that have *negative free cash flow* for the foreseeable future (usually due to capital demands).<br>• Firms with transparent financial reporting and high quality earnings. |




# Summary of Readings and Framework

**SS 10**

- R29 Equity Valuation: Applications and Processes
- R30 Return Concepts

**SS 11**

- R31 The Five Competitive Forces that Shape Strategy
- R32 Your Strategy Needs a Strategy
- R33 Industry and Company Analysis
- R34 Discounted Dividend Valuation

**SS 12**

- R35 Free Cash Flow Valuation
- R36 Market-Based Valuation: Price and Enterprise Value Multiples
- R37 Residual Income Valuation
- R38 Private Company Valuation

## Factors in assessing an industry

- **Predictability:** how accurately and how far into the future a company can forecast factors, such as
  - Industry demand
  - Corporate performance
  - Market expectations
- **Malleability:** extent to which a company and its competitors can influence these industry factors.

> ➢An appropriate strategic planning process should be consistent with the predictability and malleability of the environment in which the business operates.
>
> ➢The lower the predictability and malleability of the competitive environment, the more complex the environment and more challenging the corporate strategy formulation process.



## Strategy formulation styles

- **There are four possible strategy formulation styles based on predictability and malleability**

| | ***Less Predictable*** | ***More Predictable*** |
|---|---|---|
| ***Less Malleable*** | Adaptive | Classical |
| ***More Malleable*** | Shaping | Visionary |



## Strategy formulation styles

- **Classical: appropriate when a company faces an environment that is highly predictable and that cannot be easily changed.**
  - Example: Oil company strategist
  - Entails identification of a company's unique abilities and resources
  - Formulation of a plan to achieve the most favorable market position
  - Multiple rounds of methodical planning and quantitative prediction tools are used to generate long-term forecasts.
  - One of the goal is to optimize efficiency.
  - Analysis of an industry based on Porter's five forces is an example of the classical style.

## Strategy formulation styles

- **Adaptive: appropriate when a company faces an environment that is highly unpredictable and not easily changed**
  - Example: Specialty fashion retailing
  - Require company to react quickly to change by ensuring the company has:
    - ✓ Willingness to constantly refine long-term goals in response to a changing environment
    - ✓ The ability to quickly redistribute or acquire resources to meet changing conditions
    - ✓ A goal of maximizing flexibility rather than efficiency
    - ✓ A short-term or continuous planning processes based on a hypothesis rather than a rigid plan
    - ✓ Strategies that are closely linked to operational processes, to capture signals for change and minimize information loss.



## Strategy formulation styles

- **Shaping: appropriate when the underlying business environment is less predictable but more malleable**
  - Example: software industry
  - Entails a short or continuous planning cycle with a high degree of flexibility
  - Seek to influence the unpredictable business environment to further their business interests by:
    - ✓ Building a network of committed customers, suppliers, and partners
    - ✓ Defining new markets, technologies, and business practices
    - ✓ Promoting its interests through marketing, lobbying, and strategic partnerships.



## Strategy formulation styles

- **Visionary: appropriate when the business environment is both more predictable and more malleable**
  - Example: Satellite radio firms
  - Seeks to alter the environment to further the company's interest.
  - Entail high risk and can be disruptive, involving a so-called 'build it and they will come' approach
  - Business should:
    - ✓ Have adequate resources to commit
    - ✓ Stay focused on a long-term goal rather than constantly changing strategy

## Strategy formulation styles

- **Survival Style: a company faces severe restrictions on its access to capital or other important resources**
  - The company should defensively focus on shoring up capital, cutting expenses, restructuring, etc., in order to be ready when the business environment improves and a longer-term strategy can be formulated.



## Pitfalls in Strategy formulation

- **Focusing only on a predicable environment**
  - Most companies explicitly or implicitly assume that their business environment is fairly predictable and use only classical or visionary styles as a result.
- **Inaccuracy in gauging the dimensions**
  - Executives often overestimate the predictability of the business environment and their ability to affect it
- **Relying on predefined timetables**
  - Use structured(e.g., annual) planning cycles even though the business environment may change more rapidly.
  - Does not take into account the dynamism of the business environment



## Pitfalls in Strategy formulation

- **Having a cultural mismatch**
  - Difficult to implement an adaptive style when the corporate culture does not support it
- **Relying on a single style for diverse divisions of a company**
  - A single style would be poor fit for the company that operates in many different industries or geographical regions.
- **A style that does not evolve with changes in industry life cycle**
  - Strategy formulation style may need to change as an industry evolves over its life cycle.

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## Approaches for equity valuation models

- **Bottom-up analysis** starts with analysis of an individual company or its reportable segments.
  - E.g. revenue projections based on historical revenue growth
- **Top-down analysis** begins with expectations about a macroeconomic variable (expected growth rate of nominal GDP).
  - E.g. revenue projections that are derived from an estimate of GDP growth and an expected relationship between GDP growth and company sales
- **Hybrid analysis** incorporates elements of both top-down and bottom-up analysis.
  - Hybrid analysis is the most common type
  - Highlight any inconsistencies in assumptions between the top-down and bottom-up approaches.



## Revenue forecast approaches

- Growth relative to GDP growth
  - "GDP growth plus x%" or "to increase at the growth rate of GDP times 1+x%".

$$g_{GDP}+x\% \text{ or } g_{GDP} *(1+x\%)$$

- Market growth and market share
  - Begins with an estimate of industry sales (market growth)
  - Company revenue is estimated as a percentage of industry sales
  - Market share times estimated industry sales provide the estimate of company revenues.

Note that different business or geographic segments may have significantly different relationship between GDP growth and revenue growth

## Economies of scale

- **Characteristics of economies of scale**
  - Higher operating margins (lower average cost) as production volume increases
  - Sales volume and margins will tend to be positively correlated
- **Economies of scale may appear**
  - When larger companies(i.e. companies with higher sales) in an industry have larger margins
  - Ones way to evaluate is to look at common-size income statements
    - ✓ Evidence of economies of scale in COGS: lower COGS as a proportion of sales for larger companies
    - ✓ Evidence of economies of scale in SG&A: Lower SG&A as a proportion of sales for larger companies



## Forecast COGS

- Forecast of gross margin should consider **the probability** that increasing or decreasing trend of a company's gross margin might continue
- Examine competitors gross margin to check the reasonableness of future gross margin
  - Differences between firms' business models may be the underlying reasons for differences in gross margin
  - Investigate any remaining differences
- Closer examination of the volume and price of a firm's inputs may improve the quality of a forecast of COGS, especially in the short run.
  - Fuel cost can be volatile and will have a significant impact on an airline's COGS, gross margin and net margins
  - Firms using forward contract or other derivative securities to hedge their future input costs
    - ✓ A hedge protects the firm's gross margins from declining when input prices rise
    - ✓ Protect the firm's gross margins from increasing when input prices fall
- Estimate of a firm's COGS may also be improved by forecasting COGS for the firm's various product categories and business segments separately

$$\text{forecast COGS} = (\text{historical COGS/ revenue}) \times (\text{estimate of future revenue})$$
$$\text{forecast COGS} = (1 - \text{gross margin}) \times (\text{estimate of future revenue})$$



## Forecast Selling General and Administrative Costs(SG&A)

- **SG&A operating expenses** are less sensitive to changes in sales volume than COGS
  - **Fixed component**: greater than variable cost component
    - ✓ R&D expenditures
      - ◆ set by management over a near-term horizon
      - ◆ uncorrelated with revenue.
    - ✓ Expenses for corporate headquarters expenses, management salaries, IT operations.
      - ◆ Grow gradually as the firm grows rather than being driven by changes in firm sales in the current period
  - **Variable component:** directly related to sales volumes
    - ✓ selling and distribution costs
- If segment information for SG&A is provided as a percentage of revenue, SG&A for each segment can be forecasted to produce better estimates of segment operating margins going forward

## Forecast Financing cost

- Financial structure includes both debt and equity financing
  - **Net debt:** gross debt minus cash, cash equivalents, and short-term securities
  - **Gross interest expense**: level of (gross) debt and market interest rates.
  - **Net interest expense:** gross interest expense minus interest income on cash and short-term debt securities.
- Analyst should also use any planned debt issuance or retirement and the maturity structure of existing debt (disclosed in footnotes to financial statements) to improve the forecasts of future financing cost.




## Example: Calculating gross and net interest rates

- **Atwood Inc. provided the following information:**

| $(000s) | 20x1 | 20x2 | Average* |
|---|---|---|---|
| Gross debt | 3,200 | 3,600 | 3,400 |
| Cash+ST securities | 800 | 700 | 750 |
| Net debt | 2,400 | 2,900 | 2,650 |
| Gross interest expense for 20x2 | | 220 | |
| Interest income for 20x2 | | 8 | |
| Net interest expense 20x2 | | 212 | |

***average values=(beginning value + ending value)/2**

- Calculate Atwood's 20x2 interest expense on average gross and average net debt and the yield on average cash balances.




## Example: Calculating gross and net interest rates

- **Answer**
  - Gross interest expense rate is 220/3,400 = 6.47%
  - Net interest expense rate is 212/2,650 = 8.00%
  - Yield on average cash balance is 8/750 = 1.07%

## Forecast Income tax expense

- There are three primary tax used in analysis
  - **Statutory rate**: the percentage tax charged in the country where the firm is domiciled
  - **Effective tax rate:** income tax expense as a percentage of pretax income on the income statement
  - **Cash tax rate:** cash taxes paid as a percentage of pretax income

- Changes in deferred tax items account for the difference between income tax expense and cash taxes due.
  - Income tax expense= cash tax due + changes in deferred tax liabilities — changes in deferred tax assets




## Comparisons among income tax expense

- Statutory and effective tax rates
  - Differ because there are expenses recognized in the income statement that are not deductible for tax purposes (a permanent difference)
  - A reconciliation of theses two rates is contained in the footnotes to financial statements
    - ✓ Provide information about one-time events as well as tax rates for the various tax jurisdictions the firm operates in.
  - The effective tax rate for a corporation that has taxable income in several countries will be a weighted average of the effective tax rates in each country
    - ✓ Effective tax rate will increase if a company has relatively higher(lower) earnings growth in a high tax country
- Analyst should pay special attention to estimates of tax rates for companies that consistently report an effective tax rate that is less than the statutory rate (or consistently less than that of comparable peer companies)




## Forecasting balance sheet items

- Many balance sheet items flow from the forecasted income statement items
  - net income less dividend declared flow through to retained earing
- **Working capital items:** forecast based on their historical relationship with income statement items
  - Inventory= forecasted annual COGS/ Inventory turnover ratio
  - Projected accounts receivable=(days sales outstanding)×(forecasted sales/365)
  - Estimate derived in this way preserve working capital items' relationship with income statement items
  - Absent any complicating factors, working capital items will increase at the same rate as revenue
- **PP&E: determined by depreciation and capital expenditure(capex)**
  - Assume PP&E will equal to its historical average proportion of sales(PP&E grows at the same rate as revenue)
    - ✓ Analyst can make more accurate projections of a company's future capital needs by incorporating the information of company's operations and future plans into the model.
  - Forecasts may be improved by analyzing **capital expenditures for maintenance** separately from **capital expenditures for growth**
    - ✓ Historical depreciation should be increased by inflation rate when estimating capital expenditure for maintenance.(replacement cost can be expected to increase with inflation)

## Forecasting balance sheet items

- **Sensitivity analysis**
  - Once the forecasted financial statement are constructed, an analyst should perform sensitivity analysis for individual assumptions, or perform analyses with alternative assumptions(scenario analysis), to examine the sensitivity of net income to changes in assumptions.



## Return on invested capital (ROIC)

- **The return on invested capital (ROIC)** can be calculated once financial projections are completed.
- **Invested capital:** operating assets minus operating liabilities
- **ROIC**=Net operating profit adjusted for taxes(NOPLAT)/ invested capital
  - ROIC is a return to both equity and debt and is preferable to ROE because it allows comparisons across firms with different capital structures.
  - Firms with higher ROIC (relative to their peers) are likely exploiting some competitive advantage in the production and /or sale of their products.
- **Return on capital employed**: similar to ROIC but uses pretax operating earnings in the numerator to facilitate comparison between companies that face different tax rate.



## Competitive position based on a Porter's five forces

- Companies have less (more)pricing power when the **threat of substitute products** is **high**(low) and **switching costs are low** (high)
- Companies have less(more) pricing power when the **intensity of industry rivalry** is **high** (low).
  - **Pricing power is low** when industry concentration is less, fixed costs and exit barriers are high, industry growth is slow or negative, and when products are not differentiated to a significant degree.
- Company prospects for earnings growth are lower when the **bargaining power of suppliers is high**.
  - Few suppliers are able to extract a larger portion of any value added.
  - Companies have less pricing power when the bargaining power of customers are high
  - Companies have more pricing power and better prospects for earnings growth when the threat of new entrants is low.

## Forecast sales and costs subject to price inflation and deflation

- Analyst should understand company's hedging and vertical integration
  - Hedge their exposure to changes in input prices through derivatives
  - Make fixed-price contract for future delivery
  - Switch to a substitute input. E.g. rising oil prices may lead power generation firms to switch from oil to natural gas.
- For a company that neither hedges input price exposure nor is vertically integrated, analyst should determine.
  - how rapidly, and to what extent, the increase in costs can be passed on to customers
  - expected effect of price increases on sales volume and sales revenue



## Forecast sales and costs subject to price inflation and deflation

- **Analyst should monitor input prices change**
  - Focus on significant factors affecting input prices
    - ✓ weather, the characteristics of input markets
    - ✓ Governmental regulation and taxation, tariffs
- **Analyst should estimate the effects of an increase in input prices**
  - Make assumptions on the company's pricing strategy
    - ✓ To preserve operating margins,company may cut other costs if the increase on input prices is temporary, which is not appropriate for long-term increases
  - The effects of price increases on unit sales
    - ✓ Depend on the product's **elasticity of demand**



## Forecast sales and costs subject to price inflation and deflation

- **Product's elasticity of demand**
  - With elastic demand, the percentage reduction in unit sales is greater than the percentage increase in price, a price increase will decrease total sales revenue
  - Price increase with cost per unit and unit sales do not decrease(this is unlikely), the operating profit is unchanged but gross margins, operating margins and net margins will fall.
  - Firms that are too quick to increase prices will experience declining sales volumes
  - Firms that are slow to increase price will experience declining gross margins

# Example: effect of price inflation

- Alfredo, Inc., sells a specialized network component. The firm's income statement for the past year is given below

**Alfredo, Inc., Income Statement for the Year Ended 20X1**

| Revenues | 1,000 units @ $100 | $100,000 |
|---|---|---|
| COGS | 1,000 units @ $40 | $ 40,000 |
| Gross profit | 1,000 units @ $60 | $ 60,000 |
| SG&A | | $ 30,000 |
| Operating profit | | $ 30,000 |

For 20X2, the input costs(COGS) will increase by $5 per unit.

1. Calculate the gross margin and operating margin for Alfredo, Inc., for 20X1.
2. Calculate the 20X2 gross margin and operating margin assuming that
   a. Entire increase in input cost is passed on to the customers through an equal increase in selling price. The number of units sold is not affected.
   b. Selling price is increased by 5% and the number of units sold decreases by 5%
   c. Selling price is increased by 5% and the number of units sold decreases by 10%




# Example: effect of price inflation

- **Answer:**

1. 20X1:

| Gross margin | Gross profit/sales | 60% |
|---|---|---|
| Operating margin | Operating profit/sales | 30% |

2. a 20X2, given an increase in unit price by $5 and no change in units sold:

| Revenues | 1,000 units @ $105 | $ 105,000 |
|---|---|---|
| COGS | 1,000 units @ $45 | $ 45,000 |
| Gross profit | | $ 60,000 |
| SG&A | | $ 30,000 |
| Operating profit | | $ 30,000 |
| Gross margin | | 57% |
| Operating margin | | 29% |




# Example: effect of price inflation

- **Answer:**

b 20X2, given an increase in unit price by $5 and a decrease of 50 in units sold:

| Revenues | 950 units @ $105 | $ 99,750 |
|---|---|---|
| COGS | 950 units@ $45 | $42,750 |
| Gross profit | | $57,000 |
| SG&A | | $30,000 |
| Operating profit | | $27,000 |
| Gross margin | | 57% |
| Operating margin | | 27% |

## Example: effect of price inflation

- **Answer:**

c 20X2, given an increase in unit price by $5 and a decrease of 100 in units sold:

| Revenues | 900 units @ $105 | $ 94,500 |
|---|---|---|
| COGS | 900 units@ $45 | $40,500 |
| Gross profit | | $54,000 |
| SG&A | | $30,000 |
| Operating profit | | $24,000 |
| Gross margin | | 57% |
| Operating margin | | 25% |




## Effects of technological development

- **Advances in technology** will:
  - Decrease costs of production, increase profit margins(at least for early adopters), increase industry supply and unit sales
  - Improved substitutes or wholly new products
    - ✓ Introduction of tablets created a substitute for desktop and laptop computers
    - ✓ Cannibalization factor: percentage of the market for the existing product that will be taken by the new substitute.
      - ◆ Different for different sales channels and is likely to be lower for business customers than for direct purchases by consumers
  - Disrupt the entire market
    - ✓ Digital photography has done in the camera and film industries




## Considerations in the choice of an explicit forecast horizon

- For buy-side analyst, **the appropriate forecast horizon** may simply be the expected holding period of a stock
- **Highly cyclical companies** present difficulties when choosing a forecast horizon
  - Long enough that the effects of the current phase of the economic cycle are not driving above-trend or below-trend earnings effects
  - Long enough to include the middle of a business cycle
  - Normalized earnings are expected mid-cycle earnings, or , alternatively, expected earnings when the current effects of events or cyclicality are no longer affecting earnings
  - Long enough to include the perceived benefits from events such as acquisitions, mergers, or restructurings

## Projections beyond the short-term forecast horizon

- Assume that a trend growth rate of revenue over the previous period will continue
- Estimating Pro forma financial results based on projection of each future period's revenue
- Using earnings or some measure of cash flow over forecast period
- Estimating terminal value
  - Relative valuation approach
    - ✓ Price multiples approach: ensure that the multiple used is consistent with the estimate of the company's growth rate and required rate of return
      - ◆ E.g. using the average P/E ratio over the last 10 years, presupposes that the growth in earnings and required rate of return of the stock will be the same over the previous 10 years



## Projections beyond the short-term forecast horizon

- Discounted cash flow approach
  - ✓ **Two key inputs:** cash flow or earnings measure and an expected future growth rate
    - ◆ Expected earnings/cash flow should be normalized to a mid-cycle value that is not affected by temporary initiatives and events
    - ◆ Small changes in the estimated (perpetual) growth rate of future earnings/cash flow can have large effects on estimated terminal values and current stock value
  - ✓ Recognizing **Inflection points**: those instances when the future will not be like the past, due to changes in a company's or an industry's competitive environment or changes in the overall economy
    - ◆ Changes in Overall economic environment
    - ◆ Changes in Business cycle stages
    - ◆ Changes in government regulations
    - ◆ Technology



## Sales-based pro forma company model

- Use segment information and create **segment forecasts** when the subject company has business or geographical segments that differ from each other in important respects
- Use **sensitivity analysis or scenario analysis** to estimate a range of possible outcomes and their probabilities when appropriate

## Sales-based pro forma company model

- **Steps in developing a sales-based pro forma model:**
  - Estimate revenue growth and future expected revenue (using market growth plus market share, trend growth rate, or growth relative o GDP growth)
  - Estimate COGS (based on a percentage of sales, or on a more detailed method based on business strategy or competitive environment)
  - Estimate SG&A (as either fixed, growing with revenue, or using some other estimation technique)
  - Estimate financing costs (using interest rates, debt levels, and the effects of any large anticipated increases or decreases in capital expenditures or anticipated changes in financial structure)
  - Estimate income tax expense and cash taxes (using historical effective rates and trends, segment information for different tax jurisdictions, and anticipated growth in high- and low-tax segments)




## Sales-based pro forma company model

- Estimate cash taxes, taking into account changes in deferred tax items
- Model the balance sheet based on items that flow from the income statement [working capital accounts (i.e. account receivable, accounts payable, and inventory)]
- Use depreciation and capital expenditures (for maintenance and for growth) to estimate capital expenditures and net PP&E for the balance sheet
- Use the completed pro forma income statement and balance sheet to construct a pro forma cash flow statement

Analyst should decide when additional or more complex analysis is warranted and when additional complexity in the estimation method provides real benefits in terms of improved forecasts and value estimates.




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# DDM formula

**Basic formula:**

$$V_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+r)^t}$$

➢**One-period DDM:**

$$V_0 = \frac{D_1 + P_1}{1+r}$$

➢**Two-period DDM:**

$$V_0 = \frac{D_1}{1+r} + \frac{D_2 + P_2}{(1+r)^2}$$

➢**Multi-period DDM:**

$$V_0 = \frac{D_1}{1+r} + \frac{D_2}{(1+r)^2} + \ldots + \frac{D_n + P_n}{(1+r)^n}$$




# The Gordon Growth Model

➢ ***Assumptions***

- The firm expects to pay a dividend, D, in one year
- dividends will grow at a constant rate, g, forever.
- The growth rate (g) is less than the required rate (r)

➢ ***The formula is as follows:***

$$V_0 = \frac{D_1}{r - g}$$

➢ ***Limitations***

- Very sensitive to estimates of r and g
- Difficult with non-dividend stocks
- Difficult with unpredictable growth patterns (use multi-stage model)




# The Gordon Growth Model

➢ ***The value of a firm's equity has two components***

1)The present value of a perpetual cash flow of equity

2)The present value of its present value of growth opportunities (**PVGO**)

$V_0 = E_0/r + PVGO$

**where: E=no-growth earnings level**

**r=required return on equity**

➢ ***Justified P/E***

- *leading* $P/E = P_0/E_1 = (1 - b) / (r - g)$
- *trailing* $P/E = P_0/E_0 = (1 - b)*(1 + g) / (r - g)$

# The Gordon Growth Model

- ***Strengths***
  - Applicable to stable, mature, dividend paying companies
  - Applicable for valuing market indices
  - Easily communicated and explained
  - Used to determine price-implied growth rates, required rates of return, and value of growth opportunities.
  - Supplement other, more complex valuation methods.
- ***Weaknesses***
  - Calculate values are very sensitive to the assumed growth rate and required rate of return
  - Not applicable to non-dividend paying stocks
  - Inapplicable to unstable growth, dividend-paying stocks




# Discounted cash flow models

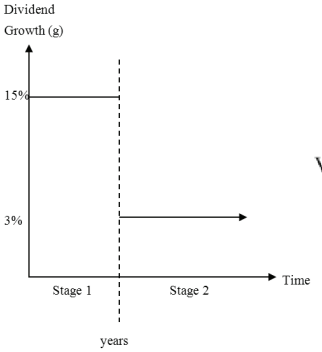
- **Valuing Preferred Stock**
  - The preferred stock holders are promised to receive a stated dividend for an infinite period.
  - Preferred stock is perpetuity since it has no maturity.
  - Valuation model of a preferred stock:

$$V_p = \frac{D_p}{(1+k_p)} + \frac{D_p}{(1+k_p)^2} + \cdots + \frac{D_p}{(1+k_p)^N} = \frac{D_p}{k_p}$$




# Multistage Dividend Discount Models

- *Two-stage DDM*: the growth rate starts at a high level for a relatively short period of time, then reverts to a long-run perpetual level



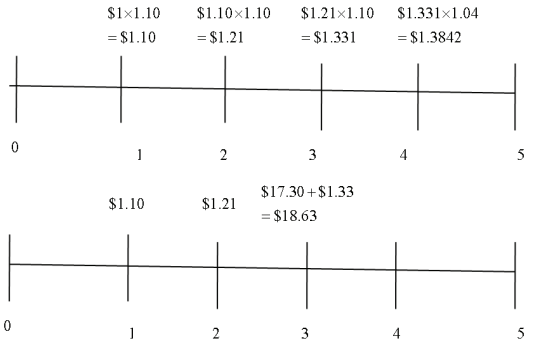

$$V_0 = \left[\sum_{t=1}^{n} \frac{D_0(1+g_S)^t}{(1+r)^t}\right] + \left[\frac{D_0 \times (1+g_S)^n \times (1+g_L)}{(1+r)^n \times (r-g_L)}\right]$$

# Multistage Dividend Discount Models

➢ ***Two-stage DDM***

Example: Calculating value with a two-stage DDM

Sea Island Recreation currently pays a dividend of $1.00. An analyst forecasts growth of 10 percent for the next three years, followed by 4 percent growth in perpetuity thereafter. The required return is 12 percent. Calculate the current value per share.

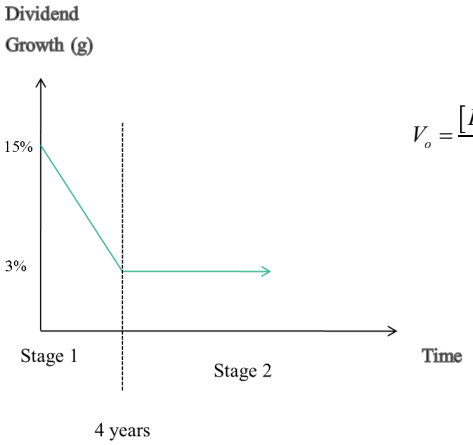






# Multistage Dividend Discount Models

➢ ***H-Model*** : the growth rate starts out high, and then *declines linearly* over the high-growth stage until it reaches the long-run average growth rate




$$V_o = \frac{[D_0 \times (1+g_L)] + [D_0 \times H(g_s - g_L)]}{r - g_L}$$

$$H = \frac{t}{2}$$




# Multistage Dividend Discount Models

## *H-Model*

➢***Example: Calculating value with the H-model***

Omega Foods currently pays a dividend of €2.00. The growth rate, which is currently 20 percent, is expected to decline linearly over the next 10 years to a stable rate of 5 percent thereafter. The required return is 12 percent. Calculate the current value of Omega.

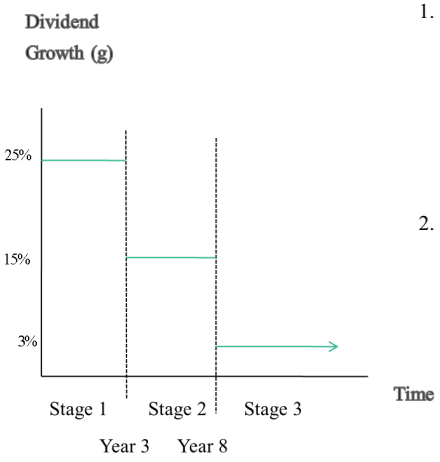
➢***Answer:***

$$V_0 = \frac{2 \times 1.05}{0.12 - 0.05} + \frac{2 \times (\frac{10}{2}) \times (0.2 - 0.05)}{0.12 - 0.05} = 30 + 21.43 = 51.43$$

Remember that the H-model provides only an approximation of the value of Omega shares. To find the exact answer, we'd have to forecast each of the first ten dividends, applying a different growth rate to each, and then discount them back to the present at 12 percent. In general, the H-value approximation is more accurate the shorter the high-growth period, t, and/or the smaller the spread between the short-term and long-term growth rates, $g_S$-$g_L$

# Multistage Dividend Discount Models

➢ ***Three-stage DDM***: the growth rate fits the three growth stages




1. R&M has a current dividend of $1.00 and a required rate of return of 12 percent. A dividend growth rate of 15 percent is projected for the next two years, followed by a 10 percent growth rate for the next four years before settling down to a constant 4 percent growth rate thereafter. Calculate the current value of R&M.
2. As an analyst, you have gathered the following information on a company you are tracking. The current annual dividend is 0.75. Dividends are expected to grow at a rate of 12 percent over the next three years, decline linearly to 4 percent over the next six years, and then remain at a long-term equilibrium growth rate of 4 percent in perpetuity. The required return is 9 percent. Calculate the value of the company.




# Multistage Dividend Discount Models

➢ ***Answer 1:***

**Relevant Cash Flows for R&M Example**

| *Time* | *Value* | *Calculation* | $D_t$ *or* $V_t$ |
|---|---|---|---|
| **1** | D1 | $1.00(1.15) | $1.150 |
| **2** | D2 | $1.150(1.15) | $1.323 |
| **3** | D3 | $1.323(1.10) | $1.455 |
| **4** | D4 | $1.455(1.10) | $1.600 |
| **5** | D5 | $1.600(1.10) | $1.760 |
| **6** | D6+V6 | $1.760(1.10)+ $1.760(1.10)(1.04)/(0.12-0.04) | $27.104 |

Now we enter the cash flows into our calculator, noting that the total cash flow at Time 6 is $1.936+ $25.168 = $27.104: CF0 = 0;C01 = 1.150; C02 = 1.323;C03 = 1.455; C04= 1.600;C05= 1.760; C06= 27.104; I= 12;CPT→NPV= 18.864.
According to the three-stage model, R&M is worth $18.864 today.




# Multistage Dividend Discount Models

➢ ***Answer 2:***

Let's start by valuing the last two stages using the H-model. We know that:

$$V_3 = \frac{\left[D_3 \times (1+g_L)\right] + \left[D_3 \times H(g_S - g_L)\right]}{r - g_L}$$

$$D_3 = D_0\ (1+g_S)^3 = \$0.75\ (1.12)^3 = \$1.0537$$

It follows that:

$$V_3 = \frac{\left[\$1.0537 \times (1.04)\right] + \left[\$1.0537 \times \frac{6}{2} \times (0.12 - 0.04)\right]}{0.09 - 0.04} = \$26.9747$$

Now we have a series of three cash flows to discount in order to find the current value of the stock, and our financial calculator does the rest of the work.
CF0 = 0; C01 = D1 = $0.75(1.12) = $0.84; C02 = D2= $0.75(1.12)2 = $0.9408;
and C03 = D3 + V3= $ 1.0537 + $26.9747 = $28.0284; I = 9;
CPT →NPV = 23.2056.
The price of the stock is $23.2056.

# Multistage Dividend Discount Models

➢ ***Spreadsheet modeling***

- In practice we can use spreadsheets to model ***any pattern of dividend growth*** we'd like with different growth rates for each year because the spreadsheet does all the calculations for us.
- It can involve a great deal of information and can ***project different growth rates*** for differing periods.
- The reason for this is the ***inherent flexibility and computational accuracy*** of spreadsheet modeling.




# Growth phase, Transitional phase, and Maturity phase

| Variable | Growth Phase | | |
|---|---|---|---|
| | Initial Growth | Transition | Maturity |
| Earnings Growth | • Very high | • Above average but falling | • Stable at long-run level |
| Capital Investment | • Significant requirements | • Decreasing | • Stable at long-run level |
| Profit Margin | • High | • Above average but falling | • Stable at long-run level |
| FCFF | • Negative | • May be positive and growing | • Stable at long-run level |
| ROE Vs. Required Return | • ROE > r | • ROE approaching r | • ROE = r |
| Dividend payout | • Low or zero | • Increasing | • Stable at long-run level |
| Appropriate Model | • Three-stage | • Two-stage | • Gordon growth |




# The Financial Determinants of Growth Rates

➢ *SGR* (sustainable growth rate) : the rate at which earnings can continue to grow indefinitely.

SGR = b * ROE b: (1 – dividend payout rate)

➢ *PRAT Model*: where SGR is a function of the profit margin (P), the retention rate (R), the asset turnover (A), and the degree of financial leverage (T).

g = ((net income – dividends)/net income) * profit margin * the asset turnover * financial leverage

# Equity analysis

- **Ratio analysis**
  - From global industry points of view: analysts should make the comparisons of each firm in the industry against the benchmark industry average
- **DuPont model**
  - is commonly used to analyze past performance
  - $ROE = \frac{NI}{equity} = \frac{NI}{EBT} \times \frac{EBT}{EBIT} \times \frac{EBIT}{Sales} \times \frac{Sales}{assets} \times \frac{assets}{equity}$
  - ROE = tax retention rate * interest burden * operating margin * asset turnover * leverage




# Multistage Dividend Discount Models

- ***Example: Calculating value with a two-stage DDM***

Given the following partial balance sheets and income statement for Horizons Company, calculate three components of the ROE (using the DuPont model) and the sustainable growth rate for 2008 based on beginning balance sheet values. Assume the dividend payout ratio is 30%. All values are in millions of USD.

Far Horizons Income Statement

| Income statement for fiscal year 2008 | |
|---|---|
| **Sales** | $40.0 |
| **Net income** | $1.8 |




# Multistage Dividend Discount Models

***Far Horizons Balance Sheet***

| Balance sheet fiscal year end 2007 and 2008 | | | | | |
|---|---|---|---|---|---|
| | 2007 | 2008 | | 2007 | 2008 |
| **Assets** | $30 | $50 | **Liabilities** | $10.0 | $20.0 |
| | | | **Equity** | 20.0 | 30.0 |
| **Total** | $30.0 | $50.0 | **Total** | $30.0 | $50.0 |

- ***Answer:***

$$\text{profit margin} = \frac{\$1.80}{\$40.00} = 0.045 = 4.5\%$$

$$\text{asset turnover} = \frac{\$40.00}{\$30.00} = 1.333$$

$$\text{financial leverage} = \frac{\$30.00}{\$20.00} = 1.5$$

$$ROE = 0.045 \times 1.333 \times 1.5 = 0.09 = 9.0\%$$

$$g = ROE \times b = 0.09 \times (1 - 0.30) = 6.3\%$$

## Summary of Readings and Framework

**SS 10**

- R29 Equity Valuation: Applications and Processes
- R30 Return Concepts

**SS 11**

- R31 The Five Competitive Forces that Shape Strategy
- R32 Your Strategy Needs a Strategy
- R33 Industry and Company Analysis
- R34 Discounted Dividend Valuation

**SS 12**

- R35 Free Cash Flow Valuation
- R36 Market-Based Valuation: Price and Enterprise Value Multiples
- R37 Residual Income Valuation
- R38 Private Company Valuation



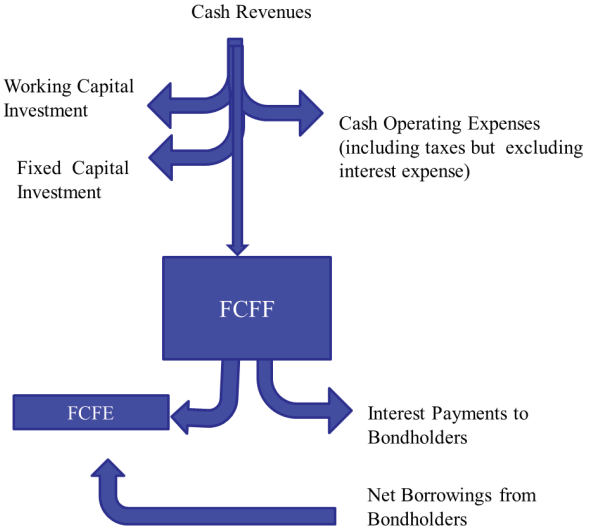
## Introduction to Free Cash Flows

➢ **The reason for Using Free Cash Flow(FCFF/FCFE):**

- Many firms pay ***no, or low, cash dividends***.
- Dividends are paid at the ***discretion of the board of directors***. It may, consequently, be poorly aligned with the firm's long-run profitability.
- If a company is viewed as an acquisition target, free cash flow is a more appropriate measure because the new owners will have ***discretion over its distribution*** (control perspective).
- Free cash flows may be more related ***to long-run profitability*** of the firm as compared to dividends.



## Introduction to Free Cash Flows



## Introduction to Free Cash Flows

➢ **The Choice of using FCFF or FCFE**

- FCFE is ***easier and more straightforward*** to use in cases where the company's capital structure is not particularly volatile.
- If a company has ***negative FCFE and significant debt outstanding, FCFF*** is generally the best choice

Equity value=Firm value – Market value of debt




## FCFF and FCFE Valuation Approaches

➢ 1) ***FCFF***: the cash flow available to all of the firm's investors (stock holders and bondholders) after all operating expenses (including tax) have been paid and necessary investments in working capital and fixed capital have been made.

- The value of the firm is estimated as the present value of the expected future
- FCFF discounted at the **WACC:**

$$FCFF_t = FCFF_{t-1} \times (1+g)$$

- Constant Growth Valuation Model

$$\text{Firm Value} = FCFF_1 / (WACC-g) = FCFF_0(1+g) / (WACC-g)$$




## FCFF and FCFE Valuation Approaches

➢ 2) ***FCFE***: the cash flow from operations minus capital expenditures minus payments to (and plus receipts from) debt-holders.

- The value of equity: the present value of the expected future FCFE discounted at the required return on equity(r).

$$FCFE_t = FCFE_{t-1} \times (1+g)$$

- The methods to estimate r:

**CAPM, APT, the Gordon growth model, and a build-up method**

- Constant Growth Valuation Model

$$\text{Equity Value} = FCFE_1 / (r-g)$$

$$= FCFE_0(1+g) / (r-g)$$

## FCFF and FCFE Valuation Approaches-Summary

- **FCFF**
  - From NI: $FCFF=(NI+NCC-WC_{INV})+Int\times(1-T)-FC_{INV}$
  - From EBIT: $FCFF=EBIT\times(1-T)+Dep-FC_{INV}-WC_{INV}$
  - From EBITDA: $FCFF=EBITDA\times(1-T)+Dep\times T-FC_{INV}-WC_{INV}$
  - From CFO: $FCFF=CFO+Int\times(1-T)-FC_{INV}$




## FCFF and FCFE Valuation Approaches-Summary

- **FCFE**
  - From NI: $FCFE=NI-(1-DR)\times(FC_{INV}-Dep)-(1-DR)\times WC_{INV}$
  - From EBIT: $FCFE=EBIT\times(1-T)-Int\times(1-T)+Dep-FC_{INV}-WC_{INV}+Net\ Borrowing$
  - From EBITDA: $FCFE=EBITDA\times(1-T)-Int\times(1-T)+Dep\times T-FC_{INV}-WC_{INV}+Net\ Borrowing$
  - From CFO: $FCFE=CFO-FC_{INV}+Net\ Borrowing$
  - From FCFF: $FCFE=FCFF-Int\times(1-T)+Net\ Borrowing$
  - Given Debt ratio: $FCFE=NI+Dep-WC_{Inv}-FC_{Inv}+(WC_{Inv}+FC_{Inv}-Dep)\times DR$




## Calculating FCFF From EBIT and EBITDA

***1. From NI:***

$$FCFF=(NI+NCC-WC_{INV})+Int\times(1-T)-FC_{INV}$$

***2. From EBIT:***

$$FCFF=EBIT\times(1-T)+Dep-FC_{INV}-WC_{INV}$$

***3. From EBITDA:***

$$FCFF=EBITDA\times(1-T)+Dep\times T-FC_{INV}-WC_{INV}$$

$$NI=(EBIT-Int)(1-T)=EBIT\times(1-T)-Int\times(1-T)$$
$$=(EBITDA-Dep-Int)(1-T)$$
$$=EBITDA\times(1-T)-Dep\times(1-T)-Int\times(1-T)$$

# Calculating FCFF From CFO

**4. Relationship between FCFF and CFO**

➢ ***From CFO:***

$$CFO = NI + NCC - WC_{Inv}$$

FCFF= CFO + Interest expense * (1- tax rate) - Investment in fixed capital

$$\text{or } FCFF = CFO + Int \times (1 - T) - FC_{Inv}$$

➢ **Attentions:**

Whether interest expense or dividend was taken out of net income and out of CFO
If yes, add it back
If no, keep it in and no need to add it back, thus avoiding double calculation.



# NCC (Non-cash charges) Adjustments

***Issue #1: NCC (Non-cash charges) adjustments for FCFF***

- The most significant noncash charge is usually ***depreciation*** (add back).
- ***Amortization of intangibles*** should be added back to net income, much like depreciation.
- Provisions for ***restructuring charges and other noncash losses*** should be added back to net income. If the firm is accruing these ***costs to cover future cash outflows***, then the forecast of future free cash flow should be reduced accordingly.
- Gains and losses on sale of long-term assets are also removed (they would be accounted for under fixed capital investment).



# NCC (Non-cash charges) Adjustments

***Issue #1: NCC (Non-cash charges) adjustments for FCFF***

- Income from ***restructuring charge*** reversals and other noncash gains should be subtracted from net income.
- The amortization of a ***bond discount*** should be added back to net income, and the accretion of the ***bond premium*** should be subtracted from net income to calculate FCFF.
- ***Deferred taxes***, which result from differences in the timing of reporting income and expenses for accounting versus tax purposes, must be carefully analyzed.
  - ✓ Over time, differences between book and taxable income should offset each other and have no significant effect on overall cash flows.
  - ✓ If, however, the analyst expects deferred tax liabilities to continue to increase (i.e., not reverse), increases in deferred tax liabilities should be added back to net income.
  - ✓ Increases in deferred tax assets that are not expected to reverse should be subtracted from net income.

## Example: NCC (Non-cash charges) Adjustments

- **Example: use the following information to answer Questions 17 through 19.**
  Meyer Henderson, CFA, is analyzing the financials of Roth Department Stores. He intends to use a free cash flow to the firm (FCFF) model to value Roth's common stock. In the 2007 financial statements and footnotes he has identified the following items:
  - Item #1: Roth reported depreciation and software amortization of $23 million in 2007.
  - Item #2: The deferred tax liability increased by $17 million in 2007.
  - Item #3: Roth reported income of $6 million in 2007 from the reversal of previous restructuring charges related to store closings in 2006.



## Example: NCC (Non-cash charges) Adjustments

- **Example: use the following information to answer Questions 17 through 19.**
  - Item #4: Net income totaled $173 million in 2007.
  - Item #5: The net increase in noncash net working capital accounts was $47 million in 2007.
  - Item #6: Net capital spending totaled $86 million in 2007.
  - Item #7: Roth reported interest expense of $19 million.
- **Answer**
  - Henderson estimated Roth's marginal tax rate to be 35%. He also expects Roth to be profitable for the foreseeable future, so he does not expect the deferred tax liability to reverse. As the base-year projection for his FCFF valuation, Henderson calculates FCFF for 2007 as:

**FCFF2007 = $173 + $23 - $6 + $17 + [$19(1- 0.35)] - $86 - $47 = $86.35 million**



## $WC_{INV}$ Calculation

***Issue #2: Calculation $WC_{Inv}$***

- The investment in net working capital is equal to the change in working capital.

$$WC_{INV} = WC_t - WC_{t-1}$$

- Excluding ***cash, cash equivalents, notes payable, and current portion of long-term debt***.
- + sign in front of a reduction in working capital

# $FC_{INV}$ Calculation

***Issue #3: Calculation $FC_{Inv}$***

- Fixed capital investment is a net amount: It is equal to the difference between capital expenditures (investments in long-term fixed assets) and the proceeds from the sale of long-term assets:

  **$FC_{Inv}$ = Capital Expenditure – Proceeds from sales of long-term assets**

- Both capital expenditures and proceeds from long-term asset sales (if any) are likely to be reported on the firm's statement of cash flows.




# FCINV Calculation

**Pay attention to** $FC_{INV}$

- If ***no long-term assets were sold*** during the year, then capital expenditures will also equal the ***change in the gross PP&E account*** from the ***balance sheet***:
  - $FC_{Inv}$ = Capital Expenditure =gross $PP\&E_t$ – gross $PP\&E_{t-1}$
  - $FC_{Inv}$ = net $PP\&E_t$ – net $PP\&E_{t-1}$ + depreciation
- ***The difference between gross PP&E and net PP&E is depreciation***
  - gross $PP\&E_t$ = net $PP\&E_t$ + accumulate depreciation
  - "depreciation" defines to the depreciation from time t-1 to time t
  - Does "depreciation" equal to "accumulate depreciation" ?




# Forecasting Free Cash Flow

**Pay attention to** $FC_{INV}$

- If ***long-term assets were sold*** during the year:
  - Items in the cash statement
    - ✓"Purchase of fixed assets"
    - ✓"Purchase of PP&E"
    - ✓"Proceeds from disposal of fixed assets"

  FCInv = Capital Expenditure – Proceeds from sales of long-term assets
  - Not given directly, find gain (loss) on asset sales from the income statement and PP&E figures from balance sheet:

$FC_{Inv}$ =$BV_1$+Dep-$BV_0$-gain, CFI=-($BV_1$+Dep-$BV_{0)}$+gain

$$FCFF=\left(NI+NCC-WC_{INV}\right)+Int\times(1-T)-FC_{INV}$$
$$=NI-WC_{INV}+Int\times(1-T)+(Dep-gain)-(BV_1+Dep-BV_0-gain)$$
$$=NI-WC_{INV}+Int\times(1-T)-(BV_1-BV_0)$$

# Example: Calculating FCINV with no long-term asset sales

- Example (1): Airbrush, Inc. financial statements for 2009 include the following information:

| | 2009 | 2008 |
|---|---|---|
| **Gross PP&E** | 5,000 | 4,150 |
| **Accumulated depreciation** | 1,500 | 1,200 |
| **Net PP&E** | 3,500 | 2,950 |

There were no sales of PP&E during the year; depreciation expense was $300. Calculate Airbrush's FCINV for 2009.

- Answer:

FCINV =ending gross PP&E-beginning gross PP&E =capital expenditures = $5,000 - $4,150 = $850




# Example: Calculating FCINV with long-term asset sales

- Example (2): Calculating FCINV with long-term asset sales

Use the same information for Airbrush, Inc. as in the previous example, but now also suppose that the company reports capital expenditures of $1,400, long-term asset sales of $600, and depreciation expense of $850. The long-term assets sold were fully depreciated. Calculate Airbrush's revised FCINV for 2009.

- Answer:

Revised FCINV = capital expenditures – proceeds from sales of long-term assets = $1,400 -$600 =$800




# Example: Calculating FCFF

- **Example (3): Given the following information, calculate FCFE:**
  - Net income = $50.
  - Working capital investment = $4.
  - Beginning gross fixed assets = $90; ending gross fixed assets = $136.
  - Beginning accumulated depreciation = $30; ending accumulated depreciation = $40.
  - Depreciation expense = $27.
  - Capital expenditures = $65.
  - Net borrowing = $0.
  - In addition, a piece of equipment with an original book value of $19 was sold for $10. The equipment had a book value at the time of the sale of $2. The gain was classified as unusual. Free cash flow to equity is closest to:

**A. $6** **B. $10** **C. $18**

- **Answer:**
  - B Recognize that the firm generated $10 in cash and a noncash $8 gain on the sale of the equipment. Then calculate FCFE as NI plus depreciation minus the noncash gain minus FCInv minus WCInv + net borrowing:

**FCFE = $50 + $27 - $8 - ($65-$10) - $4 + $0 = $10**

# Calculating FCFE

***Issue #4: net borrowing***

***FCFE:***

- From FCFF: $FCFE = FCFF - Int \times (1-T) + Net\ Borrowing$
- From CFO: $FCFE = CFO - FC_{INV} + Net\ Borrowing$
- From NI: $FCFE = NI + Dep - FC_{INV} - WC_{INV} + Net\ Borrowing$
- Preferred Stock: $FCFE = FCFF - Int \times (1-T) - Div_{pre} + Net\ Borrowing$

➢ **Net Borrowing = long- and short-term new debt**
**– long- and short-term debt repayments**



# Calculating FCFE

***Issue #5: Free Cash Flow with Preferred Stocks***

➢ Remember to treat preferred stock just ***like debt***, except preferred dividends are ***not tax deductible***.

- Preferred Stock:

$$FCFF = (NI + NCC - WC_{INV}) + Int \times (1-T) + Div_{pre} - FC_{INV}$$
$$FCFE = FCFF - Int \times (1-T) - Div_{pre} + Net\ Borrowing$$



# Example: Calculating FCFF with Preferred Stock

➢ An analyst following Barlow Energy has compiled the following information in preparation for additional analysis she has to include in a report she has been asked to produce (data is in hundreds of millions of $):

| Security Type | Market Value | Before-Tax Required Return |
|---|---|---|
| Preferred stock | 200 | 7.0% |
| Bonds | 600 | 7.5% |
| Common Stock | 700 | 14.0% |
| Total | 1500 | |

- Bonds are trading at par.
- Preferred share dividends: $14
- Net income available to common: $125
- Investment in working capital: $30
- Investment in fixed capital: $100
- Net new borrowing: $40
- Depreciation: $50
- Tax rate: 40%

The current FCFF for Barlow Energy is closest to:

A. $36 B. $62 C.$86

## Example: Calculating FCFF with Preferred Stock

➢**Answer:**

Solution: C

- C With the bonds trading at par, the interest expense is based on the before-tax yield:

$$\text{interest} = \$600 \times 0.075 = \$45$$

- Add back preferred dividends to net income available to common to get FCFF:

FCFF = NI (available to common) + NCC + [Int × (1- tax rate)] + preferred dividends
$-FC_{Inv} - WC_{Inv}$

FCFF= 125 +50+[45×(1- 0.40)]+14-100-30=$86




## Calculating FCFE with Target Capital Structure

***Issue #6: Target Debt Ratio***

- If a target debt ratio exists, Net borrowing = $(WC_{Inv} + FC_{Inv} - Dep) \times DR$
- To calculate historical FCFE and apply some constant growth rate.
- To forecast the components of free cash flow. e.g. one popular method is to forecast: the individual components of free cash flow – EBIT (1-T), net noncash charges, investment in fixed capital, investment in working capital, and net borrowing.

➢***Estimating net borrowing***

$$FCFE = NI + Dep - WC_{Inv} - FC_{Inv} + (WC_{Inv} + FC_{Inv} - Dep) \times DR$$
$$= NI - WC_{Inv} \times (1- DR) - (FC_{Inv} - Dep) \times (1- DR)$$

*DR: target debt ratio*

$$\text{Net borrowing} = (WC_{Inv} + FC_{Inv} - Dep) \times DR$$




## Forecasting Free Cash Flow

- Dividends, share repurchases, and share issues have ***no effect*** on FCFF and FCFE; leverage changes have only a ***minor effect*** on FCFE and no effect on FCFF
- Net income is a ***poor*** proxy for FCFE, and EBITDA is a ***poor*** proxy for FCFF

# Example: Calculating FCFF and FCFE

- Anson Ford, CFA, is analyzing the financial statements of Sting's Delicatessen. He has a 2009 income statement and balance sheet, as well as 2010 income statement, balance sheet, and cash flow from operations forecasts (as shown in the tables below). Assume there will be no sales of long-term assets in 2010. Calculate forecasted free cash flow to the firm (FCFF) and free cash flow to equity (FCFE) for 2010.

| Income Statement | | |
|---|---|---|
| | 2010 Forecast | 2009 Actual |
| Sales | $300 | $250 |
| Cost of goods sold | 120 | 100 |
| Gross profit | 180 | 150 |
| SG&A | 35 | 30 |
| Depreciation | 50 | 40 |
| EBIT | 95 | 80 |
| Interests expense | 15 | 10 |
| Pre-tax earnings | 80 | 70 |
| Taxes (at 30%) | 24 | 21 |
| Net income | $56 | $49 |




# Example: Calculating FCFF and FCFE

| Balance Sheet | | |
|---|---|---|
| | 2010 Forecast | 2009 Actual |
| Cash | $10 | $5 |
| Accounts receivable | 30 | 15 |
| Inventory | 40 | 30 |
| Current assets | 80 | 50 |
| Gross property, plant and equipment | 400 | 300 |
| Accumulated depreciation | -190 | -140 |
| **Total assets** | **290** | **210** |
| Accounts payable | 20 | 20 |
| Short-term debt | 20 | 10 |
| Current Liabilities | 40 | 30 |
| Long-term debt | 114 | 100 |
| Common stock | 50 | 50 |
| Retained earnings | 86 | 30 |
| Total liabilities and owners' equity | 290 | 210 |




# Example: Calculating FCFF and FCFE

| Cash Flow From Operations Forecasts for 2010 | |
|---|---|
| Net income | $56 |
| + depreciation | 50 |
| - $WC_{INV}$ | 25 |
| Cash flow from operations | $81 |

**Answer**

- Fixed capital investment is equal to capital expenditures (because there are no asset sales), which is equal to the change in gross PP&E:

$$\mathbf{FC_{Inv} = 400 - 300 = 100}$$

- Working capital investment is the change in the working capital accounts, excluding cash and short-term borrowings:

$WC_{Inv}$ = (AcctsRec2010 + Inv2010 - AcctsPay2010) - (AcctsRec2009 + Inv2009 – AcctsPay2009)

$WC_{Inv}$ = (30 + 40 - 20) - ( 15 + 30 - 20) = 50 – 25 = 25

## Example: Calculating FCFF and FCFE

- Given that depreciation is the only noncash charge, we can calculate FCFF from net income:

$$\begin{aligned} FCFF &= NI + NCC + [Int \times (1 - \text{tax rate})] - FC_{Inv} - WC_{Inv} \\ &= 56 + 50 + [15 \times (1 - 0.3)] - 100 - 25 = -8.5 \\ &= 56 + 50 + 10.5 - 100 - 25 = -8.5 \end{aligned}$$

- Its entirely possible that FCFF can be negative in the short term. Well talk more later about how to value firms with negative FCFF.
- Net borrowing is the difference between the long-term and short-term debt accounts:

$$\text{Net Borrowing} = (114 + 20) - (100 + 10) = 24$$

$$\begin{aligned} FCFE &= FCFF - [Int \times (1 - \text{tax rate})] + \text{net borrowing} \\ &= -8.5 - 10.5 + 24 = 5 \end{aligned}$$



## Free Cash Flow Model Variations

➢ ***Single-Stage Model***

$$\textit{For FCFF valuation:} \quad V_o = \frac{FCFF_1}{WACC - g} \qquad \text{Firm Value}$$

$$\textit{For FCFE valuation:} \quad V_o = \frac{FCFE_1}{r - g} \qquad \text{Equity Value}$$

- The importance of various forecasting errors can be assessed through comprehensive sensitivity analysis



## Example (1): Single-Stage Model

➢ ***Example*: Calculating firm value with a single-stage FCFF model**

Knappa Valley Winery's (KVW) most recent FCFF is $5,000,000. KVW's target debt-to-equity ratio is 0.25. The market value of the firm's debt is $10,000,000, and KVW has 2,000,000 shares of common stock outstanding. The firm's tax rate is 40 percent, the shareholders require a return of 16 percent on their investment, the firm's before-tax cost of debt is 8 percent, and the expected long-term growth rate in FCFF is 5 percent. Calculate the value of the firm and the value per share of the equity.

# Example (1): Single-Stage Model

➢ ***Answer:***

Note that the problem gives the FCFF in the most recent year ($FCFF_0$). Therefore, you need to increase $FCFF_0$ at the growth rate by one year (at the 5% rate) to get $FCFF_1$.

let's calculate the WACC. The target debt-to-equity ratio is 0.25. This implies that for every $1 of debt, there is $4 of equity, for total capital of $5. Since total assets equals total capital, it follows that the target debt-to-asset ratio is 1/5, or 20%, and the target equity-to-asset ratio is 4/5, or 80%.The WACC is:

$$WACC = (0.8 \times 0.16) + [0.20 \times 0.08(1 - 0.40)] = 0.1376 = 13.76\%$$

We can now calculate the value of the firm as:

$$\text{Value of firm} = \frac{5,000,000 \times 1.050}{0.1376 - 0.050} = \$59,931,507$$

Given that debt is worth $10,000,000, the implied total value of the equity is:

$$\text{Value of equity} = \$59,931,507 - \$10,000,000 = \$49,931,507$$

With 2,000,000 shares outstanding, the value of the equity per share is:

$$\frac{\$49,931,507}{2,000,000} = \$24.97$$

Notice that the actual debt-to-equity ratio (10,000,000/49,931,507 = 0.20) does not equal the target ratio of 0.25. There is nothing inconsistent in this example. WACC is usually calculated using target capital weights.



# Example (2): Single-Stage Model

➢ ***Example*: Calculating value with a single-stage UCUE model**

Ridgeway Construction has an FCFE of 2.50 Canadian dollars (C$) per share and is currently operating at a target debt-to-equity ratio of 0.4. The expected return on the market is 9 percent, the risk free rate is 4 percent, and Ridgeway has a beta of 1.5. The expected growth rate of FCFE is 4.5 percent. Calculate the value of Ridgeway stock.

➢ ***Answer:***

Begin by computing the required return on equity with the CAPM:

$$r = 0.04 + [1.50 * (0.09 - 0.04)] = 0.115 = 11.5\%$$

Note that the problem gives FCFE in the most recent year (FCFE0). The model calls for the FCFE next year, witch is FCFE1. Therefore, you need to multiply FCFE0 by one plus the growth rate to get FCFE1. The equity value per share is:

$$\text{Equity value per share} = \frac{C\$2.50 \times 1.045}{0.115 - 0.045} = C\$37.32$$



# Free Cash Flow Model Variations

➢ ***Two-Stage Model***

- ***Step 1***: Calculate FCF in high-growth period
- ***Step 2***: Use single-stage FCF model for terminal value at end of high-growth period

$$\text{terminal value} = \frac{FCFF_{t+1}}{WACC - g}$$

- ***Step 3***: Discount interim FCF and terminal value to time zero to find stock value; use WACC for FCFF, r for FCFE

$$\text{Value of the firm} = \frac{FCFF_1}{1 + WACC_h} + \frac{FCFF_2}{(1 + WACC_h)^2} \cdots \frac{FCFF_t + \text{terminal value}}{(1 + WACC_h)^t}$$

$$\text{Value of equity} = \frac{FCFE_1}{1 + r_h} + \frac{FCFE_2}{(1 + r_h)^2} \cdots \frac{FCFE_t + \text{terminal value}}{(1 + r_h)^t}$$

# Example: Two-Stage Model

➢ ***Example*:**

The Prentice Paint Company earned a net profit margin of 20% on revenues of $20 million this year. Fixed capital investment was $2 million, and depreciation was $3 million. Working capital investment equals 7.5% of sales every year. Net income, fixed capital investment, depreciation, interest expense, and sales are expected to grow at 10% per year for the next five years . After five years, the growth in sales, net income, fixed capital investment, depreciation , and interest expense will decline to a stable 5% per year. The tax rate is 40%, and Prentice has 1 million shares of common stock outstanding and long-term debt paying 12.5% interest trading at its par value of $32 million. Calculate the value of the firm and its equity using the FCFF model if the WACC is 17% during the high-growth stage and 15% during the stable stage.




# Example: Two-Stage Model

➢ ***Answer:***

The components of FCFF are calculated in the following table.

FCFF for Years 0 Through 6 (in per-share amounts of $)

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Sales($) | 20.00 | 22.00 | 24.20 | 26.62 | 29.28 | 32.21 | 33.82 |
| Net Income | 4.00 | 4.40 | 4.84 | 5.32 | 5.86 | 6.44 | 6.76 |
| Interest(1-T) | 2.40 | 2.64 | 2.90 | 3.19 | 3.51 | 3.87 | 4.06 |
| Depreciation | 3.00 | 3.30 | 3.63 | 3.99 | 4.39 | 4.83 | 5.07 |
| $FC_{Inv}$ | 2.00 | 2.20 | 2.42 | 2.66 | 2.93 | 3.22 | 3.38 |
| $WC_{Inv}$ | 1.50 | 1.65 | 1.82 | 2.00 | 2.20 | 2.42 | 2.54 |
| FCFF | $5.90 | $6.49 | $7.13 | $7.84 | $8.63 | $9.50 | $9.97 |

**Step 2**

Let's demonstrate the calculation of FCFF in Year 0:

net income =$20.00×0.20=$4.00
interest =$32.00×0.125=$4.00
interest(1-T) =$4.00×(1-0.40)=$2.40
$WC_{Inv}$ =$20.00×0.075=$1.50
FCFF =$4.00+$2.40+$3.00-$2.00-$1.50=$5.90

**Step 1**

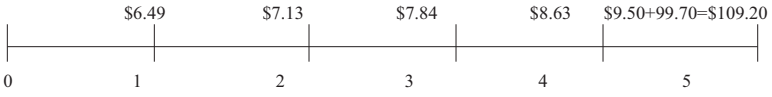



# Example: Two-Stage Model

➢ ***Answer:***

- In Year 1, sales grow by 10% to $22.00 per share. Following five years of 10% growth, the growth of each component falls to 5%.
- The terminal value (as of Year 5, discounted at the stable WACC of 15%) is:
- Terminal value = $\frac{FCFF_6}{WACC - g} = \frac{\$9.97}{0.15 - 0.05} = \$99.70$ **Step 3**
- We can place the cash flows to be evaluated on a time line, such as the one in the following figure, to get a clearer picture of what we need to evaluate.
- FCFF Timeline

**Step 4**




- Notice that WACC in the high-growth stage(17%) is different than the stable stage(15%)

# Example: Two-Stage Model

➢ ***Answer:***

- We calculated terminal value in Year 5 using 15%, but we'll calculate the present value today of the high-growth cash flows and the terminal value at 17%. The total of the firm today is:
- value of firm= $\frac{\$6.49}{1.17^1}+\frac{\$7.13}{1.17^2}+\frac{\$7.84}{1.17^3}+\frac{\$8.63}{1.17^4}+\frac{\$109.20}{1.17^5}=\$70.06$ **Step 5**
- Since, in all likelihood, we would want to use our financial calculators to perform this calculation more quickly and accurately, the appropriate keystrokes are:

$CF_0$ =0; C01=6.49; C02=7.13; C03=7.84; C04=8.63; C05=109.20; I=17; **Step 6**
CPT→NPV=70.06

- Thus, given that the value of the firm's debt is $32 per share, the value of equity per share is $70.06 - $32.00=$38.06




# Free Cash Flow Model Variations

**Three-Stage Model**

- Step 1: Calculate FCF in high-growth and transitional period
- Step 2: Discount each FCF to PV, notice the different discount rate in High-Growth period, Transitional period: $\text{PV of FCFE}_n=\frac{FCFE_n}{(1+\text{Required return}_{high})^n}$
- For example: $\text{PV of FCFE}_t=\frac{FCFE_t}{(1+\text{Required return}_{high})^n\times(1+\text{Required return}_{transitional})^{t-n}}$
- Step 3: Use single-stage FCF model for terminal value at end of transitional period:

$$\text{Terminal value}=\frac{FCFE_{t+1}}{\text{Required rate of return}_{\text{long trem}}-g}$$

- Step 4: Calculate terminal value to PV, using the same method as Step 2
- Step 5: Added all PV together




# Example : Three-Stage FCFE Model

➢ Medina Classic Furniture, Inc. is expected to experience growth in three distinct stages in the future. Its most recent FCFE is 0.90 Canadian dollars (C$) per share. The following information has been compiled:

**High-growth period:**

- Duration =3 years
- FCFE growth rate =30%
- Shareholder's required return= 20%

**Transitional period:**

- Duration = 3 years
- FCFE growth will decline by 9% per year down to indicated stable growth rate
- Shareholder's required return = 15%

**Stable-growth period:**

- FCFE growth rate = 3%
- Shareholder's required return = 10%

Calculate the value of the firm's equity using the three-stage FCFE model.

## Example : Three-Stage FCFE Model

➢ **Answer:**

- The annual FCFE and the associated present value are presented in the table:

FCFE and PV

| High-Growth Period | Year 1 | Year 2 | Year 3 |
|---|---|---|---|
| Growth rate | 30% | 30% | 30% |
| FCFE | C$1.170 | C$1.521 | C$1.977 |
| PV(@ 20%) | C$0.975 | C$1.056 | C$1.144 |

| Transitional Period | Year 4 | Year 5 | Year 6 |
|---|---|---|---|
| Growth rate | 21% | 12% | 3% |
| FCFE | C$2.393 | C$2.680 | C$2.760 |
| PV | C$1.204 | C$1.173 | C$1.050 |




## Example : Three-Stage FCFE Model

- The transitional present values are computed using a combination of the 20% initial discount rate and the transitional 15% rate. For example, the present value of FCFE, is computed as:

$$C\$1.173 = \frac{C\$2.680}{1.20^3 \times 1.15^2}$$

- We can calculate the terminal value of the stock as of Year 6 using the FCFE projected for Year 7. Notice that we use the stage 3 required return of 10%.

$$\text{terminal value} = \frac{\$2.760 \times 1.03}{0.10 - 0.03} = \$40.611$$

- The value of Medina stock is :

$$\text{value per share} = 0.975 + 1.056 + 1.144 + 1.204 + 1.050 + \left(\frac{40.611}{1.20^3 \times 1.15^3}\right) = C\$22.055$$

- The changing discount rates were important here for a couple of reasons. First, the terminal value in Year 6 had to be discounted for three years at 20% and for was not as helpful as it was in other multiple cash flow calculations. It simply cannot handle the changing discount rates in one easy set of calculations.




## Sensitivity Analysis in FCFF and FCFE

➢ Sensitivity analysis shows how sensitivity analyst's valuation results are to changes in each of a model's inputs.

➢ ***Two major sources are:***

- Estimating the future ***Growth rate*** in the FCFF and FCFE.
- The chosen ***base year*** for the FCFF or FCFE growth forecasts.

## Approaches for Calculating the Terminal Value

- Two major valuation approaches:
  - Single-stage
  - Multiple approach

terminal value in year n=(trailing P/E)×(earnings in year n)

terminal value in year n=(leading P/E)×(forecasted earnings in year n+1)




## Summary of Readings and Framework

**SS 10**

- R29 Equity Valuation: Applications and Processes
- R30 Return Concepts

**SS 11**

- R31 The Five Competitive Forces that Shape Strategy
- R32 Your Strategy Needs a Strategy
- R33 Industry and Company Analysis
- R34 Discounted Dividend Valuation

**SS 12**

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- R36 Market-Based Valuation: Price and Enterprise Value Multiples
- R37 Residual Income Valuation
- R38 Private Company Valuation




## Price Multiples

- **Introduction to Price Multiples**
- **P/E**
- **P/B**
- **P/S**
- **P/CF**
- **EV/EBITDA**
- **Dividend Yield**
- **Momentum Valuation Indicators**

## Introduction to Price Multiples

- The method of comparables is perhaps the ***most widely used approach*** for analysts reporting valuation judgments on the basis of price multiples
- The economic rationale for the method of comparables is the ***Law of One Price***.
- A justified price multiple for the stock is the estimated fair value of multiples.
- We can justify a multiple based on the method of ***comparables*** or the method based on ***forecasted fundamentals***
- The justified price multiple is also called the warranted price multiple or the intrinsic price multiple




## P/E

- Advantages & Disadvantages
  - Advantages:
    - ✓ Earning power is the primary determinant of value;
    - ✓ P/E ratio is popular;
    - ✓ P/E differences are related to long-run average stock returns
  - Disadvantage:
    - ✓ Earnings might be negative;
    - ✓ volatile earning;
    - ✓ management discretion distorts
- Justified P/E
  - Leading $P/E_1 = \frac{1-b}{r-g}$
  - Trailing $P/E_0 = \frac{(1-b)(1+g)}{r-g}$




## Normalizing EPS

- Two methods for
  - The method of ***historical average EPS***
    - ✓ Normal EPS is calculated as average EPS over the ***most recent full cycle***
    - ✓ one of several possible statistical approaches to the problem of ***cyclical earnings***
    - ✓ the method does not account for ***changes in the business's size*** however
  - The method of ***average ROE***
    - ✓ Normal EPS is calculated as the average return on equity from the ***most recent full cycle, multiplied by current book value per share***
    - ✓ by using recent book value per share, reflects more accurately the effect on EPS of ***growth or shrinkage in the company's size***
    - ✓ For that reason, the method of average ROE is ***sometimes preferred***

## Example: *Normalizing EPS*

- Using the data in the following figure, calculate normalized earnings using the method of historical average EPS and the method of average return on equity for Magnolia Enterprises.
- Data for Magnolia Enterprises [amounts in Canadian dollars (C$)]

| Year | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|
| EPS | 4.20 | 3.75 | 4.75 | 4.30 |
| BVPS | 26.02 | 27.78 | 29.25 | 32.29 |
| ROE | 14.0% | 12.0% | 16.0% | 14.0% |

- Answer:

$$\text{Normalized earnings (average EPS approach)} = \frac{4.20 + 3.75 + 4.75 + 4.30}{4} = 4.25$$

$$\text{Average ROE} = \frac{0.14 + 0.12 + 0.16 + 0.14}{4} = 0.14 = 14.00\%$$

- Normalized earnings are C$4.25 based on the method of historical average EPS and C$4.52 based on the method average return on equity.

$$\text{Normalized earnings (average ROE approach)} = \text{Average ROE} \times \text{BVPS}_{2009}$$
$$= 0.14 \times 32.29 = 4.52$$




## P/E to growth (PEG) ratio

➢ P/E to growth (PEG) ratio:

$$\text{PEG ratio} = \frac{\text{P/E Ratio}}{g}$$

- One metric that appears to address the impact of earnings ***growth on P/E ratios.***
- Calculated as the stock's P/E divided by the expected earnings growth rate. The ratio in effect calculates a ***stock's P/E per unit of expected growth***.
- Stocks with ***lower PEGs are more attractive*** than stocks with higher PEGs, ***all else equal***.
- The PEG ratio must be used with care for several reasons:
  - ✓ Assumes a linear relationship between P/E ratios and growth. The model for P/E in terms of DDM shows that in theory the relationship is ***not linear***.
  - ✓ Does not factor in ***differences in risk***, a very important component of P/E ratios.
  - ✓ Does not account for ***differences in the duration of growth***.




## P/B

➢ The measure of value in the P/B ratio, book value per share, is a stock or level variable coming from the balance sheet.

➢ Book value per share attempts to represent the investment that common shareholders have made in the company, on a per-share basis.

➢ The ***computation of book value***:

- Common shareholders' equity = (Shareholders' equity) - (the total value of equity claims that are senior to common stock)
- (Common shareholders' equity)/(number of common stock shares outstanding) = book value per share

## P/B

➢***Advantages***:

- BV almost always>0,
- BV more stable than EPS.
- Measures NAV per share, more fit for valuing companies composed chiefly of liquid assets, such as finance institutions.
- Differences in P/Bs may be related to differences in long-run average returns, according to empirical research.

➢***Disadvantages***:

- Size differences cause misleading comparisons.
- Influenced by accounting choices.
- BV≠MV due to inflation/ technology.
- Other assets besides those recognized in accounting may be critical.



## P/B

***Justified P/B***

➢use fundamental forecasts to estimate a stock's justified P/B ratio

**P/B=(ROE-g) / (r-g)**

- The P/B increases as ROE increases.
- It also increases as the spread between ROE and r increases.

➢Common adjustments to the book value include:

- Excluding intangible assets such as ***goodwill***.
- Since the book value forecasts are not widely disseminated like EPS forecasts, analysts typically use ***trailing BV*** when calculating P/Bs.



## P/S

➢***Advantages:***

- Meaningful even for distressed firms.
- Sales revenue not easily manipulated.
- Not as volatile as P/E ratios.
- Useful in valuing mature, cyclical, and start-up firms.
- Differences in P/Ss may be related to differences in long-run average returns.

➢***Disadvantages:***

- High sales do not imply high profits and cash flows.
- Does not capture cost structure differences.
- Revenue recognition practices still distort sales.

## P/S

***Justified P/S***

$$\frac{P_0}{S_0}=\frac{(E_0/S_0)(1-b)(1+g)}{r-g}$$

- E/S is the business's profit margin PM,
- Justified P/S is an increasing function of its profit margin and earning growth rate.




## P/CF

➢ ***Advantages***

- Cash flow less subject to manipulate than EPS.
- More stable than P/E
- Handles the problem of differences in the quality of reported earning
- Empirical evidence supported

➢ ***Disadvantages***

- Difficult to estimate true CFO
- FCFE better but more volatile and more frequently negative.




## P/CF

**Cash flow definition**

➢ ***Earning-plus-noncash-charges***

- CF = net income + depreciation + amortization
- limitation: ignore some items that influence cash flow (such as, noncash revenue and changes in net working capital)

➢ ***Adjusted CFO***

- adjusted CFO = CFO +[(net cash interest outflow) * (1- tax rate)]
- limitation: includes the items related to financing and investing activities

➢ ***FCFE***

- FCFE = CFO – FCInv + net borrowing

➢ ***EBITDA***

- used in enterprise value-to-EBITDA ratio

## EV/EBITDA

- Enterprise value (EV) is total company value, not equity.
- EV = market value of common stock + market value of preferred equity + market value of debt + minority interest – **cash and investments**

➢ ***Advantage***

- Useful for comparing firms with different degrees of financial leverage
- EBITDA is useful for valuing capital-intensive business EB
- EBITDA is usually positive even when EPS is not.

➢ ***Disadvantages***

- If working capital is growing, EBITDA will overstate CFO
- FCFF is more strongly linked with valuation theory than EBITDA



## Dividend Yield

- For practical purposes, dividend yield, D/P is preferred over P/D. (zero dividends are a problem)
- **Trailing dividend yield** is generally calculated as ***four times the most recent quarterly*** per-share dividend divided by the current market price per share. (The most recent quarterly dividend times four is known as the **dividend rate**.)

$$\text{trailing D/P} = \frac{4 \times \text{most recent quaterly dividend}}{\text{market price per share}}$$

- The **leading dividend yield** is calculated as forecasted dividends per share ***over the next year divided*** by the current market price per share.

$$\text{Leading D/P} = \frac{\text{forecasted dividends over next four quarters}}{\text{market price per share}}$$

- The **justified dividend yield** in a Gordon model is:

$$D/P = r\text{-}g \,/\, 1+g$$



## Comparable Method Using Price Multiples

- Basic idea of the method of comparables: to compare a stock's price multiple to the benchmark

  **multiples < benchmark →the stock's value is undervalued**

  **multiples > benchmark →the stock's value is overvalued**

- More importance about the method of comparables:
  - ✓ ***the fundamentals of stock and benchmark both should be the similar***

➢ *Details for each of price multiples*

- P/E ratio (assuming that P/E < benchmark)
  - ✓ stock: undervalued
  - ✓ stock: properly valued, but the stock has a lower expect growth rate than the benchmark → lower P/E

    OR it has higher required rate of return than benchmark → lower P/E
  - ✓ Therefore, to sure that the expected growth, risk and return of stock and those of benchmark are the similar.

## Comparable Method Using Price Multiples

- P/B
  - ✓ most analysts use ***trailing book values*** in calculating P/Bs
  - ✓ relative P/B valuation must consider differences in ROE, risk, and expected growth when to do comparisons among stocks
- P/S
  - ✓ usually, is calculated based on ***trailing sales***
  - ✓ should control for profit margin, expected growth, risk, and the quality of accounting data when to make comparison
- EV / EBITDA (else are equal)
  - ✓ lower ratio than peer firms → undervalued
  - ✓ higher ratio than peer firms → overvalued
- Dividend yield
  - ✓ to identified on the basis of comparable risk and expected growth
  - ✓ ***else are equal relative to peer firms***
    - ◆ Higher ratio → undervalued
    - ◆ Lower ratio → overvalued



## Momentum Valuation Indicators

➢ ***Momentum indicators***

- relate either price or a fundamental such as earnings to the time series of their own past values, or in some cases to the fundamental's expected value.

➢ ***Growth/momentum investment strategies***

- uses positive momentum in various senses as a selection criterion.

➢ ***Unexpected Earnings***

- Unexpected earnings (also called earnings surprise) is the difference between reported earnings and expected earnings

$$\mathbf{UE}_t = \mathbf{EPS}_t - E(\mathbf{EPS}_t)$$

- where $UE_t$ is the unexpected earnings per share for quarter t, $EPS_t$ is the reported earnings per share for quarter t, and $E(EPS_t)$ is the expected earnings per share for the quarter.



## Momentum Valuation Indicators

➢ ***Standardized Unexpected Earnings***

- The same rationale lies behind ***standardized unexpected earnings (SUE)***

$$\mathrm{SUE}_t = \frac{\mathrm{EPS}_t - E(\mathrm{EPS}_t)}{\sigma\left[\mathrm{EPS}_t - E(\mathrm{EPS}_t)\right]}$$

- where the numerator is the unexpected earnings for t and the denominator, σ[EPSt – E(EPSt)], is the standard deviation of past unexpected earnings over some period prior to time t, for example the 20 quarters prior to t as in Latané and Jones (1979), the article that introduced the SUE concept.

## Momentum Valuation Indicators

➢ ***Relative strength (RSTR) indicators***

- Relative strength (RSTR) indicators compare a stock's performance during a period either
  - ✓ to its own past performance
  - ✓ or to the performance of some group of stocks.
- The simplest relative strength indicator of the first type is the ***stock's compound rate of return*** over some specified time, such as six months or one year.
- A simple relative strength indicator of the second type is the stock's performance divided by ***the performance of an equity index***.
  - ✓ This indicator may be scaled to 1.0 at the beginning of the study period.
  - ✓ If the stock goes up quickly (slowly) than the index, then relative strength will be above (below) 1.0



## Central tendency of a group of multiples

➢ *Portfolio or index P/E is best calculated as the* ***weighted harmonic mean P/E***

$$\text{weighted harmonic mean} = \frac{1}{\sum_{i=1}^{n} \frac{W_I}{X_i}}$$

➢ *When there are outliers*

- Harmonic mean put more weights on smaller values, therefore median or weighted harmonic mean with the outliers excluded may be more appropriate measures.



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# Residual Income Valuation

- Concept of Residual Income
- Residual Income Valuation Model
- Accounting Issues
- Single-stage Model
- Multistage Models




# Concept of Residual Income

- Residual income (economic profit): is net income less a charge for common stockholder's opportunity cost of capital.

  RI = net income – equity capital * cost of equity
- EVA (economic value added): measures the value added to shareholders by management during a given year

  EVA = NOPAT – WACC * invested capital

  = EBIT*(1 – t) - $WACC

  Total capital = book value of long-term debt + book value of equity

  = net working capital + net fixed assets
- Market value added (MVA) = market value – total capital




# Concept of Residual Income

- **Example 1**
  - Madeira Fruit Suppliers, Inc. (MFS) distributes fruit to grocery stores in large U.S. cities. The book value of its assets is $1.4 billion, which is financed with $800 million in equity and $600 million in debt. Its before- tax cost of debt is 3.33 percent, and its marginal tax rate is 34 percent. MFS has a cost of equity of 12.3 percent. MFS's abbreviated income statement is shown in Following:

| | |
|---|---|
| **EBIT** | **$142,000,000** |
| **Less: Interest expense** | **(20,000,000)** |
| **Pretax income** | **122,000,000** |
| **Less: Income tax expense** | **(41,480,000)** |
| **Net income** | **$80,520,000** |

  - Determine whether MFS is profitable by calculating residual income and explaining its relationship to reported accounting income.

## Concept of Residual Income

➢**Answer:**

- While the accounting net income of $80,520,000 indicates that MFS is profitable, it remains to be seen whether the firm is profitable after deducting a charge for equity. The dollar-based equity charge is:

equity charge = equity capital × cost of equity= $800 million × 0.123
= $98,400,000

RI is calculated as

| | | |
|---|---|---|
| | Net income | $80,520,000 |
| — | Equity charge | 98,400,000 |
| | Residual income | —$17,880,000 |

- Even though MFS is profitable in the traditional accounting sense, it is economically unprofitable after taking into account the necessary charge to meet stockholders' opportunity cost of supplying capital to the company.



## Concept of Residual Income

➢**Example 2**

- VBM Inc. reports NOPAT of $2,100, a WACC of 14.2%, and invested capital of $18,000. The market price of the firm's stock is $25 per share, and VBM has 800 shares outstanding. The market value of the firm's long-term debt is $4,000. Calculate VBM's economic value added (EVA) and market value added (MVA).

➢**Answer:**

- First calculate EVA:

**$WACC = 0.142x$18,000 = $2,556**

**EVA = $2,100-$2,556 = -$456**

- The market value of the company is the market value of the equity plus the market value of the debt:

**MV of company = ($25x800)+$4,000 = $24,000**

**The firm's MVA is: MVA = $24,000-$18,000 = $6,000**



## Calculation of Residual Income

$$RI_t = EPS_t - r_e \times B_{t-1} = (ROE - r_e) \times B_{t-1}$$

$B_{t-1}$ → $E_t$ → $D_t = E_t(1-b)$ → $B_t = B_{t-1} + E_t - D_t$ → $B_t$ → $E_{t+1}$ → $D_{t+1}$ → $B_{t+1}$

$r_e \times B_{t-1}$ → $RI_t = E_t - r_e \times B_{t-1}$

$r_e \times B_t$ → $RI_{t+1} = E_{t+1} - r_e \times B_t$

**Clean surplus relation**: ending BV = beginning BV + earnings - dividend

## Residual Income Valuation Model

- ***Residual income model*** **of valuation breaks the intrinsic value of equity into two components:**
  - Adjusted ***current book value of equity***
  - ***Present value of expected future RI***
- **Under the *residual income model*, the intrinsic value of the stock can be expressed as:**

$$V_0 = B_0 + (RI_1/(1+r) + RI_2/(1+r)^2 + RI_3/(1+r)^3 \ldots)$$

  - RI model is relatively less sensitive to terminal value estimates than dividend discount and free cash flow models. This is because intrinsic values estimated with residual income models include the firm's current book value, which usually represents a substantial percentage of the estimated intrinsic value



## Residual Income Valuation Model

- **Difference with DDM & FCFE**
  - The assumptions are difference
  - Residual income model starts with a ***book value*** and ***adds to this the PV of the expected stream of residual income***
  - However, DDM & FCFE measure value by ***discounting a stream of expected cash flows***



## Relationship with justified P/B

- **Relationship with justified P/B**
  - residual income models can be used to estimate justified price multiples
  - mostly closely to P/B, due to justified P/B directly links with expected future residual income

$$V_0 = B_0 + \frac{(ROE - r_e)}{r_e - g} \times B_0 \Rightarrow \frac{P_0}{B_0} = 1 + \frac{ROE - r_e}{r_e - g}$$

$$\begin{cases} ROE > r_e \Rightarrow P_0 > B_0 \Rightarrow P/B > 1 \\ ROE < r_e \Rightarrow P_0 < B_0 \Rightarrow P/B < 1 \\ ROE = r_e \Rightarrow P_0 = B_0 \Rightarrow P/B = 1 \end{cases}$$

## Single-Stage Residual Income Valuation Model

- **Single-Stage Valuation**

$$V_0 = B_0 + [(ROE - r) * B_0]/(r - g)$$

  - If return on equity = the required return on equity, the justified market value of a share of stock is equal to its book value
  - The single-stage model assumes ***constant ROE and constant earnings growth***, which implies that residual income will ***persist indefinitely***.
  - ***[(ROE – r) * B0]/(r – g)*** is the additional value generated by the firm's ability to produce returns in excess of the cost of equity and, consequently, is the ***present value of a firm's expected economic profits.***
- ***Residual income implied growth rate***

$$g = r - [\frac{B_0 \times (ROE - r)}{V_0 - B_0}]$$

  - ***Assumption: intrinsic value = market price***



## Continuing residual income

- ***Continuing residual income***
  - Problem about the forecasting residual income: difficult to calculate PV of residual income and implement the residual income model
  - Solution
    - ✓simply use DDM or FCFE
    - ✓forecast over the short term, like 5 years, then follow the pattern of RI growth
  - Continuing residual income is …
    - ✓the residual income expected over the long term



## Multistage Residual Income Model

- **Assumptions** (***One of the four***)
  - ✓residual income is expected to ***persist at its current level forever***
  - ✓residual income is expected to ***drop immediately to zero***
  - ✓residual income is expected to decline to a ***long-run average level consistent with mature industry***
  - ✓residual income is expected to decline over time as ***ROE falls to the cost of equity***

# Multistage Residual Income Model

- Justify an estimate of continuing residual income
  - ✓ reason: economic profits reduction to the point at which firms begin to leave the industry and ROE stabilizes at a long term normal level by the industry competition
- ***Persistent factors***
  - ✓ Higher persistent factors
    - ◆**Associated with low dividend payouts**
    - ◆historically **high residual income** persistence in the industry
  - ✓ Lower persistent factors
    - ◆**high return on equity**
    - ◆significant levels of **nonrecurring items**
    - ◆**high accounting accruals**



# Multistage Residual Income Model

- In the residual income model, intrinsic value is the sum of three components:

**intrinsic value = book value + (PV of interim high-growth residual income) + (PV of continuing residual income)**

- **Step 1**: Calculate the current book value per share.
- **Step 2**: Calculate residual income in each year 1 to T-1 during the interim high-growth period and discount them back to today at the required return on equity.
- **Step 3**: Calculate continuing residual income that ***begins at the end of the high-growth period starting in year T***, and then calculate the present value of continuing residual income as of the end of year T-1 using the following formula (Four Assumptions):

$$\text{PV of continuing residual income in year T -1} = RI_T/(1 + r - \omega)$$

Where $\omega$ = persistence factor, $0 \le \omega \le 1$



# Multistage Residual Income Model

***Assumptions***

- Residual income persists at the current level forever

$$\text{PV of continuing residual income in year T-1} = RI_T/r$$

- Residual income drops immediately to zero

$$\text{PV of continuing residual income in year T-1} = RI_T/(1+r)$$

- Residual income declines to long-run level in mature industry after year t:

$$\text{PV of continuing residual income in year T-1} = [(P_T - B_T) + RI_T]/(1+r)$$

- Residual income declines over time after year T as ROE falls to the cost of equity capital, then the persistence factor, ω, is between zero and one:

$$\text{PV of continuing residual income in year T -1} = RI_T/(1 + r - \omega)$$

## Example: Multistage Residual Income Model (1)

➢**Example:**

- Java Metals is expecting an ROE of 15 percent over each of the next five years. Its current book value is $5.00 per share, it pays no dividends, and all earnings are reinvested. The required return on equity is 10 percent. Forecasted earnings in years one through five are equal to ROE times beginning book value. Calculate the intrinsic value of the company using a residual income model, assuming after five years that continuing residual income falls to zero.




## Example: Multistage Residual Income Model (1)

➢ **Answer:**

- The following table provides an estimate of the present value of residual income. Java Metals Residual Income Forecast

| *Year* | $E_t$ | *Ending Book Value (Bt-1)* | *ROE* | *Equity Charge (r x Bt-1)* | *Residual Income [E- (r x Bt-1)]* |
|---|---|---|---|---|---|
| ***0*** | | *$5.00* | | | |
| **1** | $0.75 | 5.75 | 0.15 | $0.50 | $0.25 |
| **2** | 0.86 | 6.61 | 0.15 | 0.57 | 0.29 |
| **3** | 0.99 | 7.60 | 0.15 | 0.66 | 0.33 |
| **4** | 1.14 | 8.74 | 0.15 | 0.76 | 0.38 |
| **5** | 1.31 | 10.05 | 0.15 | 0.87 | 0.44 |




## Example: Multistage Residual Income Model (1)

- Under the assumption that residual income after five years is zero (i.e., w = 0), the terminal value (the present value of continuing residual income) at the end of Year 4 is $0.44/1.10 = $0.40. Intrinsic value today is:

$$5.00+[\frac{\$0.25}{1.10}+\frac{\$0.29}{1.10^2}+\frac{\$0.33}{1.10^3}+\frac{\$0.38+\$0.40}{1.10^4}]=\$6.25$$

- Remember, you can also use your calculator to solve for the answer: CFO = 5, CO1 = 0.25, CO2 = 0.29, CO3 = 0.33, CO4 = 0.38 + 0.40 = 0.78, I = 10, CPT -> NPV = $6.25.

# Example: Multistage Residual Income Model (2)

- **Example:**
  - Suppose we change our assumption regarding Java's residual income after five years to assume instead that it remains constant at $0.44 forever. Calculate the new intrinsic value of Java.
- **Answer:**
  - The intrinsic value of Java is higher than the first case because we assume the residual income persists at the same level forever, so $RI_5 = RI_6 = \ldots = \$0.44$, and $\omega = 1$
  - The $0.44 perpetuity beginning in Year 5 is worth $4.40 ($0.44/0.10) in Year 4. The intrinsic value is:

$$V_0 = \$5.00 + [\frac{\$0.25}{1.10} + \frac{\$0.29}{1.10^2} + \frac{\$0.33}{1.10^3} + \frac{\$0.38 + \$4.40}{1.10^4}] = \$8.98$$




# Example: Multistage Residual Income Model (3)

- **Example:**
  - Now let's make the more realistic assumption that after year five Java's residual income will decay over time to zero with a persistence factor of 0.4. Calculate the new intrinsic value of Java.
- **Answer:**
  - Residual income begins to decline after Year 5, so the terminal value in Year 4 includes the present value of Year 5 residual income.
  - terminal value in year 4 = $\frac{\$0.44}{1 + 0.10 - 0.40} = \$0.63$
  - The intrinsic value today is book value plus the present value of years 1 through 4 residual income plus the present value of the terminal value in Year 4.

$$V_0 = \$5.00 + [\frac{\$0.25}{1.10} + \frac{\$0.29}{1.10^2} + \frac{\$0.33}{1.10^3} + \frac{\$0.38 + \$0.63}{1.10^4}] = \$6.40$$

  - more conservative assumption of a lower persistence factor reduces the intrinsic value of the stock.




# Example: Multistage Residual Income Model (4)

- **Example:**
  - Suppose instead that a the end of year five we assume that Java's ROE falls to a long-run average level and the price-to-book ratio falls to 1.2. Calculate Java's intrinsic value.
- **Answer:**
  - The book value per share at the end of Year 5 is $10.05, which means the market price is expected to be $10.05 x 1.2 = $12.06. The present value of continuing residual income is:
  - PV of continuing residual income in year 4 = $\frac{(\$12.06 - \$10.05) + \$0.44}{1.10} = \frac{\$2.45}{1.10} = \$2.23$
  - Then intrinsic value is:

$$V_0 = \$5.00 + [\frac{\$0.25}{1.10} + \frac{\$0.29}{1.10^2} + \frac{\$0.33}{1.10^3} + \frac{\$0.38 + \$2.23}{1.10^4}] = \$7.50$$

## Residual Income Valuation Model

- **Strengths**
  - terminal value does ***not dominate*** the intrinsic estimate;
  - ***accounting data***, which is easy to find;
  - applicable to firms that ***do not pay dividends*** or ***do not have positive expected free cash flows*** in the short run or have volatile cash flows;
  - Applicable even when ***cash flows are volatile***;
  - focus on ***economic profitability*** rather than just on accounting profitability.
- **Weaknesses**
  - rely on ***accounting data*** that can be ***manipulated*** by management;
  - reliance on ***accounting data requires*** numerous and significant adjustments;
  - assume that the ***clean surplus relation*** holds or that its failure to hold has been properly taken into account.(i.e., ending BV = beginning BV + earnings - dividend)



## Residual Income Valuation Model

- **Appropriate for:**
  - ***Not pay dividends***, or the stream of ***payments is too volatile*** to be sufficiently predictable;
  - ***Free cash flows are negative*** for the foreseeable future;
  - ***Terminal value*** forecast is ***highly uncertain***;
- **Not appropriate**
  - ***Clean surplus accounting relation is violated*** significantly;
  - ***Significant uncertainty*** concerning the estimates of ***book value*** and ***return on equity***.



## Clean Surplus Violations

- **The clean surplus relationship**
  - The clean surplus relationship can be expressed as:

$$B_t = B_{t-1} + E_t - D_t$$

  - The clean surplus relationship ***may not hold*** when ***items are charged directly to shareholders' equity*** and do not go through the income statement. Items that can bypass the income statement include:
    - ✓***Foreign currency translation gains and losses*** that flow directly to retained earnings under the all-current method;
    - ✓The minimum liability adjustment in ***pension accounting;***
    - ✓***Changes in the market*** value of debt and equity securities classified as ***available-for-sale.***
  - If the clean surplus relation doesn't hold, the ***ROE forecast will not be accurate.***

## Variations form Fair Value

- The accrual method of accounting causes many valance sheet items to be reported at book values that are significantly different than their market values, which include the following:
  - ***Operating leases***: should be capitalized by increasing assets and liabilities;
  - ***Special purpose entities (SPEs)***: assets and liabilities are not reflected;
  - ***Reserves and allowances***: should be adjusted.
  - ***Inventory for companies:*** that use LIFO should be adjusted to FIFO;
  - ***Pension asset or liability:*** should be adjusted to reflect the funded status;
  - ***Deferred tax liabilities:*** should be eliminated and reported as equity if the liability is not expected to reverse.
- *Intangible asset* **effects on book value: goodwill and productivity R&D should include;**
- *Nonrecurring Items and Other Aggressive Accounting Practices* **should be adjusted;**
- *International Accounting Differences* **should be considered.**



## Summary of Readings and Framework

**SS 10**

- R29 Equity Valuation: Applications and Processes
- R30 Return Concepts

**SS 11**

- R31 The Five Competitive Forces that Shape Strategy
- R32 Your Strategy Needs a Strategy
- R33 Industry and Company Analysis
- R34 Discounted Dividend Valuation

**SS 12**

- R35 Free Cash Flow Valuation
- R36 Market-Based Valuation: Price and Enterprise Value Multiples
- R37 Residual Income Valuation
- R38 Private Company Valuation



## Public & Private Company Valuation

**Company-specific factors**

- ***Stage of life-cycle***: typically ***less mature*** than public firms;
- ***Size***: less capital, fewer assets, and fewer employees than public firms, can be riskier;
- ***Quality and depth of management***: not be able to attract as many qualified applicants;
- ***Management/shareholder overlap***: management has a substantial ownership position;
- ***Long-term investor***: managers are ***long-term holders*** of significant equity interests;
- ***Quality of financial and other information***: less information;
- ***Taxes***: more concerned with taxes.

**Stock-specific factors**

- ***Liquidity***: less liquid;
- ***Restrictions on Marketability***: prevent shareholders from selling;
- ***Concentration of control***: high control concentration in the hands of a few shareholders.

## Reasons for Valuation

- ***Transaction-related valuation:*** ***<u>selling or financing a firm</u>***
  - *VC financing*: for capital investment;
  - *IPO*: public sale of the firm's equity;
  - *Sale in an acquisition*: development-stage or mature private firms be sold;
  - *Bankruptcy proceedings*: firms in bankruptcy;
  - *Performance-based managerial compensation*: firm compensates employees.
- ***Compliance-related valuation:*** ***<u>legal & regulatory reasons</u>***
  - *Financial reporting*
  - *Tax purposes*
- ***Litigation-related valuation:*** ***<u>shareholder suits, damage claims, lost profits claims, or divorce settlements.</u>***



## 6 kinds of values

- **6 kinds of values**
  - ***Fair market value***: used for tax purpose in the USA, characterized by: 1) hypothetical willing and able seller sells the asset or a willing and able buyer; 2) arm's length transaction in free market; 3) well-informed buyer and seller.
  - ***Fair value for financial reporting***: used in financial reporting, characterized by: 1) arm's length transaction; 3) well-informed buyer and seller.
  - ***Fair value for litigation***: in the jurisdiction of the litigation.
  - ***Market value***
  - ***Investment value***: the value to a particular buyer
  - ***Intrinsic value***
- ***Value definition*** **will have the effect on the estimated value**



## Private Company Valuation Methods

- **3 methods for private company valuation**
  - ***Income approach***: value a firm as the present value of its ***expected future income***.
  - ***Market approach***: value a firm using the price multiples based on recent sales of comparable assets.
  - ***Asset-based approach***: values a firm's assets minus its liabilities.
- **3 issues of the financial statement adjustments**
  - Normalized earnings
  - Strategic and nonstrategic buyers
  - Estimating cash flows

## Normalized Earnings

- **Normalized earnings**
  - Exclude nonrecurring and unusual items;
  - In the case of private firms with a concentrated control, there may be discretionary or tax-motivated expenses that need to be adjusted when calculating normalized earnings.
  - Real estate owned by the firm may merit treatment separate from that firm operations.



## Example: Normalized Earnings

- **Tim Groh is the principal shareholder, CEO, and founder of Arbutus Generators. Arbutus reports the following:**
  - Groh's compensation of $2,500,000 is included in the firm's selling, general, and administrative (SG&A) expenses.
  - Arbutus leases a warehouse for $100,000 a year from one of its largest suppliers.
  - Arbutus owns a vacant office building with reported SG&A expenses of $150,000 and $25,000 of depreciation expense.
  - Arbutus's capital structure has too little leverage.
  - An analyst determines that a market-based compensation figure for Groh's position is $1,000,000 and that the office building is not needed for core operations. The market lease rate of the warehouse is $130,000.
  - Based on 1-4 above, what adjustments should the analyst make to Arbutus's reported income to estimate normalized earnings (earnings), assuming the firm will be acquired?



## Example: Normalized Earnings

- **Answer:**
  - Because the market rate is $1,500,000 less, SG&A expenses should be reduced by $1,500,000 to reflect a normalized compensation expense.
  - Because the market lease rate is $30,000 higher than reported, SG&A expenses should be increased by $30,000 to reflect a normalized lease rate.
  - Because the office building is non-core, SG&A expenses should be reduced by $150,000, and depreciation expense should be reduced by $25,000.
  - Because the capital structure is non-optimal, the analyst will drop interest expense from the calculation of operating income under the assumption that the capital structure will be changed if the firm is acquired. As we will see, interest expense is added back when calculating free cash flow to the firm.

## Strategic and Nonstrategic Buyers

- Strategic transaction, valuation of the firm is based in part on the perceived synergies with the acquirer's other assets.
- A financial transaction (nonstrategic) transaction assumes no synergies, as when one firm buys another in a dissimilar industry.
- When estimating ***normalized earnings*** for a strategic transaction, the analyst should incorporate any synergies as an increase in revenues or as a reduction in costs.



## Example: Strategic and Nonstrategic Buyers

- Example:
  - An analyst is valuing a firm for two different buyers. Buyer A is a firm, in the same industry as the target firm, which expects to reduce costs at the target firm by eliminating redundancies. Buyer B is a firm in another industry.
  - Calculate the normalized EBITDA for each buyer given the information below.

| | |
|---|---|
| Reported EBITDA | $4,800,000 |
| Current executive compensation | $900,000 |
| Market-based executive compensation | $600,000 |
| Current SG&A expenses | $8,000,000 |
| SG&A expenses after synergistic savings | $7,600,000 |

- **Answer:**
  - Both strategic (Buyer A) and nonstrategic (Buyer B) buyers will attempt to reduce executive compensation to market levels. So the adjustment for both buyers to generate normalized EBITDA is $4,800,000 + ($900,000 — $600,000) = $5,100,000.
  - However, only Buyer A will be able to realize synergistic savings of $400,000 ($8,000,000 — $7,600,000). So normalized EBITDA for Buyer A is $5,500,000 and for Buyer B it is $5,100,000.



## Estimating Cash Flow

- **Estimating Cash Flow**
  - The valuation of equity depends on the definition of value used. Also, ***controlling and no controlling*** equity interests will have quite different values. These differences should be accounted for in cash flow estimates and assumptions.
  - When there is significant uncertainty about a private company's future operations, the analyst should ***examine several scenarios*** when estimating future cash flows.
  - ***Weighted average*** of these values is used to estimate firm value, weighted average scenario cash flow may be discounted using a ***single discount rate*** to arrive at an estimate of firm value.
  - The analyst should be ***aware of the potential bias*** in management estimates.
  - ***FCFF*** is usually more appropriate when the significant changes in the firm's capital structure.

# Income Approach

➢ ***The free cash flow method***

- 2-stage model

➢ ***The capitalized cash flow method***

- single-stage model: a single measure of economic benefit is divided by a capitalization rate to arrive at firm value, where the capitalization rate is required rate of return minus a growth rate.

$$Value\ of\ \ firm = \frac{FCFF_1}{WACC - g}$$

$$Value\ of\ equity = Value\ of\ \ firm - MV_D$$

$$Value\ of\ equity = \frac{FCFE_1}{r - g}$$




# Example: The Capitalized Cash Flow Method

➢ **Example:**

- Given the following figures, calculate the value of the firm and equity using the CCM.

| | |
|---|---|
| FCFF in one year | $12,100,000 |
| Growth rate of FCFF | 4.0% |
| WACC | 15.0% |
| Market value of debt | $4,000,000 |

➢ **Answer:**

- Step 1: Calculate the value of the firm.
  Using the FCFF formula:
  value of firm = ($12,100,000) / (0.15 - 0.04) = $110,000,000
- Step 2: Calculate the value of the equity.
  Subtract the debt value from firm value:
  value of equity = $110,000,000 - $4,000,000 = $106,000,000

Note that the capitalization rate in this example is 11% (15% - 4%). The WACC will be greater when more (relatively expensive) equity and less debt are used, resulting in lower estimates of firm and equity values.




# Income Approach

➢ ***Residual income* or *The excess earnings method***

- EE = firm earnings – the earnings required to provide the required rate of return on working capital and fixed asset

➢ **4 steps of EEM**

- Step 1 Calculate the required return for working capital and fixed assets
- Step 2 Calculate the excess earnings
- Step 3 Value the intangible assets
- Step 4 Sum the asset values to arrive at the total firm value

## Example: EEM

- **Example:**
  - Given the following figures, calculate the value of the firm using the EEM.

| | |
|---|---|
| Working capital | $300,000 |
| Fixed assets | $1,000,000 |
| Normalized earnings (year just ended) | $130,000 |
| Required return for working capital | 6% |
| Required return for fixed assets | 10% |
| Growth rate of residual income | 5% |
| Discount rate for intangible assets | 14% |

- **Answer:**
  - Step 1: Calculate the required return for working capital and fixed assets.

Based on the required rates of return for working capital and fixed assets, the required earnings are:

working capital: $300,000 x 6% = $18,000

fixed assets: $1,000,000 x 10% = $100,000



## Example: EEM

- Step 2: Calculate the excess earnings.

excess earnings = $130,000 - $18,000 - $100,000 = $12,000

- Step 3: Value the intangible assets.

Using the formula for a growing perpetuity, the discount rate for intangible assets, and the growth rate for excess earnings:

value of intangible assets = ($12,000 x 1.05) / (0.14 - 0.05) = $140,000

- Step 4: Sum the asset values to arrive at the total firm value.

Firm value = $300,000 + $1,000,000 + $140,000 = $1,440,000

- ***Professor's Note***: In the excess earnings method, the FCFF may be given in place of the normalized earnings. The growth rate in free cash flow may be given in place of the growth rate of residual income. After these substitutions, the calculations are identical to those above.



## Estimating The Discount Rate For Private Companies

- ***Estimating the discount rate***
  - ***Size premium***
    - ✓ Size premiums are often added to the discount rates for small private companies.
  - ***Availability and cost of debt***
    - ✓ A private firm may have less access to debt financing than a public firm.
  - ***Acquirer versus target***
    - ✓ When acquiring a private firm, some acquirers will incorrectly use their own (lower) cost of capital, rather than the higher rate appropriate for the target.
  - ***Projection risk***
    - ✓ Because of the lower availability of information from private firms and managers
  - ***Lifecycle stage***
    - ✓ It is particularly difficult to estimate the discount rate for firms in an early stage of development.

# Estimating The Discount Rate For Private Companies

➢ ***3 models to estimate the discount rate***

- ***CAPM***
  - ✓ Beta is estimated from public firm data, and this may ***not be appropriate*** for private firms that have little chance of going public or being acquired by a public firm.
- ***Expanded CAPM***
  - ✓ This version of the CAPM includes additional premiums for size and firm-specific (unsystematic) risk.
- ***Build-up method***
  - ✓ When it is not possible to find comparable public firms for beta estimation, the build-up method can be used. Beginning with the expected return on the market (beta is implicitly assumed to be one), premiums are added for small size, industry factors, and company specific factors.



# Market Approach Methods

➢ **Using *price multiples* and *data* from *previous public and private transaction***

- Guideline Public Company Method (***GPCM***)
- Guideline Transactions Method (***GTM***)
- Prior Transaction Method (***PTM***)
- Private forms may have risks not common to public firms, such ***as greater company risk and illiquidity***. Therefore, it is ***important that the public comparables be chosen carefully***.

➢ **Market Multiples**

- Large size: ***EBIT/EBITDA multiples***
- Small size: ***net income multiples***



# Guideline Public Company Method (GPCM)

➢ **GPCM:**

- Using ***price multiples from trade data for public companies***, with ***adjustments to the multiples*** to account for differences between the subject firm and the comparables.

➢ **To estimate a *control premium***

- ***Transaction type***: A ***financial transaction*** typically has a ***smaller price premium***.
- ***Industry conditions***: there is a ***flurry in industry acquisition activity***, driving up acquisition prices, share prices of public companies may already reflect some premium for control.
- ***Type of consideration***: estimates of the control premium when ***acquisitions are made with shares*** that ***are at higher temporary or "bubble" values*** will be overstated.
- ***Reasonableness***: the use of control premiums and price multiples ***can quickly result in significant differences*** in valuations from historical pricing.

# Example: Guideline Public Company Method (GPCM)

- An analyst, Natalie Hoskins, is valuing a private firm, Rensselaer Components, using the GPCM and MVIC to EBITDA multiples. Hoskins has gathered data for comparable public firms; however they are larger in size than Rensselaer. Hoskins decided to deflate the average public company multiple by 20% to account for the higher risk of Rensselaer.
- A premium of 30% was paid for a firm by an acquiring firm in the same industry. The acquirer exchanged stock for the target.
- Other data are as follows:

| | |
|---|---|
| Market value of debt | $1,100,000 |
| Normalized EB1TDA | $12,800,000 |
| Average MVIC/EBITDA multiple | 8.0 |

1. Comment on the relevance of the information above for the valuation of Rensselaer.
2. Calculate the equity value of Rensselaer using the GPCM.




# Example: Guideline Public Company Method (GPCM)

➢ ***Answer to question 1:***

- The application of control premiums is difficult and requires subjective judgment. The control premium of 30% is probably not relevant for the valuation of Rensselaer. The premium for the prior acquisition likely contained some value for synergies since it was a strategic transaction, and because stock was used for the purchase, there is also the possibility that the stock value at the time was inflated, adding to the estimated premium.
- The adjustment to the public company multiple of 20% is appropriate because growth and risk may differ between public comparables and private firms.




# Example: Guideline Public Company Method (GPCM)

➢ ***Answer to question 2:***

- The adjustment to the MVIC/EBITDA multiple for the higher risk of Rensselaer is:

$$8.0 \times (1 - 0.20) = 6.4$$

- No control premium is applied.
- The adjusted multiple is applied against the normalized EBITDA:

$$6.4 \times \$12,800,000 = \$81,920,000$$

- Subtracting out the debt results in the equity value:

$$\$81,920,000 - \$1,100,000 = \$80,820,000$$

## Guideline Transactions Method

➢**GTM:**

- Prior acquisition values for entire (***public and private***) companies that already reflect any control premiums are used, so ***no additional adjustment for a controlling interest*** is necessary.
- When using multiples from historical transactions, several issues should be considered:
  - ✓ ***Transaction type***: If the subject transaction is nonstrategic, the analyst may need to adjust the historical multiple.
  - ✓ ***Contingent consideration***: transactions with contingent consideration should be scrutinized before they are compared to transactions without such contingencies.
  - ✓ ***Type of consideration***: some transactions are for stock rather than cash, comparing transactions of different consideration type may not be relevant.



## Prior Transaction Method

- ✓ ***Availability of data***: the historical data for comparables that are relevant and accurate may be limited.
- ✓ ***Date of data***: data from very long ago, the prices and estimated premiums may not be relevant.

➢**PTM:**

- Using transactions data from the stock of the actual subject company.
- PTM is most appropriate when valuing minority (non-controlling) interests.



## Asset-based Approach

➢**ABA:**

- It estimates the value of firm equity as the firm value of its assets minus the fair value of its liabilities. It is generally ***not used for going concerns***.
- The asset-based approach generally results in the ***lowest valuation*** because the use of a firm's assets in combination usually results in greater value creation than each of its parts individually.
- Appropriate in the following circumstances:
  - ✓Firms with minimal profits and little hope for better prospects.
  - ✓Finance firms, with asset and liability based on the market price and factors
  - ✓Investment companies such as REITs and CEICs
  - ✓Small companies or early stage companies
  - ✓Natural resource firms

## Discount / Premium in Private Company Valuation

➢Adjustments are required when the liquidity or control position of an acquisition differs from that of the comparable companies. We would need to apply discounts for both a ***lack of control*** and a ***lack of marketability*** (liquidity).

➢***Discount of lack of control***

$$DLOC = 1 - [\frac{1}{1 + control\ premium}]$$

| Scenario | Comparable data | Subject Valuation | Adjustment |
|---|---|---|---|
| 1 | Controlling Interest | Controlling Interest | None |
| 2 | Controlling Interest | Noncontrolling Interest | DLOC |
| 3 | Noncontrolling Interest | Controlling Interest | Control Premium |
| 4 | Noncontrolling Interest | Noncontrolling Interest | None |



## Discount / Premium in Private Company Valuation

➢***Discount of lack of marketability***

- Method 1: using price of restricted shares
- Method 2: the price of pre-IPO shares is compared to that of post-IPO shares
- Method 3: estimate DLOM as the price of a put option divided by the stock price, where the put is at the money.

➢***Total Discount***

$$Total\ discount = 1 - [(1 - DLOC)(1 - DLOM)]$$



## Example: Discount / Premium

- An analyst determines that a control premium of 18% is included in the acquisition prices of the comparable firms used for valuing a minority interest in a private company. If she also determines that a discount for lack of marketability of 22% is appropriate for the private company interest, what is the total adjustment she will make to the value of the comparables when valuing the private company interest?
- A. 33.9%.
- ***B. 36.0%.***
- C. 40.6%.

## Valuation Standards

➢**Number of valuation standards have been developed, include:**

- Uniform Standards of Professional Appraisal Practice (USPAP);
- International Valuation Standards;
- Statement of Standards on Valuation Services (SSVS)

➢**There are many challenges involved with the implementation of appraisal standards:**

- most buyers are still unaware of them.
- Most valuation reports are private.
- It is necessarily limited due to the heterogeneity of valuations.
- Valuation will depend on the definition of value used.



## It's not the end but just beginning.

Always believe that good things are possible, and remember that mistakes can be lessons that lead to discoveries. Take your fear and transform it into trust; learn to rise above anxiety and doubt. Turn your "worry hours" into "productive hours". Take the energy that you have wasted and direct it toward every worthwhile effort that you can be involved in. You will see beautiful things happen when you allow yourself to experience the joys of life. You will find happiness when you adopt positive thinking into your daily routine and make it an important part of your world.

请坚信，美好的降临并非不可能，失误也许是成功的前奏。将惶恐化作信任，学会超越担忧和疑虑。让“诚惶诚恐”的时光变得“富有成效”。不要挥霍浪费精力，将它投到有意义的事情中去。当你下意识品尝生命的欢愉时，美好就会出现。当你积极地看待生活，并以此作为你的日常准则时，你就会找到快乐的真谛。